TRANSPORTATION IMPACT ANALYSIS

Summit School (539 E Weddell Drive)

PREPARED FOR:

CITY OF SUNNYVALE

MARCH 2016 | FINAL

Prepared By:

Kimley»Horn

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AUTO TRIP REDUCTION STATEMENT

UPDATED: October 2014

SANTA CLARA Valley Transportation Authority

PROJECT INFORMATION	*Relevant TIA Section:*	Proposed Site Use
Project Name: Summit School		
Location: 539 E Weddell Drive		
Description: The proposed project will reuse a 19,402 square foot building and temporarily locate two (2) 960 square foot portable classrooms for a public charter school for students in grade 6 through 8.		

Size (net new):	*D.U. Residential*	19,402	*Sq. Ft. Comm.*	*Acres (Gr.)*
Density:	*D.U. / Acre*			*Floor Area Ratio (FAR)*

Located within 2000 feet walking distance of an LRT, BRT, BART or Caltrain station or major bus stop? Yes

PROJECT AUTO TRIP GENERATION	*Relevant TIA Section:*	Trip Generation		
Auto Trips Generated:	205 *AM Pk Hr*	61 *PM Pk Hr*	658 *Total Weekday*	
Methodology (check one)	☒ **ITE**	☐ **Other** *(Please describe below)*		

AUTO TRIP REDUCTION APPROACH	*Relevant TIA Section:*		
☐ **Standard** *Complete Table A below*	☐ **Peer/Study-Based** *Complete Table B below*	☐ **Target-Based** *Complete Table C below*	☒ **None Taken**

TRIP REDUCTION REQUIREMENTS	*Relevant TIA Section:*	
Is the project required to meet any trip reduction requirements or targets? No	**If so, specify percent:**	
Reference code or requirement:		

TRIP REDUCTION APPROACHES

A. STANDARD APPROACH	*Relevant TIA Section:*				
Type of Reduction *Specify reduction. See Table 2 in TIA Guidelines*		**% Reduction from ITE Rates**	**Total Trips Reduced (AM/PM/Daily)**	**TOTAL REDUCTION CLAIMED**	
				%	**Trips**
Transit					
Mixed-Use					
Financial Incentives					
Shuttle					

B. PEER/STUDY-BASED APPROACH	*Relevant TIA Section:*		
Basis of Reduction		**TOTAL REDUCTION CLAIMED**	
		%	**Trips**

C. TARGET-BASED APPROACH		Relevant TIA Section:			
Type of Reduction (check all that apply)				TOTAL REDUCTION CLAIMED	
❒ % Trip Reduction	❒ % SOV mode share	❒ Trip Cap		%	Trips
Description					
Time period for reduction	Peak Hour	Peak Period	Full Day		
	❒ AM/PM	❒ AM/PM	❒		

OTHER TDM/REDUCTION MEASURES			
Bicycle/Pedestrian	Yes	Relevant TIA Section:	
The school's main entrance is located on the west side of the building, which is near the sidewalks on E Weddell Drive. The site will provide bike racks for up to 13 bicycles.			
Parking Management	No	Relevant TIA Section:	
Transit	No	Relevant TIA Section:	
The school is within walking distance to bus stops for VTA bus route 26, where passengers can connect to VTA Light Rail Transit Line 902.			
Site Planning and Design	No	Relevant TIA Section:	
TDM Program	No	Relevant TIA Section:	
The proposed project will have a TDM program which will consist of carpooling and promoting other forms of transportation such as tranist, bike and walking.			

IMPLEMENTATION	Relevant TIA Section:	
Have the project sponsor and Lead Agency agreed to any of the following measures?		
❒Monitoring		
❒Enforcement		
❒Data Sharing		

EXECUTIVE SUMMARY

Summit School ("Project"), is a proposed charter middle school located at 539 E Weddell Drive in the City of Sunnyvale, California. The proposed project will reuse a 19,402 square foot building and temporarily use two (2) 960 square foot portable classrooms. During the first school year, the proposed school will enroll students from grades 6 to 9, with a maximum enrollment of 400 students. After the first school year, the school will enroll students from grades 6 to 8, with a maximum enrollment of 300 students. The two temporary use portable classrooms will be removed after the first school year.

The project site is located on E Weddell Drive. The site will be accessed by two driveways. The south driveway will be ingress only and the east driveway will be egress only.

This traffic study was prepared to determine potential impacts related to the project based on standards and methodologies set forth by the City of Sunnyvale (City) and the Santa Clara Valley Transportation Authority (VTA). This study includes intersection level of service (LOS) and queuing analyses of the AM, School PM, and commute PM peak hour traffic conditions for fifteen (15) intersections. This study also addresses the potential transportation effects of the proposed project to assist the City with project planning and the identification of potential conditions of approval for the project.

PROJECT TRIP ESTIMATES

The number of project trips anticipated to be added to the roadway system surrounding the project site was estimated based on data published in the Institute of Transportation Engineer's (ITE) *Trip Generation 9th Edition.* During Existing and Existing Plus Background conditions, the project will generate 205 trips in the AM, 120 trips in the School PM, and 61 trips in the PM peak hour. During the Cumulative conditions, the project will generate 162 trips in the AM, 91 trips in the School PM, and 48 trips in the PM peak hour. These trip generation numbers are based on the 400 students and 300 student enrollment levels in the Existing and Cumulative conditions, respectively.

INTERSECTION LEVEL OF SERVICE

This study includes a LOS analysis of the AM, School PM, and PM peak hour traffic conditions for fifteen (15) intersections analyzed in the *Traffix* software package.

EXISTING CONDITIONS

It is evaluated that all study intersections will operate at acceptable LOS under the Existing and Existing Plus Project conditions.

EXISTING PLUS BACKGROUND CONDITIONS

It is evaluated that all study intersections will operate at acceptable LOS under the Existing Plus Background and Existing Plus Background Plus Project conditions.

CUMULATIVE CONDITIONS

It is evaluated that all study intersections will operate at acceptable LOS under the Cumulative and Cumulative Plus Project conditions.

FREEWAY LEVEL OF SERVICE

The VTA CMP guidelines dictate that a freeway segment be analyzed if the project adds the traffic equivalent of at least one percent of the freeway capacity. No freeway analysis was conducted since the proposed Project would not add sufficient traffic to freeway segments to cause a significant impact. Therefore, no freeway analysis was required.

FREEWAY RAMP ANALYSIS

Potential impacts on the nearby US 101 and Fair Oaks Avenue freeway on-ramps were evaluated in accordance with Caltrans Traffic Impact Studies (TIS) guidelines. The TIS guidelines state that a TIS is needed when a project generates over 100 peak hour assigned to a State highway facility. The evaluation result showed that the proposed Project would not add sufficient traffic to the freeway on-ramps to substantially degrade ramp operations and to cause a potentially significant impact; therefore, no further freeway ramp analysis is required.

INTERSECTION VEHICLE QUEUING

Vehicle queuing for each study intersection was analyzed using the *Highway Capacity Manual, 2000* (HCM) methodology. The 95th percentile queue length was compared to the turn pocket storage length to determine if queues would exceed the storage length. Only left turn queues were evaluated for operational deficiencies.

The City of Sunnyvale does not have a standard for queuing impacts but considers queuing issues as operational deficiencies. The analysis showed that a queuing storage deficiency would occur at the following intersections due to the proposed project traffic. Notes concerning the queuing storage deficiency and recommended improvements to resolve the deficiency are noted below, where applicable:

- #2 – N Fair Oaks Avenue / E Weddell Drive (northbound left turn)
    - No feasible improvement and queuing deficiency will remain.
- #6 – N Fair Oaks Avenue / E Duane Avenue (eastbound left turn)
    - No feasible improvement and queuing deficiency will remain.
- #8 – N Fair Oaks Avenue / Maude Avenue (eastbound left turn)
    - Additional queue storage available with existing two-way left-turn lane (TWLTL) and no improvement is recommended.

SITE ACCESS AND CIRCULATION

Site access was evaluated at the Project driveways, as listed below:

- Intersection #14 – E Weddell Drive / East Project Driveway
- Intersection # 15 – E Weddell Drive / South Project Driveway

Both driveways are unsignalized intersections. The south driveway will be ingress only and the east driveway will be egress only. The driveways were determined to operate at an acceptable LOS at the completion of the proposed project.

The student drop-off zone is located north of the school building. The proposed configuration of the drop-off and pick-up route allows for 365 feet of queuing from the student drop-off zone to the throat of the south

project driveway. An analysis of on-site queuing indicates that vehicles are not expected to queue beyond the depth of the driveway throat nor spill onto E Weddell Drive.

Previous site plans indicated that the main entrance for the school to be on the east side of the building, which is adjacent to E Weddell Drive. With this previous site configuration, there was added incentive for parents to drop-off or pick-up students at the curb adjacent to the school, rather through at the school's drop-off zone. This could disrupt traffic on E Weddell Drive. Also, there is an existing restriction for no on-street parking along E Weddell Drive.

Subsequent to the TIA Draft Report dated February 2016, the main entrance for the school has been relocated to the north side of the building, adjacent to the proposed student loading area. The two existing entrances on the south and east side of the building will remain, but will be for egress only. While the new configuration will decrease the incentive, there is still the potential for parents to do curbside drop-off or pick-up adjacent to the east side of the school. It is recommended that the curb in front of the school be signed as "No Stopping", and school be conditioned through Project approval to monitor and disallow on-street parking activities and to prohibit ingress through the eastern doors.

PARKING REQUIREMENTS

The parking proposed by the project was reviewed to be consistent with local parking policies and guidelines. The project proposes to provide 39 stalls and 5 short-term stalls in the student drop off and truck loading zone.

The City of Sunnyvale Municipal Code (SMC) requires that Primary School (Grades K-8) provide three (3) spaces per classroom. For the first year, the proposed project poses to have 13 classrooms and 11 classroom thereafter, which equates to 39 and 33 spaces, respectively. The propose project provides a total of 39 parking spaces, which meets the City's requirement for the number of spaces.

The City requires in its Municipal Code to provide a minimum of 8.5 feet by 18 feet long parking stalls for a standard space. SMC section 19.46.120 allows "low-growing groundcover two feet beyond a wheel stop or curb may be counted towards minimum space length". Therefore, the proposed parking lot design does meet the City's design requirements. However, it should be noted that these 90 degree spaces are adjacent to the 20-foot emergency vehicle access and the drop-off zone. Any vehicle exceeding the compact space size will reduce the emergency vehicle access below the standard.

PEDESTRIAN ACCESS AND CIRCULATION

The main building entrance for the school will be located on the north side of the building, adjacent to the proposed student loading zone. The two existing entrances on the south and east sides of the building will remain, but will be for egress only. Students being dropped off on the north side of the building will now have direct access to the school entrance. For vehicles parked on the west side of the school, there is a striped crosswalk which connects to a dedicated walkway adjacent to the west side of the school.

BICYCLE ACCESS AND CIRCULATION

The SMC requires that nonresidential uses provide bicycle spaces equal to five percent of the total number of vehicular parking spaces provided. The proposed site will provide 39 vehicle parking spaces, and will need to provide at least two bicycle spaces. The Project will provide bike racks that can hold a maximum of 13 bicycles, which meets the City's requirement for the number of bicycle spaces.

It should be noted that VTA *Bicycle Technical Guidelines* recommends a minimum of one (1) bicycle parking space per 30 employees and one (1) bicycle parking space per 12 students. For the proposed site that would equate to 34 spaces for the first year (1 space for employees and 33 spaces for students) and 26 spaces (1 space for employees and 25 for students) thereafter. Based on VTA standards, the proposed project does not have adequate bicycle parking.

The number of recommended bicycle spaces will vary by school based on many factors such as the biking culture of the school and surrounding area, school programs for active transportation, the bicycle experience to and from school, etc. While it is unknown at this time what the optimal number of bike racks should be, it is recommended that the proposed site monitor the use of bike storage and be required to provide additional storage if greater than 75% of proposed bike racks are utilized more than two days per week.

From the proposed site, bicyclists can access the City network of bicycle facilities via the bicycle lanes adjacent to the site on E Weddell Drive.

SCHOOL SAFETY ASSESSMENT

The roadway, bicycle, and pedestrian facilities adjacent and surrounding the proposed school were evaluated to assess the safety for students and parents. The assessment evaluated existing conditions for pedestrian, bicycle, and vehicle circulation, as well as discuss proposed improvements.

EXISTING CONDITIONS

An inventory of existing facilities was taken to identify potential barriers of challenges for students and parents to use active modes of travel within the vicinity of the school.

Adjacent to the proposed site, pedestrians will most likely use the sidewalks along E Weddell Drive or walk along the John W. Christian Greenbelt. Within the surrounding area there are some existing crosswalks, which includes the west leg at the intersection of Borregas Avenue and E Weddell Drive, the mid-block crossing for the W. Christian Greenbelt at Morse Avenue, and crosswalks at all four legs of the signalized intersection of N Fair Oaks and E Weddell Drive. Bicyclists may utilize the bicycle lanes along Borregas Avenue, Morse Avenue, and E Weddell Drive. Both pedestrians and bicyclists south of US-101 may use the bicycle/pedestrian bridge located at Ahwanee Avenue and Borregas Avenue.

Due to the existing surrounding land uses, there is no existing school-related striping or signage. With a proposed transition of uses to residential and the proposed school use, pedestrian and bicycle uses will increase and additional infrastructure improvements are needed such as additional crosswalks along and across E Weddell Drive.

PROPOSED IMPROVEMENTS

The following improvement should be implemented to improve safety in the immediate school vicinity and also encourage the use and increase safety of active transportation modes such as bicycling and walking:

- Install school-related signage and striping per 2014 CA MUTCD such as school speed limit signs, crossing ahead, ‘SLOW SCHOOL XING’ pavement markings, and school crosswalks
- Install rectangular rapid flashing beacon (RRFB) crosswalks
- Install sidewalks and pedestrian ramps
- School develop a walking and bicycle plan

- School develop pick-up and drop off procedure
- Update on-site striping and signage to emphasis one-way circulation

TRANSIT, PEDESTRIAN, AND BICYCLE

The proposed project was evaluated to determine if it would likely conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks) or generate pedestrian, bicycle, or transit travel demand that would not be accommodated by existing transit, bicycle, or pedestrian facilities and plans.

TRANSIT

For those taking transit, they can utilize the VTA bus route 26 that operates along Fair Oaks Avenue. There is a bus stop at the intersection of N Fair Oaks Avenue and Weddell Drive that provide access to the local transit system. Based on additional information, the project would not conflict with existing or planned transit facilities.

Transit vehicle delay was also considered for transit routes that operate within the study area. Transit vehicles for the transit routes in the study area are expected to use the shared right-of-way with other motorists. Since the proposed project is anticipated to increase the vehicle delay at study intersections, transit vehicle delay may increase. It should be noted that there are no impact thresholds for transit delay and therefore the transit delay is provided for informational purposes only.

The increases in transit vehicle delay are all less than 5 seconds in the AM, School PM, and PM peak. This increase in transit vehicle delay should not significantly affect the overall schedule for the transit routes.

Since the project does not conflict with existing or planned transit facilities and there are adequate facilities for pedestrian and bicycles to access transit stops, the project will have a **less than significant impact** on transit services.

PEDESTRIAN

There are existing sidewalks along the project frontage on E Weddell Drive. It is anticipated that pedestrians would use these sidewalks along the project frontage to access transit stops nearby. At the signalized intersection near the project site there are striped crosswalks for each direction allowing pedestrians to more safely cross the adjacent roadways. Therefore, the project will have a **less than significant impact** on pedestrian service.

BICYCLE

Bicyclists will have direct access to the project site using bicycle facilities on Weddell Drive. The project is currently not proposing any bicycle facility upgrades off-site.

The proposed project does not appear to impact the safety of bicyclists or have any hazardous design features impeding the use of bicycles. Since the proposed project does not conflict with any adopted policies or plans related to bicycle activity, the proposed project will have a **less than significant impact** on bicycle service.

1. INTRODUCTION

This report presents the results of the transportation impact analysis (TIA) for a proposed charter middle school located at 539 E Weddell Drive in the City of Sunnyvale, California. The proposed project ("Project") will reuse a 19,402 square foot building and temporarily use two (2) 960 square foot portable classrooms for a public charter middle school for students from grades 6 to 8, but will also enroll students in grade 9 only during the first school year. The maximum capacity of the charter school would be 400 students in the 2016-2017 school year and 300 students thereafter. The temporary use portable classrooms will be removed after the first school year.

Figure 1 illustrates the location of the project site in relation to the adjacent roadway network. The site would be accessed by two driveways on Weddell Drive. The south driveway will be ingress only and the east driveway will be egress only.

This traffic study was prepared to determine potential impacts related to the project based on standards and methodologies set forth by the City of Sunnyvale (City) and the Santa Clara Valley Transportation Authority (VTA). This study includes intersection level of service (LOS) and queuing analyses of the AM, School PM, and PM commute peak hour traffic conditions for 15 intersections. This study also addresses the potential transportation effects of the proposed project to assist the City with project planning and the identification of potential conditions of approval for the project.

STUDY AREA

The proposed project will generate new vehicular trips that will increase traffic volumes on the nearby street network. To assess changes in traffic conditions associated with the proposed project, the following intersections in **Table 1** were evaluated. The study intersections are illustrated in **Figure 1**.

Table 1 - Study Intersections

#	Intersection	Existing or Future Intersection
1	N Fair Oaks Avenue / Tasman Drive	Existing
2	N Fair Oaks Avenue / E Weddell Drive	Existing
3	N Fair Oaks Avenue / NB US-101 Ramps	Existing
4	N Fair Oaks Avenue / E Ahwanee Avenue	Existing
5	N Fair Oaks Avenue / Caliente Drive	Existing
6	N Fair Oaks Avenue / Duane Avenue	Existing
7	N Fair Oaks Avenue / N. Wolfe Road	Existing
8	N Fair Oaks Avenue / E. Maude Avenue	Existing
9	N. Wolfe Road / Stewart Drive	Existing
10	N. Wolfe Road / E. Arques Avenue	Existing
11	N. Wolfe Road / Central Expressway WB Ramps	Existing
12	N. Wolfe Road / Central Expressway EB Ramps	Existing
13	N. Fair Oaks Avenue / E. Arques Avenue	Existing
14	E. Weddell Drive / East Project Driveway	Future
15	E. Weddell Drive / South Project Driveway	Future

TRAFFIC CONDITIONS

This TIA evaluates the follow traffic scenarios:

- Existing Conditions – Based on traffic counts taken in October 2014, May 2015, June 2015 and December 2015. Since the City allows for traffic counts conducted within two years to be utilized, both previous traffic counts and new traffic counts were utilized for the evaluation. Existing roadway geometry and traffic control in 2016 were used for this scenario.
- Existing Plus Project Conditions – Based on traffic generated by the proposed project added to existing traffic volumes. Existing roadway geometry with proposed project roadway improvements and traffic controls are assumed for this scenario.
- Existing Plus Background Condition – Based on traffic from approved projects in the study area (provided by City staff and dated December 2015) added to existing traffic volumes.
- Existing Plus Background Plus Project Conditions – Based on traffic from approved projects in the study area and traffic generated by the proposed project added to existing traffic volumes.
- Cumulative Conditions – Based on future year traffic projections which are generated based on a city growth rate and the addition of traffic from pending and approved projects in the study area. This scenario assumes roadway geometry and traffic control present in 2021.
- Cumulative Plus Project Conditions – Based on future year traffic projections which are generated based on a city growth rate, the addition of traffic from pending and approved projects in the study area, and traffic generated by the proposed project. This scenario assumes roadway geometry and traffic control present in 2021.

STUDY METHODOLOGY

Analysis of significant environmental impacts at intersections and freeway segments was based on the concept of Level of Service (LOS). The LOS of an intersection is a qualitative measure used to describe operational conditions. LOS ranges from A (best), which represents minimal delay, to F (worst), which represents heavy delay and a facility that is operating at or near its functional capacity. Levels of service for this study were determined using methods defined in the *Highway Capacity Manual, 2000* (HCM) and appropriate traffic analysis software.

INTERSECTION LEVEL OF SERVICE

The HCM includes procedures for analyzing side-street stop-controlled (SSSC), all-way stop-controlled (AWSC), and signalized intersections. The SSSC procedure defines LOS as a function of average control delay for the worst minor street movement or major street left-turn. Conversely, the AWSC and signalized intersection procedures define LOS as a function of average control delay for the intersection as a whole. VTA has specific delay threshold values for each LOS that is more specific than that of the HCM. Pluses and minuses are added to the HCM ranges to further break down the LOS for signalized intersections. **Table 2** relates the operational characteristics associated with each LOS category for unsignalized intersections[1]. **Table 3** relates the operational characteristics associated with each LOS category for signalized intersections[2].

[1] Transportation Research Board, *Highway Capacity Manual 2000*, National Research Council, 2000

[2] VTA Congestion Management Program, Traffic Level of Service Analysis Guidelines, June 2003.

Table 2 - Unsignalized Intersection Level of Service Definitions

Level of Service	Description	Unsignalized (Avg. control delay per vehicle sec/veh.)
A	Free flow with no delays. Users are virtually unaffected by others in the traffic stream	≤ 10
B	Stable traffic. Traffic flows smoothly with few delays.	> 10 – 15
C	Stable flow but the operation of individual users becomes affected by other vehicles. Modest delays.	> 15 – 25
D	Approaching unstable flow. Operation of individual users becomes significantly affected by other vehicles. Delays may be more than one cycle during peak hours.	> 25 – 35
E	Unstable flow with operating conditions at or near the capacity level. Long delays and vehicle queuing.	> 35 – 50
F	Forced or breakdown flow that causes reduced capacity. Stop and go traffic conditions. Excessive long delays and vehicle queuing.	> 50

Table 3 - Signalized Intersection Level of Service Definitions

Level of Service	Description	Signalized (Avg. control delay per vehicle sec/veh.)
A	Free flow with no delays. Users are virtually unaffected by others in the traffic stream	delay ≤ 10.0
B+	Stable traffic. Traffic flows smoothly with few delays.	10.0 < delay ≤ 12.0
B		12.0 < delay ≤ 18.0
B-		18.0 < delay ≤ 20.0
C+	Stable flow but the operation of individual users becomes affected by other vehicles. Modest delays.	20.0 < delay ≤ 23.0
C		23.0 < delay ≤ 32.0
C-		32.0 < delay ≤ 35.0
D+	Approaching unstable flow. Operation of individual users becomes significantly affected by other vehicles. Delays may be more than one cycle during peak hours.	35.0 < delay ≤ 39.0
D		39.0 < delay ≤ 51.0
D-		51.0 < delay ≤ 55.0
E+	Unstable flow with operating conditions at or near the capacity level. Long delays and vehicle queuing.	55.0 < delay ≤ 60.0
E		60.0 < delay ≤ 75.0
E-		75.0 < delay ≤ 80.0
F	Forced or breakdown flow that causes reduced capacity. Stop and go traffic conditions. Excessive long delays and vehicle queuing.	delay > 80

Project impacts were determined by comparing conditions with the proposed project to those without the proposed project. Significant impacts for unsignalized and signalized intersections are created when traffic from the proposed project causes the LOS to fall below a specific threshold. For unsignalized intersections, deficient LOS suggests recommendations for improvements to the type of traffic control, such as signalization. In these cases a peak hour signal warrant was evaluated to determine if the intersection met the volume requirements for a traffic signal.

Consistent with the significance impact criteria documented in the *Transportation Impact Analysis Guidelines*[3], VTA accepts a minimum level of service of LOS E for a County intersection or CMP intersection. The City utilizes the VTA LOS standards for all intersections on the CMP roadway system. Therefore, the following conditions would result in a significant impact at a CMP or County intersection:

1. If the intersection operates at an acceptable LOS (i.e. LOS A, B, C, D, or E) without the project and degrades to an unacceptable LOS (i.e. LOS F) with the project, then it is a significant impact.
2. If the intersection operates at an unacceptable LOS (i.e. LOS F) without the project and the project increases the average control delay for the critical movements by four (4) or more seconds and increases the critical volume to capacity (v/c) by 0.01 or more, then it is a significant impact.
    a. Even if the addition of project traffic reduces the amount of average control delay for a critical movement (i.e. negative change in delay) **but** the project increases the critical v/c by 0.01 or more, then it is a significant impact.

Mitigation for intersections with a significant impact must improve the LOS back to without Project conditions or better.

The LOS standard for City of Sunnyvale intersections is LOS D except for City of Sunnyvale intersections on roadways that are designated as regionally significant (i.e. Mathilda Avenue), which allows for a minimum level of service of LOS E. Therefore, the following conditions would result in a significant impact at a City intersection:

1. If the intersection operates at an acceptable LOS (i.e. LOS A, B, C, or D) without the project and degrades to an unacceptable LOS (i.e. LOS E, or F) with the project, then it is a significant impact.
2. If the intersection operates at an unacceptable LOS (i.e. LOS E, or F) without the project and the project increases the critical movement delay of four (4) or more seconds and increased the critical volume to capacity (v/c) by 0.01 or more, then it is a significant impact.

The City of Sunnyvale does not have an officially adopted significance criterion for unsignalized intersections. Based on previously approved traffic studies, significant impacts are defined to occur when:

1. The addition of project traffic causes the worst movement/approach for side-street stop-controlled intersections to degrade to LOS E or LOS F for regionally significant roadways.
2. The intersection satisfies any traffic signal warrant from the MUTCD.

Mitigation for intersections with a significant impact must improve the LOS back to without Project conditions or better.

[3] *Transportation Impact Analysis Guidelines*, Santa Clara Valley Transportation Authority Guidelines, October 2014.

SIGNAL WARRANTS

Traffic signals may be justified when traffic operations fall below acceptable LOS standards and when one or more signal warrants are satisfied. Traffic volumes at the unsignalized study intersections were compared against the peak hour warrant in the 2014 California Manual on Uniform Traffic Control Devices (CA MUTCD)[4]. *Traffic Signal Warrant #3 – Peak Hour Volume Warrant* is satisfied when traffic volumes on the major and minor approaches exceed thresholds for one hour of the day. The Peak Hour Warrant is generally the first warrant to be satisfied. Other warrants such as those for minimum vehicle volumes, interruption of continuous traffic, and traffic progression were not evaluated because they generally require higher traffic volumes to be satisfied.

