2.2 Transportation/Traffic

The following summary of transportation and circulation impacts is based upon the *Traffic Impact Analysis (TIA) Harmony Grove Village South*, prepared by Linscott, Law & Greenspan Engineers (LLG 2017, as augmented), which was prepared in conformance with the County's Report Format & Content Requirements: Transportation and Traffic (2011). Since the Proposed Project has the potential to impact road segments and intersections within the County and the City of Escondido, the TIA methodology and significance thresholds utilized each jurisdiction's requirements, as discussed further in Section 2.2.2. The TIA can be found in its entirety in Appendix D, along with all supporting tables, figures and traffic modeling results.

2.2.1 Existing Conditions

2.2.1.1 *Existing Roadway Characteristics*

The study area was based on the criteria identified in the County's Report Format & Content Requirements: Transportation & Traffic (2011c) addressing Project direct trips. According to the criteria, "the scope of the full direct and cumulative traffic assessment shall include those roads and intersections that will receive 25 peak hour trips." This ensures that the overall study area incorporates locations which would receive 25 Project trips, regardless of actual cumulative projects volumes (thereby ensuring that a small percentage of Project direct trips does not eliminate a road segment or intersection from consideration). The peak hour represents the highest number of trips at any one time on area roads and is directly related to daily work and commute schedules, including schools (especially in the a.m. peak hour). In addition, the County criteria state that a full traffic impact study should include all regional arterials (including all State surface routes), intersections, and mainline freeway locations where the proposed project will add 50 or more peak hour trips to the existing roadway traffic.

Based on these criteria, the Project study area evaluated in the TIA captures 14 street segments, 2 freeway segments, and 19 intersections, including future roadways and intersections, within the County and Escondido. Figure 2.2-1, *Existing Conditions*, shows the existing roadway network and those intersections that were included in the TIA. A brief description of the existing Project area roadways is below, and a description of future roadways and intersections currently under construction or planned for construction are described under Harmony Grove Village Network Conditions. Roadway widths in this description are approximate.

Auto Park Way is classified as a Six-Lane Super Major Road in the City of Escondido *General Plan Mobility Element,* with a buildout level of service (LOS) E capacity of 50,000 average daily trips (ADT). From Mission Road to Meyer Avenue, Auto Park Way is currently constructed as a six-lane divided roadway. From Meyer Avenue to Country Club Drive, it is currently built as a four-lane divided roadway with a carrying capacity of 37,000. Therefore, the average carrying capacity between a six-lane and four-lane roadway of 43,500 ADT was used in the existing and near-term analysis. Bicycle lanes and sidewalks are provided on both sides of the roadway. Curbside parking is not allowed and the posted speed limit is 40 mph.

Citracado Parkway is classified as a Four-Lane Major Road in the City of Escondido *General Plan Mobility Element,* with a buildout LOS E capacity of 37,000 ADT. From Avenida Del Diablo

to West Valley Parkway, Citracado Parkway is currently built as a two-lane roadway including a wide, landscaped median with an existing LOS E capacity of 10,000 ADT. The posted speed limit is 40 mph. There are no bike lanes or bus stops on this portion of the roadway. Additional information on improvements to Citracado Parkway recently completed by the HGV project is provided under Harmony Grove Village Network Conditions.

West Valley Parkway is classified as a Four-Lane Major Road from Citracado Parkway to Auto Park Way in the City of Escondido *General Plan Mobility Element,* with an LOS E capacity of 37,000 ADT, and as a Six-Lane Major Road from Auto Park Way to the I-15 Ramps with an LOS E capacity of 50,000. Between 11th Avenue and Auto Park Way, West Valley Parkway is currently built as a four-lane divided roadway with a raised landscaped median, curb, gutter and sidewalks with an existing LOS E capacity of 37,000 ADT. Bike lanes are provided intermittently along both sides of the roadway and parking is not permitted. The posted speed limit is between 45-50 mph. From Auto Park Way to the I-15 Southbound Ramps, West Valley Parkway is built as an eight-lane divided roadway with an existing LOS E capacity of 70,000 ADT, exceeding its *Mobility Element* classification. The existing eight-lane capacity was used in all analysis scenarios.

9th Avenue is classified as a Four-Lane Collector in the City of Escondido *General Plan Circulation Element,* with an LOS E capacity of 34,200 ADT. From Valley Parkway to Auto Park Way, 9th Avenue is currently built as a 60-foot wide two-lane roadway with a continuous two-way left-turn lane. Therefore, a carrying capacity of 15,000 ADT was used in the existing and near-term analysis. The posted speed limit is 35 mph. Curbside parking is permitted and there are no bike lanes or bus stops.

Country Club Drive is classified as a Two-Lane Local Collector in the City of Escondido *General Plan Mobility Element* from Auto Park Way to Hill Valley Drive. The roadway segment has a LOS E capacity of 10,000 ADT and is currently built as a two-lane undivided roadway. Starting at the industrial development approximately 0.25 mile west of Auto Park Way, frontage improvements have been completed to widen the southbound lane and to provide a sidewalk on the west side of the roadway allowing for curbside parking. No curbs, gutters or sidewalks are provided, and parking is not permitted on the east side of the roadway. The posted speed limit is 45 mph. A carrying capacity of 10,000 ADT was used in all analysis scenarios.

Country Club Drive is an unclassified roadway in the County *General Plan Mobility Element* from Hill Valley Drive to Hillside Road. It is currently built as a two-lane undivided roadway from Hill Valley Drive to Kauana Loa Drive with minimal shoulders and a 45-mph speed limit. Based on these roadway characteristics, it currently functions as a 2.2F Light Collector with an LOS E capacity of 9,700 ADT. See Harmony Grove Village Network Conditions below for further descriptions of Country Club Drive from Kauana Loa Drive to Harmony Grove Road.

Harmony Grove Road is classified as a 2.2E Light Collector from Wilgen Drive to Country Club Drive with an LOS E capacity of 16,200 ADT and as a 2.2B Light Collector with a Continuous Turn Lane from Country Club Drive to Kauana Loa Drive with an LOS E capacity of 19,000 ADT in the County *General Plan Mobility Element*. For more details on the existing conditions of Harmony Grove Road within the County's jurisdiction, see Harmony Grove Village Network Conditions provided below.

From Kauana Loa Drive to Enterprise Street, Harmony Grove Road is an unclassified roadway in both the County's *Mobility Element* and the City of Escondido's *General Plan Mobility Element*. It is currently built as a two-lane undivided roadway with capacity improvements along the industrial frontage approaching Enterprise Street where curb, gutter and sidewalks are provided. The posted speed limit is 40 mph. The roadway is located in both County and City jurisdiction; however, the majority of the roadway abuts the County line. Given these roadway characteristics, this portion of Harmony Grove Road currently functions as a 2.2F Light Collector with an LOS E capacity of 9,700 ADT. This capacity was used in all analysis scenarios.

Kauana Loa Drive is an unclassified roadway in the County of San Diego *General Plan Mobility Element*. From Country Club Drive to Harmony Grove Road, Kauana Loa Drive is currently constructed as a two-lane undivided roadway. Parking is generally not allowed along the roadway and the posted speed limit is 40 mph. No curbs, gutters, or sidewalks are provided. East of Country Club Drive, Kauana Loa Drive provides a paved shoulder with a 40-mph speed limit. Based on these roadway characteristics, it currently functions as a 2.3C Minor Collector with an LOS E capacity of 8,000 ADT.

Harmony Grove Village Parkway is described below under Harmony Grove Village Network Conditions.

State Route 78 (SR-78) is generally a six-lane east/west freeway. Additional auxiliary lanes are provided at the Nordahl Road interchange and at the I-15 junction. Ramp meters are provided at the Nordahl Road on-ramps. According to the *Caltrans Guidelines for the Preparation of Traffic Impact Studies, December 2002*, a capacity of 2,000 vehicles per hour (vph) per lane was used for mainline operations with 1,200 vph per lane for auxiliary lanes.

Harmony Grove Village Network Conditions

The HGV project, located north of Harmony Grove Road and bound by Country Club Drive and Wilgen Drive, is currently under construction. The project is developing as a rural residential community with a small community/commercial core. The project includes the development of 710 residential single-family units, 32 live/work lofts with 16,500 s.f. of retail, a 25,000-s.f. village core, an equestrian park, public and private parks, an institutional site (assumed to be a tack and feed store), and a fire station site. As part of the project, and as of 2016, a new road named Harmony Grove Village Parkway has been constructed to connect Country Club Drive to the southern extension of Citracado Parkway. Harmony Grove Village Parkway is identified in the County *General Plan Mobility Element* by its previous name of "Lariat Drive" and is ultimately classified as a 2.1C Community Collector with Intermittent Turn Lanes for an LOS E capacity of 19,000 ADT. The segment from Country Club Drive to Harmony Grove Road has already been completed, and provides a graded width of 74 feet with a paved width of 54 feet including curb, gutter and sidewalks for an LOS E capacity of 19,000 ADT. East of Harmony Grove Road to Citracado Parkway, it has been constructed to a graded width of 60 feet with a paved width of 40 feet including curb, gutter, and sidewalks for an LOS E capacity of 16,200 ADT.

Citracado Parkway has been extended northward from its prior terminus at Avenida Del Diablo for a short distance to intersect with the new Harmony Grove Village Parkway roadway. At the

Avenida Del Diablo intersection with Citracado Parkway, the eastbound and westbound directions are right-turn only; in addition, the southbound direction has a restricted left-turn movement.

Within the study area, Country Club Drive from Kauana Loa Drive to the northerly boundary of HGV has been improved to modified Rural Light Collector standards per the previously adopted General Plan (corresponding with a 2.2F Light Collector on the currently adopted General Plan) for an LOS E capacity of 9,700 ADT. South of the HGV project boundary to Harmony Grove Village Parkway, Country Club Drive has been improved to Rural Collector standards per the previously adopted General Plan (corresponding with 2.2E Light Collector on the currently adopted General Plan) with an LOS E capacity of 16,200 ADT. South of Harmony Grove Village Parkway to Harmony Grove Road, it has been constructed for an LOS E capacity of 19,000 ADT.

Harmony Grove Road has been improved from Wilgen Drive to Country Club Drive to a graded width of 74 feet and a paved width of 54 feet with curb and gutters for an LOS E capacity of 19,000 ADT. Although the County *General Plan Mobility Element* classifies this segment as a 2.2E Light Collector with an LOS E capacity of 16,200 ADT, because the roadway has been improved to 2.2C Light Collector standards (19,000 ADT), this capacity was used in all near-term and buildout analyses.

From Country Club Drive to Harmony Grove Village Parkway, Harmony Grove Road was improved to provide a graded width of 36 feet with a paved width of 28 feet where feasible. Built to these standards, the roadway functions as a modified Rural Light Collector with an LOS E capacity of 16,200 ADT.

In addition, traffic signals have installed at the Harmony Grove Road/Harmony Grove Village Parkway intersection, the Harmony Grove Road/Country Club Drive intersection, and the Citracado Parkway/Avenida del Diablo intersection has been upgraded to include one restricted left-turn lane in east-, west-, and southbound directions. These lanes accommodate projected Project traffic.

Because these improvements were expected to be completed (and have been completed) prior to opening day of the Proposed Project, they were included in the existing street network assumptions. Appendix A of the TIA contains a copy of the HGV Conditions of Approval (COA), which required the improvements discussed above.

2.2.1.2 *Existing Traffic Volumes*

Weekday a.m. and p.m. peak hour intersection turning movement and 24-hour bi-directional daily traffic counts were conducted in February and June of 2014 when schools were in session. The peak hour counts were conducted between the hours of 7:00-9:00 a.m. and 4:00-6:00 p.m.

Freeway volumes were taken from the most recent Caltrans Performance Measurement System (PeMS) data. The PeMS software distributes real-time peak hour and average daily traffic volumes and provides a graphical representation of volumes at each PeMS station location. Where available, peak hour freeway volume data were obtained. ADT freeway volumes were taken from the most recent Caltrans ADT data.

Harmony Grove Village Traffic Volumes

As stated under Harmony Grove Village Network Conditions, the HGV project is currently under construction. With the completion of the project anticipated in the near term, a conservative assumption was made that the total traffic generated by HGV would be on the street system prior to the opening day of the Proposed Project. It is therefore included under existing baseline conditions, and assumes the greatest number of trips from that project on the road. The trip assignment taken from the HGV Final EIR was added to the existing 2014 traffic data to arrive at the final existing traffic volume conditions.

Table 2.2-1, *Existing Traffic Volumes,* is a summary of the most recent available average daily traffic volumes (ADTs). Appendix B of the TIA (Appendix D to this EIR) contains the manual count sheets and the freeway mainline traffic data as well as a copy of the project assignment for HGV. Figure 2.2-2, *Existing Traffic Volumes*, depicts the volumes at the study area intersections and segments.

2.2.1.3 *Existing Levels of Service*

LOS is the term used to denote the different operating conditions which occur on a given roadway segment under various traffic volume loads. It is a qualitative measure used to describe a quantitative analysis taking into account factors such as roadway geometries, signal phasing, speed, travel delay, freedom to maneuver, and safety. LOS provides an index to the operational qualities of a roadway segment or an intersection. LOS designations range from A to F, with LOS A representing the best operating conditions and LOS F representing the worst operating conditions. LOS designation is reported for signalized intersections, unsignalized intersections, and roadway segments.

Signalized intersections were analyzed under a.m. and p.m. peak hour conditions. Average vehicle delay was determined utilizing the methodology found in Chapter 16 of the 2000 Highway Capacity Manual (HCM), with the assistance of the Synchro (version 7.0) computer software. The delay values (represented in seconds) were qualified with a corresponding intersection LOS. A more detailed explanation of the methodology is attached in EIR Appendix D**.**

Unsignalized intersections also were analyzed under a.m. and p.m. peak hour conditions. Average vehicle delay and LOS were determined based upon the procedures found in Chapter 17 of the *HCM,* with the assistance of the *Synchro* (version 7.0) computer software. A more detailed explanation of the methodology is attached in EIR Appendix D.

Street segment analysis is based upon the comparison of ADTs to the County and City of Escondido *Roadway Classification, Level of Service, and ADT Tables,* depending on which jurisdiction the street segment is located within. These tables provide segment capacities for different street classifications, based on traffic volumes and roadway characteristics. Copies of the County and City capacity tables are attached in Appendix D.

Freeway segments were analyzed during the a.m. and p.m. peak hours based on the methodologies as outlined in the San Diego Traffic Engineers' Council/Institute of Transportation Engineers (SANTEC/ITE) Guidelines developed by Caltrans. The freeway segments LOS is based on a Volume to Capacity (V/C) method. Page 5 of Caltrans' *Guide for the Preparation of Traffic Impact*

Studies (December 2002) documents a maximum service flow rate of 2,000 passenger cars per hour per lane. The freeway segments were analyzed using the existing mainline lane conditions at the location where PeMS data was collected. The freeway LOS operations are summarized in Table 2.2-2, *Caltrans District 11 Freeway Segment Level of Service Definitions*.