QUEUING

The effects of vehicle queuing were analyzed and the 95th percentile queue is reported for all study intersections. The 95th percentile queue length represents a condition where 95 percent of the time during the peak hour, traffic volumes will be less than or equal to the queue length determined by the analysis. This is referred to as the "95th percentile queue." Average queuing is generally less.

Queues that exceed the turn pocket length can create potentially hazardous conditions by blocking or disrupting through traffic in adjacent travel lanes. However, these potentially hazardous queues are generally associated with left turn movements. Locations where the right turn pocket storage is exceeded are considered less hazardous because the right turn movement typically goes at the same time as the through movement and the additional vehicles that spill out of the turn pocket are less likely to hinder nor disrupt the adjacent through traffic.

The City of Sunnyvale does not have standards for queuing and considers queuing deficiencies as operational issues. Thus, for purposes of this analysis, operational deficiencies were considered to occur under conditions where project traffic causes the queue in a left turn pocket to extend beyond the turn pocket by 25 feet or more (i.e. the length of one vehicle) into adjacent traffic lanes that operate separately from the left turn lane. Where the vehicle queue already exceeds that turn pocket length under pre-project conditions, a queuing deficiency would occur if project traffic lengthens the queue by 25 feet or more.

FREEWAY SEGMENTS

Impacts on nearby freeway segments were evaluated in accordance with VTA CMP guidelines. The guidelines dictate that a freeway segment be analyzed if the proposed project adds traffic equivalent to at least one percent of the freeway capacity. The analysis shows that the proposed Project would not add sufficient traffic to freeway segments to cause a potential significant impact; therefore, no further freeway analysis is required. The analysis to determine whether the study freeway segments met the VTA thresholds is shown in the **Appendix**.

FREEWAY RAMP ANALYSIS

Impacts on nearby US 101 and Fair Oaks freeway on-ramps were evaluated in accordance with Caltrans Traffic Impact Studies (TIS) guidelines. The TIS guidelines state that a TIS is needed when a project generates over 100 peak hour assigned to a State highway facility. **Table 4** list the number of project trips that would be added to the two Fair Oaks Avenue on-ramps. The analysis shows that the proposed Project

[4] *California Manual on Uniform Traffic Control Devices,* (FHWA's MUTCD 2009 Edition, as amended for use in California), November 7, 2014

would not add sufficient traffic to the freeway on-ramps to substantially degrade ramp operations and to cause a potentially significant impact; therefore, no further freeway ramp analysis is required.

Table 4 - Project Trips Added to US 101 On-Ramps

Location	Peak Hour	Project Trips
Southbound US 101 / Fair Oaks Avenue Loop On-Ramp	AM Peak	6
	PM Peak	2
Northbound US 101 / Fair Oaks Avenue Diagonal On-Ramp	AM Peak	4
	PM Peak	2

TRANSIT IMPACTS

Impacts on the transit system were evaluated in accordance with VTA guidelines. Transit analysis evaluated existing VTA bus routes that currently run within the study area, particularly through any study intersection. The impacts of the project to the transit system, such as a possible increase in demand or vehicle delay was analyzed. It should be noted, that the VTA TIA guidelines does not have significance criteria for transit impacts, therefore the transit analysis is stated for informational purpose.

REPORT ORGANIZATION

The remainder of the report is divided into the following chapters:

- Chapter 2: Existing Conditions – describes existing conditions on the roadway network, transit system, pedestrian facilities, and bicycle facilities.
- Chapter 3: Existing Plus Project Conditions – describes the proposed project, trip generation, and estimated impact on the transportation system under Existing Plus Project Conditions.
- Chapter 4: Existing Plus Background Traffic Conditions – describes the traffic conditions under Existing Plus Background Conditions with and without the proposed project.
- Chapter 5: Cumulative Traffic Conditions – describes the traffic conditions under Cumulative Conditions with and without the proposed project.
- Chapter 6: Intersection Vehicle Queuing - describes vehicle queuing analysis at the study intersections.
- Chapter 7: Site Access and Circulation and School Safety Assessment – describes site access and circulation for the proposed project as well as discussion on the school safety assessment which evaluates the safety for student and parents using various modes traveling to and from the proposed site.
- Chapter 8: Public Transit, Bicycle, and Pedestrian Facilities – describes potential effects the proposed project may have on the transit system, pedestrian facilities, and bicycle facilities.
- Chapter 9: Summary of Impacts and Recommended Mitigation – summarizes potential impacts of the proposed project and mitigations, if necessary.
- Chapter 10: Summary of Queuing Deficiencies and Recommended Improvements – summarizes potential queuing deficiencies of the proposed project and recommendations for improvements, if necessary.

2. EXISTING CONDITIONS

This chapter describes the existing conditions of the roadway network, transit service, pedestrian facilities, and bicycle facilities within the vicinity of the project site. The chapter also presents existing turning movement volumes and intersection levels of service.

EXISTING ROADWAY NETWORK

This section provides a description of the specific roadways included in this study.

US-101

US-101 is an eight-lane freeway near the study area with a high occupancy vehicle (HOV) lane in each direction, within the study area. US-101 primarily runs north-south (but runs east-west near the study area) and connects multiple cities in the Bay Area from Santa Rosa in the north to Gilroy in the south. US-101 provides access to Sonoma County, Marin County, San Francisco County, San Mateo County, and Santa Clara County. The posted speed limit on US-101 near the study area is 65 miles per hour.

AHWANEE AVENUE

Ahwanee Avenue is a two-lane, east-west collector roadway within the study area, which serves residential and commercial land uses. Ahwanee Avenue begins in the east, just west of Lawrence Expressway and connects to Mathilda Avenue to the west. The speed limit on Ahwanee Avenue is 35 miles per hour.

ARQUES AVENUE

Arques Avenue is a four-lane east-west arterial roadway within the study area. It connects Central Expressway on the west side to Lawrence Expressway on the east side. Arques Avenue provides access to residential land uses, commercial land uses, and office uses. The posted speed limit on Arques Avenue is 40 miles per hour within the project study area. Bicycle lanes are present on Arques Avenue.

CALIENTE DRIVE

Caliente Drive is a two-lane local east-west roadway with on-street parking. Caliente Drive connects Fair Oaks Avenue, on the west side, to Johanna Avenue, on the east side, and provides access to residential and commercial land uses. The posted speed limit on Caliente Drive is 25 miles per hour.

CENTRAL EXPRESSWAY

Central Expressway is a four-lane divided expressway near the study area. Central Expressway runs east-west providing access to Mountain View, Sunnyvale, and Santa Clara. The speed limit on Central Expressway near the study area is 50 miles per hour.

DUANE AVENUE/OAKMEAD PARKWAY

Duane Avenue is a four-lane, east-west collector roadway within the study area, which serves residential land uses, office land uses, and King's Academy as another local school. Duane Avenue begins just west of Pine Avenue and connects to Lawrence Expressway to the east. East of Lawrence Expressway, Duane Avenue becomes Oakmead Parkway, a two-lane street with a two-way left-turn lane (TWLTL) that provides access to office land uses. The speed limit on Duane Avenue and Oakmead Parkway is 35 miles per hour.

FAIR OAKS AVENUE

Fair Oaks Avenue is a north-south arterial roadway within the study area serving residential, commercial, and office land uses. Fair Oaks Avenue has four to six lanes and connects SR-237 on the north end and El Camino Real on the south end. Fair Oaks Avenue becomes Java Drive north of SR-237. The speed limit on Fair Oaks Avenue ranges from 30 to 45 miles per hour within the study area.

MAUDE AVENUE

Maude Avenue is a collector roadway with four-lanes and a TWLTL west of Mathilda Avenue and two lanes and a TWLTL east of Mathilda Avenue. Maude Avenue connects SR-237 in the west to Wolfe Road on the east side. Maude Avenue provides access to residential land uses, retail uses, office uses, and Bishop Elementary School. There is on-street parking on Maude Avenue and the posted speed limit within the study area is 35 miles per hour west of Mathilda Avenue and 30 miles per hour east of Mathilda Avenue.

STEWART DRIVE

Stewart Drive is a two-lane local east-west roadway with a TWLTL and bike lanes. Stewart Drive runs between Wolfe Road and Duane Avenue and provides access to commercial and office land uses. The posted speed limit on Stewart Drive is 30 miles per hour.

TASMAN DRIVE

Tasman Drive is a four-lane, east-west collector roadway east of Fair Oaks Avenue. West of Fair Oaks Avenue, Tasman Drive is a two-lane roadway with a TWLTL and bicycle lanes. Tasman Drive connects Morse Avenue on the west side to I-880 on the east side. East of I-880, Tasman Drive becomes Great Mall Parkway. East of Fair Oaks, there are light rail tracks on Tasman Drive. Tasman Drive serves office, residential, and commercial land uses, as well as Levi's Stadium. The speed limit on Tasman Drive varies between 30 and 40 miles per hour within the study area.

WEDDELL DRIVE

Weddell Drive is a two-lane, east-west collector roadway within the study area, which serves office, residential, commercial, and church land uses. Weddell Drive connects Ross Drive on the west side to just east of Fair Oaks Avenue on the east side. There is on-street parking on Weddell Drive and bicycle lanes between Morse Avenue and Fair Oaks Avenue. The speed limit on Weddell Drive is 35 miles per hour.

WOLFE ROAD

Wolfe Road is a six-lane, north-south collector roadway within the study area. It connects to Fair Oaks Avenue to the north and to Interstate 280 to the south. Within the study area, Wolfe Road provides access to residential, commercial and office land uses. There are bike lanes on Wolfe Road within the study area. The posted speed limit on Wolfe Road is 35 miles per hour.

EXISTING TRANSIT FACILITIES

Santa Clara Valley Transportation Authority (VTA) and Caltrain provide transit services within Sunnyvale and other cities in Santa Clara County. The existing transit services within the study area are shown in **Figure 2** and described in this section.

VTA BUS SERVICES

VTA has multiple bus routes near the project site and throughout Santa Clara County. Many routes (such as Route 22, 32, 104, 522, etc.) operate within the study area, but do not run near the proposed site, therefore only routes that service the nearby area of the proposed project are described in this section.

Route 26 is a local bus service that operates between the Sunnyvale/Lockheed Martin Transit Center and the Eastridge Transit Center. In the vicinity of the proposed project, Route 26 begins at the Lockheed Martin Transit Center and runs on 5th Avenue, Mathilda Avenue, and Java Drive before going on Fair Oaks Avenue. On weekdays, Route 26 operates from 5:34 AM to 11:49 PM on 15-minute to 60-minute headways. On Saturdays and Sundays, Route 26 operates from 6:32 AM to 10:54 PM on 30-minute to 60-minute headways. Near the proposed project site, there is a bus stop for Route 26 at the intersection of N Fair Oaks Avenue and E Weddell Drive.

VTA LIGHT RAIL TRANSIT (LRT)

Line 902 is the Mountain View–Winchester Avenue light rail train (LRT) which operates between Downtown Mountain View and Winchester Avenue in Campbell. The closest LRT stations to the project site is the Fair Oaks Station located approximately half a mile north, off of N Fair Oaks Avenue and Tasman Drive. On weekdays, Line 902 operates between 4:46 AM and 12:41 AM (of the following day) at 15-minute to 30-minute headways. On Saturdays and Sundays, Line 902 operates between 6:02 AM and 12:39 AM (of the following day) at 30-minute headways.

EXISTING PEDESTRIAN FACILITIES

Sidewalks and crosswalks are mostly provided throughout the study area in Sunnyvale to allow pedestrians to access nearby transit stops, residential uses, and commercial uses. There are existing sidewalks present for the majority of the area surrounding the project site, but there are some gaps in the pedestrian facilities, for example on E Weddell Drive between Borregas Avenue and Morse Avenue.

EXISTING BICYCLE FACILITIES

Figure 3 shows existing bicycle facilities within the study area.

Class I bicycle paths are located throughout the City of Sunnyvale. The following is a list of the Class I bicycle paths near the study area:

- The John W Christian Greenbelt is between Garner Drive and Weddell Drive, parallel and to the north of Lakehaven Drive between Weddell Drive and Stonylake Court, parallel and to the south of Prescott Avenue between Blazingwood Drive and Calabazas Creek. This path connects to the Calabazas Creek Trail. There is also a short bicycle path parallel and to the west of Lakehaven Terrace, that extends off the John W Christian Greenbelt.
- The Calabazas Creek Trail is located along the eastern border for the City of Sunnyvale and extends from SR-237 to Mission College Boulevard.
- A bicycle path is located near Britton Avenue between Duane Avenue and Wolfe Road.
- A bicycle path is located along Squirrel Hollow between Persian Drive and Fair Oaks Avenue.

Class II bicycle lanes are located throughout the City of Sunnyvale. The following is a list of the Class II bicycle lanes near the study area:

- Borregas Avenue between Caribbean Drive and Moffett Park Drive, between Persian Drive and Weddell Drive, and between Ahwanee Avenue and Maude Avenue
- Java Drive / Fair Oaks Avenue between Tasman Drive and Crossman Avenue
- Fair Oaks Avenue between Evelyn Avenue and Kifer Road
- Kifer Road between Fair Oaks Avenue and Lawrence Expressway
- Persian Drive between Ross Drive and Lawrence Expressway
- Fair Oaks Avenue / Remington Drive between Bernardo Avenue and Old San Francisco Road (future bicycle lanes planned between Old San Francisco Road and Evelyn Avenue)
- Tasman Drive between Morse Avenue and Fair Oaks Avenue
- Morse Avenue between Persian Drive and Weddell Drive
- Weddell Drive between Morse Avenue and Fair Oaks Avenue
- Duane Avenue between San Simeon Street and Lawrence Expressway (future bicycle lanes planned between Fair Oaks Avenue and San Simeon Street)
- DeGuigne Drive / Commercial Street between Duane Avenue and Central Expressway
- Stewart Drive between Wolfe Road and Duane Avenue
- Santa Trinita Avenue between Stewart Drive and Arques Avenue
- Arques Avenue east of Fair Oaks Avenue
- Wolfe Road between Fair Oaks Avenue and Reed Avenue
- Maude Avenue between Logue Avenue and Mathilda Avenue (future bicycle lanes between Mathilda Avenue and Fair Oaks Avenue)
- Oakmead Parkway between Lawrence Expressway and Central Expressway
- Mathilda Avenue between Moffett Park Drive and Caribbean Drive and between El Camino Real and Sunnyvale-Saratoga Road
- Moffett Park Drive between Bordeaux Drive and Caribbean Drive

Class III bicycle routes are located throughout the City of Sunnyvale. The following is a list of the Class III bicycle routes near the study area:

- Fair Oaks Avenue between Wolfe Road and Ahwanee Avenue
- Wolfe Road between Old San Francisco Road/Reed Avenue and El Camino Real

EXISTING IMPROVEMENT FUNDING AND ESTABLISHED MITIGATION PROGRAMS

The City of Sunnyvale has a General Plan that sets forth goals, policies, and actions for developing the transportation network in Sunnyvale. Resulting from the goals, policies, and actions from the General Plan are transportation improvement projects that will help mitigate the increased vehicular demand on the network. These roadway projects will be funded from multiple revenue sources, such as the Transportation Impact Fee Ordinance and the City's Transportation Strategic Program.

TRANSPORTATION IMPACT FEE ORDINANCE

The City of Sunnyvale has a transportation impact fee fund in its Municipal Code. Chapter 3.50 details the transportation impact fee and its use of funds. The use of funds is only to complete traffic improvement projects as specified in the Transportation Strategic Program.

The fees are calculated for non-residential uses on a per square foot basis for all new gross floor area. Fees for existing buildings that change in land use are based on the incremental difference between the peak hour trips generated by the prior land use compared to the proposed new use.

The fees are due before any building permits are issued or before any conversion of use to an existing building can be completed.

CITY'S CAPITAL IMPROVEMENT PROGRAM

The City of Sunnyvale has a Capital Improvement Plan (CIP) to ensure the maintenance and infrastructure replacement of the City's transportation network. The City updates the budget every two years for the 20-year future. The CIP has taken into account Long Range plans such as the Valley Transportation Plan 2040, the Transportation Strategic Program, the Downtown Specific Plan (2003), the Bicycle CIP, the 2007 Pedestrian Safety and Opportunities Study, the Tasman/Fair Oaks Bicycle and Pedestrian Circulation Plan, and the Moffett Park Specific Plan.

The total traffic and transportation amount budgeted for the 2015-2016 fiscal year is $11,516,170[5]. Budgeted transportation projects include the City's share of development related street improvements, traffic signal controllers, and hardware/wiring improvements.

EXISTING LANE CONFIGURATION AND TRAFFIC CONTROL

Existing intersection lane configuration and traffic controls are illustrated in **Figure 4**. **Table 5** lists the existing traffic control for each study intersection.

[5] *Recommended Budget and Resource Allocation Plan – City of Sunnyvale, California - Fiscal Year 2015/2016,* City of Sunnyvale.

Table 5 - Study Intersection and Traffic Control

#	Intersection	Existing or Future Intersection	Existing Traffic Control
1	N Fair Oaks Avenue / Tasman Drive	Existing	Signal
2	N Fair Oaks Avenue / E Weddell Drive	Existing	Signal
3	N Fair Oaks Avenue / NB US-101 Ramps	Existing	Signal
4	N Fair Oaks Avenue / E Ahwanee Avenue	Existing	Signal
5	N Fair Oaks Avenue / Caliente Drive	Existing	Signal
6	N Fair Oaks Avenue / Duane Avenue	Existing	Signal
7	N Fair Oaks Avenue / N. Wolfe Road	Existing	Signal
8	N Fair Oaks Avenue / E. Maude Avenue	Existing	Signal
9	N. Wolfe Road / Stewart Drive	Existing	Signal
10	N. Wolfe Road / E. Arques Avenue	Existing	Signal
11	N. Wolfe Road / Central Expressway WB Ramps	Existing	Signal
12	N. Wolfe Road / Central Expressway EB Ramps	Existing	Signal
13	N. Fair Oaks Avenue / E. Arques Avenue	Existing	Signal
14	E. Weddell Drive / East Project Driveway	Future	SSSC
15	E. Weddell Drive / South Project Driveway	Future	SSSC
Note: SSSC – Side-Street Stop Control			

EXISTING PEAK-HOUR TURNING MOVEMENT VOLUMES

Weekday intersection turning movement volumes for study intersections were collected from October 2014, May 2015, June 2015 and December 2015. Volumes were collected during the AM (7:00-9:00 AM) peak period, school PM (2:00 – 4:00 PM), and commute PM (4:00-6:00 PM) peak period on a weekday when local schools were in session.

Since count volumes were collected during different months, volumes between intersections along Fair Oaks were checked to determine if there were any large discrepancies. It was found that the difference in volume between adjacent study intersections could be justified based on the surrounding land uses and driveway entrances between study intersections. No volumes were adjusted. Intersection volume data sheets for all traffic counts are provided in the **Appendix**. Peak hour turning movement volumes are shown in **Figure 5** and **6**.

EXISTING INTERSECTION LEVEL OF SERVICE

Traffic operations were evaluated at the study intersections under existing traffic conditions. Results of the analysis are presented in **Table 6**. **Table 6** lists the municipal jurisdiction, LOS criteria, intersection control, and LOS/delay for each intersection. All study intersections function within acceptable LOS standards under this analysis scenario.

Analysis sheets are provided in the **Appendix**.

Table 6 - Existing Intersection Level of Service Summary

#	Intersection	LOS Criteria	Jurisdiction	Control	Existing								
					AM Peak			School PM Peak			PM Peak		
					LOS	Delay (sec)[1]	v/c Ratio	LOS	Delay (sec)[1]	v/c Ratio	LOS	Delay (sec)[1]	v/c Ratio
1	N Fair Oaks Avenue / Tasman Drive	D	City	Signal	B	17.1	0.423	B	17.2	0.228	B-	19.4	0.517
2	N Fair Oaks Avenue / E Weddell Drive	D	City	Signal	B	13.3	0.264	B-	18.9	0.241	B	16.9	0.457
3	N Fair Oaks Avenue / US-101 Ramps	E	City/Caltrans	Signal	B	15.7	0.658	C+	22.0	0.573	C	25.3	0.845
4	N Fair Oaks Avenue / Ahwanee Avenue	D	City	Signal	B	16.5	0.535	B	17.8	0.384	B+	11.2	0.577
5	N Fair Oaks Avenue / Caliente Drive	D	City	Signal	B+	10.6	0.438	B+	10.7	0.301	A	8.4	0.448
6	N Fair Oaks Avenue / E Duane Avenue	D	City	Signal	C	24.6	0.596	C	27.9	0.491	C	29.1	0.680
7	N Fair Oaks Avenue / N Wolfe Road	D	City	Signal	C+	22.6	0.384	C+	20.9	0.300	C+	20.7	0.545
8	N Fair Oaks Avenue / Maude Avenue	D	City	Signal	C	29.8	0.383	C	29.0	0.413	C-	33.2	0.591
9	N Wolfe Road / Stewart Drive	D	City	Signal	B	14.3	0.227	B-	18.2	0.163	B	16.9	0.383
10	N Wolfe Road / E Arques Avenue	D	City	Signal	C	28.1	0.384	D+	36.9	0.293	C-	34.4	0.431
11	N Wolfe Road / Central Expressway WB Ramps[2]	E	City/County	Signal	C	24.6	0.288	B	17.8	0.187	B-	18.4	0.450
12	N Wolfe Road / Central Expressway EB Ramps[2]	E	City/County	Signal	B	12.5	0.233	C	27.2	0.273	B-	19.2	0.639
13	N Fair Oaks / E Arques Avenue	D	City	Signal	D+	35.3	0.515	C-	34.4	0.491	D	40.7	0.709
14	E Weddell Drive / East Project Driveway	D	City	SSSC	Future Intersection with Project								
15	E Weddell Drive / South Project Driveway	D	City	SSSC									

1 The average control delay is reported for signalized intersections. The delay for the worst movement is reported for SSSC intersections.

2 Central Expressway is a CMP expressway with LOS E threshold.

FIELD OBSERVATIONS

Field observations were conducted to qualitatively confirm existing intersection LOS results with conditions in the field to identify any existing problems. Overall, the study intersections were observed to operate similarly to the calculated LOS.

It should be noted that additional observations were conducted during the AM peak at N Fair Oaks Avenue and E Weddell Drive to observe existing queuing conditions at the intersection, especially for the eastbound approach and northbound left turn movement.

For the eastbound approach there was little queuing observed for both lanes. If there was queuing present, the queue for the eastbound right turn lane consisted of vehicles heading south on N Fair Oaks Avenue or heading to the NB US 101 on-ramp, but were unable to turn due to congestion on southbound Fair Oaks Avenue from the US 101 northbound ramps to Weddell Drive. The eastbound right turn queue was typically four to five vehicles, which is within the available storage length. A maximum queue of eight vehicles was observed for the eastbound right-turn movement. The maximum queue exceeded the available storage length, but did not impede traffic on E Weddell Drive and the queue cleared during the green phase. The queue for the eastbound shared left-through lane consisted of vehicles waiting for the green and was typically one or two vehicles, with a maximum of three vehicles observed. For both lanes, the queues cleared within one cycle length.

For the northbound left turn, the queue was typically five to seven vehicles, which is within the available storage length. The queue was able to clear during the green time for the left turns.

3. EXISTING PLUS PROJECT CONDITIONS

This chapter presents a description of the proposed site use, trip generation, trip distribution, and trip assignment, as well as potential impacts of the proposed project on the transportation system.

PROPOSED SITE USE

The proposed project will reuse a 19,402 square foot building and temporarily locate two (2) 960 square foot portable classrooms for the purpose of a public charter school. The school is intended for middle school students from grades 6 to 8, but will also serve students in grade 9 only during its first school year. The first year enrollment is planned to 400 students, which consists of 300 students in grades 6-8 and 100 students in grade 9. After the first year, the school will enroll 300 students in grades 6 to 8.

Figure 7 illustrates the site plan for the proposed project, with changes noted by the project Applicant via email correspondence to the City on February 18, 2016. The Project will have access on E Weddell Drive. Both driveways are unsignalized. The south driveway will be ingress only and the east driveway will be egress only.

TRIP GENERATION

Trip generation for projects is typically calculated based on information contained in the Institute of Transportation Engineer's (ITE) publication, *Trip Generation, 9th Edition*.[6] The manual is a standard reference used by jurisdictions throughout the country for the estimation of trip generation potential of proposed projects.

A trip is defined in the *Trip Generation Manual* as a single or one-directional vehicle movement with either the origin or destination at the project site. In other words, a trip can be either "to" or "from" the site and therefore, a single visitor to a site is counted as two.

For purposes of determining the worst-case impacts of traffic on the surrounding street network, the trips generated by a proposed project are estimated for the AM peak (between the hours of 7:00 AM and 9:00 AM), the school PM peak (between the hours of 2:00 and 4:00 PM) and for the commute PM peak (between 4:00 PM and 6:00 PM) on a typical weekday.

For the Existing and Existing Plus Background scenarios, the proposed project would consist of 300 Middle School (ITE Land Use 522) students and 100 High School (ITE Lane Use 530) students. For Cumulative conditions, the proposed project would consist of 300 Middle School students.

Table 7 presents the trip generation for the proposed project for Existing and Existing Plus Background conditions. During the Existing and Existing Plus Background conditions, the project will generate 205 trips in the AM, 120 trips in the School PM, and 61 trips in the PM peak hour.

Table 8 presents the trip generation for the proposed project for Cumulative conditions. During the Cumulative conditions, the project will generate 162 trips in the AM peak period, 91 trips in the School PM, and 48 trips in the PM peak hour.

Trip generation calculation sheets are provided in the **Appendix**.

[6] *Trip Generation, 9th Edition*, Institute of Transportation Engineers, 2012.