Existing Roadway Segments

Table 2.2-3, *Existing Street Segment Operations*, summarizes the existing intersections LOS. All street segments are calculated to currently operate at acceptable levels of service except for:

City of Escondido

- Segment #5. 9th Avenue from Valley Parkway to Auto Park Way (LOS D)

Existing Intersections

Table 2.2-4, *Existing Intersection Operations*, summarizes the existing intersections LOS. All intersections are calculated to currently operate at acceptable levels of service except for:

City of Escondido

- Intersection #7. Valley Parkway/I-15 NB Ramps (LOS D during the p.m. peak hour)

Existing Freeway Segments

Table 2.2-5, *Existing Freeway Mainline Operations*, summarizes the existing freeway segments LOS. All eastbound and westbound segments of SR-78 east and west of Nordahl Road currently operate at acceptable levels during both the a.m. and p.m. peak hours except for the following:

- Mainline #1. SR-78 Westbound, west of Nordahl Road (LOS E during the a.m./p.m. peak hours)

2.2.1.4 *Regulatory Setting*

County Zoning Ordinance, Parking Regulations, Sections 6750- 6799

The County's Zoning Ordinance sets the standards for parking, including requirements for new uses and structures; existing uses and structures; conversion, alterations, or expansion of existing uses or structures; computation of vehicle and bicycle space requirements; location of parking to building sites; parking space dimensions; design of bicycle storage; design standards for off-street parking; loading spaces; variances from parking regulations; and parking of commercial vehicles in residential, agricultural, and certain special purpose zones. The County of San Diego Off-Street Parking Design Manual implements Section 6793(c) of the County Zoning Ordinance. This section of the Ordinance relates to the design, dimensions, construction, landscaping, and surfacing of parking and bicycle spaces, and driveways.

San Diego County Public Road Standards

These standards provide minimum design and construction requirements for public road improvement projects located within the unincorporated areas of the County. These standards apply to County initiated public road improvement projects as well as privately initiated public road improvement projects.

San Diego County Private Road Standards

These standards provide minimum design and construction requirements for private road improvements based on ADT and required as conditions of land development approval in unincorporated areas of the County. Levels of service are not established for private roads.

County of San Diego Consolidated Fire Code

The County of San Diego, in collaboration with the local fire protection districts, created the SDCFC in 2001. The SDCFC contains the County's and fire protection districts' amendments to the California Fire Code. Adequate emergency ingress/egress is necessary for both citizen evacuation and emergency vehicle access in the event of a fire or other emergency. Section 902.2 of the SDCFC dictates minimum design standards for Fire Apparatus Access Roads and secondary access requirements. Road standard requirements for emergency vehicles specify a minimum 12-foot paved lane or 24-foot travel-way.

County of San Diego Regulatory Ordinances, Sections 77.201 – 77.220, Transportation Impact Fee

The San Diego County Transportation Impact Fee (TIF) Ordinance, as amended in December 2012, requires the assessment and collection of fees for roadway impacts as a condition of approval of a subdivision map or prior to issuance of a development permit, including a building permit. The County TIF Ordinance defrays the actual or estimated costs of constructing planned transportation facilities necessary to accommodate increased traffic generated by future development consistent with Section 66000 et seq. of the California Government Code (Mitigation Fee Act). Application of this fee includes, but is not limited to, development for residential, commercial, and industrial land uses. The fees are collected to fund identified transportation facilities, or portions thereof, that provide increased road capacity necessitated by the cumulative impacts of future development.

2.2.2 Analysis of Project Effects and Determination as to Significance

2.2.2.1 *Project Trip Generation*

Trip generation rates for the "single-family residential" land use type of 10 ADTs per DU were used to calculate the Project's ADT (SANDAG 2002). Therefore, the Project is calculated to

generate 4,500[1] ADT, with a total of 360 trips during the a.m. peak hour (108 inbound/ 252 outbound trips) and 450 total trips during the p.m. peak hour (315 inbound/135 outbound).

In addition to residential uses, some limited commercial/civic uses listed in the Project's Specific Plan are also assumed. Although the specific commercial retail tenant is not known at this time, square footage, and assumptions related to the types of uses that allowed at the site have been identified.

The Project would include a pedestrian-oriented 5,000 s.f. community center (Center House) which would contain a minimum of 1,500 s.f. of commercial uses. The Center House is designed to feature a use such as a café, coffee shop, hair or nail salon, or day spa. The Center House also would include such uses as a park, overnight accommodations of up to four rooms (available only to HGV South and HGV guests), a gym, an event lawn, and private recreational facilities like a pool or clubhouse available to HGV South residents only. Appendix F to the TIA (EIR Appendix D) shows Project trip generation calculations, including the commercial/civic land uses and associated mixed-use reductions.

By placing the residential units within 0.5 mile of the commercial/civic uses, it will promote walking and cycling, and the related reduction of vehicular travel within HGV South and adjacent HGV. The nature of the commercial/civic uses would be locally serving, and the majority of trips would be expected to be pass-by or diverted trips already on the road for another purpose. Residents within the community would be able to visit the business without generating additional primary vehicle trips. As such, trips from outside the Harmony Grove Villages area would not be expected to/from these uses in any meaningful way. Therefore, the residential distribution discussed above adequately includes any trips associated with these non-residential uses.

2.2.2.2 *Project Trip Distribution and Assignment*

Project trip distribution was developed based on the distribution used for the adjacent HGV project, including the proposed network improvements currently under construction. The HGV project utilized a SANDAG Select Zone Assignment that distributes trips in the area based on the location of residential and employment opportunities in the surrounding vicinity. The Final Certified EIR for HGV was approved by both the County of San Diego Board of Supervisors and City of Escondido Figure 2.2-3, *Project Traffic Distribution*, shows the Project traffic distribution, and Figure 2.2-4, *Project Traffic Volumes*, shows the assignment of the total Project trips.

Generally, eight percent of trips were distributed to/from the southwest on Harmony Grove Road, 22 percent were distributed to/from Country Club Drive in the north, and 70 percent were distributed to/from Harmony Grove Road in the northeast.

The trigger point at which a Project's impact becomes significant is identified in two steps. First, identify the allowable increase in delay (intersections) or volume-to-capacity (street segments). This is typically the point where the LOS deteriorates to an unacceptable level, or, for locations

[1] The Project currently proposes 453 DUs. The base analysis provided in the TIA assumed 450 DUs. The increase of three DUs would result in an additional 30 ADT, with 2 a.m. peak hour and 3 p.m. peak hour trips added to traffic modeling. As stated in the TIA in Section 2.2, this increase would have a nominal effect on the analysis and would not change the significance conclusions.

operating at unacceptable levels without the project, the increase allowed by the jurisdiction at such locations. The second step is to ascertain to the proportion of project traffic that can be added before crossing this threshold. For street segments this is a straightforward calculation of the allowable increase divided by the total project traffic on a particular segment. As intersection delay does not increase in a linear fashion with increased traffic, a trial-and-error process is used to determine the proportion of project traffic corresponding to the threshold. Specific guidelines as to the significance of impacts are addressed in Section 2.2.2.3, immediately below, for roadway segments, and in Sections 2.2.2.4 and 2.2.2.5 for intersections.

2.2.2.3 *Roadway Segments*

Guidelines for the Determination of Significance

County

A significant traffic impact would occur if:

1. The additional or redistributed ADT generated by the Proposed Project would cause on-site Mobility Element roads to operate below LOS C during peak traffic hours.[2]

2. The additional or redistributed ADT generated by the Proposed Project would significantly increase congestion on a Mobility Element road or state highway currently operating at LOS E or F, or would cause a Mobility Element road or state highway to operate at a LOS E or F as a result of the Proposed Project as identified in Matrix 1, below.

Matrix 1
MEASURES OF SIGNIFICANT PROJECT IMPACTS TO CONGESTION ON MOBILITY ELEMENT ROAD SEGMENTS

Allowable Increases on Congested Road Segments			
LOS	**Two-lane Road**	**Four-lane Road**	**Six-lane Road**
E	200 ADT	400 ADT	600 ADT
F	100 ADT	200 ADT	300 ADT

Notes:
1. By adding Proposed Project trips to all other trips from a list of projects, this same table is used to determine if total cumulative impacts are significant. If cumulative impacts are found to be significant, each project that contributes additional trips must mitigate a share of the cumulative impacts.
2. The County may also determine impacts have occurred on roads even when a project's traffic or cumulative impacts do not trigger an unacceptable LOS, when such traffic uses a significant amount of remaining road capacity.

3. The Proposed Project would cause a Mobility Element road to exceed the thresholds presented in Matrix 2, below.

[2] Mobility Element Policy 2.1 addresses *Mobility Element* roads. It states that development projects are required "to provide associated road improvements necessary to achieve a level of service of "D" or higher on all ME roads except for those where a failing level of service has been accepted by the County pursuant to the criteria specifically identified in the accompanying text box (Criteria for Accepting a Road Classification with Level of Service E/F)."

Matrix 2
MEASURE OF SIGNIFICANT PROJECT TRAFFIC IMPACTS FOR MOBILITY ELEMENT ROADS, SIGNALIZED INTERSECTIONS, AND RAMPS

LOS with Project	Allowable Change Due to Project Impact						
	Freeways*		Roadway Segments[1]		Signalized Intersections	Ramps	Ramps with >15 min. delay
	V/C	Speed (mph)	V/C	Speed (mph)	Delay (sec.)[2]	Delay (min.)[2]	Delay (min.)[2]
E and F	0.01	1	0.02	1	2	-	2

[1] For County arterials that are not identified in SANDAG's RTP as regionally significant arterials, significance may be measured based upon an increase in ADT. The allowable change in ADT due to Project impacts in this instance would be identified in Threshold Matrix 1.
[2] Delay = Average stopped delay per vehicle measured in seconds (sec.) or minutes (min.)
> = greater than
* It is noted that the County does not have jurisdiction over freeways. Caltrans, the agency with jurisdiction over freeways within the study area, considers impacts to freeways significant if additional traffic causes the operations to degrade by 0.01 for segments operating at LOS E or F. The Caltrans thresholds are used in the analysis below.

4. The additional or redistributed ADT generated by the Proposed Project would cause a residential street to exceed its design capacity.

City of Escondido

A street segment is considered significantly impacted when the project traffic degrades the LOS from acceptable to unacceptable. Unacceptable LOS is D or below. If a segment is operating at LOS C and decreases to D, E or F, then a significant impact is calculated.

Guidelines Sources

Guidelines for identification of potential significant impacts were based on the County Guidelines for Determining Significance – Transportation and Traffic (2011c), for study locations within the County. For study area intersections and segments located in the City of Escondido or on Caltrans facilities, the SANTEC/ITE *Guidelines for Traffic Impact Studies* in the San Diego Region (2000) were applied.

Analysis

As shown in Figure 2.2-5, *Existing Plus Project Traffic Volumes*, and Table 2.2-6, *Roadway Segment Operations Under Existing and Existing Plus Cumulative Plus Project Conditions*, one segment on Country Club Drive would operate at unacceptable LOS in the City of Escondido due to the addition of Project traffic: Auto Park Way to Hill Valley Drive. The LOS of this segment would decrease from C to D. With regard to the County street segments, the addition of Project traffic would not increase congestion on any Mobility Element road or State highway, cause a Mobility Element road to exceed the thresholds in Matrix 2, or cause a residential street to exceed its design capacity. Therefore, **one significant impact to roadway segments under Existing Plus Project conditions would occur. (Impact TR-1a)**

2.2.2.4 *Signalized Intersections*

Guidelines for the Determination of Significance

County

A significant traffic impact would occur if:

1. The additional or redistributed ADT generated by the Proposed Project would significantly increase congestion on a signalized intersection currently operating at LOS E or LOS F, or would cause a signalized intersection to operate at a LOS E or LOS F as identified in Matrix 3, below.

2. Based upon an evaluation of existing accident rates, the signal priority list, intersection geometrics, proximity of adjacent driveways, sight distance or other factors, the Proposed Project would significantly impact the operations of the intersection.

Matrix 3
MEASURES OF SIGNIFICANT PROJECT IMPACTS
TO CONGESTION ON INTERSECTIONS:
ALLOWABLE INCREASES ON CONGESTED INTERSECTIONS

LOS	Signalized	Unsignalized
E	Delay of 2 seconds or less	20 or less peak period trips on a critical movement
F	Either a delay of 1 second, or 5 or less peak period trips on a critical movement	5 or less peak period trips on a critical movement

Notes:
1. A critical movement is an intersection movement (right-turn, left-turn, through movement) that experiences excessive queues, which typically operate at LOS F. Also, if a project adds significant volume to a minor roadway approach, a gap study should be provided that details the headways between vehicles on the major roadway.
2. By adding Proposed Project trips to all other trips from a list of projects, these same tables are used to determine if total cumulative impacts are significant. If cumulative impacts are found to be significant, each project is responsible for mitigating its share of the cumulative impact.
3. The County may also determine impacts have occurred on roads even when a project's direct or cumulative impacts do not trigger an unacceptable LOS, when such traffic uses a significant amount of remaining road capacity.
4. For determining significance at signalized intersections with LOS F conditions, the analysis must evaluate both the delay and the number of trips on a critical movement, exceedance of either criteria result in a significant impact.

City of Escondido

A signalized intersection is considered to be significantly impacted when Project traffic degrades LOS from acceptable to unacceptable. Unacceptable LOS is D or below. If an intersection is operating at LOS D, E or F, then a significant impact is calculated when the Proposed Project adds more than 2 seconds of delay.

Guideline Sources

For study area intersections within the County, these guidelines are based on the County Guidelines for Determining Significance – Transportation and Traffic (2011c). For study area

intersections located in the City of Escondido, the SANTEC/ITE *Guidelines for Traffic Impact Studies in the San Diego Region* (2000) were applied.

Analysis

As shown in Table 2.2-7, *Intersection Operations Under Existing and Existing Plus Cumulative Plus Project Conditions*, all signalized intersections are calculated to operate at acceptable levels of service with the exception of the following intersection in the County:

- Country Club Drive/Harmony Grove Road (LOS F during the p.m. peak hours)

The Project traffic would cause this intersection to have a change in delay of greater than 2 seconds. With regard to the City of Escondido, the Project would not cause an intersection to operate at D, E, or F while also adding more than 2 seconds of delay. As a result, **one significant impact to intersections under Existing Plus Project conditions would occur. (Impact TR-2a)**

2.2.2.5 *Unsignalized Intersections*

Guidelines for the Determination of Significance

County

A significant traffic impact would occur if:

3. The additional or redistributed ADT generated by the Proposed Project would add 21 or more peak hour trips to a critical movement of an unsignalized intersection, and cause an unsignalized intersection to operate below LOS D.

4. The additional or redistributed ADT generated by the Proposed Project would add 21 or more peak hour trips to a critical movement of an unsignalized intersection currently operating at LOS E.

5. The additional or redistributed ADT generated by the Proposed Project would add six or more peak hour trips to a critical movement of an unsignalized intersection, and cause the unsignalized intersection to operate at LOS F.

6. The additional or redistributed ADT generated by the Proposed Project would add six or more peak hour trips to a critical movement of an unsignalized intersection currently operating at LOS F.

7. Based upon an evaluation of existing accident rates, the signal priority list, intersection geometrics, proximity of adjacent driveways, sight distance or other factors, the Proposed Project would significantly impact the operations of the intersection.

City of Escondido

An unsignalized intersection is considered significantly impacted when Proposed Project traffic degrades the LOS from acceptable to unacceptable. Unacceptable LOS is D or below. If an

intersection is operating at LOS D, E or F, then a significant impact is calculated when the Proposed Project adds more than 2.0 seconds of delay.

Guideline Sources

For study area intersections within the County, these guidelines are based on the County Guidelines for Determining Significance – Transportation and Traffic (2011c). For study area intersections located in the City of Escondido and the City of San Marcos, the SANTEC/ITE *Guidelines for Traffic Impact Studies in the San Diego Region* (2000) were applied.

Analysis

As shown in Table 2.2-7, all unsignalized intersections in the County are calculated to operate at acceptable levels of service with the addition of Project traffic. There are no unsignalized intersections in the study area within the City of Escondido. As a result, **impacts to unsignalized intersections under Existing Plus Project conditions would be less than significant.**

2.2.2.6 *Freeway Mainline Segments*

Guidelines for the Determination of Significance

A significant traffic impact would occur if:

8. The Proposed Project would cause a freeway segment to exceed the thresholds presented in Matrix 2, above.

Guideline Source

For all freeway segments within the study area, this guideline is based on the SANTEC/ITE Guidelines

Analysis

Under Existing Plus Project conditions, the WB segment of SR-78, west of Nordahl Road, would operate at LOS E during the a.m./p.m. peak hours (Table 2.2-8, *Freeway Segment Operations Under Existing and Existing Plus Cumulative Plus Project Conditions*). The increase in V/C from the Project would be 0.006 in the a.m. peak hour and 0.003 in the p.m. peak hour, both of which are lower than the significance threshold of 0.01 V/C. Therefore, **the Project would result in less than significant impacts to freeway segments.**

2.2.2.7 *Traffic Hazards Due to an Existing Transportation Design Feature*

Guidelines for the Determination of Significance

The determination of significant hazards to an existing transportation design feature would be on a case-by-case basis, considering the following factors:

9. Design features/physical configurations of access roads may adversely affect the safe movement of all users along the roadway.

10. The percentage or magnitude of increased traffic on the road due to the Proposed Project may affect the safety of the roadway.

11. The physical conditions of the Project site and surrounding area, such as curves, slopes, walls, landscaping or other barriers, may result in conflicts with other users or stationary objects.

12. Conformance of existing and proposed roads to the requirements of the private or public road standards, as applicable.

Guidelines Sources

These guidelines, which apply to the entire study area, regardless of jurisdiction, are based on the County Guidelines for Determining Significance – Transportation and Traffic (2011c).

Analysis

The Proposed Project circulation system, including driveway corner sight distances, was designed in conformance with applicable County standards and requirements and would not significantly impact the safe movement of users along the area roadways. Project access would be from Country Club Drive, south of Harmony Grove Village Road, at Project driveways Private Drive C and Private Drive A (see Figure 1-6a of this EIR).

As part of the Project, improvements to Country Club Drive, currently an unclassified substandard Rural Residential Road, would be made to improve the street to a public enhanced Residential Collector. This would include increasing the paved width to incorporate three travel lanes. With the above improvements in place, this street segment would be expected to operate at LOS B. To improve the flow along Country Club Drive, southbound left-turn pockets from Country Club Drive to the Project driveways are proposed. This would allow for left-turning vehicles to queue outside the flow of traffic, thereby increasing the capacity of Country Club Drive.

It should be noted that a design speed exception is requested for a portion of Country Club Drive adjacent to Cordrey Drive. The request is for a reduced design speed on Country Club Drive from 30 mph to 27.5 mph at the existing crest vertical curve near the intersection of Cordrey Drive. A copy of the design exception request is included in Appendix J of the TIA (Appendix D to this EIR). Per Appendix D, this request would not affect the roadway's ability to serve the approximately 600 ADT on that section of Country Club Drive.

As the Project access/exit points are located on a curve along Country Club Drive, a review of corner and stopping sight distances for these locations shall be conducted in accordance with County Private and Public Road Standards. The Project will be required to meet the County's Road Standards for sight distance to ensure that adequate sight distance is met. Sight lines are open from the primary Project driveway. It is noted that the Project will construct and improve the profile of Country Club Drive by lengthening the crest vertical curve south of the southernmost driveway, thus improving the stopping sight distance.

In addition, through the HGV Project, the intersection of Country Club Drive at Harmony Grove Road is being improved to provide a traffic signal with north/south "split" phasing and east/west

"protected" left-turn phasing with dedicated left-turn lanes in the eastbound, westbound and southbound directions. Crosswalks and pedestrian and equestrian-level push buttons are proposed for this intersection. No improvements were proposed by HGV for the southern leg of the intersection. The Proposed Project would improve the northbound approach to this intersection on Country Club Drive (between the proposed bridge and the intersection) to include on southbound lane, one northbound left-turn lane, one northbound through lane, and one northbound right-turn lane. The projected LOS F for this intersection would be improved to LOS D.

The Proposed Project would also include the construction of numerous internal roadways. These roadways are proposed to be constructed to County private-road standards, with paved widths varying from 24 feet to 36 feet within the property. Circulation would be provided via an internal loop road comprised of private drives, with seven cul-de-sacs branching off the loop (refer to Figure 1-6a). The construction of on-site roadways to County standards would facilitate adequate on-site circulation with the Project site.

Therefore, although the Proposed Project would result in increased traffic on new and existing roadways, **impacts associated with safety of those roadways would be less than significant.**

2.2.2.8 *Traffic Hazard to Pedestrians or Bicyclists or Equestrians*

Guidelines for the Determination of Significance

The determination of significant hazards to pedestrians or bicyclists or equestrians would be on a case-by-case basis, considering the following factors:

13. Design features/physical configurations on a road segment or at an intersection that may adversely affect the visibility of pedestrians or bicyclists or equestrians to drivers entering and exiting the site, and the visibility of cars to pedestrians and bicyclists.

14. The amount of pedestrian activity at the Project access points that may adversely affect pedestrian safety.

15. The preclusion or substantial hindrance of the provision of a non-motorized trail facility on a roadway adjacent to the Project site.

16. The percentage or magnitude of increased traffic on the road due to the Proposed Project that may adversely affect non-motorized trail safety.

17. The physical conditions of the Project site and surrounding area, such as curves, slopes, walls, landscaping or other barriers that may result in vehicle/pedestrian or vehicle/ bicycle or vehicle/equestrian conflicts.

18. Conformance of existing and proposed roads to the requirements of the private or public road standards, as applicable.

19. The potential for a substantial increase in non-motorized trail activity without the presence of adequate facilities.

Guidelines Source

These guidelines, which apply to all of the study area, regardless of jurisdiction, are based on the County Guidelines for Determining Significance – Transportation and Traffic (2011c).

Analysis

As described in Section 1.2.2.2, a trail system would extend internally through the Proposed Project, as well as connect to surrounding neighborhoods and existing adjacent trails in the area. As depicted on Figures 1-14a and 1-17, a 10-foot wide, soft-surface public multi-use trail ultimately would extend along the west side of Country Club Drive as part of the HGV Equestrian Ranch implementation. A 5 to 6-foot walkway would be installed by the Proposed Project on the east side of Country Club Drive, separated from the roadway by a 4 to 5-foot landscaped parkway. Both of these trail/pathways would connect to various parks, open space areas, and the Project private trail system. The public trail would be built to County Trail Design Standards and would be fenced on one or both sides. The proposed private pathways within the Project would abut each street and be 4 to 5 feet in width. Trail safety and rules signage would be posted at strategic locations along the trails. The internal roadways would be painted with sharrows to indicate to motorists that bicyclists share the roadways with vehicular traffic. Hazards for equestrian crossings at signalized and unsignalized intersections are similar to those for pedestrians and bicyclists. Due to low traffic loading there are no signalized intersections in the immediate vicinity of the Project access locations. Pedestrian and equestrian crossings at unsignalized intersections are legal at all intersections, whether marked or unmarked. Due care is required for all crossing parties and for drivers of automobiles as required by State law. On-site roads will have lower posted speeds than Country Club Drive and Harmony Grove Road and present fewer hazards for pedestrian and equestrian crossings.

Additionally, the Project improvements to Country Club Drive (installation of a third lane and installation of the pathway on the east side of the road) would be constructed in accordance with County standards and would not include design features or physical configurations on a road segment or at an intersection that would adversely affect the visibility of other non-motorized users to drivers entering and exiting the site, and the visibility of cars to other non-motorized users. The Project contributions to/implementation of the bridge crossing of Escondido Creek also would be expected to lessen hazards to non-motorized travelers on Country Club Drive. Currently, pedestrians/bicyclists/equestrians cross the creek on the Arizona crossing, which is relatively narrow, and visually encroached upon by the riparian habitat on either side of the crossing. Visibility to the crossing from east-west Harmony Grove Road is not open until the road user is already heading south on Country Club Drive. Any potential for conflict with a non-motorized user can only be known with only a short time to react. Also, the ability of the non-motorized user to get off the road is constrained. On the east side of the road there is ponded water, with the depth not apparent from the surface due to the water quality. On the west side of the road, there is small, but sharp drop of about 5 feet with rip-rap, where the culverts that carry water under the crossing open to the west, and where scour from fast-flowing waters has lowered the creek bed. The bridge, which would need to accommodate non-motorized users, would be expected to contain a separated pathway connecting to off-site trails, which would improve visibility, as well as safety, of all users crossing the creek. The Proposed Project also would not preclude or substantially hinder the provision of a planned bike lane or pedestrian facility on a roadway adjacent to the Project site. It

would implement a pedestrian pathway on the east side of Country Club Drive, and allow for future implementation of the multi-purpose trail on the west side of the road.

The Project would be constructed in phases, and each phase would consist of sub-phases, none of which would generate more traffic than the ADT identified for the Project overall. As such, no capacity impacts are anticipated to occur during any construction phase, and all appropriate work zone traffic control plans would be prepared during construction.

For these reasons, **impacts to pedestrian, equestrian, and bicyclist safety would be less than significant**.

2.2.2.9 *Alternative Transportation*

Guideline for the Determination of Significance

A significant impact to alternative transportation would occur if:

20. The Proposed Project would not comply with County's General Plan objectives supporting alternate forms of transportation to reduce demand on the road system.

Guideline Source

This guideline is based on the County Guidelines for Determining Significance – Transportation and Traffic (2011c). The objectives would be implemented through specific policies of the Conservation and Open Space (COS) Element (see Section 3.1.5 for discussion of applicable General Plan policies).

Analysis

The County General Plan provides for balanced population growth and development with infrastructure needs and resource protection. It achieves this by emphasizing Smart Growth and land planning principles that will reduce vehicle miles traveled (VMT) by locating future development in and near areas close to jobs, services, and public facilities to maximize the use of existing infrastructure, thus resulting in a reduction of GHGs.[3]

Specifically, Goal COS-16 states a goal of having "Transportation and mobility systems that contribute to environmental and human sustainability and minimize GHG and air pollutant emissions." Mobility Element Policy ME-8.1 seeks to locate transit stops and facilities in areas that facilitate transit ridership, and designate such locations as part of planning efforts for Town Centers, transit nodes, and large-scale commercial or residential development projects. With the Nordahl Road Station, opportunities will be available for shuttle and bus service on Country Club Drive. Currently, there is bus service on Citracado Parkway and design plans for construction of a connection of Harmony Grove Road and Avenida Del Diablo and to I-15 are complete. The City of Escondido expects the construction to start in 2016. Ultimately, the location and extent of public

[3] The reader should note that per the County's GHG guidelines, the Project would achieve the County's GHG reduction goals and impacts associated with GHG emissions would not be significant. The Proposed Project would be consistent with the goals and strategies of local and State plans, policies, and regulations to reduce GHG emissions from land use and development (refer to Subchapter 2.7 of this EIR).

transportation service in this part of the County is under the purview of North County Transit District. Refer to the Section 3.1.5 for an analysis of the General Plan goals and policies.

The Proposed Project incorporates and would facilitate Smart Growth principles and alternative transportation, by virtue of its location and inclusion of a multi-use trail network. As described above, the proposed pathways/trails would connect to both internal private park and public Center House areas as well as off-site public trails and other uses. The Project also would include installation of an electric vehicle recharge station near the Center House (see Figure 1-8 of this EIR). The Proposed Project would be built in proximity to the nearby Palomar Medical Center, Palomar Power Plant, Stone Brewing Company, and many other manufacturing, retail, and office/business park uses within 2 miles of the Project site. Retail opportunities in the HGV Village Center would be located less than 0.5 mile from the Proposed Project, and accessible by the Project-provided pathway and, ultimately, the HGV multi-use trail; potential retail uses at the HGV Equestrian Ranch would be located across the street from the Project. Placing residential uses within this distance to transportation, employment, shopping, and services, helps minimize travel times and is consistent with the goals of Senate Bill 375 (SB 375; Sustainable Communities and Climate Protection Act of 2008). This proximity to a variety of service and employment uses would be expected to incrementally reduce the average trip length for the average commuter residing at HGV South from 7.9 to 7.88 miles per trip (LLG 2016).

In summary, the Proposed Project incorporates and would facilitate smart growth principles and alternative transportation for pedestrians and cyclists, which would support alternate forms of transportation and reduce demand on the vehicular travel system. For these reasons, **impacts to alternative transportation would be less than significant**.

2.2.3 Cumulative Impact Analysis

Other future development projects in the vicinity of the Proposed Project have the potential to contribute additional vehicle trips and traffic impacts to the same road segments and intersections as those evaluated in the Proposed Project traffic analysis. The impacts associated with the Proposed Project in combination with this cumulative traffic are addressed in the Existing Plus Cumulative Plus Project analysis scenario, in which existing traffic plus cumulative traffic projected to occur through Project buildout are combined with Proposed Project traffic.

Based on the research conducted for the cumulative condition, 2 County projects, 31 City of San Marcos projects, and 5 City of Escondido projects were identified for inclusion in the TIA, for a total of 37 cumulative projects. These projects are discussed in detail in the TIA contained in Appendix D.

Figure 2.2-6 depicts the *Existing Plus Cumulative Traffic Volumes* and Figure 2.2-7 shows the *Existing Plus Cumulative Plus Project Traffic Volumes* in the study area.

2.2.3.1 *Existing Plus Cumulative Plus Project Impacts*

Several network improvements are proposed by the cumulative projects. Because the timeframe for construction of the majority of these improvements is unknown, however, the existing lane geometries, with the inclusion of the HGV network improvements currently under construction, were assumed as the baseline conditions in the Existing Plus Cumulative scenarios. This is a

conservative approach in that cumulative project volumes are included without including the corresponding cumulative network mitigation.

In addition, the Citracado Parkway Extension project was not included in the near-term conditions per information provided by City of Escondido staff. The extension project is delayed due to funding issues. In October 2015, the City of Escondido's attempt to receive funding through the Transportation Investment Generating Economic Recovery (TIGER) grant program, distributed by the U.S. Department of Transportation, was denied. Therefore, due to a lack of funding and an unknown timeframe for completion, this connection was not included in the near-term analysis.

Roadway Segments

As shown on Figure 2.2-7 and Table 2.2-6, six roadway segments would operate at an unacceptable LOS in the Existing Plus Cumulative Plus Project scenario. The Proposed Project's traffic, in conjunction with cumulative traffic, would exceed the threshold limits indicated in Matrix 1 as the Project-induced increase in V/C would be greater than 0.02 for LOS E or F for one street segment in the City of Escondido, and the Project would add more than 200 or 100 ADT to County street segments operating at LOS E or F, respectively. Therefore, **cumulative impacts to the following six roadway segments would be significant (Impacts TR-1b, TR-3, TR-4, TR-5, TR-6, and TR-7)**:

City of Escondido

TR-1b: Country Club Drive from Auto Park Way to Hill Valley Drive (LOS F)

County

TR-3: Country Club Drive from Hill Valley Drive to Kauana Loa Drive (LOS E)[4]

TR-4: Harmony Grove Road from Country Club Drive to Harmony Grove Village Parkway (LOS E)

TR-5: Harmony Grove Road from Harmony Grove Village Parkway to Kauana Loa Drive (LOS E)

TR-6: Harmony Grove Road from Kauana Loa Drive to Enterprise Street (LOS F)

TR-7: Harmony Grove Village Parkway from Harmony Grove Road to Citracado Parkway (LOS E)

[4] Subsequent to Project modeling, the Valiano project (one of the cumulative projects along Country Club Drive) revised a primary project entrance, resulting in additional trips between Hill Valley Drive and Kauana Loa Drive. As a result, the existing plus cumulative plus project loading would be LOS F rather than LOS E. Both LOS E and LOS F comprise significant cumulative impacts and require mitigation. The mitigation identified for Impact TR-3 also adequately mitigates LOS F conditions to acceptable LOS.