Table 7 - Existing and Existing Plus Background Project Trip Generation

TIME PERIOD	LAND USE	Trips		
		In	Out	Total
Daily	Middle School/Junior High School (300 Students)	243	243	486
	High School (100 Students)	86	86	172
	Total Trips	329	329	658
AM Peak	Middle School/Junior High School (300 Students)	89	73	162
	High School (100 Students)	29	14	43
	Total Trips	118	87	205
School PM	Middle School/Junior High School (300 Students)	41	50	91
	High School (100 Students)	10	19	29
	Total Trips	51	69	120
PM Peak	Middle School/Junior High School (300 Students)	24	24	48
	High School (100 Students)	6	7	13
	Total Trips	30	31	61

Table 8 - Cumulative Project Trip Generation

TIME PERIOD	LAND USE	Trips		
		In	Out	Total
Daily	Middle School/Junior High School (300 Students)	243	243	486
AM Peak	Middle School/Junior High School (300 Students)	89	73	162
School PM	Middle School/Junior High School (300 Students)	41	50	91
PM Peak	Middle School/Junior High School (300 Students)	24	24	48

PROJECT TRIP DISTRIBUTION AND ASSIGNMENT

Project trip distribution was based on current trip distribution for the current school campus located at 495 Mercury Drive. The proposed campus would replace the existing campus and would have a similar trip distribution. The distribution was reviewed by the City and the applicant and approved for use in this TIA. **Figure 8** presents the traffic distribution assumed for this analysis.

Based on the assumed trip distribution and assignment, the new vehicles trips generated by the project were assigned to the street network as shown in **Figure 9** and **10** for Existing and Existing Plus Background conditions, and as shown in **Figure 11** and **12** for Cumulative condition**.**

EXISTING PLUS PROJECT INTERSECTION LEVEL OF SERVICE

Traffic operations were evaluated at the study intersections under existing conditions plus traffic generated by the project, as seen on **Figure 13** and **14**. Results of the analysis are presented in **Table 9**. All study intersections function within acceptable LOS standards under this analysis scenario. Thus, the project has a less than significant impact at all study intersection and no mitigation measures are required.

It should be noted that for some intersections, the reported delay improved with the addition of the project trips. The reason for this occurrence is because the trips were primarily added to the through lane movements, which had a lower movement delay than the average intersection delay, and thereby decreases the overall average delay.

In addition, none of the unsignalized intersections met the peak hour signal warrant for the Existing Plus Project scenario in the AM, School PM, and commute PM peak hours.

Analysis sheets are provided in the **Appendix**.

Table 9 - Existing Plus Project Intersection Level of Service Summary

#	Intersection	LOS Criteria	Jurisdiction	Control	Existing									Existing Plus Project											
					AM Peak			School PM Peak			PM Peak			AM Peak					School PM Peak					PM Peak				
					LOS	Delay (sec)[1]	v/c Ratio	LOS	Delay (sec)[1]	v/c Ratio	LOS	Delay (sec)[1]	v/c Ratio	LOS	Delay (sec)[2]	v/c Ratio	v/c Var	Crit. Delay Var.	LOS	Delay (sec)[2]	v/c Ratio	v/c Var	Crit. Delay Var.	LOS	Delay (sec)[2]	v/c Ratio	v/c Var	Crit. Delay Var.
1	N Fair Oaks Avenue / Tasman Drive	D	City	Signal	B	17.1	0.423	B	17.2	0.228	B-	19.4	0.517	B	17.3	0.433	0.010	0.4	B	17.2	0.232	0.004	0.0	B-	19.5	0.520	0.003	0.0
2	N Fair Oaks Avenue / E Weddell Drive	D	City	Signal	B	13.3	0.264	B-	18.9	0.241	B	16.9	0.457	B	14.8	0.264	0.000	0.0	B-	19.3	0.266	0.025	1.3	B	17.5	0.472	0.015	1.0
3	N Fair Oaks Avenue / US-101 Ramps	E	City/Caltrans	Signal	B	15.7	0.658	C+	22.0	0.573	C	25.3	0.845	B	15.8	0.679	0.021	0.4	C+	21.9	0.588	0.015	0.1	C	25.4	0.852	0.007	0.4
4	N Fair Oaks Avenue / Ahwanee Avenue	D	City	Signal	B	16.5	0.535	B	17.8	0.384	B+	11.2	0.577	B	16.2	0.558	0.023	-0.1	B	17.5	0.392	0.008	-0.3	B+	11.1	0.581	0.004	0.0
5	N Fair Oaks Avenue / Caliente Drive	D	City	Signal	B+	10.6	0.438	B+	10.7	0.301	A	8.4	0.448	B+	10.5	0.460	0.022	0.1	B+	10.4	0.311	0.010	-0.2	A	8.4	0.452	0.004	0.0
6	N Fair Oaks Avenue / E Duane Avenue	D	City	Signal	C	24.6	0.596	C	27.9	0.491	C	29.1	0.680	C	26.1	0.620	0.024	-0.9	C	27.8	0.504	0.013	0.2	C	29.1	0.687	0.007	0.2
7	N Fair Oaks Avenue / N Wolfe Road	D	City	Signal	C+	22.6	0.384	C+	20.9	0.300	C+	20.7	0.545	C+	22.8	0.399	0.015	0.2	C+	20.9	0.307	0.007	0.1	C+	20.8	0.549	0.004	0.1
8	N Fair Oaks Avenue / Maude Avenue	D	City	Signal	C	29.8	0.383	C	29.0	0.413	C-	33.2	0.591	C	29.7	0.389	0.006	-0.3	C	28.9	0.418	0.005	-0.2	C-	33.2	0.594	0.003	0.0
9	N Wolfe Road / Stewart Drive	D	City	Signal	B	14.3	0.227	B-	18.2	0.163	B	16.9	0.383	B	14.3	0.227	0.000	0.0	B-	18.1	0.165	0.002	-0.2	B	16.9	0.384	0.001	0.0
10	N Wolfe Road / E Arques Avenue	D	City	Signal	C	28.1	0.384	D+	36.9	0.293	C-	34.4	0.431	C	28.0	0.387	0.003	-0.2	D+	36.8	0.293	0.000	-0.1	C-	34.3	0.432	0.001	0.0
11	N Wolfe Road / Central Expressway WB Ramps[2]	E	City/County	Signal	C	24.6	0.288	B	17.8	0.187	B-	18.4	0.450	C	24.8	0.290	0.002	0.1	B	17.7	0.188	0.001	-0.1	B-	18.3	0.451	0.001	0.0
12	N Wolfe Road / Central Expressway EB Ramps[2]	E	City/County	Signal	B	12.5	0.233	C	27.2	0.273	B-	19.2	0.639	B	12.7	0.235	0.002	0.4	C	27.2	0.275	0.002	0.1	B-	19.2	0.640	0.001	0.0
13	N Fair Oaks / E Arques Avenue	D	City	Signal	D+	35.3	0.515	C-	34.4	0.491	D	40.7	0.709	D+	35.4	0.523	0.008	0.2	C-	34.3	0.494	0.003	-0.1	D	40.8	0.710	0.001	0.0
14	E Weddell Drive / East Project Driveway	D	City	SSSC	Future Intersection with Project									B	13.1	0.158	-	-	B	11.7	0.111	-	-	B	11.9	0.054	-	-
15	E Weddell Drive / South Project Driveway	D	City	SSSC										A	7.7	0.005	-	-	A	7.6	0.002	-	-	A	7.8	0.002	-	-

1 The average control delay is reported for signalized intersections. The delay for the worst movement is reported for SSSC intersections.

2 Central Expressway is a CMP expressway with LOS E threshold.

4. EXISTING PLUS BACKGROUND TRAFFIC CONDITIONS

This chapter will discuss the traffic conditions under the Existing Plus Background and Existing Plus Background Plus Proposed Project scenarios.

EXISTING PLUS BACKGROUND TRANSPORTATION IMPROVEMENTS

As documented in the City's Capital Improvement Program (CIP)[7] there are programmed network improvements in the project area that have an identified funding source.

Under Existing Plus Background conditions, it is anticipated that there will be changes in lane geometry along Duane Avenue due to the Duane Avenue Road Diet Project. It should be noted that this road diet project is being implemented independent of the proposed project. The road diet project will reduce Duane Avenue between Fair Oaks Avenue and Stewart Drive from a four-lane roadway to a two-lane roadway with buffered bike lanes and will affect one study intersection:

- Intersection #6 – Fair Oaks Avenue / Duane Avenue: The east leg will be restriped to have one left turn lane, one through lane, and one right turn lane.

The existing plus background lane geometry in **Figure 15** illustrates the intersection geometry and traffic control assumed in the Existing Plus Background analysis.

EXISTING PLUS BACKGROUND TRAFFIC VOLUMES

At the time of the analysis, the most recent version of the Development Update spreadsheet (dated December 2015) was received from the City and used to determine which projects would be included in this scenario. This source lists development projects in the vicinity of the project site that are undergoing any stage of planning, approval, or development. **Figure 16** shows the locations of the approved projects.

To achieve Existing Plus Background traffic conditions, traffic volumes from approved but not yet constructed projects were incorporated according to the information provided by the City.

EXISTING PLUS BACKGROUND INTERSECTIONS LEVEL OF SERVICE

Existing Plus Background volumes were evaluated at the study intersections and are presented in **Figure 17** and **18**. Results are presented in **Table 10**. All study intersections function within acceptable LOS standards under this analysis scenario. Analysis sheets are provided in the **Appendix**.

[7] *Adopted Budget and Resource Allocation Plan – Fiscal Year 2014/2015,* City of Sunnyvale.

Table 10 - Existing Plus Background Intersection Level of Service Summary

#	Intersection	LOS Criteria	Jurisdiction	Control	Existing Plus Background								
					AM Peak			School PM Peak			PM Peak		
					LOS	Delay (sec)[1]	v/c Ratio	LOS	Delay (sec)[1]	v/c Ratio	LOS	Delay (sec)[1]	v/c Ratio
1	N Fair Oaks Avenue / Tasman Drive	D	City	Signal	C+	21.3	0.594	B	17.3	0.304	C+	21.8	0.641
2	N Fair Oaks Avenue / E Weddell Drive	D	City	Signal	B-	18.6	0.475	B-	19.5	0.367	C+	20.3	0.660
3	N Fair Oaks Avenue / US-101 Ramps	E	City/Caltrans	Signal	B-	18.5	0.814	C+	22.6	0.686	D	45.5	1.055
4	N Fair Oaks Avenue / Ahwanee Avenue	D	City	Signal	B	15.6	0.638	B	16.6	0.440	B+	10.9	0.646
5	N Fair Oaks Avenue / Caliente Drive	D	City	Signal	B+	10.2	0.541	A	9.6	0.361	A	8.5	0.517
6	N Fair Oaks Avenue / E Duane Avenue	D	City	Signal	C	28.9	0.752	C	30.4	0.633	D	39.5	0.894
7	N Fair Oaks Avenue / N Wolfe Road	D	City	Signal	C	24.5	0.491	C+	21.7	0.339	C+	22.4	0.603
8	N Fair Oaks Avenue / Maude Avenue	D	City	Signal	C	26.1	0.403	C	27.6	0.468	C-	32.7	0.681
9	N Wolfe Road / Stewart Drive	D	City	Signal	B	14.6	0.232	B-	18.7	0.196	B	17.1	0.395
10	N Wolfe Road / E Arques Avenue	D	City	Signal	C	31.6	0.431	D+	37.7	0.315	D+	36.5	0.490
11	N Wolfe Road / Central Expressway WB Ramps[2]	E	City/County	Signal	C	25.1	0.300	B-	18.0	0.189	B-	18.3	0.454
12	N Wolfe Road / Central Expressway EB Ramps[2]	E	City/County	Signal	B	15.0	0.253	C	27.3	0.282	B-	19.3	0.639
13	N Fair Oaks / E Arques Avenue	D	City	Signal	D+	37.3	0.632	C-	34.9	0.559	D	44.7	0.816
14	E Weddell Drive / East Project Driveway	D	City	SSSC	Future Intersection with Project								
15	E Weddell Drive / South Project Driveway	D	City	SSSC									

1 The average control delay is reported for signalized intersections. The delay for the worst movement is reported for SSSC intersections.

2 Central Expressway is a CMP expressway with LOS E threshold.

EXISTING PLUS BACKGROUND PLUS PROPOSED PROJECT INTERSECTION LEVEL OF SERVICE

Existing Plus Background Plus Project traffic conditions were evaluated at the study intersections and are shown in **Figure 19** and **20**. Results are presented in **Table 11**. All study intersections function within acceptable LOS standards under this analysis scenario. Thus, the project has a less than significant impact at all study intersections and no mitigation measures are required.

It should be noted that for some intersections, the reported delay improved with the addition of the project trips. The reason for this occurrence is because the trips were primarily added to the through lane movements, which had a lower movement delay than the average intersection delay, and thereby decreases the overall average delay.

In addition, none of the unsignalized intersections met the peak hour signal warrant for the Existing Plus Background Plus Project scenario in the AM, School PM, and PM peak hours.

Analysis sheets are provided in the **Appendix**.

Table 11 - Existing Plus Background Plus Proposed Project Intersection Level of Service Summary

#	Intersection	LOS Criteria	Jurisdiction	Control	Existing Plus Background									Existing Plus Background Plus Project												
					AM Peak			School PM Peak			PM Peak			AM Peak					School PM Peak					PM Peak				
					LOS	Delay (sec)[1]	v/c Ratio	LOS	Delay (sec)[1]	v/c Ratio	LOS	Delay (sec)[1]	v/c Ratio	LOS	Delay (sec)[2]	v/c Ratio	v/c Var	Crit. Delay Var.	LOS	Delay (sec)[2]	v/c Ratio	v/c Var	Crit. Delay Var.	LOS	Delay (sec)[2]	v/c Ratio	v/c Var	Crit. Delay Var.
1	N Fair Oaks Avenue / Tasman Drive	D	City	Signal	C+	21.3	0.594	B	17.3	0.304	C+	21.8	0.641	C+	21.8	0.603	0.009	1.0	B	17.4	0.309	0.005	0.2	C+	21.9	0.643	0.002	0.2
2	N Fair Oaks Avenue / E Weddell Drive	D	City	Signal	B-	18.6	0.475	B-	19.5	0.367	C+	20.3	0.660	B-	18.9	0.460	-0.015	-1.5	C+	20.0	0.392	0.025	0.9	C+	20.9	0.676	0.016	0.8
3	N Fair Oaks Avenue / US-101 Ramps	E	City/Caltrans	Signal	B-	18.5	0.814	C+	22.6	0.686	D	45.5	1.055	B-	19.0	0.835	0.021	1.1	C+	22.6	0.700	0.014	0.1	D	46.7	1.062	0.007	2.1
4	N Fair Oaks Avenue / Ahwanee Avenue	D	City	Signal	B	15.6	0.638	B	16.6	0.440	B+	10.9	0.646	B	15.5	0.661	0.023	0.2	B	16.4	0.450	0.010	-0.3	B+	10.9	0.649	0.003	0.1
5	N Fair Oaks Avenue / Caliente Drive	D	City	Signal	B+	10.2	0.541	A	9.6	0.361	A	8.5	0.517	B+	10.2	0.563	0.022	0.3	A	9.5	0.370	0.009	-0.1	A	8.5	0.521	0.004	0.0
6	N Fair Oaks Avenue / E Duane Avenue	D	City	Signal	C	28.9	0.752	C	30.4	0.633	D	39.5	0.894	C	29.9	0.776	0.024	1.6	C	30.5	0.646	0.013	0.4	D	39.8	0.901	0.007	0.9
7	N Fair Oaks Avenue / N Wolfe Road	D	City	Signal	C	24.5	0.491	C+	21.7	0.339	C+	22.4	0.603	C	24.7	0.506	0.015	0.2	C+	21.8	0.345	0.006	0.0	C+	22.5	0.607	0.004	0.1
8	N Fair Oaks Avenue / Maude Avenue	D	City	Signal	C	26.1	0.403	C	27.6	0.468	C-	32.7	0.681	C	26.1	0.408	0.005	-0.2	C	27.5	0.473	0.005	-0.2	C-	32.7	0.683	0.002	0.0
9	N Wolfe Road / Stewart Drive	D	City	Signal	B	14.6	0.232	B-	18.7	0.196	B	17.1	0.395	B	14.6	0.232	0.000	0.0	B-	18.6	0.197	0.001	-0.1	B	17.1	0.396	0.001	-0.1
10	N Wolfe Road / E Arques Avenue	D	City	Signal	C	31.6	0.431	D+	37.7	0.315	D+	36.5	0.490	C	31.5	0.435	0.004	-0.2	D+	37.6	0.316	0.001	-0.1	D+	36.5	0.491	0.001	0.1
11	N Wolfe Road / Central Expressway WB Ramps[2]	E	City/County	Signal	C	25.1	0.300	B-	18.0	0.189	B-	18.3	0.454	C	25.4	0.317	0.017	-1.6	B	18.0	0.190	0.001	-0.2	B-	18.3	0.454	0.000	0.0
12	N Wolfe Road / Central Expressway EB Ramps[2]	E	City/County	Signal	B	15.0	0.253	C	27.3	0.282	B-	19.3	0.639	B	15.1	0.254	0.001	0.2	C	27.3	0.283	0.001	0.1	B-	19.3	0.640	0.001	0.0
13	N Fair Oaks / E Arques Avenue	D	City	Signal	D+	37.3	0.632	C-	34.9	0.559	D	44.7	0.816	D+	37.5	0.640	0.008	0.2	C-	34.9	0.562	0.003	0.0	D	44.7	0.818	0.002	0.0
14	E Weddell Drive / East Project Driveway	D	City	SSSC	Future Intersection with Project									B	13.1	0.158	-	-	B	11.8	0.111	-	-	B	12.0	0.054	-	-
15	E Weddell Drive / South Project Driveway	D	City	SSSC										A	7.7	0.005	-	-	A	7.6	0.002	-	-	A	7.8	0.002	-	-

1 The average control delay is reported for signalized intersections. The delay for the worst movement is reported for SSSC intersections.

2 Central Expressway is a CMP expressway with LOS E threshold.

5. CUMULATIVE TRAFFIC CONDITIONS

This chapter will discuss the traffic conditions under the Cumulative and Cumulative Plus Project Conditions. Cumulative conditions for this analysis were established as occurring in year 2021 (5 years from existing conditions).

CUMULATIVE TRANSPORTATION IMPROVEMENTS

Under Cumulative conditions, there are no new lane geometry improvements, therefore Existing Plus Background lane geometry was assumed in Cumulative conditions. The Existing Plus Background lane geometry in **Figure 15** illustrates the intersection geometry and traffic control in the Cumulative analysis.

CUMULATIVE TRAFFIC VOLUME

To achieve Cumulative traffic conditions, five years of background traffic growth and traffic volumes from approved and pending projects were incorporated according to the information provided by the City. An annual growth rate of 1.5 percent was applied to traffic volumes in the study area to grow Existing volumes to reflect Cumulative volumes.

CUMULATIVE INTERSECTIONS LEVEL OF SERVICE

Cumulative volumes were evaluated at the study intersections and are presented in **Figure 21** and **22**. Results are presented in **Table 12**, All study intersections function within acceptable LOS standards under this analysis scenario. Analysis sheets are provided in the **Appendix**.

Table 12 - Cumulative Intersection Level of Service Summary

#	Intersection	LOS Criteria	Jurisdiction	Control	Cumulative								
					AM Peak			School PM Peak			PM Peak		
					LOS	Delay (sec)[1]	v/c Ratio	LOS	Delay (sec)[1]	v/c Ratio	LOS	Delay (sec)[1]	v/c Ratio
1	N Fair Oaks Avenue / Tasman Drive	D	City	Signal	C-	32.4	0.694	B	17.5	0.340	C	25.5	0.718
2	N Fair Oaks Avenue / E Weddell Drive	D	City	Signal	B-	18.4	0.532	B-	19.2	0.399	C+	20.9	0.726
3	N Fair Oaks Avenue / US-101 Ramps	E	City/Caltrans	Signal	C+	22.4	0.909	C	23.8	0.754	E	68.3	1.159
4	N Fair Oaks Avenue / Ahwanee Avenue	D	City	Signal	B	16.5	0.720	B	16.4	0.465	B+	11.7	0.714
5	N Fair Oaks Avenue / Caliente Drive	D	City	Signal	B+	10.7	0.614	A	9.5	0.385	A	9.0	0.576
6	N Fair Oaks Avenue / E Duane Avenue	D	City	Signal	C-	32.2	0.825	C	31.5	0.688	D	46.7	0.975
7	N Fair Oaks Avenue / N Wolfe Road	D	City	Signal	C	25.0	0.548	C+	22.1	0.364	C	23.4	0.654
8	N Fair Oaks Avenue / Maude Avenue	D	City	Signal	C	28.5	0.493	C	28.6	0.520	D+	35.2	0.769
9	N Wolfe Road / Stewart Drive	D	City	Signal	B	15.2	0.241	B-	19.0	0.211	B	17.4	0.424
10	N Wolfe Road / E Arques Avenue	D	City	Signal	C	31.8	0.466	D+	37.7	0.344	D+	37.2	0.526
11	N Wolfe Road / Central Expressway WB Ramps[2]	E	City/County	Signal	C	25.4	0.345	B-	18.0	0.203	B-	18.6	0.489
12	N Wolfe Road / Central Expressway EB Ramps[2]	E	City/County	Signal	B+	10.1	0.280	C	27.5	0.303	C+	20.0	0.689
13	N Fair Oaks / E Arques Avenue	D	City	Signal	D	39.2	0.715	D+	36.0	0.625	D-	52.7	0.926
14	E Weddell Drive / East Project Driveway	D	City	SSSC	Future Intersection with Project								
15	E Weddell Drive / South Project Driveway	D	City	SSSC									

1 The average control delay is reported for signalized intersections. The delay for the worst movement is reported for SSSC intersections.

2 Central Expressway is a CMP expressway with LOS E threshold.

CUMULATIVE PLUS PROJECT INTERSECTION LEVEL OF SERVICE

Cumulative Plus Project traffic conditions were evaluated at the study intersections and are shown in **Figure 23** and **24**. Results of the analysis are presented in **Table 13**. All study intersections function within acceptable LOS standards under this analysis scenario. Thus, the project has a less than significant impact at all study intersections and no mitigation measures are required.

It should be noted that for some intersections, the reported delay improved with the addition of the project trips. The reason for this occurrence is because the trips were primarily added to the through lane movements, which had a lower movement delay than the average intersection delay, and thereby decreases the overall average delay.

In addition, none of the unsignalized intersections met the peak hour signal warrant for the Cumulative Plus Project scenario in the AM, School PM, and PM peak hours.

Analysis sheets are provided in the **Appendix**.

Table 13 - Cumulative Plus Project Intersection Level of Service Summary

#	Intersection	LOS Criteria	Jurisdiction	Control	Cumulative									Cumulative Plus Project												
					AM Peak			School PM Peak			PM Peak			AM Peak					School PM Peak					PM Peak				
					LOS	Delay (sec)[1]	v/c Ratio	LOS	Delay (sec)[1]	v/c Ratio	LOS	Delay (sec)[1]	v/c Ratio	LOS	Delay (sec)[2]	v/c Ratio	v/c Var	Crit. Delay Var.	LOS	Delay (sec)[2]	v/c Ratio	v/c Var	Crit. Delay Var.	LOS	Delay (sec)[2]	v/c Ratio	v/c Var	Crit. Delay Var.
1	N Fair Oaks Avenue / Tasman Drive	D	City	Signal	C-	32.4	0.694	B	17.5	0.340	C	25.5	0.718	C-	33.5	0.701	0.007	2.5	B	17.6	0.343	0.003	0.1	C	25.7	0.720	0.002	0.3
2	N Fair Oaks Avenue / E Weddell Drive	D	City	Signal	B-	18.4	0.532	B-	19.2	0.399	C+	20.9	0.726	B-	18.8	0.525	-0.007	-0.9	B-	19.7	0.420	0.021	0.8	C+	21.4	0.738	0.012	0.8
3	N Fair Oaks Avenue / US-101 Ramps	E	City/Caltrans	Signal	C+	22.4	0.909	C	23.8	0.754	E	68.3	1.159	C	23.3	0.926	0.017	2.3	C	23.9	0.764	0.010	0.2	E	69.4	1.164	0.005	2.1
4	N Fair Oaks Avenue / Ahwanee Avenue	D	City	Signal	B	16.5	0.720	B	16.4	0.465	B+	11.7	0.714	B	16.6	0.737	0.017	0.3	B	16.6	0.478	0.013	1.6	B+	11.7	0.717	0.003	0.1
5	N Fair Oaks Avenue / Caliente Drive	D	City	Signal	B+	10.7	0.614	A	9.5	0.385	A	9.0	0.576	B+	10.8	0.631	0.017	0.3	A	9.4	0.392	0.007	-0.1	A	9.0	0.579	0.003	0.0
6	N Fair Oaks Avenue / E Duane Avenue	D	City	Signal	C-	32.2	0.825	C	31.5	0.688	D	46.7	0.975	C-	33.7	0.844	0.019	2.2	C	31.5	0.697	0.009	0.3	D	47.2	0.980	0.005	1.1
7	N Fair Oaks Avenue / N Wolfe Road	D	City	Signal	C	25.0	0.548	C+	22.1	0.364	C	23.4	0.654	C	25.2	0.559	0.011	0.2	C+	22.1	0.369	0.005	0.1	C	23.5	0.657	0.003	0.1
8	N Fair Oaks Avenue / Maude Avenue	D	City	Signal	C	28.5	0.493	C	28.6	0.520	D+	35.2	0.769	C	28.8	0.503	0.010	0.5	C	28.5	0.524	0.004	0.0	D+	35.2	0.771	0.002	0.1
9	N Wolfe Road / Stewart Drive	D	City	Signal	B	15.2	0.241	B-	19.0	0.211	B	17.4	0.424	B	15.1	0.244	0.003	-0.1	B-	18.9	0.213	0.002	-0.1	B	17.3	0.425	0.001	0.0
10	N Wolfe Road / E Arques Avenue	D	City	Signal	C	31.8	0.466	D+	37.7	0.344	D+	37.2	0.526	C	31.8	0.468	0.002	0.0	D+	37.6	0.345	0.001	-0.1	D+	37.2	0.528	0.002	0.0
11	N Wolfe Road / Central Expressway WB Ramps[2]	E	City/County	Signal	C	25.4	0.345	B-	18.0	0.203	B-	18.6	0.489	C	25.6	0.347	0.002	0.2	B	17.9	0.204	0.001	-0.1	B-	18.6	0.490	0.001	0.0
12	N Wolfe Road / Central Expressway EB Ramps[2]	E	City/County	Signal	B+	10.1	0.280	C	27.5	0.303	C+	20.0	0.689	B+	10.2	0.279	-0.001	-6.4	C	27.5	0.304	0.001	0.1	C+	20.0	0.689	0.000	0.0
13	N Fair Oaks / E Arques Avenue	D	City	Signal	D	39.2	0.715	D+	36.0	0.625	D-	52.7	0.926	D	39.4	0.722	0.007	0.3	D+	36.0	0.628	0.003	-0.1	D-	52.8	0.927	0.001	0.1
14	E Weddell Drive / East Project Driveway	D	City	SSSC	Future Intersection with Project									B	12.9	0.132	-	-	B	11.8	0.083	-	-	B	12.3	0.044	-	-
15	E Weddell Drive / South Project Driveway	D	City	SSSC										A	7.7	0.003	-	-	A	7.6	0.001	-	-	A	7.9	0.001	-	-

1 The average control delay is reported for signalized intersections. The delay for the worst movement is reported for SSSC intersections.

2 Central Expressway is a CMP expressway with LOS E threshold.

6. INTERSECTION VEHICLE QUEUING

This chapter presents the results from the vehicle queuing analysis completed for each of the study intersections.

VEHICLE QUEUING

As congestion increases, it is common for traffic at intersections to form lines of stopped (or queued) vehicles. Queue lengths were determined for each turn lane and measure the distance that vehicles will back up in each direction approaching an intersection. *Traffix* software calculates the 95th percentile queues based on *HCM 2000* methodology. The 95th percentile queue is used to account for fluctuations in traffic and represents a condition where 95 percent of the time during the peak period, traffic volumes will be less than or equal to the queue determined by the analysis. It is used as a benchmark for determining deficiencies as a standard transportation engineering practice. A typical vehicle length of 25 feet was used in the queuing analysis. As stated in the Operating Conditions and Criteria, an operational deficiency was assumed to occur if the queue increases by one or more vehicles and the vehicle queue exceeds the turn pocket length. A summary of the queuing results is included in the **Appendix**.

The analysis showed that several existing turn bay storage lengths are exceeded by future traffic volumes. In all cases the exceeded queue lengths are not solely due to the project, but are a result of pre-existing deficiencies. For example, the 95th percentile eastbound left turn queue length at the intersection of Fair Oaks Avenue and Duane Avenue Way is 203 feet during the AM peak in the Existing Conditions and 226 feet during the AM peak in the Existing Plus Project Conditions. The turn pocket length is 50 feet long and the queue spills out of the turn pocket, the result is a pre-existing deficiency. At locations affected by the project traffic, the increase in vehicle queuing is typically less than one vehicle for a left turn lane except at the following intersections:

- **Intersection #2 – N Fair Oaks Avenue / Weddell Drive**
  - Existing Plus Project, AM Peak: Northbound left turn queue length of 240 feet exceeds the 155-foot turn pocket length in the Existing Plus Project Condition. The Project increases the queuing approximately four (4) vehicles or 85 feet of the total queue.
  - Existing Plus Project, School PM Peak: Northbound left turn queue length of 208 feet exceeds the 155-foot turn pocket length in the Existing Plus Project Condition. The Project increases the queuing approximately one (1) vehicle or 32 feet of the total queue.
  - Existing Plus Project, commute PM Peak: Northbound left turn queue length of 346 feet exceeds the 155-foot turn pocket length in the Existing Plus Project Condition. The Project increases the queuing approximately one (1) vehicle or 25 feet of the total queue.
  - Existing Plus Background Plus Project, AM Peak: Northbound left turn queue length of 312 feet exceeds the 155-foot turn pocket length in the Existing Plus Background Plus Project Condition. The Project increases the queuing approximately four (4) vehicles or 97 feet of the total queue.
  - Existing Plus Background Plus Project, School PM Peak: Northbound left turn queue length of 320 feet exceeds the 155-foot turn pocket length in the Existing Plus Background Plus Project Condition. The Project increases the queuing approximately one (1) vehicle or 34 feet of the total queue.
  - Existing Plus Background Plus Project, commute PM Peak: Northbound left turn queue length of 561 feet exceed the 155-foot turn pocket length in the Existing Plus Background Plus Project Condition. The Project increases the queuing approximately one (1) vehicle or 30 feet of the total queue.

- Cumulative Plus Project, AM Peak: Northbound left turn queue length of 303 feet exceeds the 155-foot turn pocket length in the Cumulative Plus Project Condition. The Project increases the queuing approximately three (3) vehicles or 75 feet of the total queue.
- Cumulative Plus Project, School PM Peak: Northbound left turn queue length of 336 feet exceeds the 155-foot turn pocket length in the Cumulative Plus Project Condition. The Project increases the queuing approximately one (1) vehicle or 29 feet of the total queue.
- Cumulative Plus Project, commute PM Peak: Northbound left turn queue length of 607 feet exceeds the 155-foot turn pocket length in the Cumulative Plus Project Condition. The Project increases the queuing approximately one (1) vehicle or 26 feet of the total queue.

- **Intersection #6 – Fair Oaks Avenue / Duane Avenue**
  - Existing Plus Background Plus Project, AM Peak: Eastbound left turn queue of 351 feet exceeds the 50-foot pocket length in the Existing Plus Background Plus Project. The Project increases the queuing approximately one (1) vehicle or 30 feet of the total queue.
  - Cumulative Plus Project, AM Peak: Eastbound left turn queue of 414 feet exceeds the 50-foot pocket length in the Cumulative Plus Project. The Project increases the queuing approximately one (1) vehicle or 27 feet of the total queue.
- **Intersection #8 – Fair Oaks Avenue / Maude Avenue**
  - Existing Plus Project, AM Peak: Eastbound left turn queue of 225 feet exceeds the 95-foot pocket length in the Existing Plus Project. The Project increases the queuing approximately one (1) vehicle or 27 feet of the total queue
  - Existing Plus Background Plus Project, AM Peak: Eastbound left turn queue of 238 feet exceeds the 95-foot pocket length in the Existing Plus Background Plus Project. The Project increases the queuing approximately one (1) vehicle or 27 feet of the total queue.

7. SITE ACCESS AND CIRCULATION AND SCHOOL SAFETY ASSESSMENT

This chapter will include discussion of site access and circulation for the proposed project site, as well as discussion of the school safety assessment.

SITE ACCESS AND CIRCULATION

SITE ACCESS

Site access was evaluated at each of the Project driveways. As shown in the proposed site plan, **Figure 7**, the proposed project access points will be at the following locations and with the proposed minimum throat depths:

- Intersection #14 – E Weddell Drive / East Project Driveway: 50 feet
- Intersection #15 – E Weddell Drive / South Project Driveway: 50 feet

Both driveways are unsignalized intersections. The south driveway will be ingress only and the east driveway will be egress only. The driveways were determined to operate at an acceptable LOS at the completion of the proposed project.

ON-SITE VEHICLE CIRCULATION

The student drop-off zone is located directly north of the school building and will have space for approximately five vehicles. The proposed configuration of the drop-off and pick-up route allows for 365 feet of queuing from the front of the student drop-off zone to the throat of the south project driveway.

An analysis was conducted to evaluate the on-site queuing for the proposed site. Tthe majority of students is anticipated to arrive within a 30 minute period between 8:30 AM and 9:00 AM and will depart within a 30 minute period between 3:30 PM and 4:00 PM. These peak periods are anticipated to be the worst case arrival and departure times for the proposed school, as all other times have anticipated minimal trips in terms of queuing. It was estimated that 118 trips would arrive during the AM drop-off period and 100 trips during the PM pick-up period. It should be noted that the 100 trips is the vehicle trips for the midday school dismissal and PM periods combined; however, these periods closely overlap and therefore are analyzed together as a conservative estimate. For each peak period, a dwelling time or the amount of time it takes for a vehicle to enter the dedicated loading area and for the student to safely enter or exit the car, was assumed based on engineering and professional judgment. The dwelling times for the drop-off and pick-up times of 30 seconds and 60 seconds, respectively, were used in the analysis. These estimates are higher than those typically used for middle-school age children, but are used here as a conservative approach. The analysis of on-site queuing indicates that vehicles are not expected to queue beyond the depth of the driveway throat nor spill onto E Weddell Drive. Results of on-site queuing are shown on **Figure 25** and included in the **Appendix**.

It should be noted that previous site plans indicated that the main entrance for the school to be on the east side of the building, which is adjacent to E Weddell Drive. With this previous site configuration, there was added incentive for parents to drop-off or pick-up students at the curb adjacent to the school, rather through at the school's drop-off zone. This could disrupt traffic on E Weddell Drive. Also, there is an existing restriction for no on-street parking along E Weddell Drive.

Subsequent to the TIA Draft Report dated February 2016, the main building entrance for the school has been relocated to the north side of building, adjacent to the proposed student loading area. The two existing entrances on the south and east side of the building will remain, but will be for egress only. While the new configuration will decrease the incentive, there is still the potential for parents to do curbside drop-off or pick-up adjacent to the east side of the school. It is recommended that the curb in front of the school be signed as "No Stopping", and the school be conditioned through Project approval to monitor and disallow on-street drop-off activities and to prohibit ingress through the eastern doors.

PARKING REQUIREMENTS

The parking proposed by the project was reviewed to determine consistency with local parking policies and guidelines. The project proposes to provide 39 stalls and 5 short-term stalls in the student drop off and truck loading zone.

The City of Sunnyvale Municipal Code (SMC) requires that Primary School (Grades K-8) provide three (3) spaces per classroom. For the first year, the project proposes to have 13 classrooms, and 11 classrooms thereafter, which equates to 39 and 33 spaces required, respectively. The propose project provides a total of 39 parking spaces, which meets the City's requirement for the number of spaces.

The City requires in its Municipal Code to provide a minimum of 8.5 feet by 18 feet long parking stalls for a standard space. The project proposes 90 degree parking spaces for the school, with 8.5 feet wide and 16.5-foot long stalls. SMC section 19.46.120 allows "low-growing groundcover two feet beyond a wheel stop or curb may be counted towards minimum space length". Therefore, the proposed parking lot design meets the City's design requirements. However, it should be noted that these 90 degree spaces are adjacent to the 20-foot emergency vehicle access and the drop-off zone. Any vehicle exceeding the compact space size will reduce the emergency vehicle access below the standard.

PEDESTRIAN ACCESS AND CIRCULATION

The main building entrance for the school will be located on the north side of the building, adjacent to the proposed student loading zone. The two existing building entrances on the south and east sides of the building will remain, but will be for egress only. Students being dropped off on the north side of the building will now have direct access to the school entrance. For vehicles parked on the west side of the school, there is a striped crosswalk which connects to a dedicated walkway adjacent to the east side of the school.

BICYCLE ACCESS AND CIRCULATION

The SMC requires that nonresidential uses provide bicycle spaces equal to five percent of the total number of vehicular parking spaces provided. The proposed site will provide 39 vehicle parking spaces, and will need to provide at least two bicycle spaces. The Project will keep the existing bike racks, which can hold a maximum of 13 bicycles, which meets the City's requirement for the number of bicycle spaces.

It should be noted that VTA *Bicycle Technical Guidelines*[8] recommends a minimum of one (1) bicycle parking space per 30 employees and one (1) bicycle parking space per 12 students. For the proposed site that would equate to 34 spaces for the first year (18 Class I and 16 Class II spaces) and 26 spaces (14

[8] *VTA Bicycle Technical Guidelines*, VTA, 2012

Class I and 12 Class II spaces) thereafter. Based on VTA standards, the proposed project does not have adequate bicycle parking.

The number of recommended bicycle spaces will vary by school based on many factors such as the biking culture of the school and surrounding area, school programs for active transportation, the bicycle experience to and from school, etc. While it is unknown at this time what the optimal number of bike racks should be, it is recommended that the proposed site monitor the use of bike storage and be required to provide additional storage if greater than 75% of proposed bike racks are utilized more than two days per week.

From the proposed site, bicyclists can access the City network of bicycle facilities via the bicycle lanes adjacent to the site on E Weddell Drive.

SCHOOL SAFETY ASSESSMENT

The roadway, bicycle and pedestrian facilities adjacent and surrounding the proposed school were evaluated to assess the safety for students and parents. This section will discuss existing conditions for pedestrian, bicycle, and vehicle circulation, as well as discuss proposed improvements.

EXISTING CONDITIONS

This section discusses the existing conditions in relation to pedestrian, bicycle, and vehicle circulation. Inventory of existing facilities is discussed, as well as identifying potential barriers or challenges for students and parents to use active modes of travel such as bicycling and walking.

Pedestrian Circulation

Students living in residential areas within walking distance to the proposed school are located north of E Weddell Drive, east of Fair Oaks Avenue, and south of US 101. There are also future residential developments located at 520 and 550 W Weddell Drive.

Students living north of E Weddell Drive may use sidewalks throughout the neighborhoods. East of Morse Avenue, pedestrians may utilize the sidewalk along E Weddell Drive. West of Morse Avenue, there are some sidewalks on the north side of E Weddell, but the sidewalk is discontinuous and will not provide an adequate walking route. However, pedestrians may use the John W. Christian Greenbelt to walk east to Morse Avenue or E Weddell Drive and use public sidewalks to access the proposed project.

Pedestrians coming from neighborhoods east of Fair Oaks Avenue will be able to access the site by crossing Fair Oaks Avenue at the signalized intersection with E Weddell Drive and walk on the north sidewalk along E Weddell Drive.

For the residential area south of US 101, pedestrians have multiple routes to access the proposed project. The first route includes utilizing the east sidewalks along Fair Oaks Avenue, however, this route may be uncomfortable for students due to the higher speeds of vehicles entering and exiting the US 101 freeway ramps. The second route would be using the bicycle/pedestrian bridge located at Ahwanee Avenue and Borregas Avenue. This bridge connects on the north side of the freeway at the intersection of E Borregas Avenue and E Weddell Drive. From the bicycle/pedestrian bridge, pedestrians may head north on Borregas Avenue and then head east on the John W. Christian Greenbelt. It should be noted that the second route would add approximately 0.8 miles for pedestrians south of US-101 and east of Fair Oaks Avenue.

Future residential developments will be located east of the proposed school, on the east side of E Weddell Drive. Currently the only crosswalks across E Weddell Drive is west at Borregas Avenue or northeast at Fair Oaks Avenue, which are approximately 0.45 and 0.25 miles away from the proposed school, respectively. Due to the close proximity of the future residential development and the proposed school, combined with the long distances to the nearest crosswalk on E Weddell Drive, it is likely that pedestrians will cross E Weddell Drive at an unmarked location. To channelize pedestrians to a single crossing and increase motorist's awareness of potential pedestrians, it is recommended that a enhanced lighted mid-block crosswalk be installed across E Weddell Drive in the vicinity of the two proposed developments, contiguous to the John W. Christian Greenbelt.

It should be noted that within the surrounding area there some existing crosswalks. The crosswalks within the vicinity of the proposed school include the crosswalk on the west leg at the intersection of Borregas Avenue and E Weddell Drive, the mid-block crossing for the John W. Christian Greenbelt at Morse Avenue and the crosswalks for all four legs at the signalized intersection of Fair Oaks Avenue and E Weddell Drive. With a proposed transition of uses to residential and the proposed school use, pedestrian activity will increase and infrastructure improvements should be implemented by the corresponding proposed project.

Bicycle Circulation

Bicyclists will most likely come from the same neighborhoods as those walking to school, which include the neighborhoods north of E Weddell Drive, east of Fair Oaks Avenue, and south of US 101.

For bicyclists coming from the north neighborhoods, there are bicycle lanes on Borregas Avenue, Morse Avenue, and E Weddell Drive between Fair Oaks Avenue and Morse Avenue. Bicyclist may also utilize the John W. Christian Greenbelt.

Students coming from the east side of Fair Oaks Avenue may cross at the signalized crosswalk at Fair Oaks Avenue and E Weddell Drive and use the bicycle lanes along E Weddell Drive.

For residents in the neighborhoods south of US 101, bicyclists may utilize the bicycle lanes along Borregas Avenue, cross US 101 with the bicycle/pedestrian bridge, and use John W. Christian Greenbelt to access the school. It should be noted that there are no current bicycle facilities along Fair Oaks Avenue north of US 101 and Fair Oaks Avenue is designated as a Class III bicycle route south of US 101.

Vehicle Circulation

Vehicles may access the proposed school by driving along E Weddell Drive. Within the vicinity of the proposed project, E Weddell Drive is a collector roadway which serves office, residential, commercial, and assembly land uses. The speed limit on E Weddell Drive is 35 mph, which is higher than the typical speed limit of 25 mph for school zones. Due to the existing surrounding land uses, there are no existing school-related striping or signage.

There is sight distance concern just east of the project south driveway due to the horizontal curve on E Weddell Drive.

The school's main entrance is located on the north side of the building, with additional building egresses on the east and south side of the building. Due to the buildings placement on the site being close to E Weddell Drive, there is a potential for parents to try to park and conduct curbside drop-off and pickup along E Weddell Drive. The City has prohibited on-street parking on E Weddell Drive adjacent to the property and proper signage should be installed.

PROPOSED IMPROVEMENTS

This section will discuss and describe proposed improvements to improve safety in the immediate school vicinity and encourage the use and increased safety of active transportation modes such as bicycling and walking.

Figure 26 illustrates the locations of where the proposed improvements are located. Details of each improvement are discussed below.

1. **Relocate Main Entrance for School:** Previous site plans showed the main entrance for the proposed school building is located on the east side of the building. It is recommended that the main entrance be relocated to the north side of the building and that the east entrance be used as emergency egress/ingress only. The relocation of the main entrance will help discourage unsafe passenger loading and unloading along E Weddell Drive.

   It should be noted that this recommend change was incorporated into the site plan via correspondence with the City on February 18, 2016. The main entrance has been relocated to the north side of the building.

2. **Implement School Speed Limit Zone:** The speed limit along E Weddell Drive is 35 mph. It is proposed that School Speed Limit signs be installed 500 feet away from the school along E Weddell Street. For eastbound traffic, the sign should be installed west of Morse Avenue and west of Kiel Court for westbound traffic.

   Along with installation of School Speed Limit signs, 35 MPH Speed Limit sign (R2-1) should be installed west of Kiel Court for eastbound traffic and installed west of Morse Avenue for westbound traffic to indicate the end of the school zone.

3. **Install School Crosswalks**: It is recommend that school crosswalks be installed within the vicinity of the school. School crosswalks shall be yellow high-visibility ladder markings with corresponding advance markings per 2014 CA MUTCD.

   It is proposed that the following existing crosswalks be updated to be school crossing:

   - All crosswalks at the intersection of Fair Oaks Avenue and E Weddell Drive, after obtaining approval from Caltrans,
   - North leg of Kiel Court and E Weddell Drive

   It is proposed that the following crosswalks be installed:

   - North leg of Morse Avenue and E Weddell Drive (new curb ramps required)
   - Future mid-block crossing at E Weddell Drive and John W. Christian Greenbelt shall be school crosswalk with school crossing signs and advance markings. This improvement needs to be approved by the City and County of San Francisco (SFPUC).

4. **Install Rectangular Rapid Flashing Beacon Crosswalk:** Within the vicinity of the proposed school there is an existing mid-block crossing along Morse Avenue and a proposed mid-block crossing along E Weddell Drive. With the addition of the proposed project and other residential developments in the surrounding area, there is expected to be an increase in traffic volume and pedestrian activity to the area. To improve safety at these mid-block crossings, it is recommended that Rectangular Rapid Flashing Beacon (RRFB) crosswalk be installed the following locations:

- Existing mid-block crossing at Morse Avenue and John W. Christian Greenbelt. Since this is likely the preferred east-west travel route for students, the crossing of Morse Avenue is recommended for enhancement as an RRFB installation.
- Future mid-block crossing at E Weddell Drive and John W. Christian Greenbelt. This crosswalk will be constructed as part of the 520 E Weddell Drive project, only if approved by the SFPUC. The proposed school project should be conditioned to add any additional striping or signage to this crossing to meet compliance with treatment as a school crossing rather than the proposed non-school crossing by the 520 E Weddell Drive project.

5. **Install Sidewalk:** The *Tasman/Fair Oaks Area Pedestrian and Bicycle Circulation Plan*, identifies that future sidewalks be constructed along the south/east side of E Weddell Drive between Fair Oaks Avenue and the John W. Christian Greenbelt. For connectivity from the school and the new RRFB crossing at the Greenbelt, these sidewalks are recommended for installation as part of the project or that the school pay a fair share of installation to the project development immediately adjacent to these crosswalks. This improvement will be constructed as part of the 520 E Weddell Drive project.

6. **Install Pedestrian Ramps:** It is proposed that a pedestrian ramp be installed on the northwest corner at the intersection of Morse Avenue and E Weddell Drive.

7. **Install School Signs and Striping:** Due to the existing surrounding land uses, there are no existing school-related signage or striping. It is recommended that school signage and striping be installed per 2014 CA MUTCD at the locations shown in **Figure 25**. Signage and striping to be installed include:

    - School Crossing Ahead Sign
    - School Zone Signs
    - 'SLOW SCHOOL XING' pavement marking

8. **Install No Stopping Signs**: To prevent on-street parking and loading adjacent to the school, it is proposed that no stopping signage be installed along the curb adjacent to the school property.

9. **Replace No Parking Signs**: It is recommended that the No Parking signs on the north/west side of E Weddell Drive between Kiel Court and Morse Avenue be replaced with No Stopping signs to prevent parents attempting to temporarily park or conduct drop-off and pick-up activities. The existing sign posts may remain, the static signs mounted on the existing posts ae recommended for replacement.

10. **Crossing Guard:** It is recommended that a crossing guard be considered to be stationed at the intersection of Fair Oaks Avenue and E Weddell Drive. Subsequent to the school being open for a few months and student and parents learning their preferred routes, it is recommended that the school fund a city-administered engineering study to determine if a crossing guard is warranted.

11. **Intersection Improvements:** As part of the 520 E Weddell Project, there will be improvements made to the intersection of Fair Oaks Avenue and E Weddell Drive to improve pedestrian facilities such as install new crosswalk striping and pedestrian push buttons. The proposed school project should be conditioned to add any additional striping (e.g. yellow high visibility crosswalk striping) or signage to this intersection to meet compliance with treatment as a school crossing rather than the proposed non-school crosswalk improvements by the 520 E Weddell Drive project.

12. **Develop Walking and Bicycle Plan:** It is recommended that the school develop and distribute a walking and bicycle plan that will designate recommended routes for pedestrians and bicyclists. The plan should encourage use of the existing pedestrian and bicycle facilities in the project area such as the existing sidewalks, bicycle lanes, the greenbelt, and the bicycle/pedestrian bridge over US 101 as well as the enhanced treatments recommended in this report section.

13. **Develop pick-up and drop off procedures:** It is recommended that the school develop drop-off and pick-up procedures for parents to ensure efficiency, increase safety, and reduce congestion during drop-off and pick-up times. The concern for potential queuing issues is related more to the afternoon pick-up period since this activity includes matching the student to their vehicle, parents arriving early for pick-up, and all students active outside of the school rather than slightly staggered as they are during morning drop-off arrivals. In this regard, pick-up procedures should include some best practices including the following:

    - Faculty or staff valet assistance entering and existing vehicles
    - Monitoring of drop-off zone student congregation to limit conflicts with vehicles
    - Radio communication between back of vehicle queue and front of queue to provide time for student-vehicle matching
    - Maintain a pull around to allow vehicles done dropping-off or picking-up to move out of the queue line
    - Focus pick-up and drop-off to front 2-4 vehicles only. This will limit the conflict space of pedestrians in the vehicle area and also limit back-of-line drop-offs and then accelerated cut-through of campus
    - Deliveries shall only take place between 30 minutes after last AM bell and 30 minutes before first PM bell[9]
    - All parking stalls to be conned off half hour prior to student arrival until half hour after the last AM bell and half hour prior to first PM release time until half hour after las PM bell[10]

14. **Modify south driveway:** The current driveway is wide enough for two-way traffic. It is suggested that improvements be made to the south driveway to emphasize single lane entry such as narrowing the driveway.

15. **On-site striping and signage:** The on-site circulation striping and signage for the proposed projects needs to emphasize one-way circulation. All signs and pavement markings shall be per 2014 CA MUTCD and 2010 Caltrans Standard Plans. Recommended striping and signage include, but are not limited to:

    - 'Do Not Enter' signs at the northern driveway
    - 'No Parking' and 'Passenger Loading Only' signs
    - One-way signs at southern driveway
    - Pavement arrows at driveways and internal circulation lanes
    - Fire lane red curb marking or pavement red stripe with white text along northern and western wall and walkways

16. **Driveway and Corner Sight Distance:** The proposed project needs to ensure that the site is compliant with driveway and corner (at the horizontal curve) vision triangles per SMC to ensure proper visibility for ingress/egress from site.

[9] Proposed Site Plan General Notes #7, Cody Anderson Wasney Architects, 2016.

[10] Proposed Site Plan General Notes #8, Cody Anderson Wasney Architects, 2016.

8. PUBLIC TRANSIT, BICYCLE, AND PEDESTRIAN FACILITIES

The proposed project was evaluated to determine if it would potentially conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks) or generate pedestrian, bicycle, or transit travel demand that would not be accommodated by existing transit, bicycle, or pedestrian facilities and plans.

Students, parents, and school employees traveling to the charter school will have the option of driving, taking transit, walking or bicycling to and from the proposed project.