Signalized Intersections

Figure 2.2-7 and Table 2.2-7 illustrate the ADT for each signalized intersection analyzed in the Existing Plus Cumulative Plus Project condition. Under this scenario, two signalized intersections in the City of Escondido would operate at an unacceptable LOS D with a Project-related increase in delay of greater than two seconds. In addition, one signalized intersection in the County would experience Project-induced increase in delay to LOS F. Therefore, **the Proposed Project, along with other cumulative projects, would cause a significant cumulative impact to the following signalized intersections (Impact TR-8, TR-9, and TR-2b)**:

City of Escondido

TR-8: Auto Park Way/Country Club Drive (LOS D during the a.m. peak hour)

TR-9: Valley Parkway/Citracado Parkway (LOS D during the a.m. peak hour)

County

TR-2b: Country Club Drive/Harmony Grove Road (LOS F during the p.m. peak hour)

Unsignalized Intersections

Under the Existing Plus Cumulative Plus Project scenario, one unsignalized intersection in the County would operate at an unacceptable LOS E or F (Figure 2.2-7 and Table 2.2-7). The Project would add greater than 20 peak hour trips or 5 peak hour trips, respectively, to the northbound critical movement; therefore, **the Project would cause a significant cumulative impact to the following unsignalized intersection (Impact TR-10)**:

TR-10: Harmony Grove Road/Kauana Loa Drive (LOS E and F during the a.m. and p.m. peak hours, respectively)

Freeway Mainline Segments

As shown on Figure 2.2-7 and Table 2.2-8, the segment of westbound SR-78 west of Nordahl Road would operate at an unacceptable LOS in the Existing Plus Cumulative Plus Project scenario. The Proposed Project traffic in conjunction with cumulative traffic along this segment of SR-78, however, would not exceed the significance criteria in Matrix 2 (above). Therefore, **cumulative impacts to freeway mainline segments would be less than significant.**

2.2.4 Buildout Impact Analysis

As the Project's proposed land use would generate more traffic than projected for the parcel in the 2011 General Plan, a buildout analysis was completed. Per County criteria, a buildout analysis is conducted to determine whether the proposed land use changes would require any changes to the Mobility Element roadway classifications.

Using SANDAG's trip generation rates, the General Plan land use designation for the Project's parcel could produce approximately 2,220 ADT (Buildout without Project scenario). As discussed

under Section 2.2.2.1, the Project proposes a land use designation that would produce 4,500 ADT (Buildout with Project scenario). Therefore, the Buildout with Project scenario assumes an increase of 2,280 ADT over the Buildout without Project Scenario. In addition, SANDAG Series 12 Year 2035 traffic volumes, the adopted 2011 General Plan roadway classifications, and the projects in the cumulative analysis under Section 2.2.3 were used in the analysis.

As shown in Table 2.2-9, *Roadway Segment Operations under Buildout Conditions,* under both scenarios all roadway segments are calculated to operate at acceptable LOS except for the Country Club Drive between Auto Park Way and Hill Valley Drive segment, which is forecasted to operate at LOS D. Therefore, under buildout, the Project itself would not decrease LOS to an unacceptable level compared to the General Plan land use.

As discussed earlier, the Project would have both direct (operations at LOS D; TR-1a) and cumulative (operations at LOS F; TR-1b) significant impacts on this roadway segment. (The LOS for the cumulative scenario is worse than the buildout scenario due to major, planned roadway improvements being finished by the buildout scenario but not by the cumulative scenario, such as the Citracado Parkway extension.) In accordance with these significant impacts, mitigation measures M-TR-1a and M-TR-1b are proposed below that would improve operations on Country Club Drive between Auto Park Way and Hill Valley Drive segment.

2.2.5 Significance of Impacts Prior to Mitigation

The Proposed Project would result in the following significant direct and cumulative impacts to a number of roadway segments and intersections (both signalized and unsignalized):

Direct and Cumulative Impacts

Under Existing Plus Project and Existing Plus Cumulative Plus Project conditions, significant direct and/or cumulative impacts would occur along six analyzed roadway segments:

City of Escondido

Impact TR-1a and 1b Country Club Drive from Auto Park Way to Hill Valley Drive (LOS D, Direct; LOS F, Cumulative)

County

Impact TR-3 Country Club Drive from Hill Valley Drive to Kauana Loa Drive (LOS E; Cumulative)

Impact TR-4 Harmony Grove Road from Country Club Drive to Harmony Grove Village Parkway (LOS E; Cumulative)

Impact TR-5 Harmony Grove Road from Harmony Grove Village Parkway to Kauana Loa Drive (LOS E; Cumulative)

Impact TR-6 Harmony Grove Road from Kauana Loa Drive to Enterprise Street (LOS F; Cumulative)

Impact TR-7 Harmony Grove Village Parkway from Harmony Grove Road to Citracado Parkway (LOS E; Cumulative)

Under Existing Plus Cumulative Plus Project conditions, significant direct and/or cumulative impacts would occur at three analyzed signalized intersections:

City of Escondido

Impact TR-8 Auto Park Way/Country Club Drive (LOS D during the a.m. peak hour; Cumulative)

Impact TR-9 Valley Parkway/Citracado Parkway (LOS D during the a.m. peak hour; Cumulative)

County

Impact TR-2a and 2b Country Club Drive/Harmony Grove Road (LOS F during the p.m. peak hour; Direct and Cumulative)

Under Existing Plus Cumulative Plus Project conditions, significant cumulative impacts would occur at one analyzed unsignalized intersection:

County

Impact TR-10 Harmony Grove Road/Kauana Loa Drive (LOS E and F during the a.m. and p.m. peak hours, respectively; Cumulative)

2.2.6 Mitigation

Mitigation for Direct and Cumulative Significant Impacts

As enumerated in Section 2.2.4, the Proposed Project would result in significant impacts to local roadway segments and intersections in Escondido and the County. Mitigation measures proposed to address the Proposed Project's contribution to direct and cumulative impacts are identified below.

Direct impacts are those impacts caused by project-related development. Cumulative impacts can result from individually minor, but collectively significant projects taking place over a period of time (CEQA Guidelines §15355), and are caused collectively by all development within the community. The CEQA Guidelines recognize that mitigation for cumulative impacts may involve the adoption of ordinances or regulations (CEQA Guidelines §15130) such as, but not limited to, the County-adopted TIF Program (described below).

City of Escondido

The City of Escondido requires that physical improvements be implemented for direct impacts where a project reduces LOS below acceptable LOS C thresholds. A fair share payment toward

future improvements is required where the addition of project traffic is cumulative to the overall LOS D or worse pre-project conditions.

County

The County Board of Supervisors adopted the TIF ordinance, which provides a mechanism for the County to obtain funding to mitigate anticipated cumulative transportation/circulation impacts, by requiring payment of an impact fee designated in the ordinance. The TIF Program covers all cumulative impacts within the unincorporated area for General Plan conforming projects to support adequate circulation through Year 2030. The TIF is paid at time of building permit issuance. The County updated the TIF Program in December 2012. The TIF Program identifies transportation facilities needed to address cumulative impacts within designated areas of the County (TIF Areas) and then provides for payment of fees to cover a project's "fair share" of the cost. TIF fees are segregated by TIF Area, Region, State Highway, and Ramps, and are used to help fund transportation improvements within those identified locations. Since the project proposes a GPA, it will need to participate on a fair share basis (contribute funds) in an update to the TIF program to cover the changes in land use.

Roadway Segments

City of Escondido

M-TR-1a and 1b Prior to occupancy of 80 Project units, Country Club Drive shall be widened to provide a paved width of 36 feet consisting of two travel lanes and a 10-foot striped center turn lane starting 220 feet southwest of Auto Park Way for a length of approximately 830 feet. Improvements will include connecting the existing sidewalk along the northern side of this roadway section with a 5-foot sidewalk complete with a 6-inch curb and gutter and providing a 4-foot decomposed granite pathway along the south side of this segment with a 6-inch asphalt berm. With the additional 12 feet added to the paved width, the roadway capacity of this Local Collector would increase to 15,000 ADT.[5]

County

M-TR-3 Prior to occupancy of 80 Project units, the Project shall widen Country Club Drive at the Country Club Drive/Eden Valley Lane intersection to provide a dedicated northbound left-turn lane onto Eden Valley Lane.

M-TR-4 The Project shall make a payment toward the County of San Diego TIF program to address cumulative impacts to the segment of Harmony Grove Road between Country Club Drive and Harmony Grove Village Parkway.

M-TR-5 The Project shall make a payment toward the County of San Diego TIF program to address cumulative impacts to the segment of Harmony Grove Road between Harmony Grove Village Parkway and Kauana Loa Drive.

[5] Because this mitigation would be located in the City of Escondido it is currently identified as significant and unmitigated as described under Section 2.2.7.

M-TR-6 Project payment toward the County of San Diego TIF program as part of mitigation provided under M-TR-10, below, will mitigate impacts to this segment of Harmony Grove Road between Kauana Loa Drive and Enterprise Street.

M-TR-7 Prior to occupancy of 135 Project units, the Project shall provide a northbound to eastbound right-turn overlap phase at the Harmony Grove Road/Harmony Grove Village Parkway signalized intersection.

Intersections

City of Escondido

M-TR-8 Prior to occupancy of 293 Project units, the Project shall restripe the eastbound approach of the Auto Park Way/Country Club Drive intersection to provide one left-turn lane, one shared left-turn/through lane, and one right-turn lane with a signal timing modification to change the east/west approach to "split" phasing.[6]

M-TR-9 Prior to occupancy of 54 Project units. the Project shall pay a fair share toward the approved Citracado Parkway Extension Project, which would improve the intersection operations with an additional through lane in the southbound direction.[7]

County

M-TR-2a and 2b Prior to occupancy of 23 Project units, the Project shall widen the northbound approach of Country Club Drive to Harmony Grove Road to provide one left-turn, one through lane, and one dedicated right-turn lane with an overlap phase in order to mitigate this direct and cumulative impact to the Harmony Grove Road Country Club intersection. In addition, the Project shall make a payment toward the County of San Diego TIF Program.

M-TR-10 The Project shall make a payment toward the County of San Diego TIF program to address cumulative impacts to the Harmony Grove Road/Kauana Loa Drive unsignalized intersection.

2.2.7 Conclusion

This section presents the rationales for the conclusions of impact levels resulting after implementation of the Project and the proposed mitigation measures. If the Project is approved, each of the mitigation measures committed to below would be made a Condition of Approval, which would require implementation of the stated measures.

[6] Because this mitigation would be located in the City of Escondido it is currently identified as significant and unmitigated as described under Section 2.2.7.

[7] Because this mitigation would be located in the City of Escondido and there is no current funding mechanism, the impact is currently identified as significant and unmitigated as described under Section 2.2.7.

Specific to the cumulative impacts addressed below, County mitigation requires participation in the TIF Program. This program was specifically designed to address cumulative issues (i.e., incremental Project effects which, when combined with the incremental adverse effects of other area-wide projects, reach a level of impact requiring mitigation). Required improvements are specified through the 2030 planning horizon, and funds are collected from projects coming on line in order to collect fees to cover costs of those improvements when implemented. The Project will be required to contribute funding toward an update to the TIF program to include the Project and its increased density. Because the TIF Program was designed to address cumulative concerns and the associated appropriate payment for specified improvements, participation in the TIF Program constitutes effective and adequate mitigation for Project cumulative impacts when the facility is identified as a "TIF-eligible Facility" in the 2012 *County of San Diego TIF Transportation Needs Assessment Report*.

Development of the Proposed Project would result in potentially significant direct traffic impacts to only one study area roadway segment and one intersection. Both of these facilities also would have cumulative impacts. As discussed above, the Project would have only cumulative impacts to an additional five roadway segments and three intersections (including two signalized intersections and one unsignalized intersection). The remainder of this discussion addresses impacts by jurisdiction: those projected to occur within County jurisdiction and those projected to occur within City of Escondido jurisdiction.

The Proposed Project would add direct and cumulative traffic to the segment of Country Club Drive from Auto Park Way to Hill Valley Drive in the City of Escondido, resulting in direct and cumulative impacts (TR-1a and 1b). Project effects would be mitigated through the widening of Country Club Drive to provide a paved width of 36 feet consisting of two travel lanes and a 10-foot striped center turn lane starting 220 feet southwest of Auto Park Way for a length of approximately 830 feet. Improvements would include connecting the existing sidewalk along the northern side of this roadway section with a 5-foot sidewalk complete with a 6-inch curb and gutter and providing a 4-foot decomposed granite pathway along the south side of this segment with a 6-inch asphalt berm. With the additional 12 feet added to the paved width, the roadway capacity of this Local Collector would increase to 15,000 ADT. These measures would improve traffic flow by providing improved intersection operations with re-striped traffic lanes. The mitigation would improve Country Club Drive operations in the City of Escondido and allow it to operate more efficiently compared to pre-Project conditions.

The Proposed Project would result in cumulative impacts to two City of Escondido signalized intersections: Auto Park Way/Country Club Drive (TR-8) and Valley Parkway/Citracado Parkway (TR-9). For Auto Park Way/Country Club Drive, the impact would be mitigated through restriping the eastbound approach at this intersection to provide one left-turn lane, one shared left-turn/ through lane, and one right-turn lane with a signal timing modification to change the east/west approach to "split" phasing. Implementation of the noted improvements to the noted segment of Country Club Drive would also mitigate the cumulative impact at this intersection in the City of Escondido to less than significant. The described improvements would return the forecasted LOS operations at this intersection to better than pre-Project conditions. For Valley Parkway/Citracado Parkway (TR-9), payment of a fair share toward the proposed future intersection improvements would support implementation of an additional through lane in the southbound direction, and would mitigate this cumulative impact to below a level of significance. (Consideration also was

given to an alternate proposal; the provision of an eastbound to southbound right-turn overlap phase to improve the a.m. LOS and reduce the cumulative impacts. The City has a right-turn restriction for this movement during the a.m. peak hour, however, which makes this improvement infeasible.)

Implementation of these roadway and intersection improvements in the City of Escondido would adequately mitigate the impacts. Therefore, once implemented, the Proposed Project's contribution to these direct and cumulative impacts in Escondido would be reduced to a less than significant level. Because the City of Escondido is a lead agency under CEQA for impacts within their jurisdiction, however; it is Escondido, and not the County, that has responsibility for approval/assurance of implementation of those improvements. As such, the County cannot guarantee ultimate implementation or timing of City of Escondido-approved mitigation. Therefore, the mitigation measure is not currently feasible. Thus, impacts within Escondido are identified as remaining significant and unavoidable pending City of Escondido action.

The Proposed Project would add to cumulative impacts to five roadway segments in the County: Country Club Drive from Hill Valley Drive to Kauana Loa Drive (TR-3), Harmony Grove Road from Country Club Drive to Harmony Grove Village Parkway (TR-4), Harmony Grove Road from Harmony Grove Village Parkway to Kauana Loa Drive (TR-5), Harmony Grove Road from Kauana Loa Drive to Enterprise Street (TR-6), and Harmony Grove Village Parkway from Harmony Grove Village Road to Citracado Parkway (TR-7). Two of these segments are identified as TIF-eligible facilities: TR-4 and TR-5. Project impacts for those two segments would be addressed through payment toward the County TIF Program, which would mitigate the cumulative impact at these locations to below a level of significance.

Relative to TR-3, the provision of the left-turn lane at the Country Club Drive/Eden Valley Lane intersection would provide a refuge lane for left-turning vehicles. This would improve the flow of northbound through traffic on Country Club Drive between Hill Valley Drive and Kauana Loa Drive, and reduce the potential for vehicular conflict due to the slowing of northbound traffic. Implementation of this mitigation measure would be expected to reduce this cumulative impact to less than significant.

Harmony Grove Road between Kauana Loa Drive and Enterprise Street (TR-6) is not a part of the General Plan roadway network and is an unclassified roadway on the Mobility Element. Therefore, it does not have any planned improvements beyond its existing configuration. Ultimately, construction of the Citracado Parkway Extension Project within the City of Escondido is planned to cul-de-sac Harmony Grove Road just east of Kauana Loa Drive. This would reduce traffic volume along this roadway and improve operations to acceptable LOS D or better as a result of a substantial shift in traffic patterns (as studied extensively in the Citracado Parkway Final EIR, approved February 2012 and included in the City's certified General Plan Update EIR). However, the City has no current plans to construct the Citracado Parkway Extension Project at this time, and does not have a financing plan to fund this improvement into which the Applicant could pay a fair share (LLG 2017). Also, the County is without jurisdiction to ensure the construction of the Citracado Parkway Extension Project and has no plans to make any improvements beyond its current configuration. This mitigation is therefore not considered feasible at this time.

Regardless, the segment is bound by two intersections, Harmony Grove Road/Kauana Loa Drive in the County and Harmony Grove Road/Enterprise Street in Escondido. The County intersection is located within the portion of Harmony Grove Road that is classified as a TIF-eligible facility. Therefore, the Project's TIF payment mitigates the shared intersection, which would improve operations on adjacent legs, both TIF and Non-TIF eligible. As such, cumulative improvements from TR-10 would apply to this impact, and implementation of mitigation measure TR-10 would be expected to reduce this cumulative impact to less than significant.

For TR-7 (Harmony Grove Village Parkway from Harmony Grove Village Road to Citracado Parkway), this segment is currently built to Community Collector standards providing 16,200 ADT of capacity. It is classified in the Mobility Element to be improved to a Community Collector providing additional capacity to 19,000 ADT. The segment is not, however, currently included as a TIF-eligible facility.

The segment is bound by two intersections: Harmony Grove Road/Harmony Grove Village Parkway in the County and Avenida Del Diablo/Citracado Parkway in Escondido. Both of these intersections are calculated to operate at LOS C or better during peak hours with both Project and cumulative project traffic volumes. As such, this segment also would be expected to operate at correspondingly acceptable LOS. Nonetheless, the cumulative contribution exceeds the County's threshold and a cumulative impact is identified.

Even though the intersection at Harmony Grove Road/Harmony Grove Village Parkway is calculated to operate at LOS C or better during peak hours with both Project and cumulative project traffic volumes, the construction of the northbound to eastbound right-turn overlap phase at this intersection would provide additional improvements to both a.m. and p.m. peak hour delays by 1.3 and 2.1 seconds, respectively. Where intersections operate at acceptable LOS, their adjoining segments also operate at acceptable LOS because the intersections control the system. Considering that the adjacent intersections currently operate acceptably, the intersection improvements would be expected to reduce this cumulative impact to less than significant.

The Proposed Project would result in a direct and cumulative impact to one County signalized intersection, Country Club Drive/Harmony Grove Road (TR-2a and 2b). To mitigate these impacts, the northbound approach would be widened to provide left- and right turn lanes (as well as through lanes), along with payment toward the County TIF Program. The implementation of the direct improvements would occur prior to occupancy of 23 Project units, thereby reducing Project effects on the intersection to less than significant levels, as well as the cumulative effect. Payment toward the TIF Program would reduce cumulative effects to a less than significant level by supporting County regional road improvements as needed.

The Proposed Project would result in a cumulative impact to one County unsignalized intersection, Harmony Grove Road/Kauana Loa Drive (TR-10). This intersection is located within the portion of Harmony Grove Road that is classified as a TIF-eligible facility. Therefore, payment toward the County TIF program would mitigate this cumulative intersection impact to below a level of significance.

Conclusion Summary

In conclusion, all direct and cumulative impacts within County of San Diego jurisdiction would be mitigated to below a level of significance through implementation of the specified mitigation measures.

The Proposed Project would add direct and cumulative traffic to the segment of Country Club Drive from Auto Park Way to Hill Valley Drive in the City of Escondido, resulting in direct and cumulative impacts (TR-1a and 1b). Project effects would be mitigated through the widening of Country Club Drive to provide a paved width of 36 feet consisting of two travel lanes and a 10-foot striped center turn lane starting 220 feet southwest of Auto Park Way for a length of approximately 830 feet. Improvements would include connecting the existing sidewalk along the northern side of this roadway section with a 5-foot sidewalk complete with a 6-inch curb and gutter and providing a 4-foot decomposed granite pathway along the south side of this segment with a 6-inch asphalt berm. With the additional 12 feet added to the paved width, the roadway capacity of this Local Collector would increase to 15,000 ADT.

The Proposed Project would result in cumulative impacts to two City of Escondido signalized intersections: Auto Park Way/Country Club Drive (TR-8) and Valley Parkway/Citracado Parkway (TR-9). For Auto Park Way/Country Club Drive, the impact would be mitigated through restriping the eastbound approach at this intersection to provide one left-turn lane, one shared left-turn/ through lane, and one right-turn lane with a signal timing modification to change the east/west approach to "split" phasing. Implementation of the noted improvements to the noted segment of Country Club Drive would also mitigate the cumulative impact at this intersection in the City of Escondido to less than significant. The described improvements would return the forecasted LOS operations at this intersection to better than pre-Project conditions. For Valley Parkway/Citracado Parkway, payment of a fair share toward the proposed future intersection improvements would support implementation of an additional through lane in the southbound direction, and, once implemented, would mitigate this cumulative impact to below a level of significance.

Implementation of these roadway and intersection improvements in the City of Escondido would adequately mitigate the identified impacts. Therefore, once implemented, the Proposed Project's contribution to direct and cumulative impacts in Escondido would be reduced to a less than significant level based on the implementation of the noted improvements.

Because the City of Escondido is a lead agency under CEQA for impacts within their jurisdiction, however, it is Escondido, and not the County, that has responsibility for approval/assurance of implementation of those improvements. As such, the County cannot guarantee ultimate implementation or timing of City of Escondido-approved mitigation in this County EIR. Thus, although appropriate mitigation has been identified to lower all Project-related impacts within the City to less than significant levels under CEQA once implemented, impacts within Escondido are identified as remaining significant and unavoidable pending City action.

Table 2.2-1
EXISTING TRAFFIC VOLUMES

Street Segment	ADT[a]	Jurisdiction
Auto Park Way		
1. Mission Road to Country Club Drive	26,110	Escondido
Citracado Parkway		
2. Avenida Del Diablo to West Valley Parkway	6,170	Escondido
Valley Parkway		
3. 11th Avenue to Citracado Parkway	24,110	Escondido
4. Auto Park Way to I-15 SB Ramps	37,280	Escondido
9th Avenue[b]		
5. West Valley Parkway to Auto Park Way	11,630	Escondido
Country Club Drive		
6. Auto Park Way to Hill Valley Drive	6,490	Escondido
Country Club Drive		
7. Hill Valley Drive to Kauana Loa Drive	5,980	County
8. Kauana Loa Drive to Harmony Grove Village Parkway	3,260	County
9. Harmony Grove Village Parkway to Harmony Grove Road	2,430	County
Harmony Grove Road		
10. Wilgen Drive to Country Club Drive	8,370	County
11. Country Club Drive to Harmony Grove Village Parkway	7,510	County
12. Harmony Grove Village Parkway to Kauana Loa Drive	5,890	County
13. Kauana Loa Drive to Enterprise Street	7,310	County/Escondido
Harmony Grove Village Parkway		
14. Harmony Grove Road to Citracado Parkway	8,220	County
Freeway Mainline Segments		
1. SR-78 West of Nordahl Road	159,000	Caltrans
2. SR-78 East of Nordahl Road	164,000	Caltrans

[a] Average Daily Traffic (ADT) Volumes collected in February and June of 2014 when schools were in session. Caltrans volumes taken from most recent available data

[b] 9th Avenue provides a paved width of 60 feet with a 12-foot center turn lane and 24-foot travel lanes in each direction (8-foot parking lane plus 16-foot travel lane). Therefore, a capacity of 15,000 ADT was used in the analysis

[c] Country Club Drive from Harmony Grove Village Parkway to Harmony Grove Road and Harmony Grove Village Parkway from Harmony Grove Road to Citracado Parkway were under construction at the time of data collection. With the construction of Harmony Grove Village and the new roadways in the area, the existing counts to portions of Country Club Drive, Harmony Grove Road, and Harmony Grove Village Parkway were adjusted to account for the rerouting of existing traffic and to incorporate the projected trips generated by the HGV project

Table 2.2-2
CALTRANS DISTRICT 11
FREEWAY SEGMENT LEVEL OF SERVICE DEFINITIONS

LOS	V/C	Congestion/Delay	Traffic Description
Used for Freeways, Expressways and Conventional Highways			
A	<0.41	None	Free flow
B	0.42-0.62	None	Free to stable flow, light to moderate volumes
C	0.63-0.80	None to minimal	Stable flow, moderate volumes, freedom to maneuver noticeably restricted
D	0.81-0.92	Minimal to substantial	Approaches unstable flow, heavy volumes, very limited freedom to maneuver
E	0.93-1.00	Significant	Extremely unstable flow, maneuverability and psychological comfort extremely poor
Used for Freeways and Expressways			
F(0)	1.01-1.25	Considerable: 0-1 hour delay	Forced flow, heavy congestion, long queues form behind breakdown points, stop and go
F(l)	1.26-1.35	Severe 1-2 hour delay	Very heavy congestion, very long queues
F(2)	1.36-1.45	Very Severe: 2-3 hour delay	Extremely heavy congestion, longer queues, more numerous breakdown points, longer stop periods
F(3)	>1.46	Extremely Severe: 3+ hours of delay	Gridlock

Table 2.2-3
EXISTING STREET SEGMENT OPERATIONS

City of Escondido Street Segments	Currently Built As	Existing Capacity (LOS E)[a]	ADT[b]	LOS[c]	V/C[d]
Auto Park Way					
1. Mission Road to Country Club Drive[e]	4-Lane Divided	43,500	26,110	B	0.600
Citracado Parkway					
2. Avenida Del Diablo to Valley Parkway	2-Lane Undivided	15,000	6,170	B	0.411
Valley Parkway					
3. 11th Avenue to Citracado Parkway	4-Lane Divided	37,000	24,110	C	0.652
4. Auto Park Way to I-15 SB Ramps	8-Lane Divided	70,000	37,280	B	0.533
9th Avenue					
5. Valley Parkway to Auto Park Way	2-Lane Undivided	15,000	11,630	D	0.775
Country Club Drive					
6. Auto Park Way to Hill Valley Drive	2-Lane Undivided	10,000	6,490	C	0.649
County of San Diego Street Segments	**Currently Built As**	**Existing Capacity (LOS E)[a]**	**ADT[b]**	**LOS[c]**	
Country Club Drive					
7. Hill Valley Drive to Kauana Loa Drive[f]	2-Lane Undivided	9,700	5,980	B	
8. Kauana Loa Drive to Harmony Grove Village Parkway[g]	2-Lane Undivided	9,700	3,260	A	
9. Harmony Grove Village Parkway to Harmony Grove Road[h]	2-Lane Undivided	19,000	2,430	A	
Harmony Grove Road					
10. Wilgen Drive to Country Club Drive[i]	2-Lane Undivided	19,000	8,370	C	
11. Country Club Drive to Harmony Grove Village Parkway[j]	2-Lane Undivided	16,200	7,510	D	
12. Harmony Grove Village Parkway to Kauana Loa Drive[j]	2-Lane Undivided	16,200	5,890	C	
13. Kauana Loa Drive to Enterprise Drive[k]	2-Lane Undivided	9,700	7,310	C	

Table 2.2-3 (cont.)
EXISTING STREET SEGMENT OPERATIONS

County of San Diego Street Segments (cont.)	Currently Built As	Existing Capacity (LOS E)[a]	ADT[b]	LOS[c]	V/C[d]
Harmony Grove Village Parkway					
14. Harmony Grove Road to Citracado Parkway[l]	2-Lane Undivided	16,200	8,220	D	

Notes:
[a] Capacities based on City of Escondido and County of San Diego Roadway Classification Tables
[b] Average Daily Traffic Volumes
[c] Level of Service
[d] Volume to Capacity ratio
[e] Auto Park Way is currently built as a 6-Ln Major from Mission Road to Meyers Avenue and a 4-Ln Major from Meyers Avenue to Country Club Drive. Therefore, a 5-Ln Major road capacity of 43,500 was used in the analysis
[f] Although Country Club Drive is not a Mobility Element roadway, due to the increased paved width and 45 mph speed limit and reduced shoulder, the roadway functions as a 2.2F Light Collector with an LOS "E" capacity of 9,700 ADT
[g] Country Club Drive from Kauana Loa Drive to the northerly boundary of Harmony Grove Village is currently being improved to modified Rural Light Collector standards per the previously adopted General Plan (corresponding with a 2.2F Light Collector on the 2011 General Plan) with an ADT capacity of 9,700. South of the HGV project boundary to Harmony Grove Village Parkway, Country Club Drive is being improved to Rural Collector standards per the previously adopted General Plan (corresponding with 2.2E Light Collector on the 2011 General Plan) with an ADT capacity of 16,200. For purposes of being conservative, the 9,700 ADT capacity was used in the buildout assessment
[h] From Harmony Grove Village Parkway to Harmony Grove Road, Country Club Drive is being improved to Town Collector standards per the previously adopted General Plan (corresponding with 2.1C Community Collector in the 2011 General Plan) with an ADT capacity of 19,000
[I] Harmony Grove Road from Wilgen Drive to Country Club Drive is currently being improved to 2.2C Light Collector standards with an ADT capacity of 19,000
[j] Harmony Grove Road from Country Club Drive to Kauana Loa Drive functions as a Rural Light Collector with a LOS C capacity of 16,200 ADT
[k] Harmony Grove Road from Kauana Loa Drive to Enterprise Street is currently built as a two-lane roadway with curb, gutter and sidewalk improvements for the majority of the roadway with a posted speed limit of 40 mph. The roadway is located in both the County and City's jurisdiction; however, the majority of the roadway abuts the County line. Therefore, an LOS E capacity of 9,700 ADT was used in the analysis.
[l] Harmony Grove Village Parkway is currently under construction to be built to 2.2E Light Collector standards with an ADT capacity of 19,000

Table 2.2-4
EXISTING INTERSECTION OPERATIONS

Intersection	Control Type	Peak Hour	Existing	
			Delay[a]	LOS[b]
City of Escondido Jurisdiction				
1. Nordahl Road / SR-78 WB Ramps	Signal	AM	22.4	C
		PM	25.2	C
2. Nordahl Road / SR-78 EB Ramps	Signal	AM	21.6	C
		PM	20.4	C
3. Auto Park Way / Mission Road	Signal	AM	32.1	C
		PM	33.7	C
4. Auto Park Way / Country Club Drive	Signal	AM	16.8	B
		PM	17.5	B
5. Harmony Grove Road / Enterprise St	Signal	AM	13.1	B
		PM	14.8	B
6. Avenida Del Diablo / Citracado Pkwy	Signal	AM	10.0	B
		PM	9.5	A
7. Valley Pkwy / I-15 NB Ramps	Signal	AM	26.5	C
		PM	35.1	D
8. Valley Pkwy / I-15 SB Ramps	Signal	AM	31.1	C
		PM	32.7	C
9. Valley Pkwy / Auto Park Way	Signal	AM	30.6	C
		PM	32.2	C
10. Valley Pkwy / 9th Avenue	Signal	AM	26.6	C
		PM	36.2	C
11. Valley Pkwy / 11th Avenue	Signal	AM	16.1	B
		PM	14.2	B
12. Valley Pkwy / Citracado Pkwy	Signal	AM	30.1	C
		PM	24.7	C
13. Auto Park Way / I-15 SB Ramps	Signal	AM	17.7	B
		PM	24.1	C
14. Auto Park Way / I-15 NB Ramps	Signal	AM	21.9	C
		PM	21.0	C