TRANSIT

For those taking transit, VTA bus route 26 operates along Fair Oaks Avenue. There is a bus stop at the intersection of N Fair Oaks Avenue and Weddell Drive that provides access to the local transit system. The project would not conflict with existing or planned transit facilities.

Transit vehicle delay was also considered for transit routes that operate within the study area. Transit vehicles for the transit routes in the study area are expected to use the shared right-of-way with other motorists. Since the proposed project is anticipated to increase the vehicle delay at study intersections, transit vehicle delay may increase. The increase in transit vehicle delay was calculated from the intersection level of service outputs from *Traffix* software. For each transit route, the study intersections and specific movements along the route were identified. The vehicle delay for each movement for each study intersection along the route was summed to determine the transit vehicle delay in the study area.

For route 26, the northbound and southbound through movements at intersections along N Fair Oaks Avenue between Tasman Drive and Arques Avenue were evaluated. The maximum increase in vehicle delay is 5.4 seconds for the northbound through movement for all intersections combined in the AM peak. In the School PM peak, the maximum increase in vehicle delay is 4.1 seconds for the southbound through movements. In the PM peak, the maximum increase in vehicle delay is 3.6 seconds for the southbound movements. The increase in vehicle delay in the AM, School PM, and PM peaks is considered minor.

For route 55, the northbound right and westbound left movements at the intersection of N Fair Oaks Avenue/E Duane Avenue and the eastbound left and southbound right movements at the intersections of N Fair Oaks Avenue/N Wolfe Road and N Fair Oaks Avenue/Maude Avenue were identified as along the bus route. The maximum increase in vehicle delay is 5.0 seconds for the northbound/eastbound movements for all intersections combined in the AM peak. In the School PM peak, the maximum increase in vehicle delay is 0.7 for the southbound/westbound movements. In the PM peak the maximum increase in vehicle delay is 1.4 seconds for the southbound/westbound movements. The increase in vehicle delay in the AM, School PM, and PM peaks is considered minor.

For route 304, the northbound right and westbound left movements at the intersection of N Fair Oaks Avenue/E Arques Avenue were evaluated. In the AM peak, there was no change in vehicle delay for both the northbound right movement and westbound left movement. In the School PM peak the maximum increase in vehicle delay is 0.2 seconds in the westbound left movement. In the PM peak the maximum increase in vehicle delay is 0.3 seconds in the westbound left movement. The increase in vehicle delay in the AM, School PM, and PM peaks is considered minor.

The maximum increase in transit delay for AM, School PM, and PM peak hours is 4.6 seconds. This increase in transit vehicle delay should not significantly affect the overall schedule for the transit routes.

Since the project does not conflict with existing or planned transit facilities and there are adequate facilities for pedestrian and bicycles to access transit stops, the project will have a **less than significant impact** on transit services.

PEDESTRIAN

There are existing sidewalks along the project frontage on E Weddell Drive. It is anticipated that pedestrians would use these sidewalks along the project site's frontage to access transit stops nearby. At the signalized intersection near the project site there are striped crosswalks for each direction allowing pedestrians to more safely cross the adjacent roadways. Therefore, the project will have a **less than significant impact** on pedestrian capacity.

BICYCLE

Bicyclists will have direct access to the project site using bicycle facilities on Weddell Drive. The project is currently not proposing any bicycle facility upgrades off-site.

The proposed project does not appear to impact the safety of bicyclists or have any hazardous design features impeding the use of bicycles. Since the proposed project does not conflict with any adopted policies or plans related to bicycle activity, the propose project will have a **less than significant impact** on bicycle capacity.

9. SUMMARY OF IMPACTS AND RECOMMENDED MITIGATIONS

Based on the results of the traffic analysis and evaluation of the proposed site plan, there are no significant impacts as a result of the proposed project.

10. SUMMARY OF QUEUING DEFICIENCIES AND RECOMMENDED IMPROVEMENTS

Based on the results of the queuing analysis, the follow deficiencies are noted in **Table 14**.

Table 14 - Queuing Deficiencies Summary

#	Intersection	Scenarios
2	N Fair Oaks Avenue / Weddell Drive	Existing Plus Project AM Peak Existing Plus Project School PM Peak Existing Plus Project PM Peak Existing Plus Background Plus Project AM Peak Existing Plus Background Plus Project School PM Existing Plus Background Plus Project PM Peak Cumulative Plus Project AM Peak Cumulative Plus Project School PM Peak Cumulative Plus Project PM Peak
6	N Fair Oaks Avenue / Duane Avenue	Existing Plus Background Plus Project AM Peak Cumulative Plus Project AM Peak
8	N Fair Oaks Avenue / Maude Avenue	Existing Plus Project AM Peak Existing Plus Background Plus Project AM Peak

RECOMMENDED IMPROVEMENTS

The following queuing deficiencies are listed by study intersection:

DEFICIENCY QUEUING-1 – N FAIR OAKS AVENUE / WEDDELL DRIVE (INTERSECTION #2)

The intersection of N Fair Oaks Avenue / Weddell Drive have a queuing deficiency in the following scenarios due to the proposed project:

- Existing Plus Project – AM Peak
- Existing Plus Project – School PM Peak
- Existing Plus Project – PM Peak
- Existing Plus Background Plus Project – AM Peak
- Existing Plus Background Plus Project – School PM Peak
- Existing Plus Background Plus Project – PM Peak
- Cumulative Plus Project – AM Peak
- Cumulative Plus Project – School PM Peak
- Cumulative Plus Project – PM Peak

Existing Plus Project

In the Existing Plus Project scenario, the queue for the northbound left turn movement is 240 feet in the AM peak, which exceeds the 155-foot turn pocket. Without the project, the northbound left turn queue is 155 feet, which is equal to the storage length. The proposed project adds 85 feet, or approximately four (4)

vehicles, to the total queue. Since the project causes the queue to exceed the turn pocket, this is a queuing deficiency.

In addition, during the School PM Peak, the northbound left turn movement is 208 feet in the Existing Plus Project scenario. Without the project, the northbound left turn queue is 176 feet, which also exceeds the turn pocket. The proposed project adds 32 feet, or approximately one (1) vehicle to the total queue. Since the queue exceeds the left turn pocket and the proposed project increased the queue length by at least one vehicle length, this is a queuing deficiency.

In addition, during the PM Peak, the northbound left turn movement is 346 feet in the Existing Plus Project scenario. Without the project, the northbound left turn queue is 321 feet, which also exceeds the turn pocket. The proposed project adds 25 feet, or approximately one (1) vehicle to the total queue. Since the queue exceeds the left turn pocket and the proposed project increased the queue length by at least one vehicle length, this is a queuing deficiency.

There is no feasible improvement for this deficiency. An additional northbound left turn lane would be needed, but cannot be added due to right-of-way constraints. Therefore, this queuing deficiency would remain.

Existing Plus Background Plus Project

In the Existing Plus Background Plus Project scenario, the queue for the northbound left turn movement is 312 feet in the AM peak, which exceeds the 155-foot turn pocket. Without the project, the northbound left turn queue is 215 feet. The proposed project adds 97 feet, or approximately four (4) vehicles, to the total queue. Since the queue exceeds the left turn pocket and the proposed project increased the queue length by at least one vehicle length, this is a queuing deficiency.

In addition, during the School PM Peak, the northbound left turn movement is 320 feet in the Existing Plus Background Plus Project scenario. Without the project, the northbound left turn queue is 286 feet. The proposed project adds 34 feet, or approximately one (1) vehicle to the total queue. Since the queue exceeds the left turn pocket and the proposed project increased the queue length by at least one vehicle length, this is a queuing deficiency.

In addition, during the PM Peak, the northbound left turn movement is 561 feet in the Existing Plus Background Plus Project scenario. Without the project, the northbound left turn queue is 531 feet. The proposed project adds 30 feet, or approximately one (1) vehicle to the total queue. Since the queue exceeds the left turn pocket and the proposed project increased the queue length by at least one vehicle length, this is a queuing deficiency.

There is no feasible improvement for this deficiency. An additional northbound left turn lane would be needed, but cannot be added due to right-of-way constraints. Therefore, this queuing deficiency would remain.

Cumulative Plus Project

In the Cumulative Plus Project scenario, the queue for the northbound left turn movement is 303 feet in the AM peak, which exceeds the 155-foot turn pocket. Without the project, the northbound left turn queue is 228 feet. The proposed project adds 75 feet, or approximately three (3) vehicles, to the total queue. Since the queue exceeds the left turn pocket and the proposed project increased the queue length by at least one vehicle length, this is a queuing deficiency.

In addition, during the School PM Peak, the northbound left turn movement is 336 feet in the Cumulative Plus Project scenario. Without the project, the northbound left turn queue is 307 feet. The proposed project adds 29 feet, or approximately one (1) vehicle to the total queue. Since the queue exceeds the left turn pocket and the proposed project increased the queue length by at least one vehicle length, this is a queuing deficiency.

In addition, during the PM Peak, the northbound left turn movement is 607 feet in the Cumulative Plus Project scenario. Without the project, the northbound left turn queue is 581 feet. The proposed project adds 26 feet, or approximately one (1) vehicle to the total queue. Since the queue exceeds the left turn pocket and the proposed project increased the queue length by at least one vehicle length, this is a queuing deficiency.

There is no feasible improvement for this deficiency. An additional northbound left turn lane would be needed, but cannot be added due to right-of-way constraints. Therefore, this queuing deficiency would remain.

DEFICIENCY QUEUING-2 – N FAIR OAKS AVENUE / DUANE AVENUE (INTERSECTION #6)

The intersection of N Fair Oaks Avenue / Duane Avenue will have a queuing deficiency in the following scenario due to the proposed project:

- Existing Plus Background Plus Project – AM Peak
- Cumulative Plus Project – AM Peak

Existing Plus Background Plus Project

In the Existing Plus Background Plus Project scenario, the queue for the eastbound left turn movement is 351 feet in the AM peak, which exceeds the 50-foot turn pocket. Without the project, the eastbound left turn queue is 321 feet. The proposed project adds 30 feet, or approximately one (1) vehicle, to the total queue. Since the queue exceeds the left turn pocket and the proposed project increased the queue length by at least one vehicle length, this is a queuing deficiency.

There is no feasible improvement for this deficiency. An additional eastbound left turn lane would be needed, but cannot be added due to right-of-way constraints. Therefore, this queuing deficiency would remain.

Cumulative Plus Project

In the Cumulative Plus Project scenario, the queue for the eastbound left turn movement is 414 feet in the AM peak, which exceeds the 50-foot turn pocket. Without the project, the eastbound left turn queue is 386 feet. The proposed project adds 28 feet, or approximately one (1) vehicle, to the total queue. Since the queue exceeds the left turn pocket and the proposed project increased the queue length by at least one vehicle length, this is a queuing deficiency.

There is no feasible improvement for this deficiency. An additional eastbound left turn lane would be needed, but cannot be added due to right-of-way constraints. Therefore, this queuing deficiency would remain.

DEFICIENCY QUEUING-3 – N FAIR OAKS AVENUE / MAUDE AVENUE (INTERSECTION #8)

The intersection of N Fair Oaks Avenue / Maude Avenue will have a queuing deficiency in the following scenario due to the proposed project:

- Existing Plus Project – AM Peak
- Existing Plus Background Plus Project – AM Peak

Existing Plus Project

In the Existing Plus Project scenario, the queue for the eastbound left turn movement is 225 feet in the AM peak, which exceeds the 95-foot turn pocket. Without the project, the northbound left turn queue is 198 feet. The proposed project adds 27 feet, or approximately one (1) vehicle, to the total queue. Since the queue exceeds the left turn pocket and the proposed project increased the queue length by at least one vehicle length, this is a queuing deficiency.

Although the queue extends beyond the storage length, there is a two-way left turn lane (TWLTL) where additional queued vehicles can be stored, therefore no improvement is recommended.

Existing Plus Background Plus Project

In the Existing Plus Background Plus Project scenario, the queue for the eastbound left turn movement is 238 feet in the AM peak, which exceeds the 95-foot turn pocket. Without the project, the northbound left turn queue is 211 feet. The proposed project adds 27 feet, or approximately one (1) vehicle, to the total queue. Since the queue exceeds the left turn pocket and the proposed project increased the queue length by at least one vehicle length, this is a queuing deficiency.

Although the queue extends beyond the storage length, there is a two-way left turn lane (TWLTL) where additional queued vehicles can be stored, therefore no improvement is recommended.

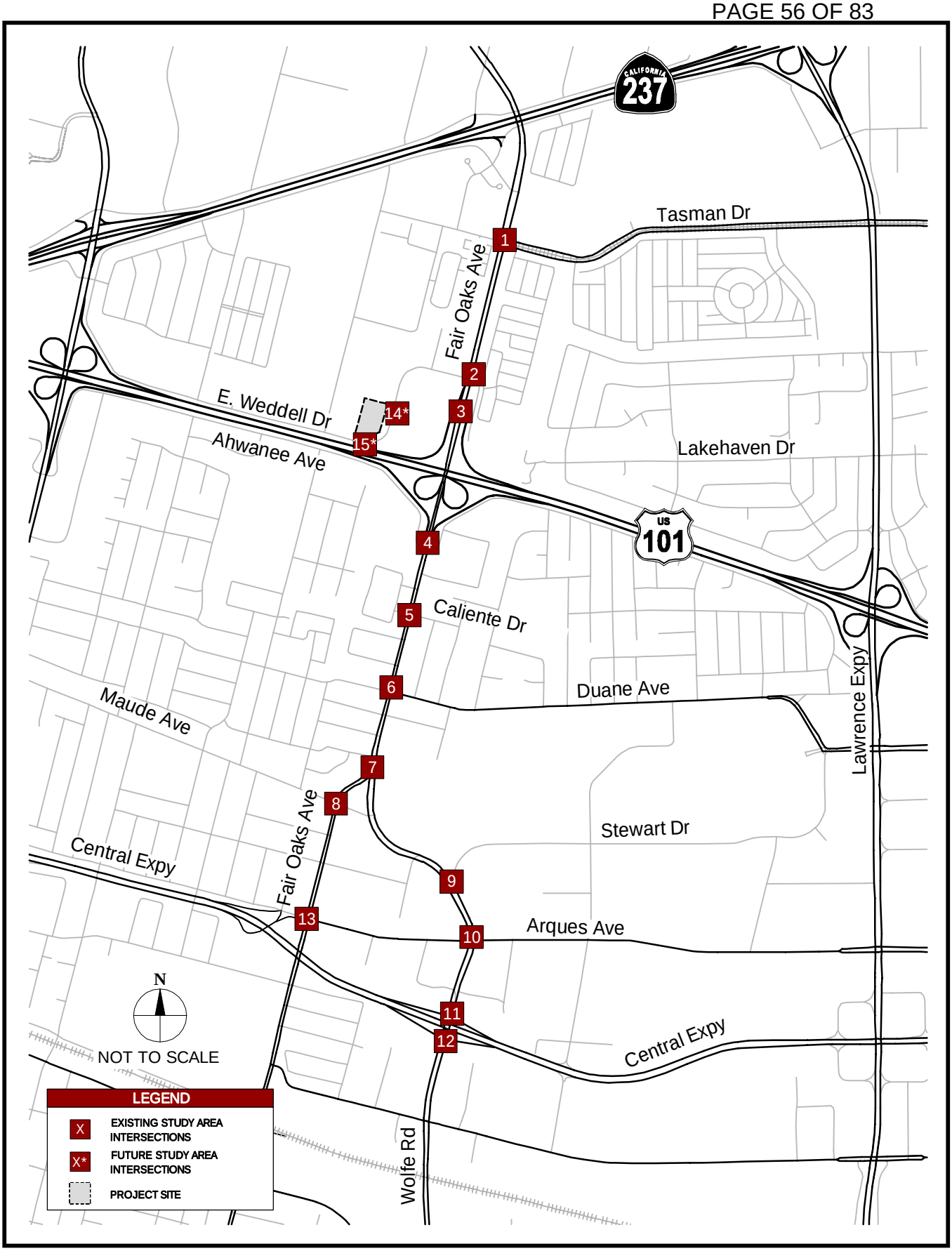

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FIGURE 1

PROJECT LOCATION AND STUDY INTERSECTIONS

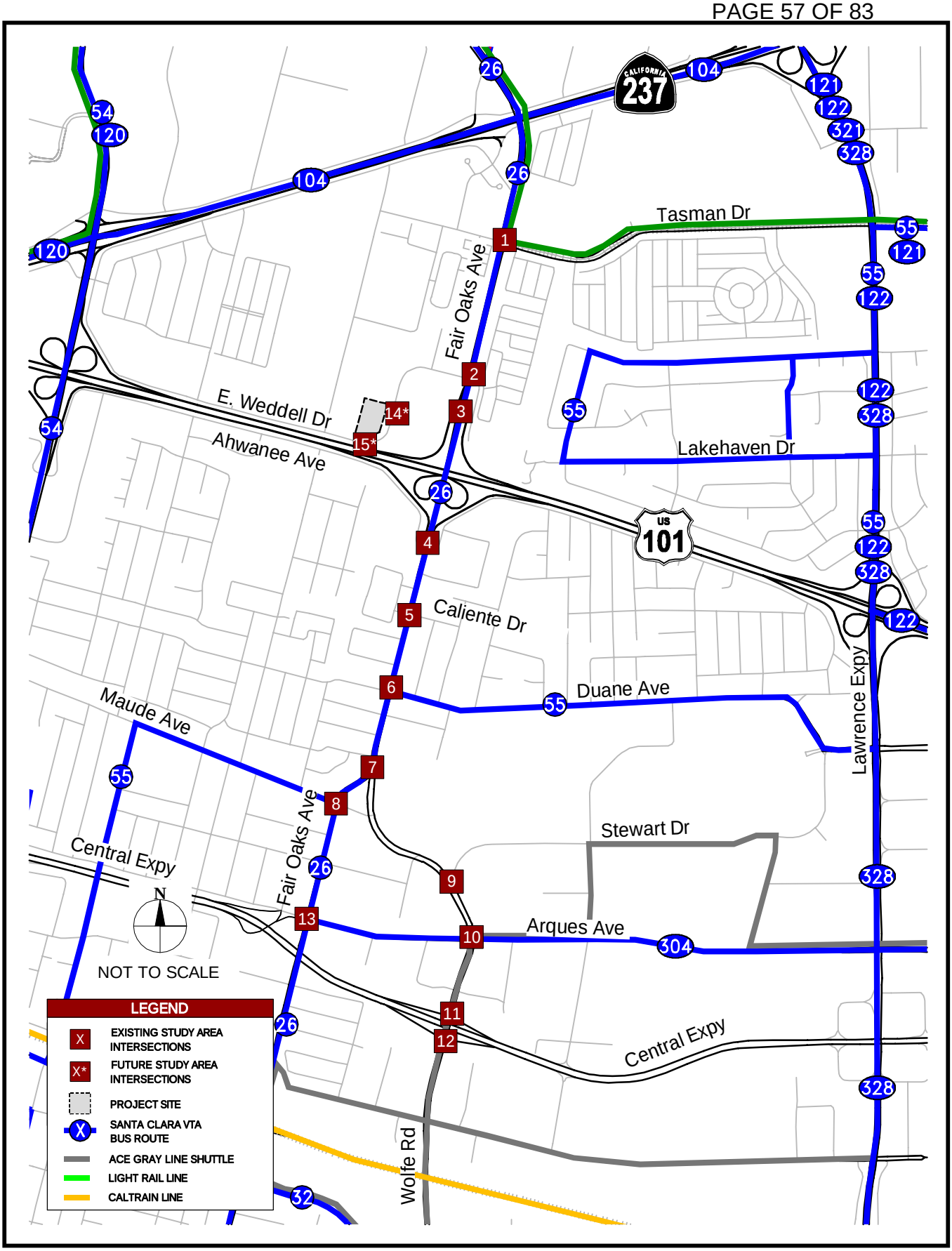

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FIGURE 2
EXISTING TRANSIT SYSTEM

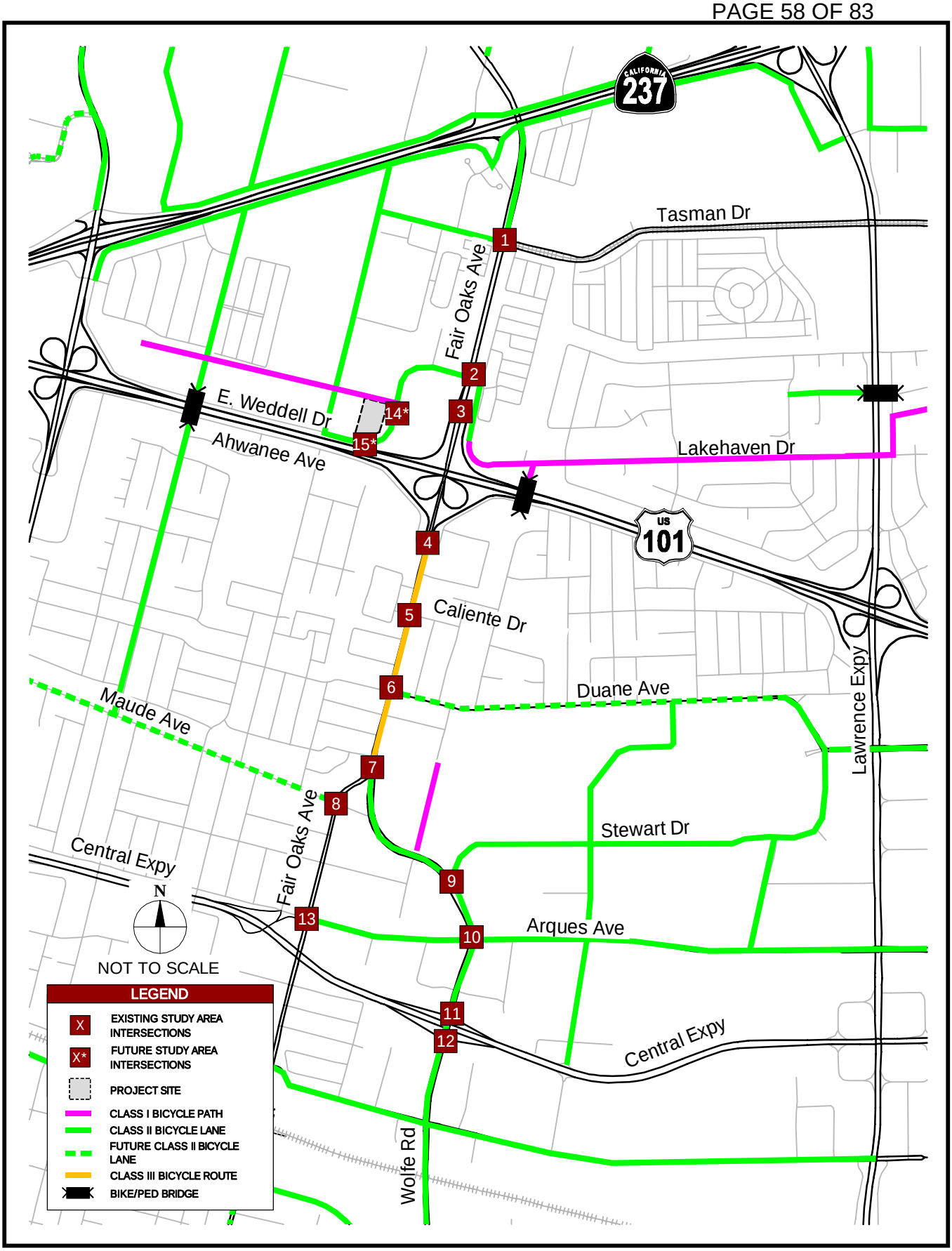

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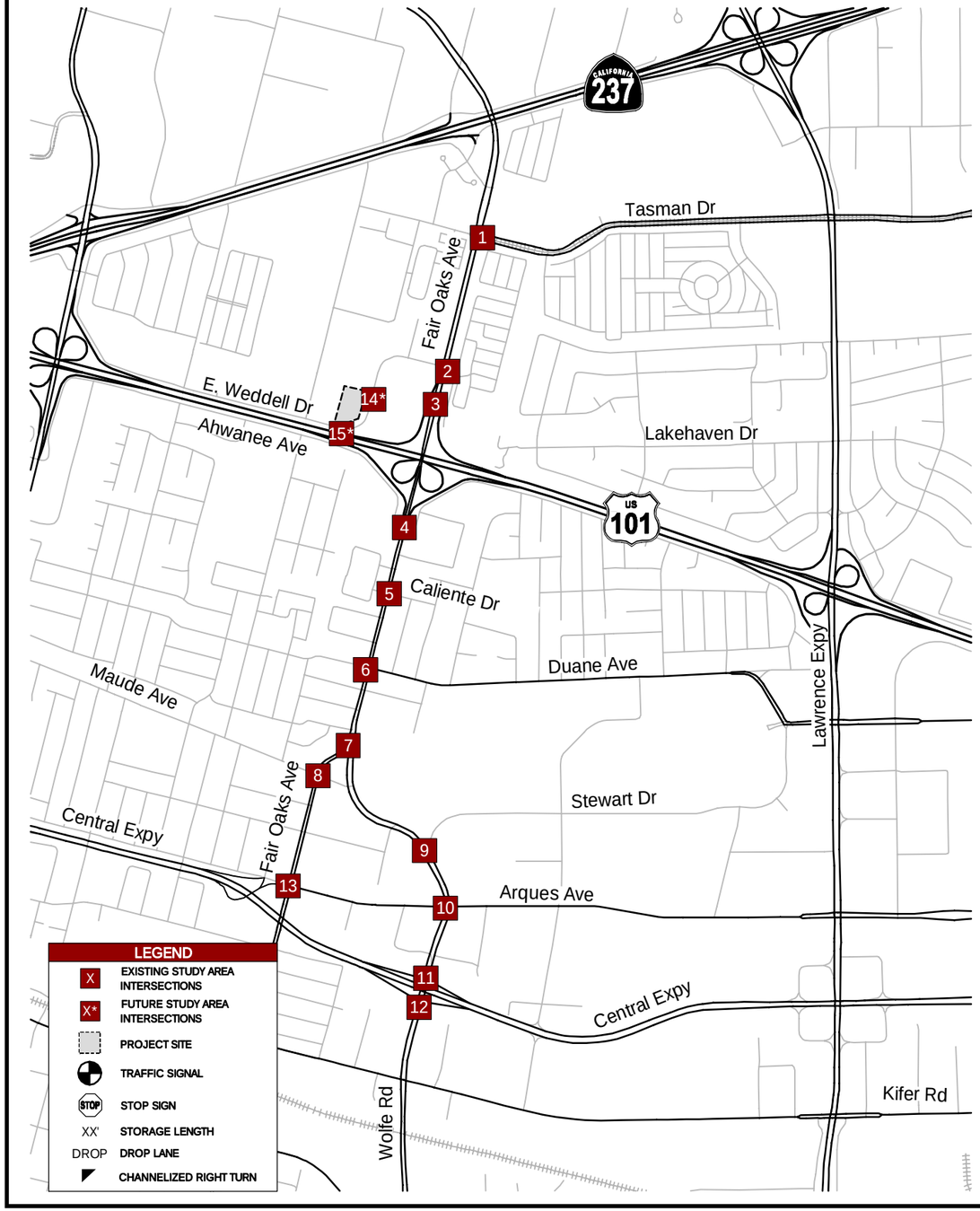
FIGURE 3