Table 2.2-4 (cont.)
EXISTING INTERSECTION OPERATIONS

Intersection	Control Type	Peak Hour	Existing	
			Delay[a]	LOS[b]
County of San Diego Jurisdiction				
15. Country Club Drive / Kauana Loa Drive	AWSC[c]	AM	8.2	A
		PM	8.8	A
16. Country Club Drive / Harmony Grove Village Parkway	AWSC	AM	8.9	A
		PM	10.3	B
17. Country Club Drive / Harmony Grove Road	Signal	AM	30.5	C
		PM	36.6	D
18. Harmony Grove Road / Kauana Loa Drive	MSSC[d]	AM	12.0	B
		PM	15.2	C
19. Harmony Grove Road / Harmony Grove Village Parkway	Signal	AM	24.2	C
		PM	20.9	C

Notes:
[a] Average delay expressed in seconds per vehicle
[b] Level of Service
[c] AWSC - All-Way Stop Controlled intersection. Average delay reported
[d] MSSC - Minor Street Stop Controlled intersection. Minor street left-turn delay is reported

Signalized	
Delay/LOS Thresholds	
Delay	LOS
0.0 ≤ 10.0	A
10.1 to 20.0	B
20.1 to 35.0	C
35.1 to 55.0	D
55.1 to 80.0	E
≥ 80.1	F

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

Table 2.2-5
EXISTING FREEWAY MAINLINE OPERATIONS

Freeway Segment	Dir.	# of Lanes[a]	Hourly Capacity[b]	Volume[c]	Peak Hour Volume[d]		V/C[e]		LOS[f]	
					AM	PM	AM	PM	AM	PM
State Route 78										
West of Nordahl Road	EB	3M+1A	7,200	159,000	4,994	4,983	0.694	0.692	C	C
	WB	3M	6,000		5,862	5,625	0.977	0.938	E	E
East of Nordahl Road	EB	3M+1A	7,200	164,000	4,144	5,097	0.576	0.708	B	C
	WB	4M+1A	9,200		5,663	5,070	0.616	0.551	B	B

Notes:
[a] Lane geometry taken from PeMS lane configurations at corresponding postmiles including SR-78 recent improvements
[b] Capacity calculated at 2000 vehicles per hour (vph) per lane for mainline lanes and 1200 vph for auxiliary lanes, from Caltrans Guide for the Preparation of Traffic Impact Studies, Dec 2002
[c] Existing ADT volumes taken from most recent Caltrans traffic volumes
[d] Peak hour volumes taken from most recent PeMS traffic volumes
[e] V/C = (Peak Hour Volume/Hourly Capacity)
[f] LOS = Level of Service

General Notes:
M = Mainline
A = Auxiliary Lane

LOS	V/C
A	<0.41
B	0.62
C	0.80
D	0.92
E	1.00
F(0)	1.25
F(1)	1.35
F(2)	1.45
F(3)	>1.46

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Table 2.2-6
ROADWAY SEGMENT OPERATIONS UNDER EXISTING AND EXISTING PLUS CUMULATIVE PLUS PROJECT CONDITIONS

City of Escondido Street Segments	Existing Capacity (LOS E)[a]	Existing			Existing + Project				Existing + Cumulative Projects			Existing + Project + Cumulative Projects				Impact Type
		ADT[b]	LOS[c]	V/C[d]	ADT	LOS	V/C	Δ[e]	ADT	LOS	V/C	ADT	LOS	V/C	Δ[e]	
Auto Park Way																
1. Mission Road to Country Club Drive	43,500	26,110	B	0.600	27,325	B	0.628	0.028	28,480	B	0.655	29,695	C	0.683	0.028	None
Citracado Parkway																
2. Avenida Del Diablo to Valley Parkway	15,000	6,170	B	0.411	7,970	B	0.531	0.120	6,610	B	0.441	8,410	C	0.561	0.120	None
Valley Parkway																
3. 11th Avenue to Citracado Parkway	37,000	24,110	C	0.652	25,145	C	0.680	0.028	24,800	C	0.670	25,835	C	0.698	0.028	None
4. Auto Park Way to I-15 SB Ramps	70,000	37,280	B	0.533	38,315	C	0.547	0.014	39,910	C	0.570	40,945	C	0.585	0.015	None
9th Avenue																
5. Valley Parkway to Auto Park Way	15,000	11,630	D	0.775	11,900	D	0.793	0.018	14,370	E	0.958	14,640	E	0.976	0.018	None
Country Club Drive																
6. Auto Park Way to Hill Valley Drive	10,000	6,490	C	0.649	**7,615**	**D**	**0.762**	**0.113**	9,530	E	0.953	**10,655**	**F**	**1.066**	**0.113**	**Direct & Cumulative**

County of San Diego Street Segments	Existing Capacity (LOS E)[a]	Existing		Existing + Project			Existing + Cumulative Projects		Existing + Project + Cumulative Projects			Impact Type
		ADT[b]	LOS[c]	ADT	LOS	Δ[e]	ADT	LOS	ADT	LOS	Δ[e]	
Country Club Drive												
7. Hill Valley Drive to Kauana Loa Drive	9,700	5,980	B	7,105	C	—	8,260	D	**9,385**	**E**	**1,125**	**Cumulative**
8. Kauana Loa Drive to Harmony Grove Village Parkway	9,700	3,260	A	4,250	A	—	5,980	B	6,970	C	—	None
9. Harmony Grove Village Parkway to Harmony Grove Road	19,000	2,430	A	3,420	B	—	3,810	B	4,800	B	—	None
Harmony Grove Road												
10. Wilgen Drive to Country Club Drive	19,000	8,370	C	8,730	C	—	11,690	D	12,050	D	—	None
11. Country Club Drive to Harmony Grove Village Parkway	16,200	7,510	D	10,660	D	—	10,680	D	**13,830**	**E**	**3,150**	**Cumulative**
12. Harmony Grove Village Parkway to Kauana Loa Drive	16,200	5,890	C	7,240	D	—	9,770	D	**11,120**	**E**	**1,350**	**Cumulative**
13. Kauana Loa Drive to Enterprise Street	9,700	7,310	C	8,525	D	—	11,520	F	**12,735**	**F**	**1,215**	**Cumulative**
Harmony Grove Village Parkway												
14. Harmony Grove Road to Citracado Parkway	16,200	8,220	D	10,020	D	—	10,360	D	**12,160**	**E**	**1,800**	**Cumulative**

Notes:
[a] Capacities based on City of Escondido and County of San Diego Roadway Classification Tables. See Table 2.2-3 for detailed notes on roadway capacities for Country Club Drive, Harmony Grove Road, and Harmony Grove Village Parkway
[b] ADT - Average Daily Traffic Volumes
[c] LOS - Level of Service
[d] V/C - Volume to Capacity ratio
[e] Δ denotes the Project-induced increase in V/C for City of Escondido roadway segments. Δ denotes the Project-induced increase in ADT for segments operating at LOS E or F located in the County of San Diego
[f] Auto Park Way is currently built as a 6-Lane Major from Mission Road to Meyers Avenue and a 4-Lane Major from Meyers Avenue to Country Club Drive. Therefore, a 5-Lane Major road capacity of 43,500 was used in the analysis
General Note: **Bold** typeface and **shading** represents a significant impact.

Table 2.2-7
INTERSECTION OPERATIONS UNDER EXISTING AND EXISTING PLUS CUMULATIVE PLUS PROJECT CONDITIONS

Intersection	Control Type	Peak Hour	Existing		Existing + Project			Existing + Cumulative Projects		Existing + Project + Cumulative Projects			Impact Type
			Delay[a]	LOS[b]	Delay	LOS	Δ [c]	Delay	LOS	Delay	LOS	Δ [c]	
City of Escondido Jurisdiction													
1. Nordahl Road / SR-78 WB Ramps	Signal	AM	22.4	C	22.5	C	0.1	27.1	C	30.1	C	3.0	None
		PM	25.2	C	25.7	C	0.5	31.6	C	32.1	C	0.5	
2. Nordahl Road / SR-78 EB Ramps	Signal	AM	21.6	C	21.6	C	0.0	22.1	C	22.9	C	0.8	None
		PM	20.4	C	21.1	C	0.7	29.4	C	31.9	C	2.5	
3. Auto Park Way / Mission Road	Signal	AM	32.1	C	32.1	C	0.0	51.9	D	52.6	D	0.7	None
		PM	33.7	C	34.1	C	0.4	49.5	D	50.0	D	0.5	
4. Auto Park Way / Country Club Drive	Signal	AM	16.8	B	19.5	B	2.7	30.7	C	**37.3**	**D**	**6.6**	**Cumulative**
		PM	17.5	B	18.9	B	1.4	22.4	C	25.3	C	2.9	
5. Harmony Grove Road / Enterprise St	Signal	AM	13.1	B	13.1	B	0.0	15.0	B	15.4	B	0.4	None
		PM	14.8	B	15.7	B	0.9	17.3	B	18.7	B	1.4	
6. Avenida Del Diablo / Citracado Pkwy	Signal	AM	10.0	B	10.2	B	0.2	10.4	B	10.6	B	0.2	None
		PM	9.5	A	10.1	B	0.6	10.3	B	11.1	B	0.8	
7. Valley Pkwy / I-15 NB Ramps	Signal	AM	26.5	C	26.7	C	0.2	31.0	C	31.2	C	0.2	None
		PM	35.1	D	36.0	D	0.9	39.3	D	40.6	D	1.3	
8. Valley Pkwy / I-15 SB Ramps	Signal	AM	31.1	C	31.8	C	0.7	39.9	D	39.9	D	0.0	None
		PM	32.7	C	33.2	C	0.5	63.0	E	64.6	E	1.6	
9. Valley Pkwy / Auto Park Way	Signal	AM	30.6	C	30.7	C	0.1	38.4	D	38.5	D	0.1	None
		PM	32.2	C	32.4	C	0.2	46.3	D	46.3	D	0.0	
10. Valley Pkwy / 9th Avenue	Signal	AM	26.6	C	27.1	C	0.5	31.3	C	31.7	C	0.4	None
		PM	36.2	C	36.9	D	0.7	49.4	D	50.7	D	1.3	
11. Valley Pkwy / 11th Avenue	Signal	AM	16.1	B	16.4	B	0.3	16.2	B	16.8	B	0.6	None
		PM	14.2	B	15.2	B	1.0	16.9	B	17.1	B	0.2	
12. Valley Pkwy / Citracado Pkwy	Signal	AM	30.1	C	33.8	C	3.7	36.7	D	**44.0**	**D**	**7.3**	**Cumulative**
		PM	24.7	C	27.2	C	2.5	26.6	C	29.1	C	2.5	
13. Auto Park Way / I-15 SB Ramps	Signal	AM	17.7	B	18.6	B	0.9	19.1	B	20.5	C	1.4	None
		PM	24.1	C	24.4	C	0.3	27.1	C	27.9	C	0.8	
14. Auto Park Way / I-15 NB Ramps	Signal	AM	21.9	C	22.1	C	0.2	22.5	C	22.7	C	0.2	None
		PM	21.0	C	21.6	C	0.6	21.7	C	22.3	C	0.6	
County of San Diego Jurisdiction													
15. Country Club Drive / Kauana Loa Drive	AWSC[e]	AM	8.2	A	8.7	A	—[d]	9.8	A	10.7	B	—	None
		PM	8.8	A	9.7	A	—	10.6	B	12.2	B	—	
16. Country Club Drive / Harmony Grove Village Parkway	AWSC	AM	8.9	A	9.4	A	—	10.0	B	10.8	B	—	None
		PM	10.3	B	11.4	B	—	11.1	B	12.4	B	—	
17. Country Club Drive / Harmony Grove Road	Signal	AM	30.5	C	39.7	D	—	40.4	D	43.1	D	—	**Direct & Cumulative**
		PM	36.6	D	**>100.0**	**F**	**>2.0**	49.9	D	**>100.0**	**F**	**>2.0**	
18. Harmony Grove Road / Kauana Loa Drive	MSSC[f]	AM	12.0	B	14.2	B	—	25.6	D	**48.6**	**E**	**75[g]**	**Cumulative**
		PM	15.2	C	18.4	C	—	32.2	D	**63.5**	**F**	**40[g]**	
19. Harmony Grove Road / Harmony Grove Village Parkway	Signal	AM	24.2	C	25.1	C	—	25.5	C	26.6	C	—	None
		PM	20.9	C	24.1	C	—	24.9	C	26.9	C	—	

Notes:
[a] Average delay expressed in seconds per vehicle;
[b] LOS - Level of Service;
[c] Δ denotes the Project-induced increase in V/C for City of Escondido roadway segments. Δ denotes the Project-induced increase in delay for signalized intersections and Project traffic added to the critical movement for unsignalized intersections located in the County of San Diego;
[d] Project increases in delay or number of trips only shown for County intersection where LOS E or F operations are reported;
[e] AWSC: All Way Stop Controlled Intersection. Average intersection delay is reported;
[f] MSSC: Minor Street Stop Controlled Intersection. Minor street left-turn delay is reported; [g] Both the northbound left-turn and right-turn volumes are shown for the LOS E/F intersection since the existing geometry provides one shared lane for both movements
General Note: **Bold** typeface and **shading** represents a significant impact.

Table 2.2-8
FREEWAY SEGMENT OPERATIONS UNDER EXISTING AND EXISTING PLUS CUMULATIVE PLUS PROJECT CONDITIONS

Freeway Segment	Dir.	# of Lanes[a]	Hourly Capacity[b]	Existing[c]		V/C[d]		LOS[e]		Existing + Project		V/C		LOS		Δ[f] V/C		Impact Type
				AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	
State Route 78 (SR-78)																		
West of Nordahl Road	EB	3M+1A	7,200	4,994	4,983	0.694	0.692	C	C	5,010	5,030	0.696	0.699	C	C	0.002	0.007	None
	WB	3M	6,000	5,862	5,625	0.977	0.938	E	E	5,900	5,645	0.983	0.941	E	E	0.006	0.003	None
East of Nordahl Road	EB	3M+1A	7,200	4,144	5,097	0.576	0.708	B	C	4,156	5,104	0.577	0.709	B	C	0.002	0.001	None
	WB	4M+1A	9,200	5,663	5,070	0.616	0.551	B	B	5,668	5,086	0.616	0.553	B	B	0.001	0.002	None
Freeway Segment	**Dir.**	**# of Lanes[a]**	**Hourly Capacity[b]**	**Existing + Cumulative Projects**		**V/C[d]**		**LOS[e]**		**Existing + Project + Cumulative Projects**		**V/C**		**LOS**		**Δ[f] V/C**		**Impact Type**
				AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	
State Route 78 (SR-78)																		
West of Nordahl Road	EB	3M+1A	7,200	5,547	5,535	0.770	0.769	C	C	5,563	5,582	0.773	0.775	C	C	0.002	0.007	None
	WB	3M	6,000	6,511	6,248	1.085	1.041	F(0)	F(0)	6,549	6,268	1.091	1.045	F(0)	F(0)	0.006	0.004	None
East of Nordahl Road	EB	3M+1A	7,200	4,424	5,442	0.615	0.756	B	C	4,436	5,449	0.616	0.757	B	C	0.002	0.001	None
	WB	4M+1A	9,200	6,046	5,413	0.657	0.588	C	B	6,051	5,429	0.658	0.590	C	B	0.001	0.002	None

Notes:
[a] Lane geometry taken from 2011 PeMS lane configurations at corresponding postmile, including recent SR 78 improvements
[b] Existing volumes taken from PeMS peak hour data
[c] Capacity calculated at 2000 vehicles per hour (vph) per mainline lane (pcphpl) and 1200 vph per lane for auxiliary lanes from Caltrans Guide for the Preparation of Traffic Impact Studies, Dec 2002
[d] V/C = Peak Hour Volume/Hourly Capacity
[e] LOS = Level of Service
[f] Δ denotes the Project-induced increase in V/C. Per SANTEC/ITE Guidelines, a significant impact occurs when the V/C is reduced by 0.01 for LOS E or F.

General Notes:
M = Mainline
A = Auxiliary Lane

LOS	V/C
A	<0.41
B	0.62
C	0.80
D	0.92
E	1.00
F(0)	1.25
F(1)	1.35
F(2)	1.45
F(3)	>1.46

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Table 2.2-9
ROADWAY SEGMENT OPERATIONS UNDER BUILDOUT CONDITIONS

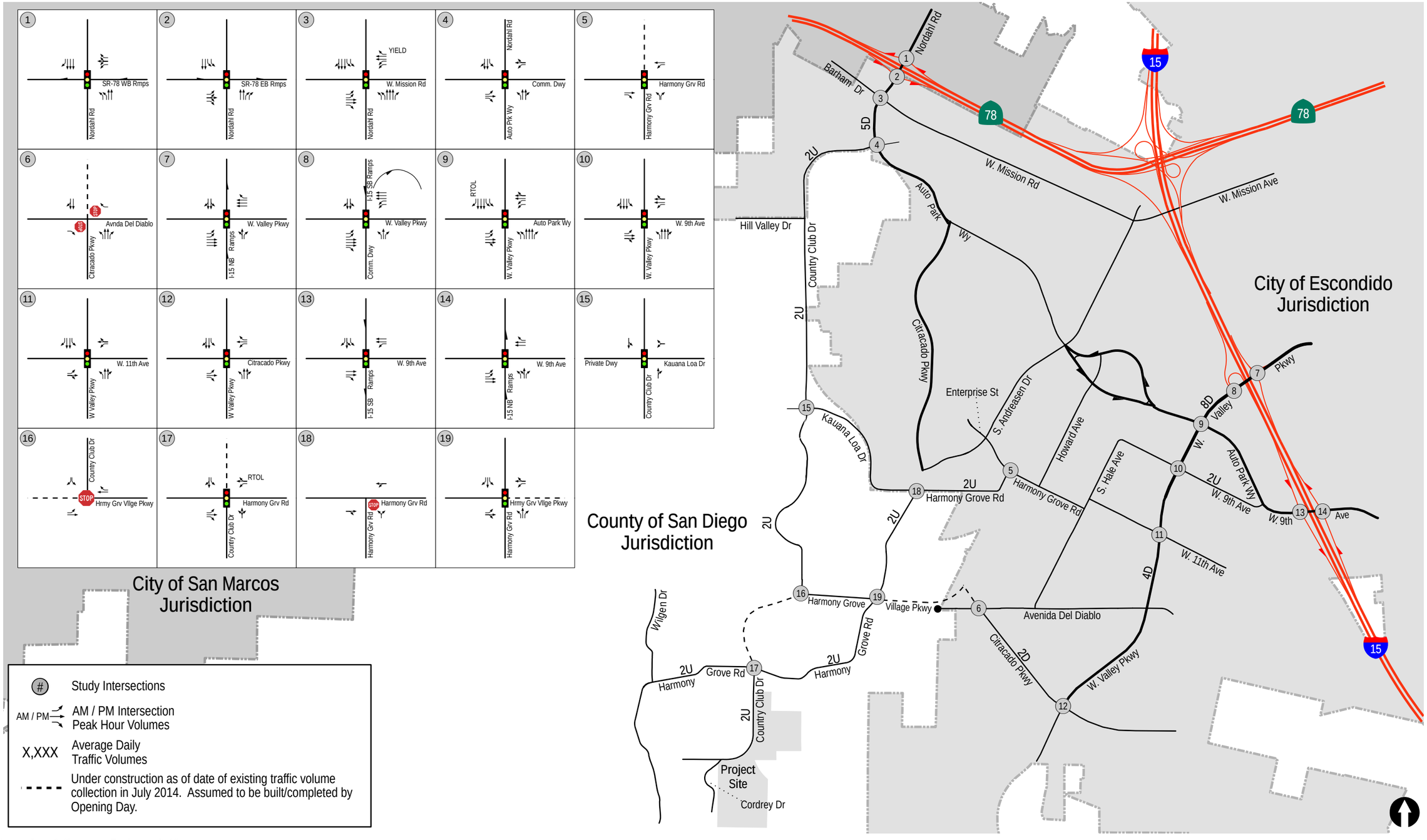
City of Escondido Street Segments	General Plan Capacity (LOS E)[a]	Buildout without Project (General Plan Land Use)			Buildout with Project (Proposed Project Land Use)		
		ADT[b]	LOS[c]	V/C[d]	ADT[b]	LOS[c]	V/C[d]
Auto Park Way							
1. Mission Road to Country Club Drive	50,000	31,600	C	0.632	32,216	C	0.644
Citracado Parkway							
2. Avenida Del Diablo to Valley Parkway	37,000	24,900	C	0.673	25,812	C	0.698
Valley Parkway							
3. 11th Avenue to Citracado Parkway	37,000	18,800	B	0.508	19,324	B	0.522
4. Auto Park Way to I-15 SB Ramps	70,000[e]	50,000	C	0.714	50,524	C	0.722
9th Avenue							
5. Valley Parkway to Auto Park Way	34,200	10,800	A	0.316	10,937	A	0.320
Country Club Drive							
6. Auto Park Way to Hill Valley Drive	10,000	7,500	D	0.750	8,070	D	0.807

County of San Diego Street Segments	General Plan Capacity (LOS E)[a]	Buildout without Project (General Plan Land Use)		Buildout with Project (Proposed Project Land Use)	
		ADT[b]	LOS[c]	ADT[b]	LOS[c]
Country Club Drive					
7. Hill Valley Drive to Kauana Loa Drive	9,700	6,300	B	6,870	C
8. Kauana Loa Drive to Harmony Grove Village Parkway	9,700	3,600	A	4,102	A
9. Harmony Grove Village Parkway to Harmony Grove Road	19,000	3,900	B	4,402	B
Harmony Grove Road					
10. Wilgen Drive to Country Club Drive	16,200	8,000	C	8,182	C
11. Country Club Drive to Harmony Grove Village Parkway	19,000	9,900	D	11,496	D
12. Harmony Grove Village Parkway to Kauana Loa Drive	19,000	9,100	C	9,784	D
13. Kauana Loa Drive to Enterprise Drive	9,700	5,500	A	5,500	A

Table 2.2-9 (cont.)
ROADWAY SEGMENT OPERATIONS UNDER BUILDOUT CONDITIONS

County of San Diego Street Segments	General Plan Capacity (LOS E)[a]	Buildout without Project (General Plan Land Use)		Buildout with Project (Proposed Project Land Use)	
		ADT[b]	LOS[c]	ADT[b]	LOS[c]
Harmony Grove Village Parkway					
14. Harmony Grove Road to Citracado Parkway	19,000	9,200	C	10,112	D

Notes:
[a] Capacities based on City of Escondido and County of San Diego Roadway Classification Tables
[b] ADT – Average Daily Traffic Volumes
[c] LOS – Level of Service
[d] V/C – Volume to Capacity ratio
[e] From Auto Park Way to the I-15 Southbound Ramps, W. Valley Parkway is currently built as an eight-lane divided roadway with an existing LOS E capacity of 70,000 ADT, exceeding its *Mobility Element* classification; the existing eight-lane capacity was used in the buildout assessment



Source: Linscott Law & Greenspan Engineers, 2018

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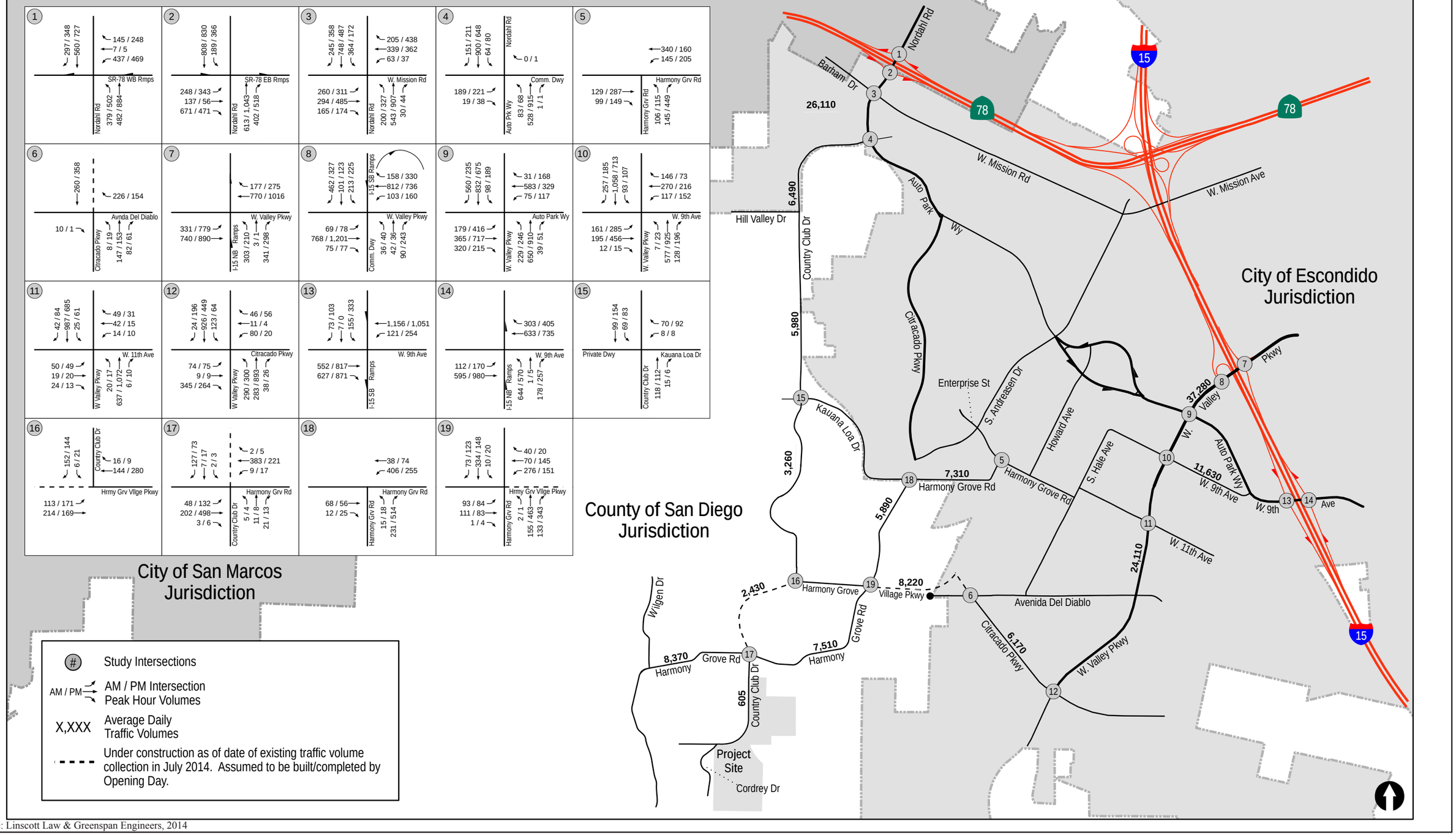
Existing Conditions

HARMONY GROVE VILLAGE SOUTH

Figure 2.2-1

HELIX Environmental Planning



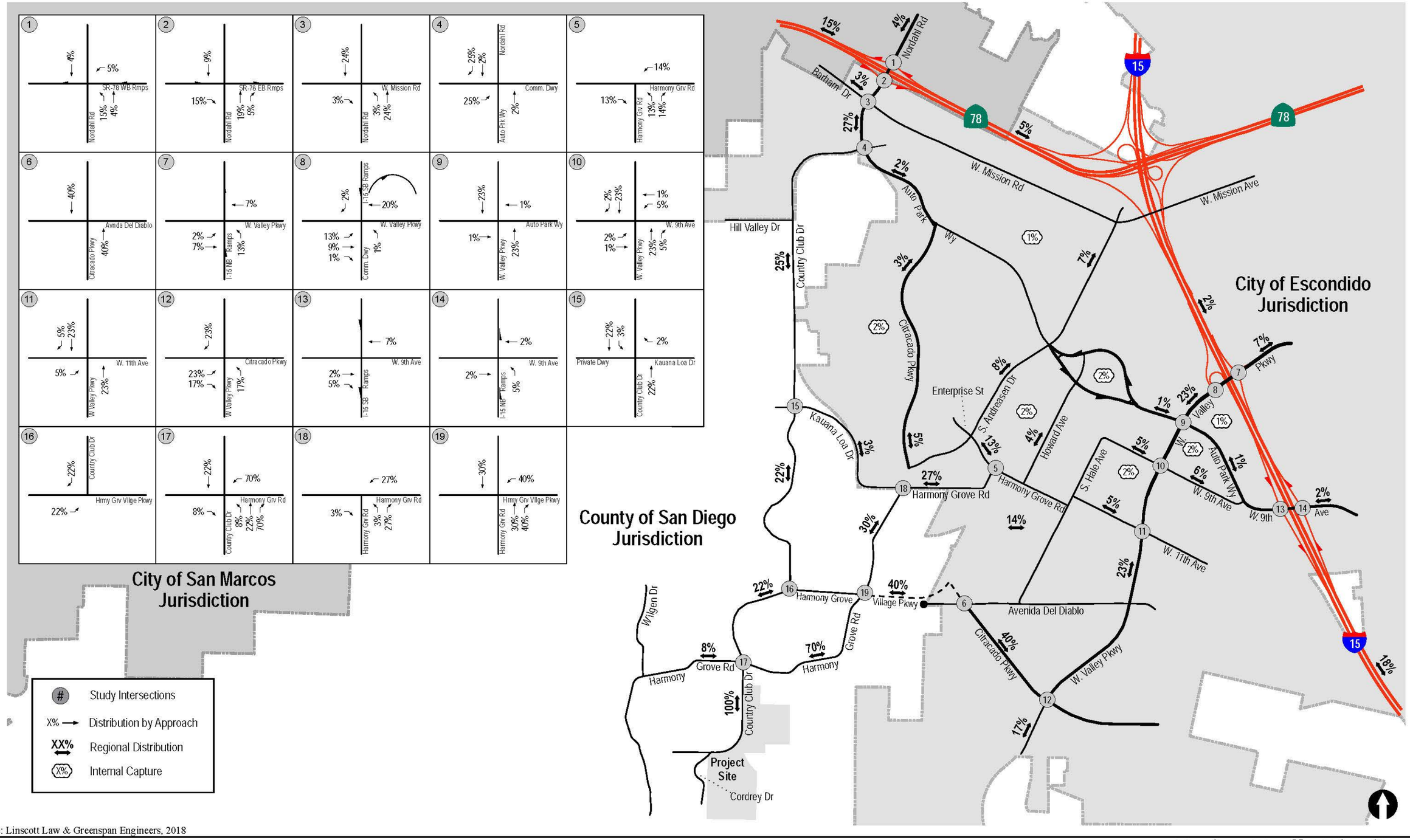
Source: Linscott Law & Greenspan Engineers, 2014