EXISTING BICYCLE FACILITIES



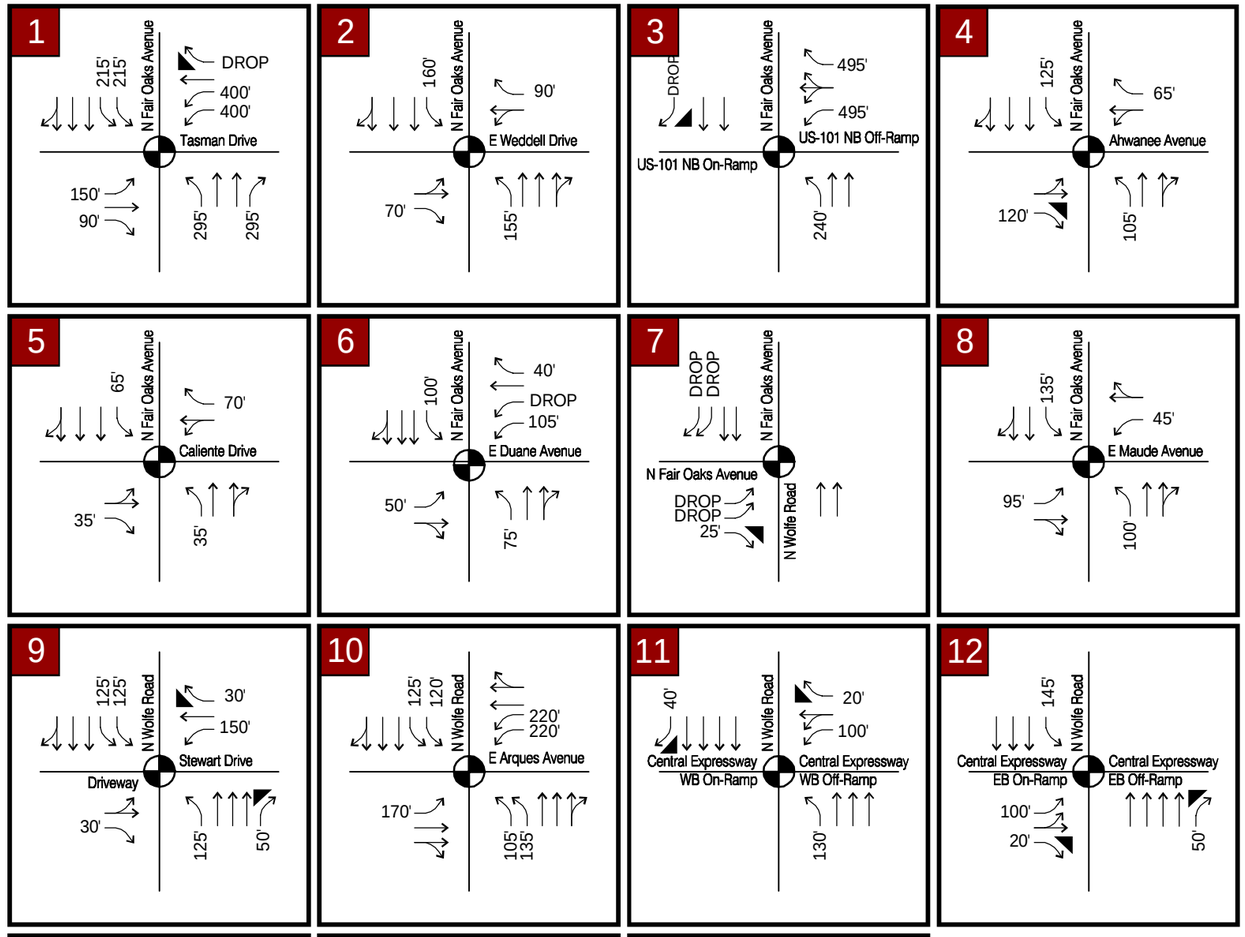


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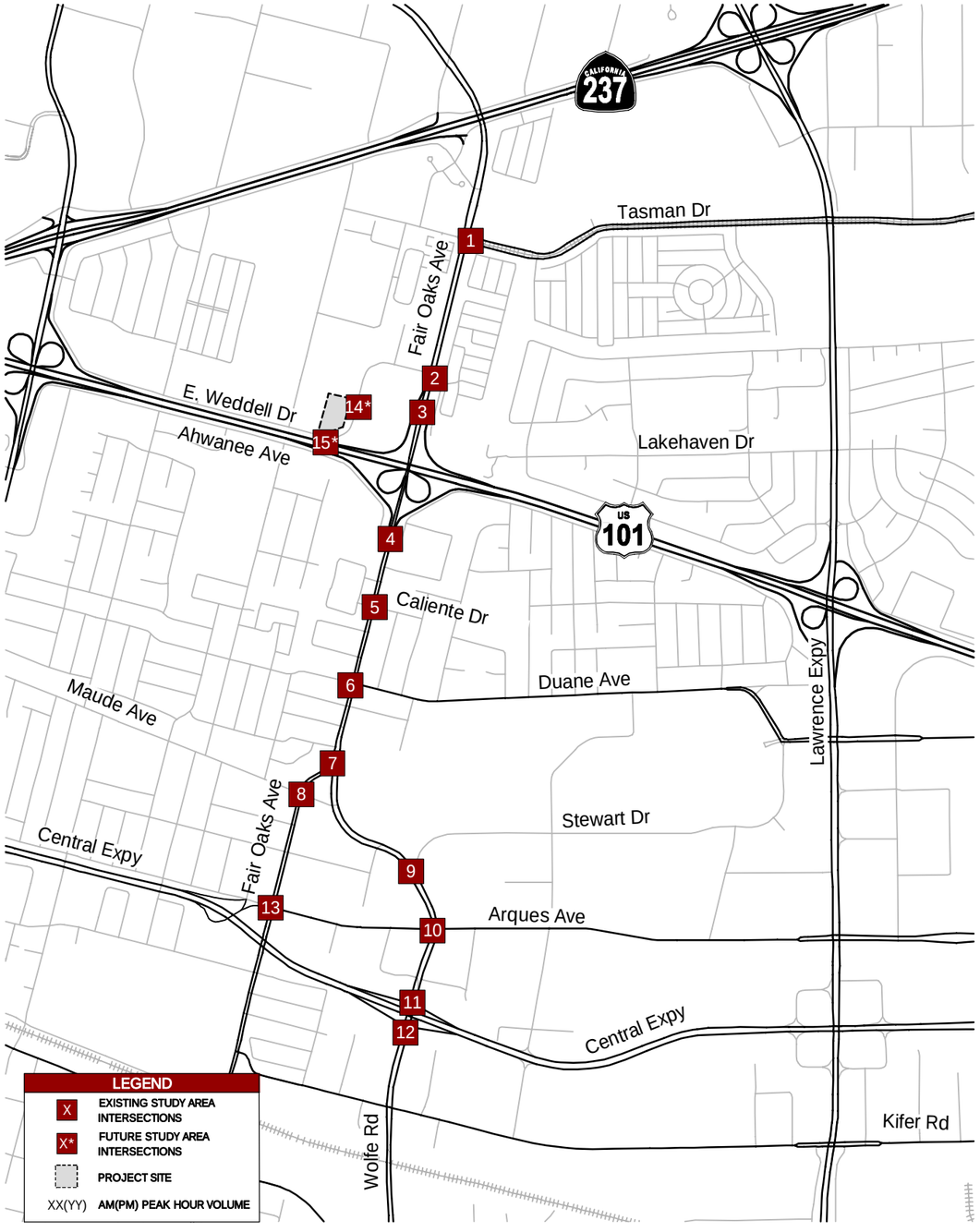
FIGURE 4
EXISTING LANE GEOMETRY AND TRAFFIC CONTROL

SUMMIT SCHOOL (539 E WEDDELL DRIVE) TRAFFIC IMPACT ANALYSIS



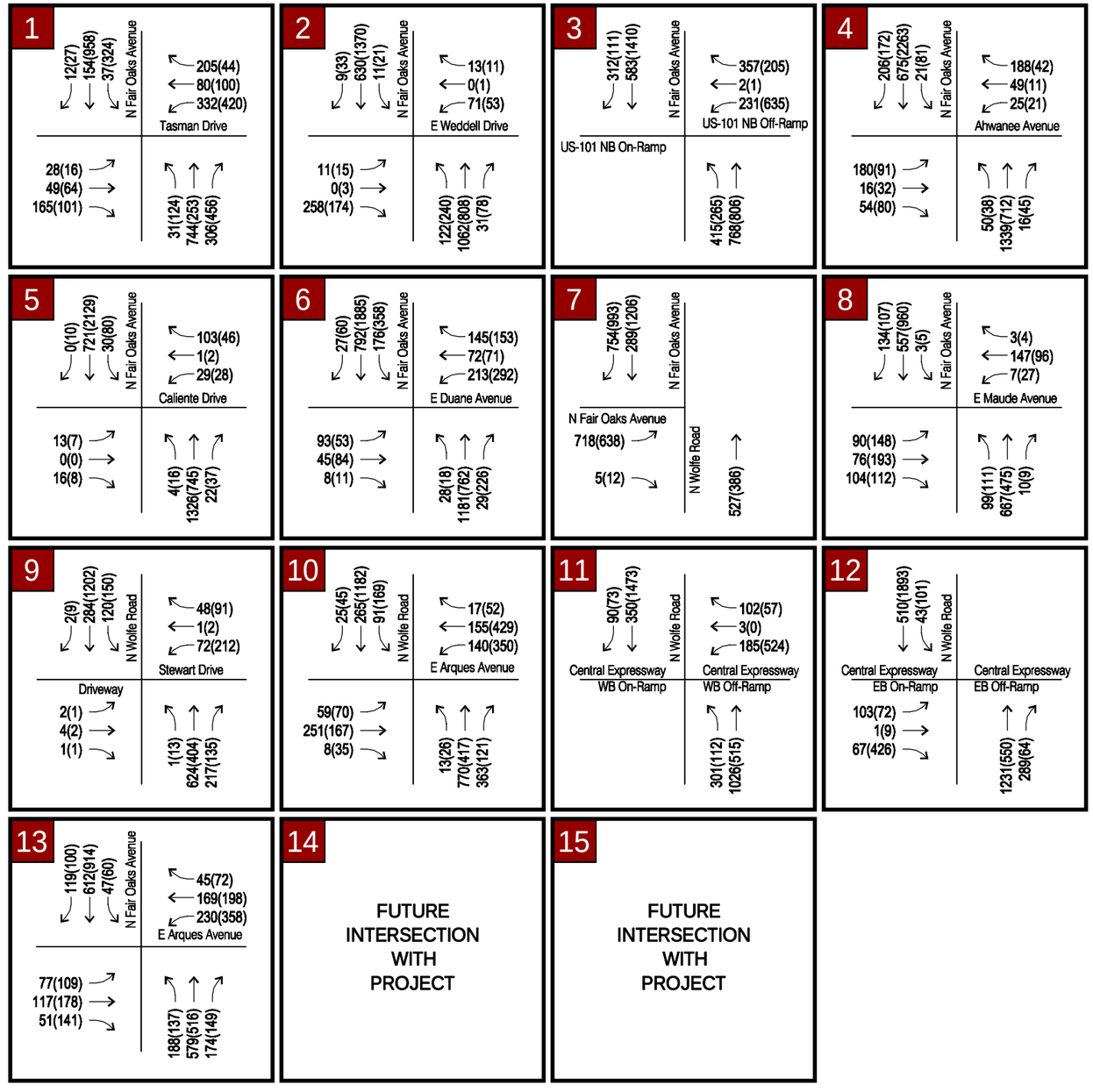


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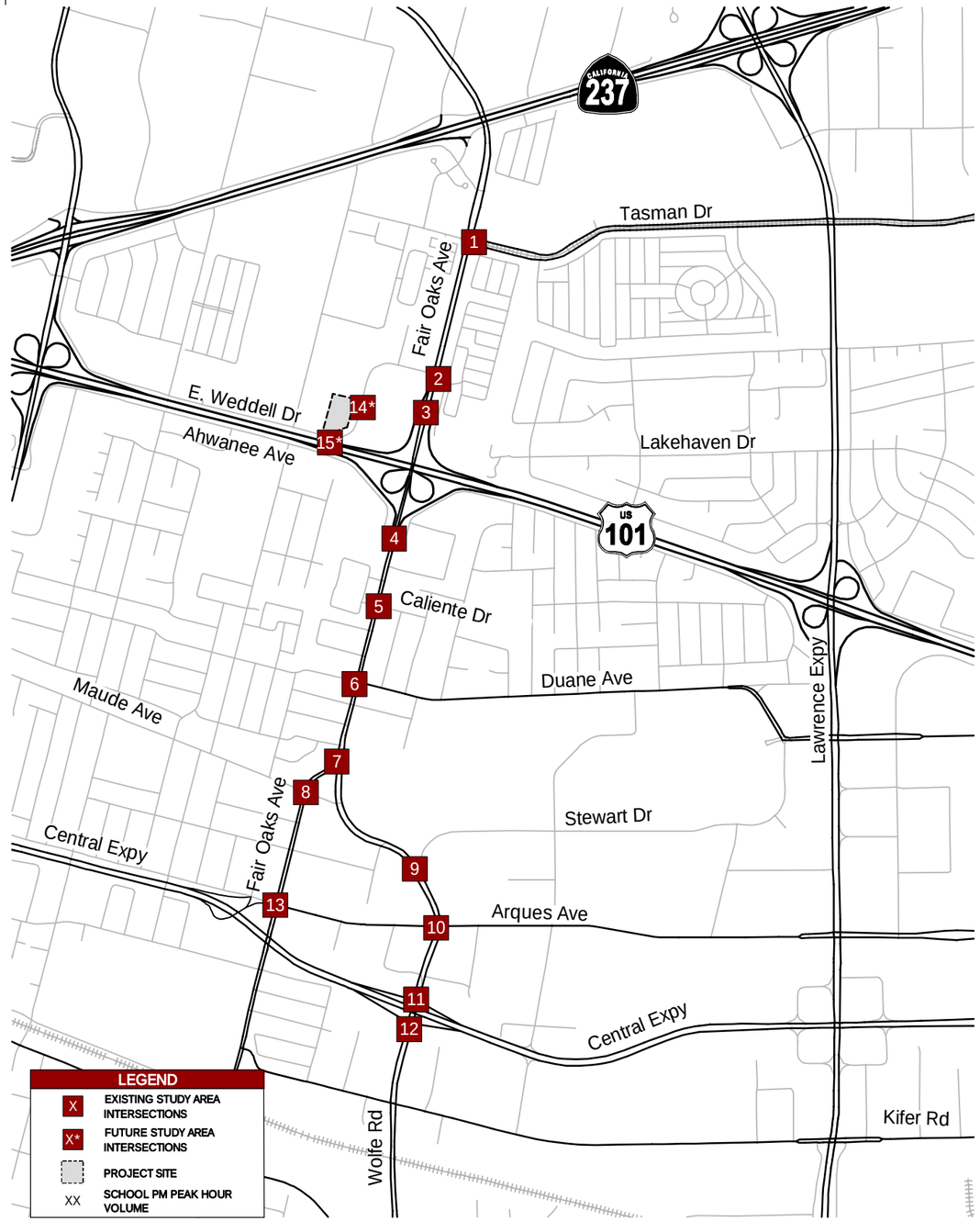
FIGURE 5
EXISTING WEEKDAY PEAK HOUR TURNING MOVEMENT VOLUMES

SUMMIT SCHOOL (539 E WEDDELL DRIVE) TRAFFIC IMPACT ANALYSIS



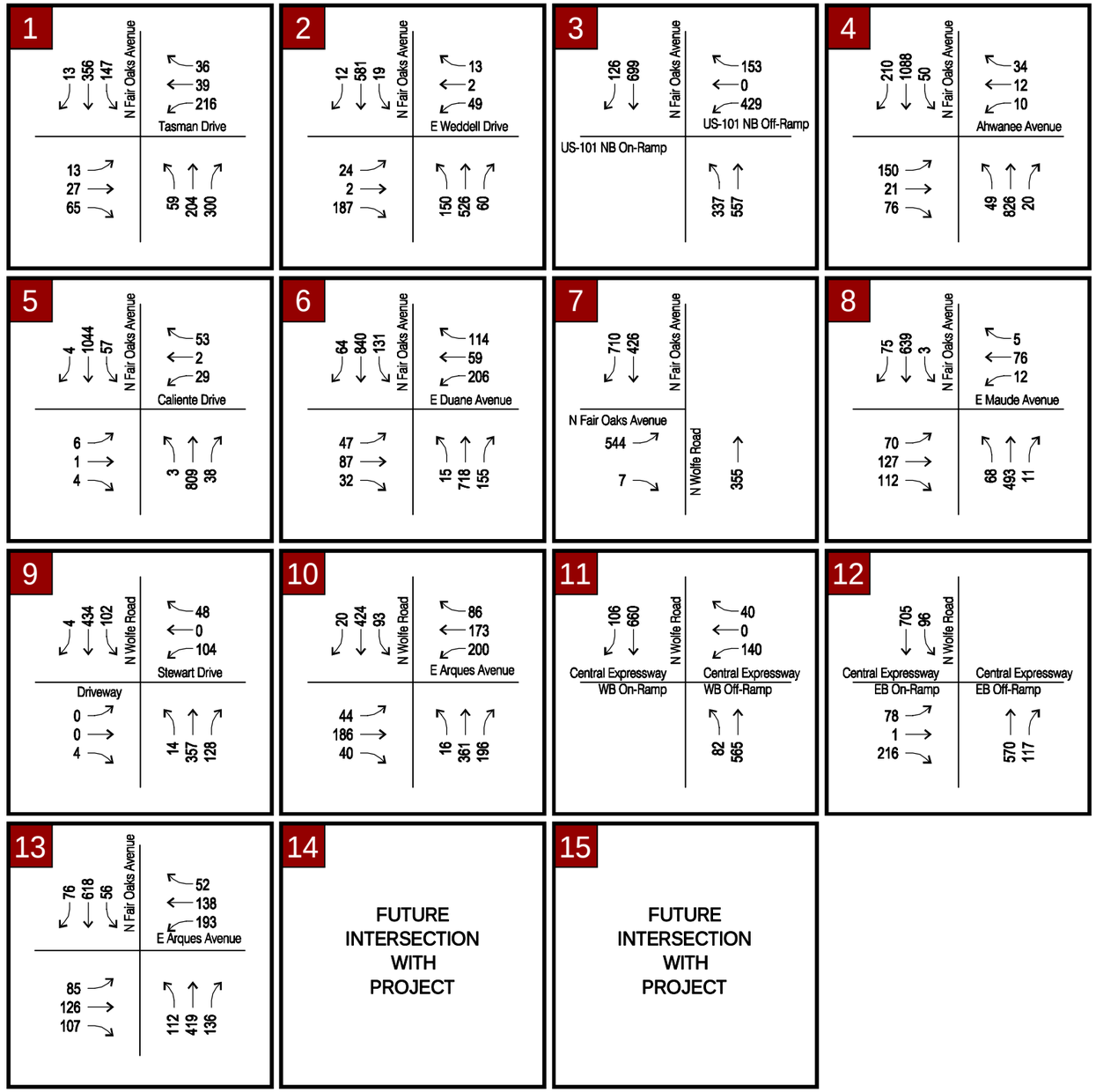


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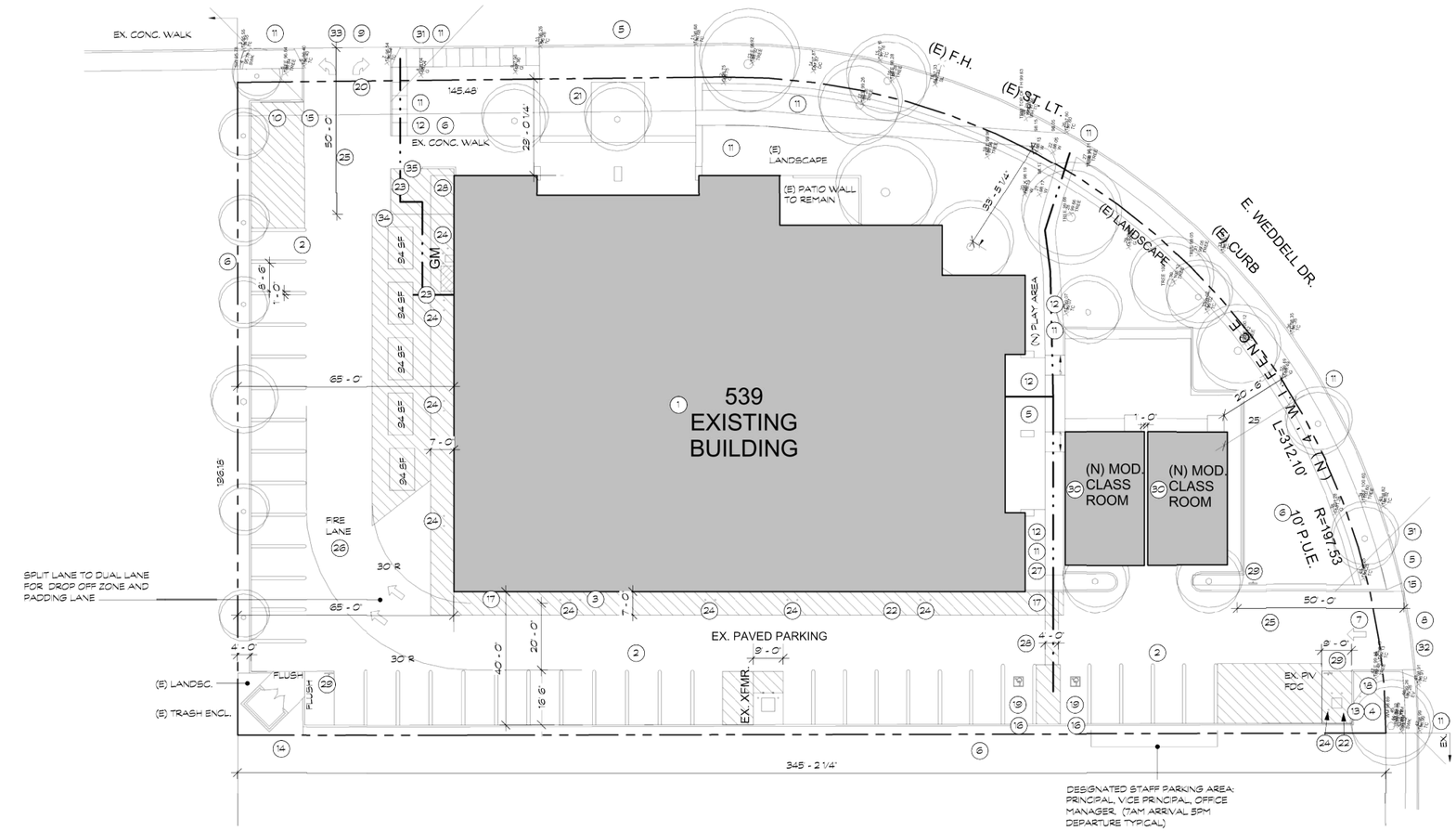
FIGURE 6
EXISTING SCHOOL PM PEAK HOUR TURNING MOVEMENT VOLUMES

SUMMIT SCHOOL (539 E WEDDELL DRIVE) TRAFFIC IMPACT ANALYSIS



TRUE NORTH

1 PROPOSED SITE PLAN

1" = 20'-0"

GENERAL NOTES

1. ALL WALKWAYS ALONG THE ACCESSIBILE ROUTE SHALL BE A MINIMUN OF 4'-0" WIDE AND THERE SHALL BE NO DROP-OFFS OVER 4", AT THE EDGE OF WALK OR LANDING WHERE A 4" DROP OFF DOES OCCUR, PROVIDE A WARNING CURB 6" IN HEIGHT. (SEE CBC SECTION 11B-303.5)

2. PATH OF TRAVEL (P.O.T.), AS INDICATED, IS A COMMON BARRIER-FREE ACCESS ROUTE WITHOUT ANY ABRUPT VERTICAL CHANGES EXCEEDING 1/2" BEVELED AT 1:2 MAXIMUM SLOPE, EXCEPT THAT LEVEL CHANGES DO NOT EXCEED 1/4" VERTICAL AND ARE AT LEAST 48" WIDE. THE PATH SURFACE IS SLIP RESISTANT, STABLE, FIRM AND SMOOTH. PASSING SPACES (11B-403.5) AT LEAST 60" X 60" ARE LOCATED NOT MORE THAN 200' APART. PARTS OF THE P.O.T. WITH CONTINUOUS GRADIENTS HAVE SLOPE AND SLOPE IN THE DIRECTION OF TRAVEL IS LESS THAN 5% UNLESS OTHERWISE INDICATED. P.O.T. SHALL BE MAINTAINED FREE OF OVERHANGING OBSTRUCTIONS TO 80" MIN. AND PROTRUDING OBJECTS GREATER THAN 4" PROJECTION FROM WALL AND ABOVE 27" AND LESS THAN 80" (11B-307).

3. FIRE DEPARTMENT ACCESS SHALL BE MAINTAINED TO ALL PORTIONS OF THE SITE DURING CONSTRUCTION. ALL FIRE LANES SHALL BE MAINTAINED CLEAR.

4. THE FIRE AUTHORITY SHALL BE CONSULTED REGARDING ACCESS ROADS, GATES, PERIMETER FENCING, PORTABLE FIRE EXTINGUISHERS, AND OTHER FIRE PROTECTION SYSTEMS OR MEASURES DURING CONSTRUCTION.

5. SEE CIVIL DRAWINGS FOR EXTENT OF NEW A.C. PAVING AND AREAS OF PAVEMENT REPAIR

6. A STRIPING AND SIGNAGE PLAN FOR ON-SITE CIRCULATION SHALL BE SUBMITTED FOR DPW REVIEW AND APPROVAL. THE PLAN SHALL INCLUDE, BUT IT IS NOT LIMITED TO:
   - -DO NOT ENTER' SIGNS AT THE NORTHERN DRIVEWAY
   - -NO PARKING' AND 'PASSENGER LOADING ONLY' (OR COMBINATION SIGNS) WHERE APPLICABLE
   - -ONE-WAY SIGNS AT ENTRY DRIVEWAY
   - -PAVEMENT ARROWS AT DRIVEWAYS AND INTERNAL CIRCULATION LANES
   - -FIRE LANE RED CURB MARKING OR PAVEMENT RED STRIPE W/ WHITE TEXY ALONG THE NORTHERN AND WESTERN WALLS/WALKWAYS
   - -ALL SIGNS AND PAVEMENT MARKINGS SHALL BE PER 2014 CA MUTCD SIGN CHART (AND SIGN SPECS) AND 2010 CALTRANS STANDARD PLANS.

7. DELIVERIES SHALL ONLY TAKE PLACE BETWEEN 30 MIN. AFTER LAST A.M. BELL AND 30 MIN. BEFORE FIRST P.M. BELL

8. ALL PARKING STALLS TO BE CONED OFF HALF HOUR PRIOR TO STUDENT ARRIVAL UNTIL HALF HOUR AFTER THE LAST A.M. BELL AND HALF HOUR PRIOR TO FIRST P.M. RELEASE TIME UNTIL HALF HOUR AFTER LAST P.M. BELL

SITE PLAN KEYNOTES

1	(E) BUILDING TO REMAIN
2	(E) PARKING TO BE RE-STRIPED.
3	RESTRIPE AS SHOWN
4	(N) WATER METER - REFER TO CIVIL
5	(E) CONCRETE TO REMAIN
6	(E) LANDSCAPE TO REMAIN
7	MODIFY (E) PAINTED DIRECTIONAL ARROW TO INDICATE DEDICATED ENTRY
8	(N) SIGNAGE INDICATING DEDICATED SINGLE LANE ENTRANCE
9	(N) SIGNAGE INDICATING NO ENTRY
10	REMOVE (E) ACCESS PARKING SPACE
11	(E) CONCRETE WALK
12	(E) ACCESS PATH OF TRAVEL
13	(N) BACKFLOW - REFER TO CIVIL
14	(E) TRASH ENCLOSURE WITH RECYCLE AREA
15	(E) R'OOB ST'L. SIGN (TOW AWAY) ON ST'L. POLE
16	RELOCATE (E) R39 ST'L. SIGN (ACCESS PARKING) ON BLDG. OR ST'L. POLE
17	(E) R26 F (FIRE LANE) ST'L. SIGN SIGN ON ST'L. POLE
18	(N) REDUCED PRESSURE DETECTOR - REFER TO CIVIL
19	RELOCATE (E) ACCESS PARKING
20	MODIFY (E) PAINTED DIRECTIONAL ARROWS TO INDICATE DEDICATED EXIT, LEFT OR RIGHT TURN ONLY
21	(E) BIKE RACK FOR 13
22	(E) 4' DIAG. WHITE PAINTED STRIPES @ 3' O.C.
23	(N) ACCESS PATH OF TRAVEL
24	(E) BOLLARDS, 26' FROM BUILDING (VERIFY IN FIELD). PENDING BUILDING DIVISION REVIEW, MAY NEED TO BE RELOCATED.
25	MAINTAIN 50' CLR ENTRANCE AND EXIT DISCHARGE TO STREET
26	MAINTAIN 20' CLR. FIRE LANE
27	(E) CURB CUT
28	(N) 4' DIAG. WHITE PAINTED STRIPES AT 3' O.C.
29	(E) SIGN - 'THE 43 PARKING SPACES BETWEEN THESE SIGNS ARE DEDICATED FOR THE USE BY 521 E. WEDDELL DURING THE HOURS OF 9 AM & 12:30 PM ON SUNDAYS.'
30	INSTALL (2) 24'X40' MODULAR CLASSROOM BLDGS.
31	VISION TRIANGLES REQUIRED BY THE CITY
32	MODIFY DRIVEWAY TO A ONE-WAY DRIVEWAY PER CITY STANDARDS AND SMC
33	CHANGE TO EGRESS DUAL LANE, RIGHT TURN AND LEFT TURN ONLY
34	STUDENT DROP OFF AND TRUCK LOADING DELIVERY ZONE
35	REMOVE PORTION OF (E) CURB TO ALLOW FOR FLUSH TRANSITION BETWEEN DROP OFF ZONE AND SIDEWALK.

SOURCE: CODY ANDERSON WASNEY ARCHITECTS

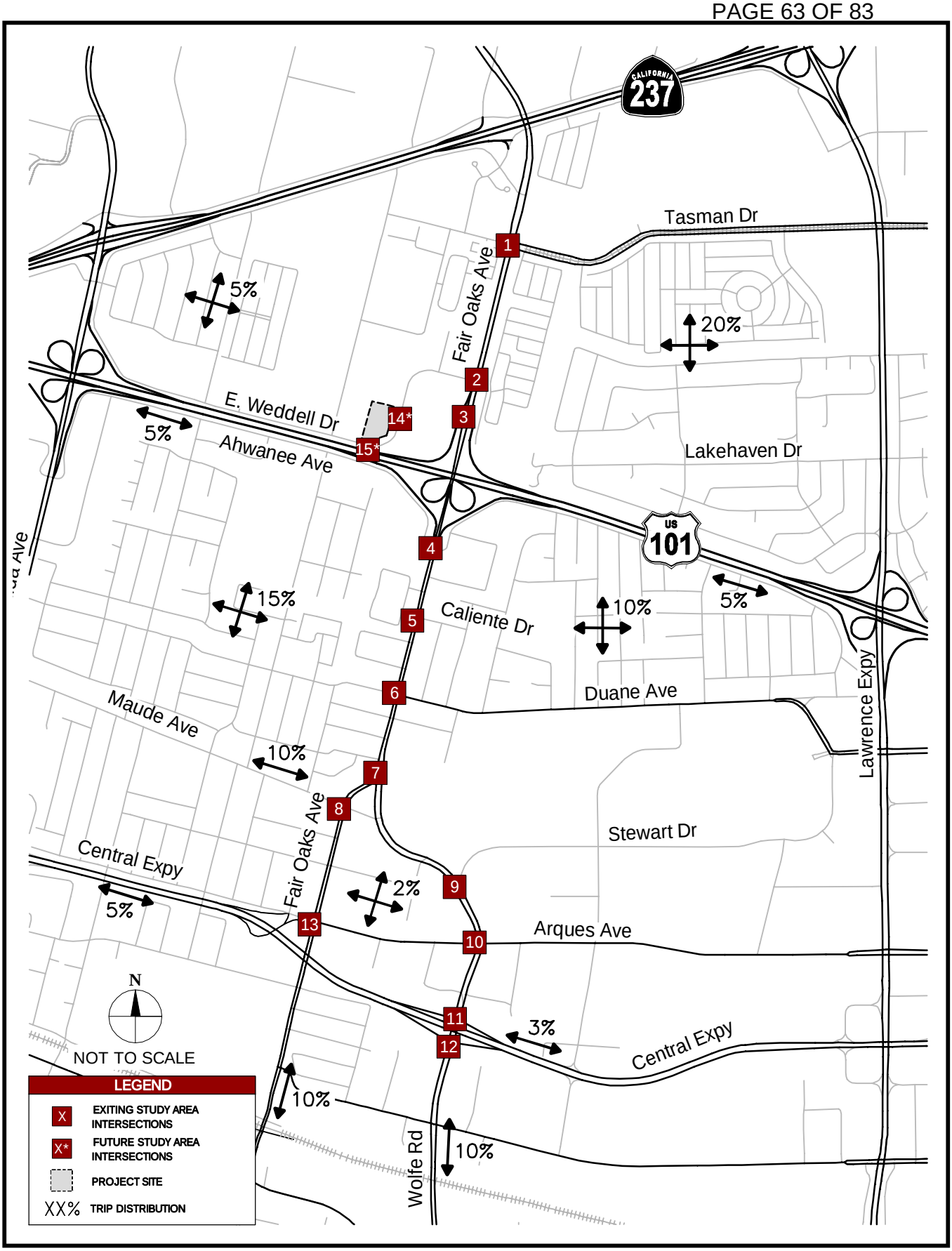


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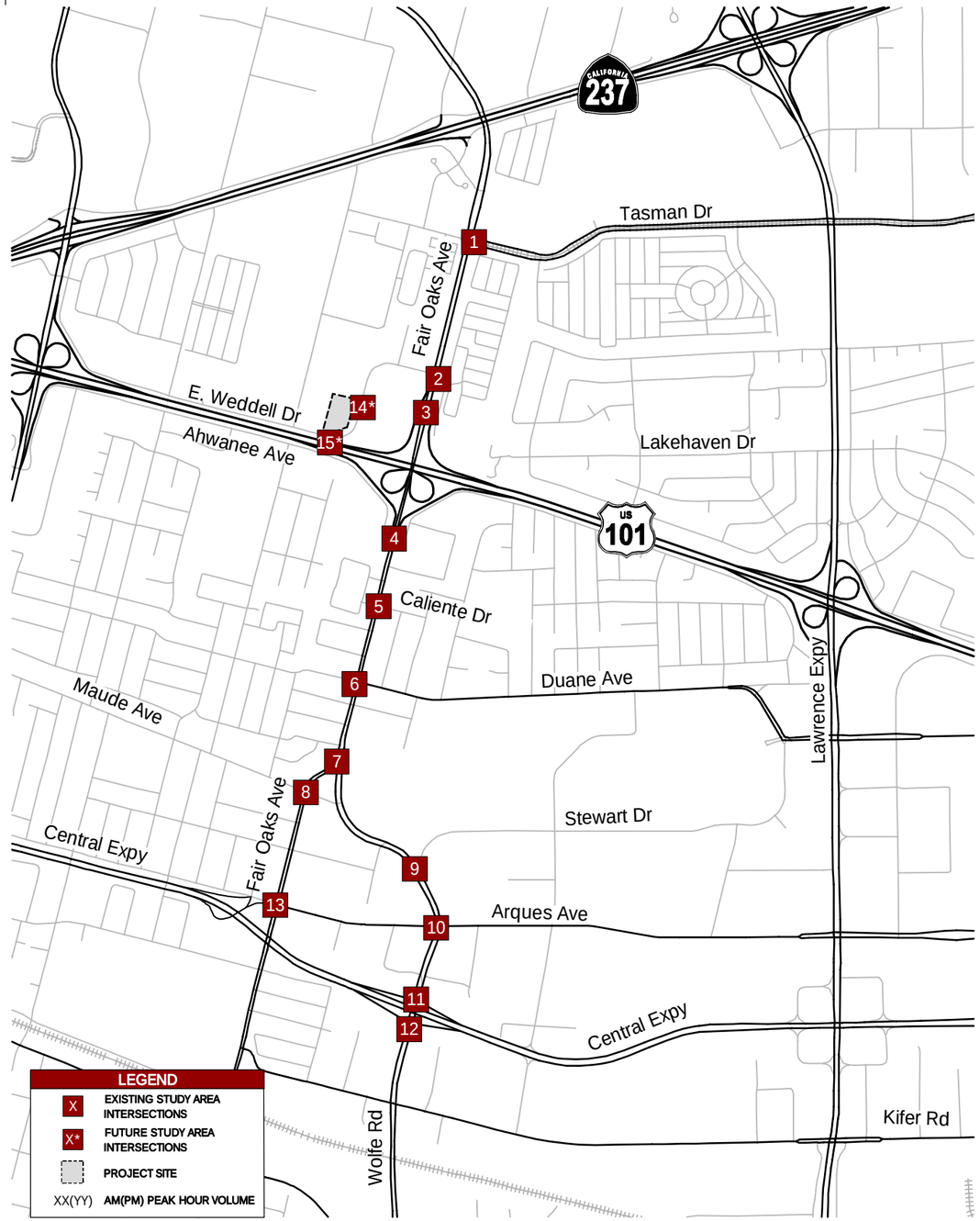
FIGURE 8
PROJECT TRIP DISTRIBUTION



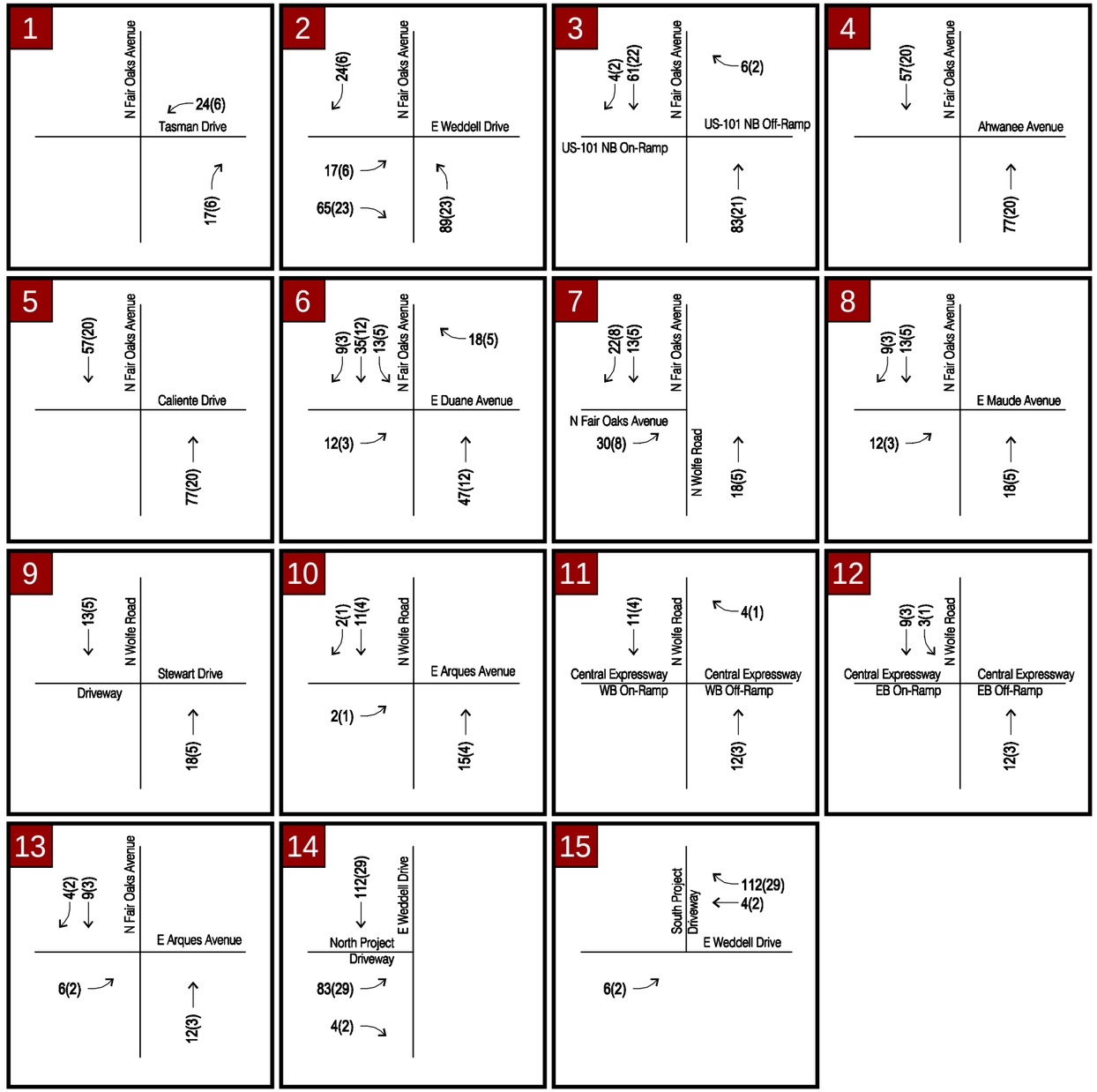


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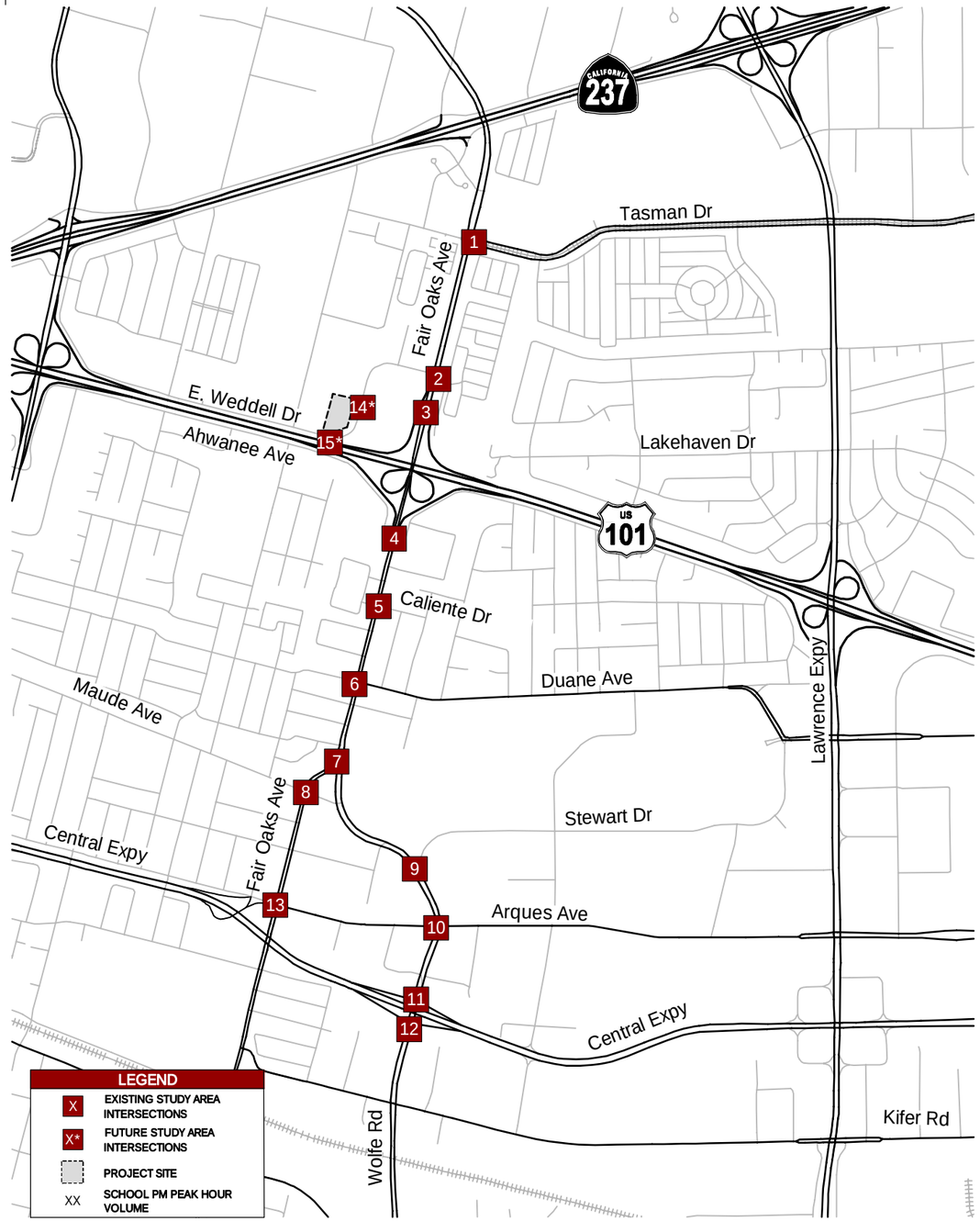
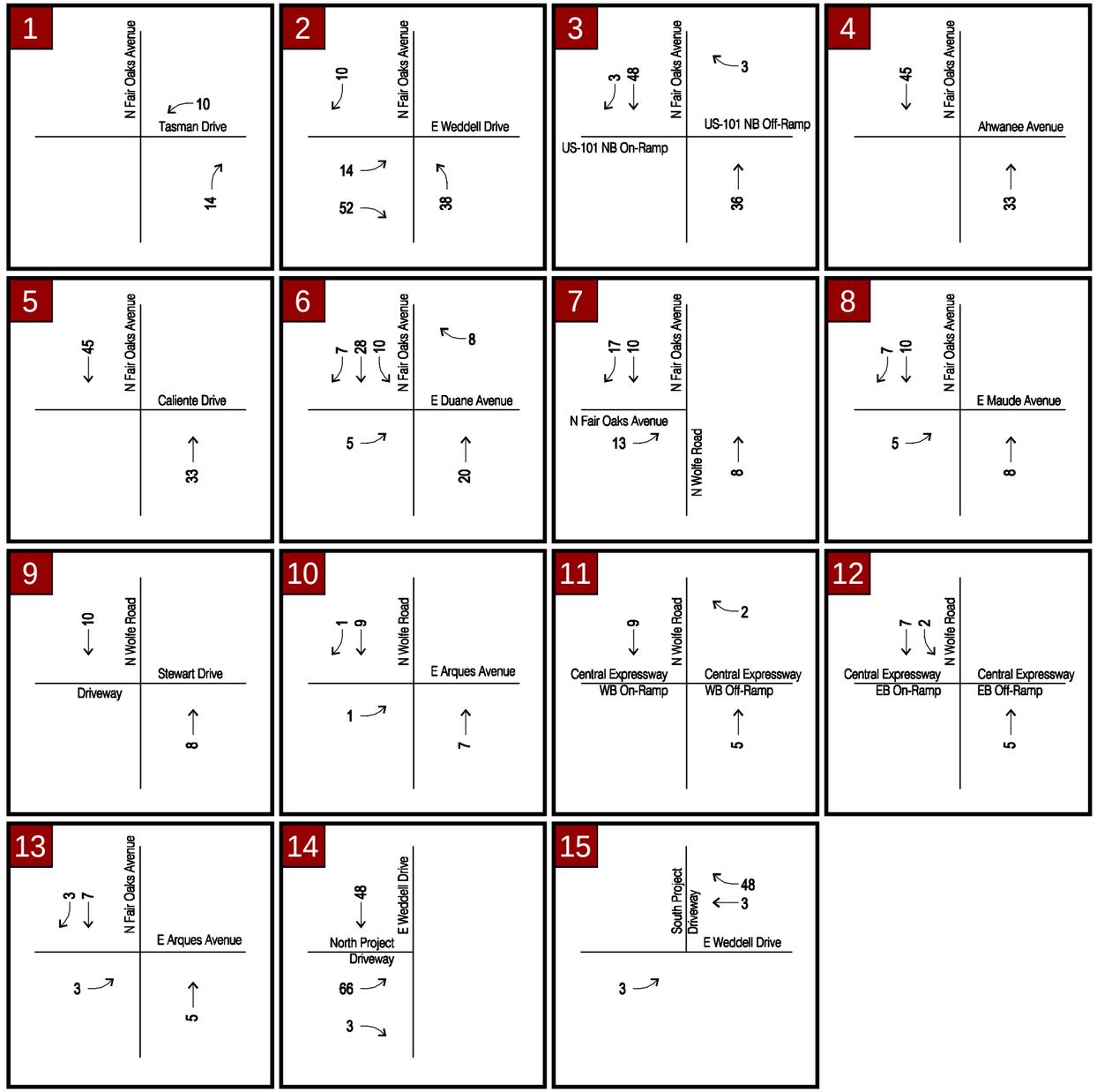
FIGURE 9
EXISTING AND EXISTING PLUS BACKGROUND PROJECT GENERATED WEEKDAY PEAK HOUR TURNING MOVEMENT VOLUMES