Existing Traffic Volumes

HARMONY GROVE VILLAGE SOUTH

Figure 2.2-2

HELIX Environmental Planning



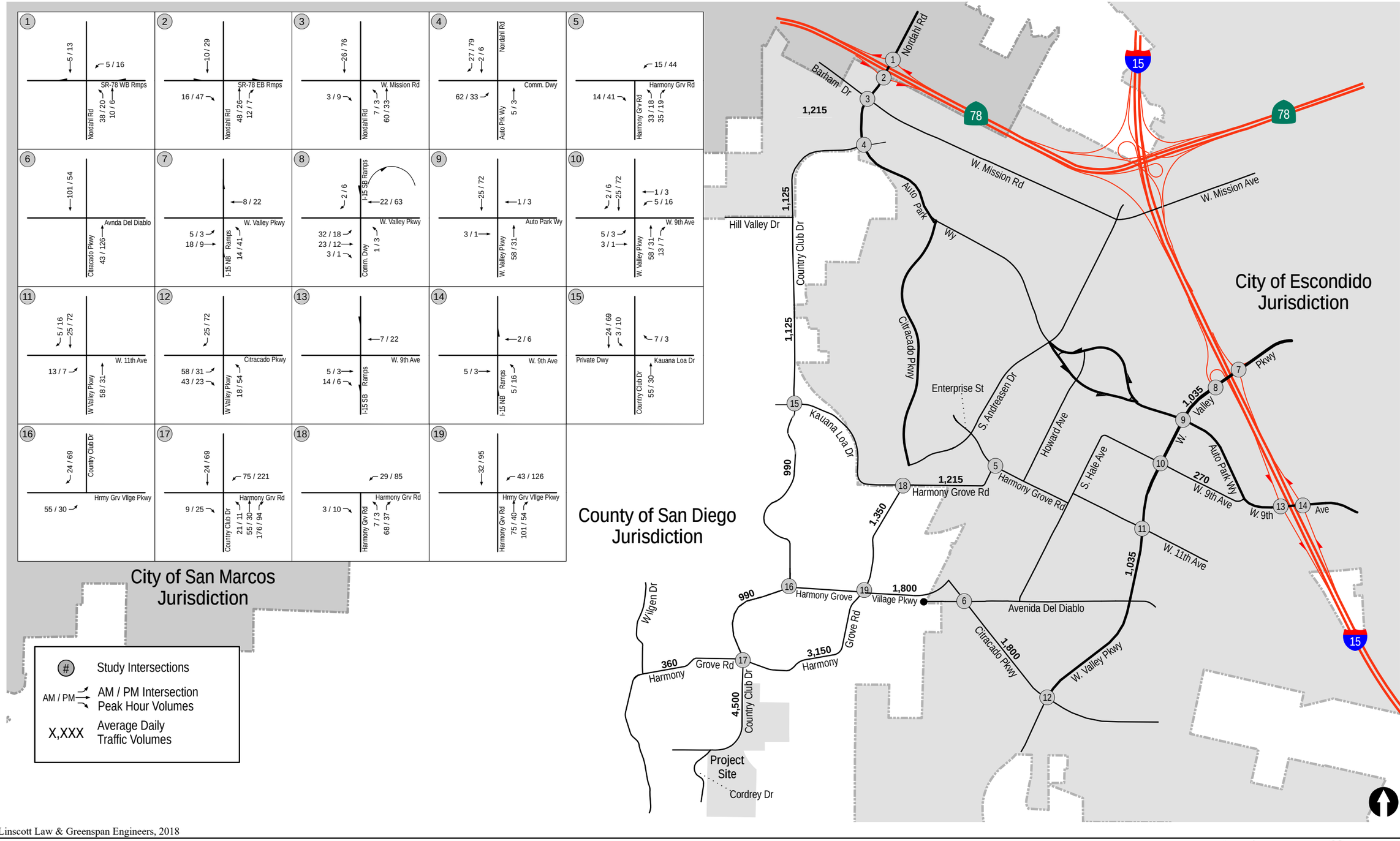
Source: Linscott Law & Greenspan Engineers, 2018

Project Traffic Distribution

HARMONY GROVE

Figure 2.2-3

HELIX Environmental Planning



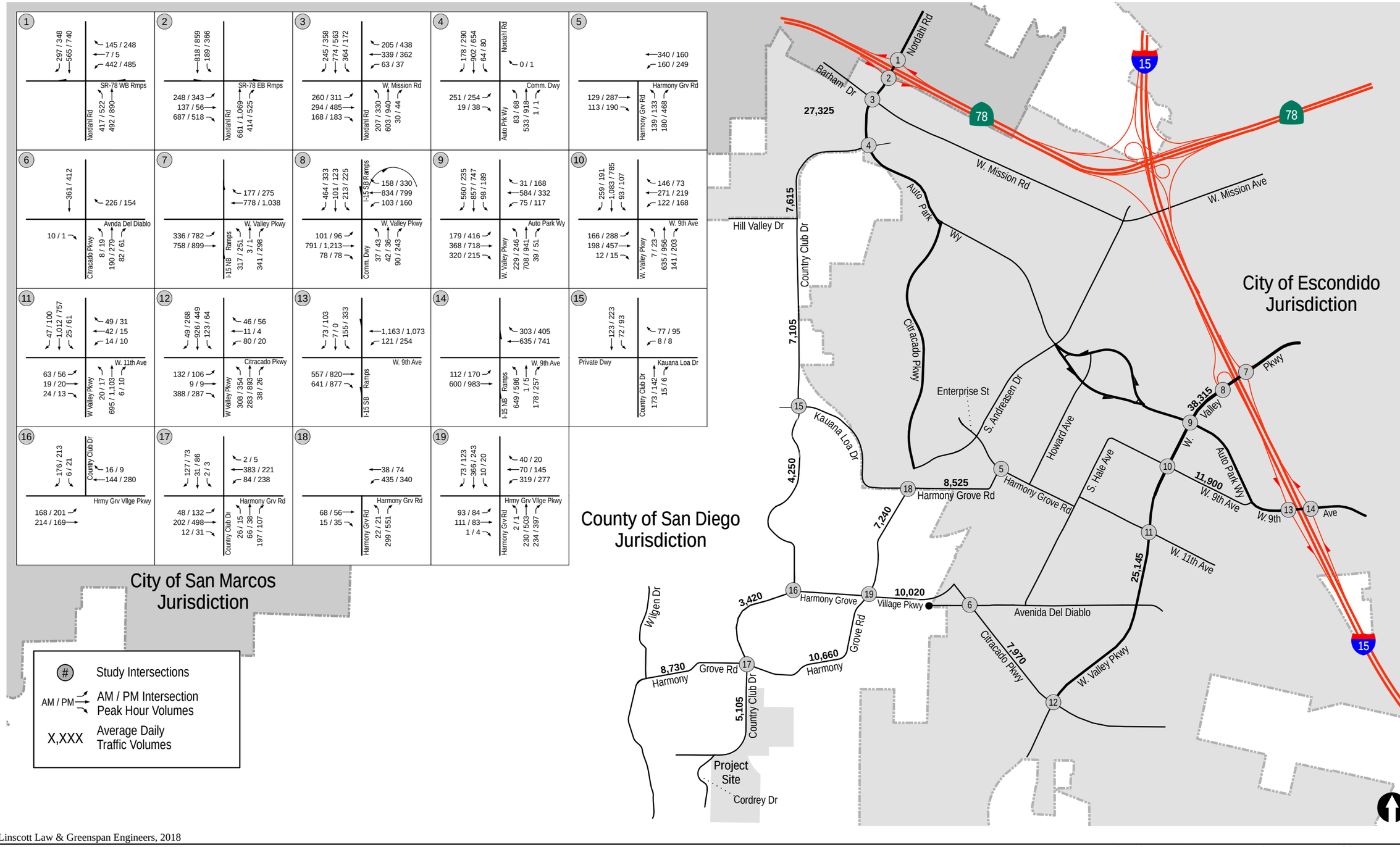
Source: Linscott Law & Greenspan Engineers, 2018

Project Traffic Volumes

HARMONY GROVE

Figure 2.2-4

HELIX Environmental Planning



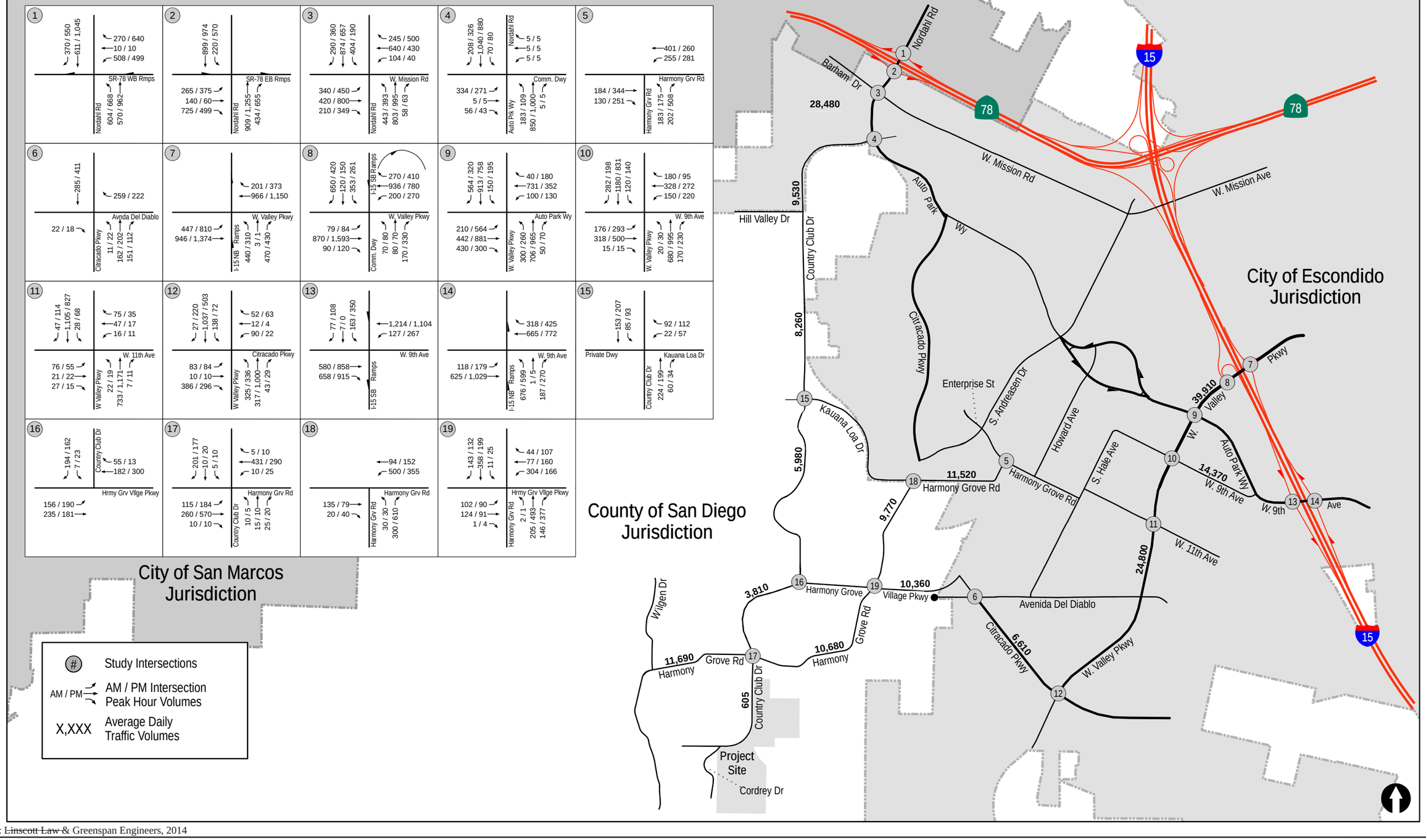
Source: Linscott Law & Greenspan Engineers, 2018

Existing Plus Project Traffic Volumes

HARMONY GROVE

Figure 2.2-5

HELIX Environmental Planning



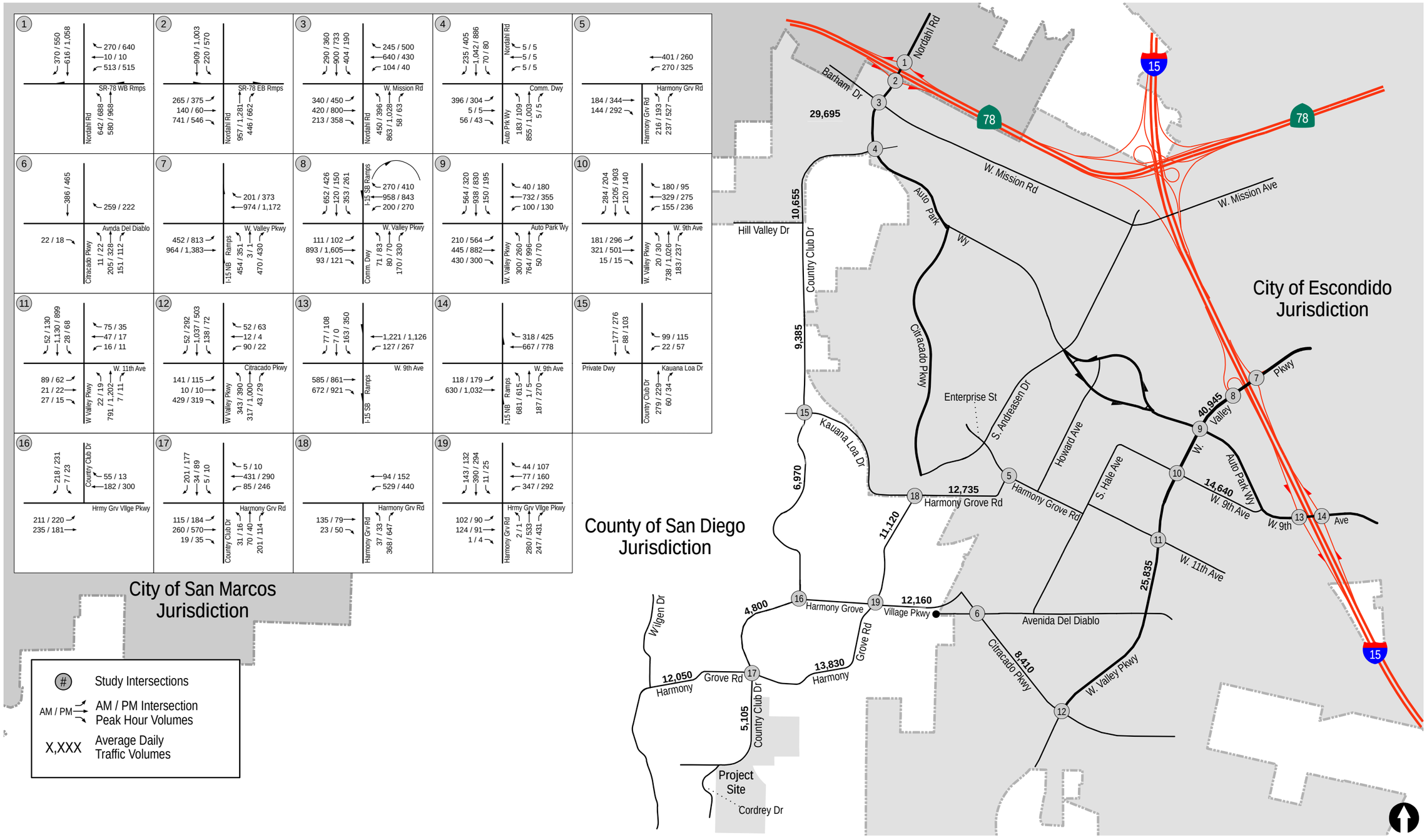
Source: ~~Linscott Law &~~ Greenspan Engineers, 2014

Existing Plus Cumulative Traffic Volumes

HARMONY GROVE

Figure 2.2-6

HELIX Environmental Planning



Source: Linscott Law & Greenspan Engineers, 2018

Existing Plus Cumulative Plus Project Traffic Volumes

HARMONY GROVE

Figure 2.2-7

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