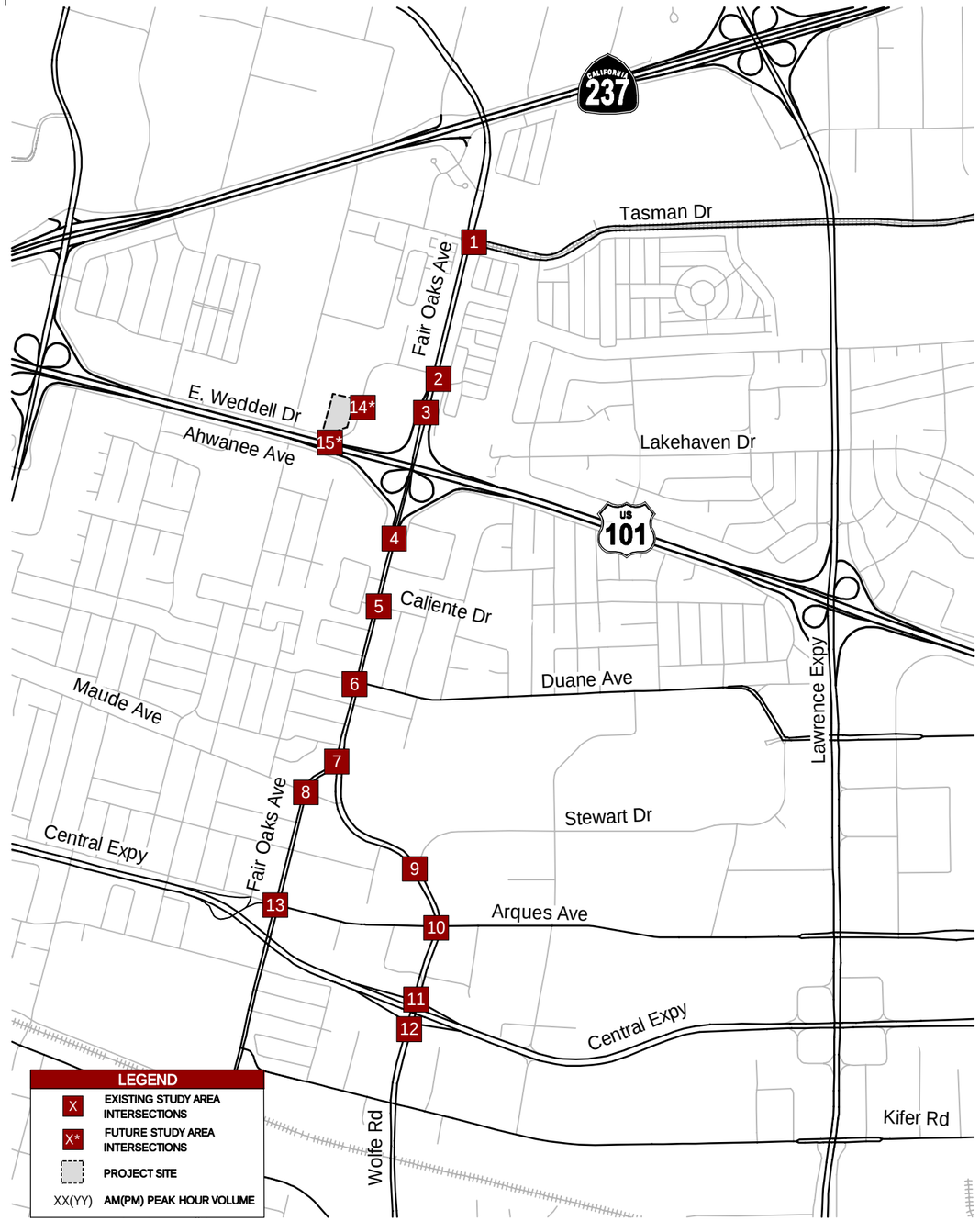
SUMMIT SCHOOL (539 E WEDDELL DRIVE) TRAFFIC IMPACT ANALYSIS





NOT TO SCALE

FIGURE 10
EXISTING AND EXISTING PLUS BACKGROUND PROJECT GENERATED SCHOOL PM PEAK HOUR TURNING MOVEMENT VOLUMES
SUMMIT SCHOOL (539 E WEDDELL DRIVE) TRAFFIC IMPACT ANALYSIS



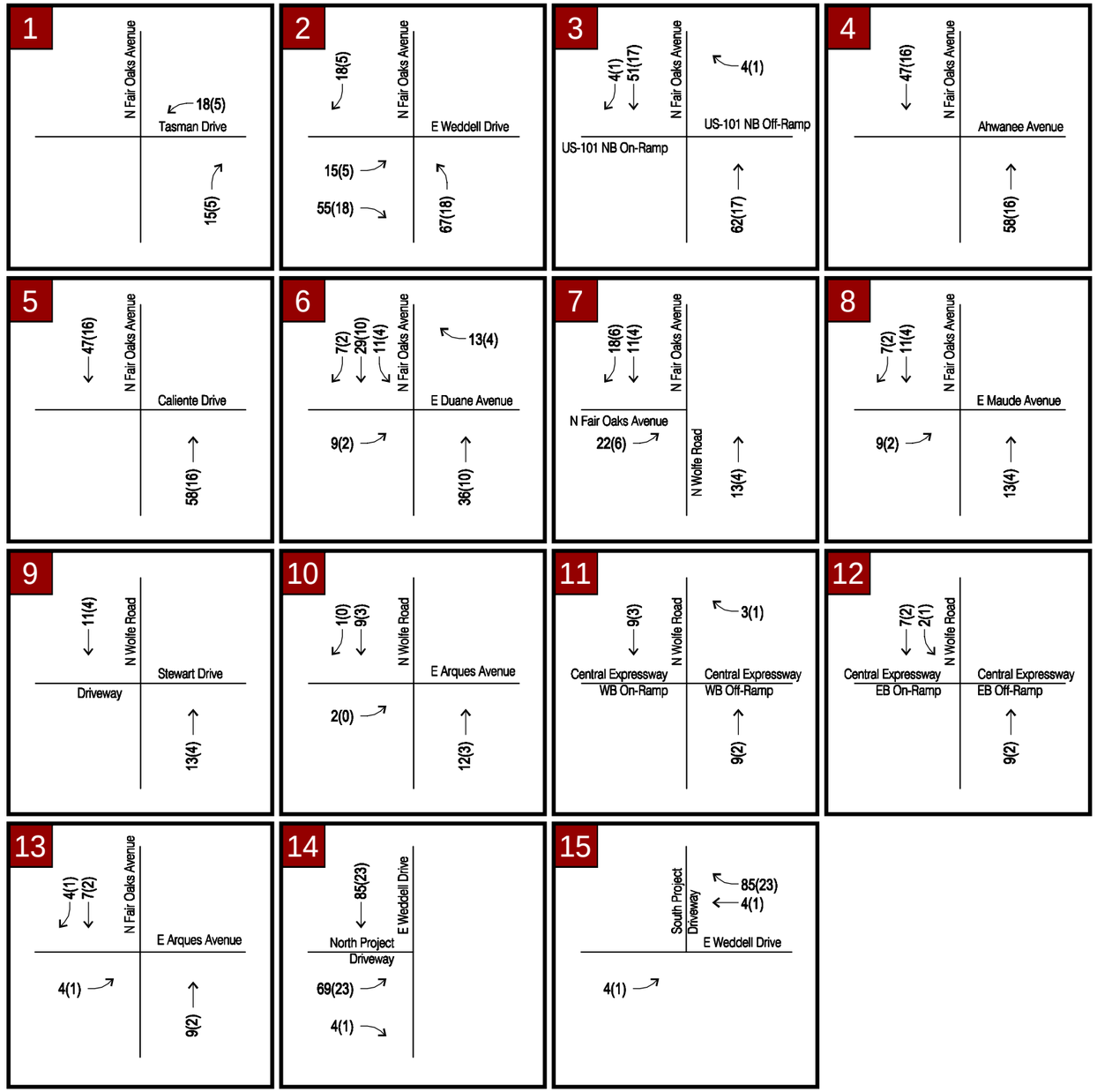


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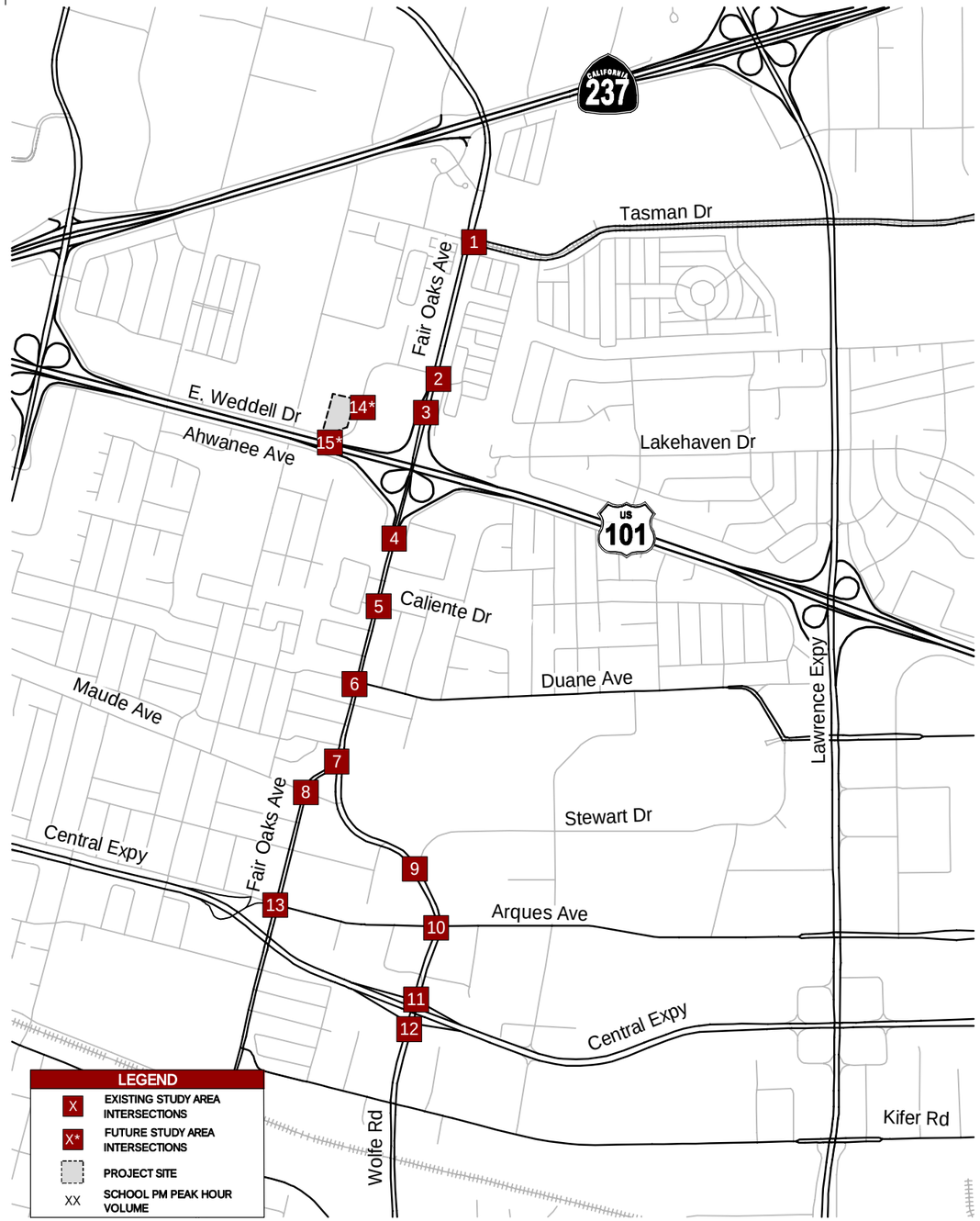
FIGURE 11
CUMULATIVE PROJECT GENERATED WEEKDAY PEAK HOUR TURNING MOVEMENT VOLUMES

SUMMIT SCHOOL (539 E WEDDELL DRIVE) TRAFFIC IMPACT ANALYSIS



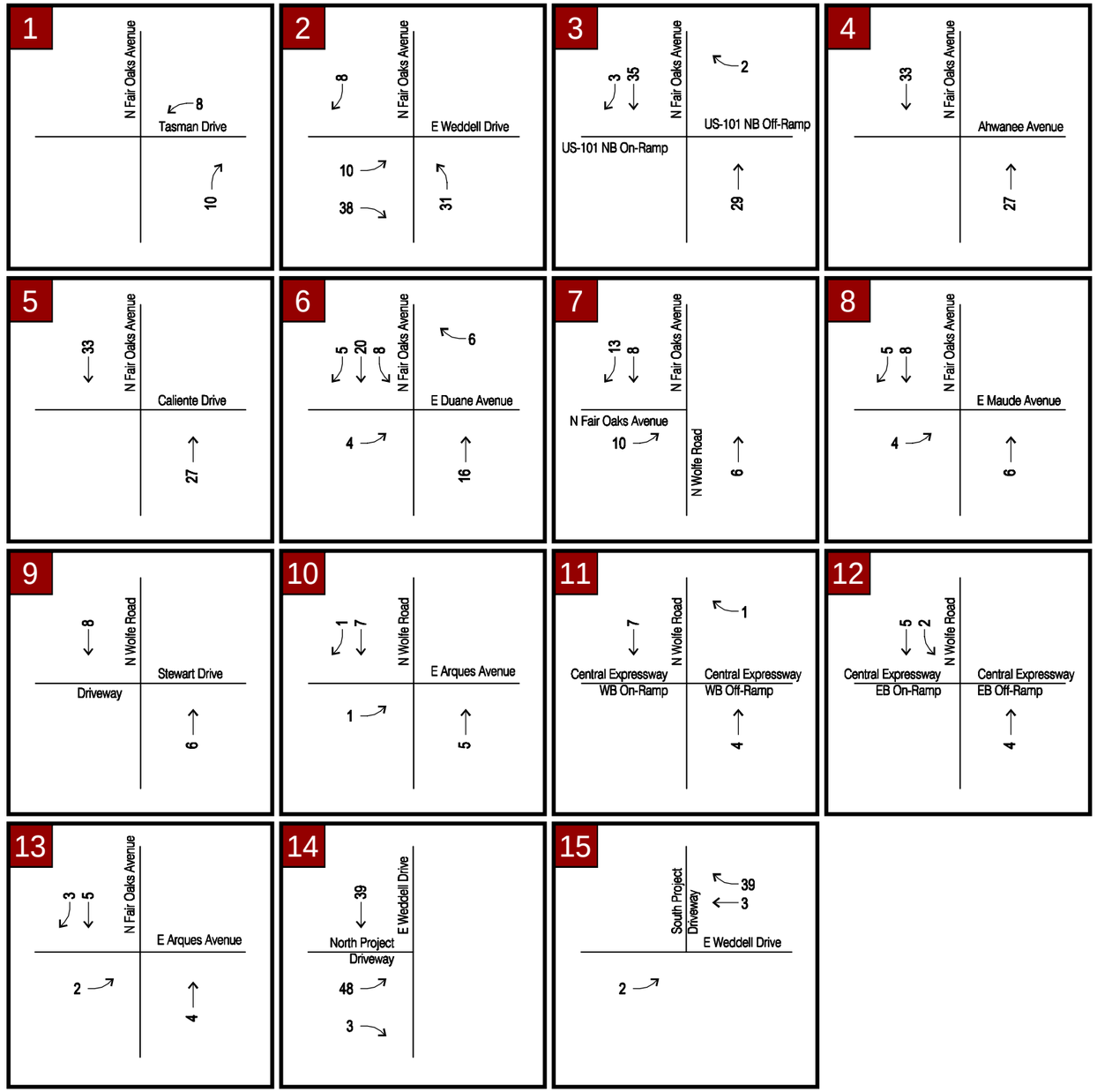


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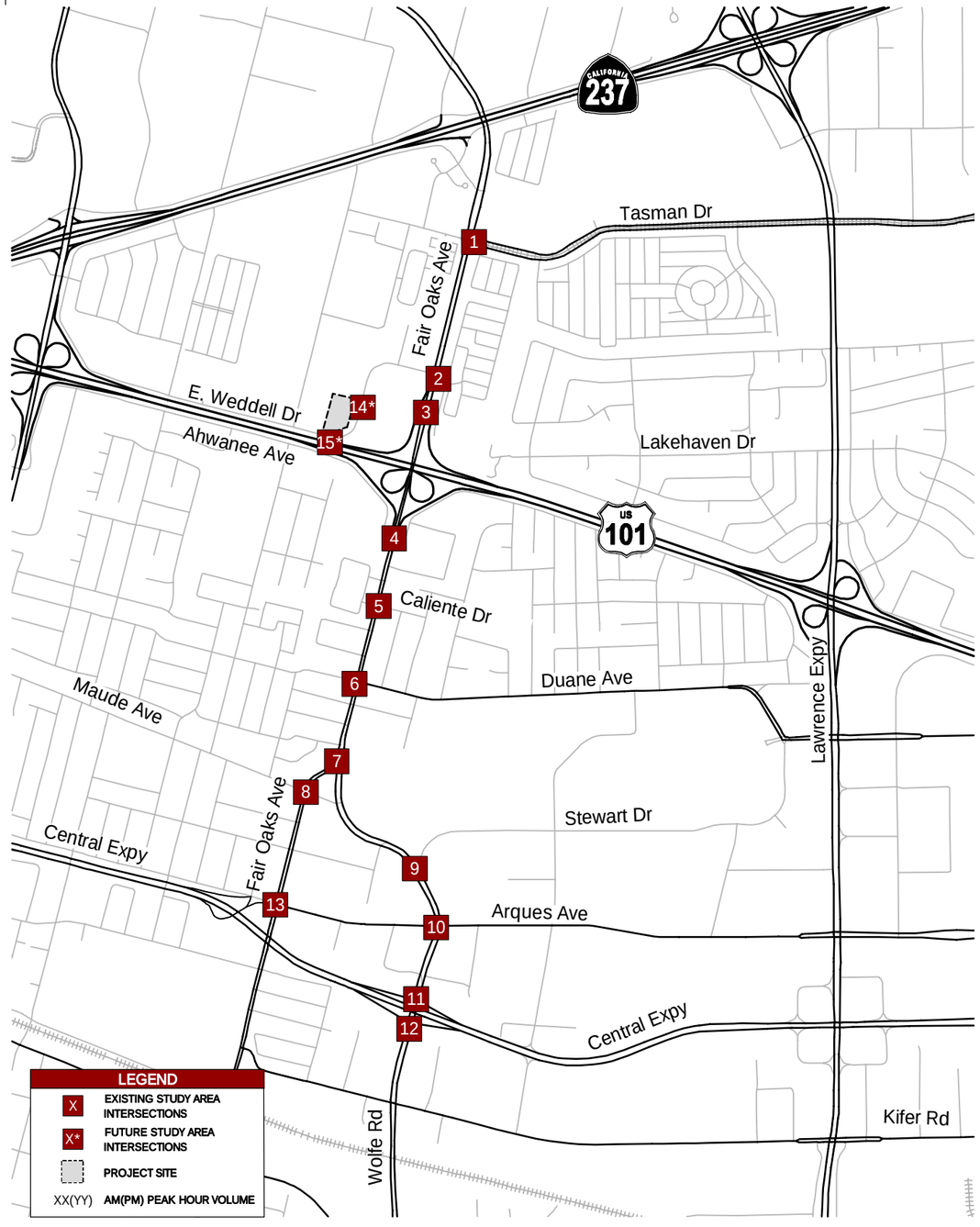
FIGURE 12
CUMULATIVE PROJECT GENERATED SCHOOL PM PEAK HOUR TURNING MOVEMENT VOLUMES

SUMMIT SCHOOL (539 E WEDDELL DRIVE) TRAFFIC IMPACT ANALYSIS



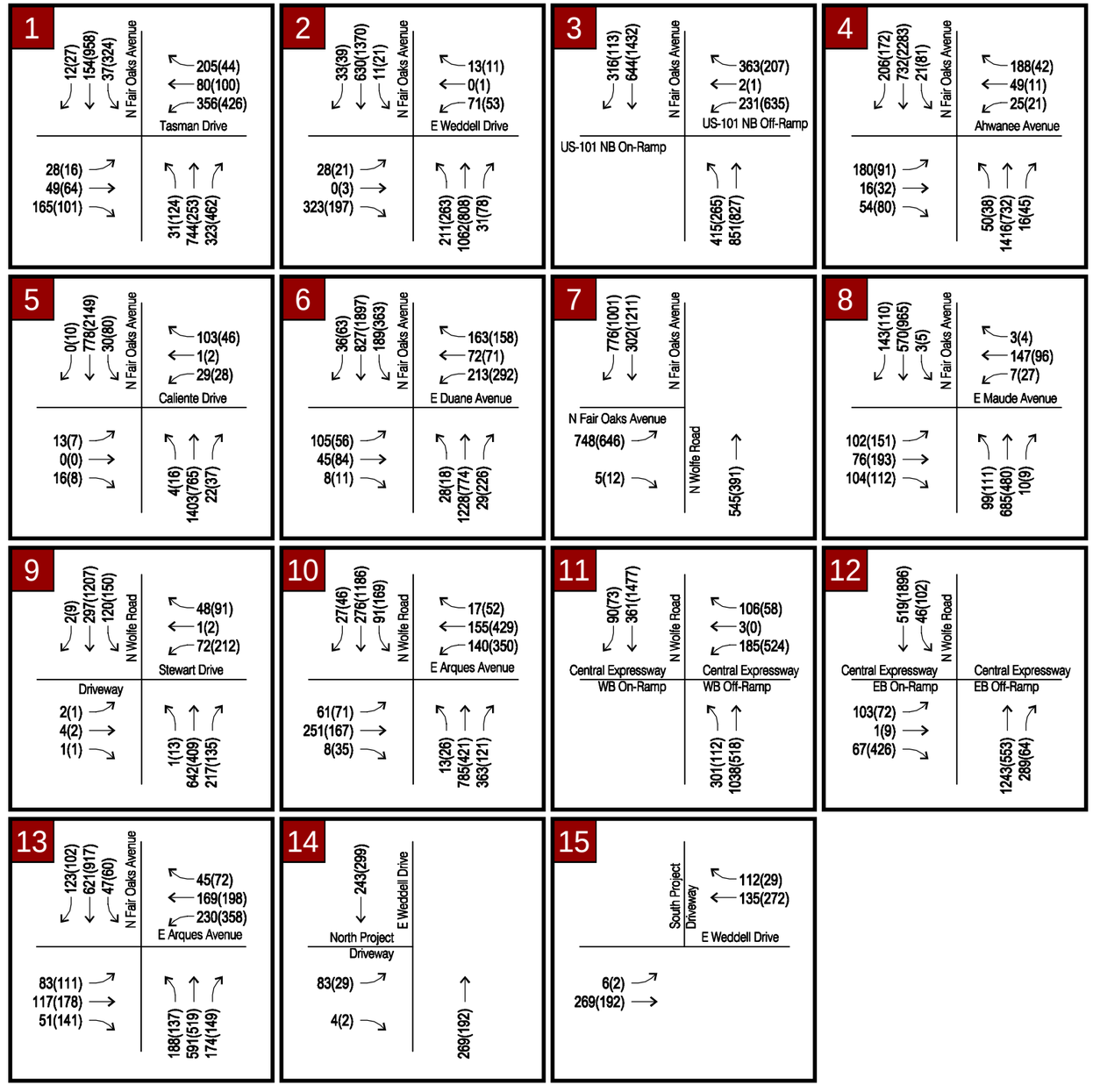


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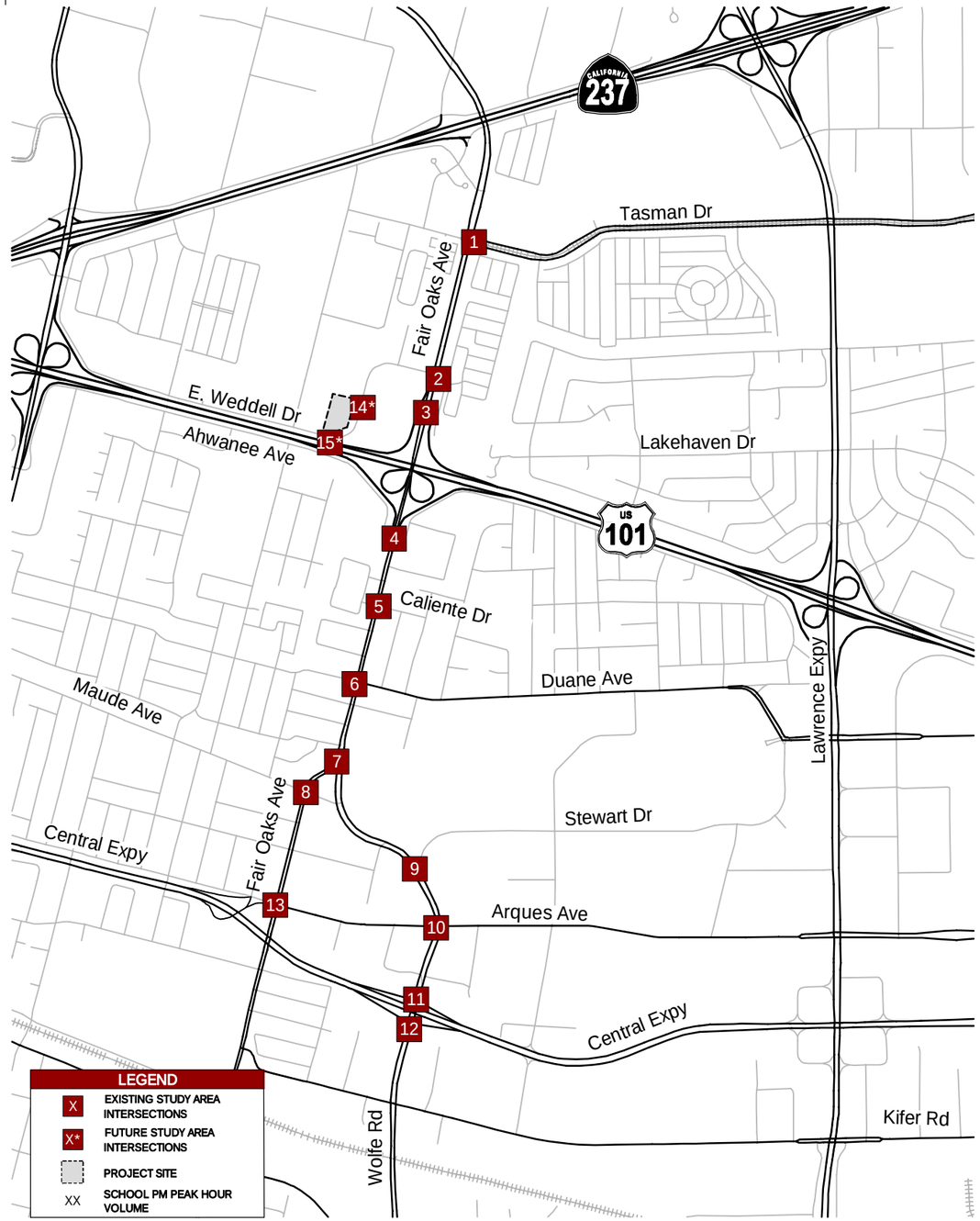
FIGURE 13
EXISTING PLUS PROJECT WEEKDAY PEAK HOUR TURNING MOVEMENT VOLUMES

SUMMIT SCHOOL (539 E WEDDELL DRIVE) TRAFFIC IMPACT ANALYSIS



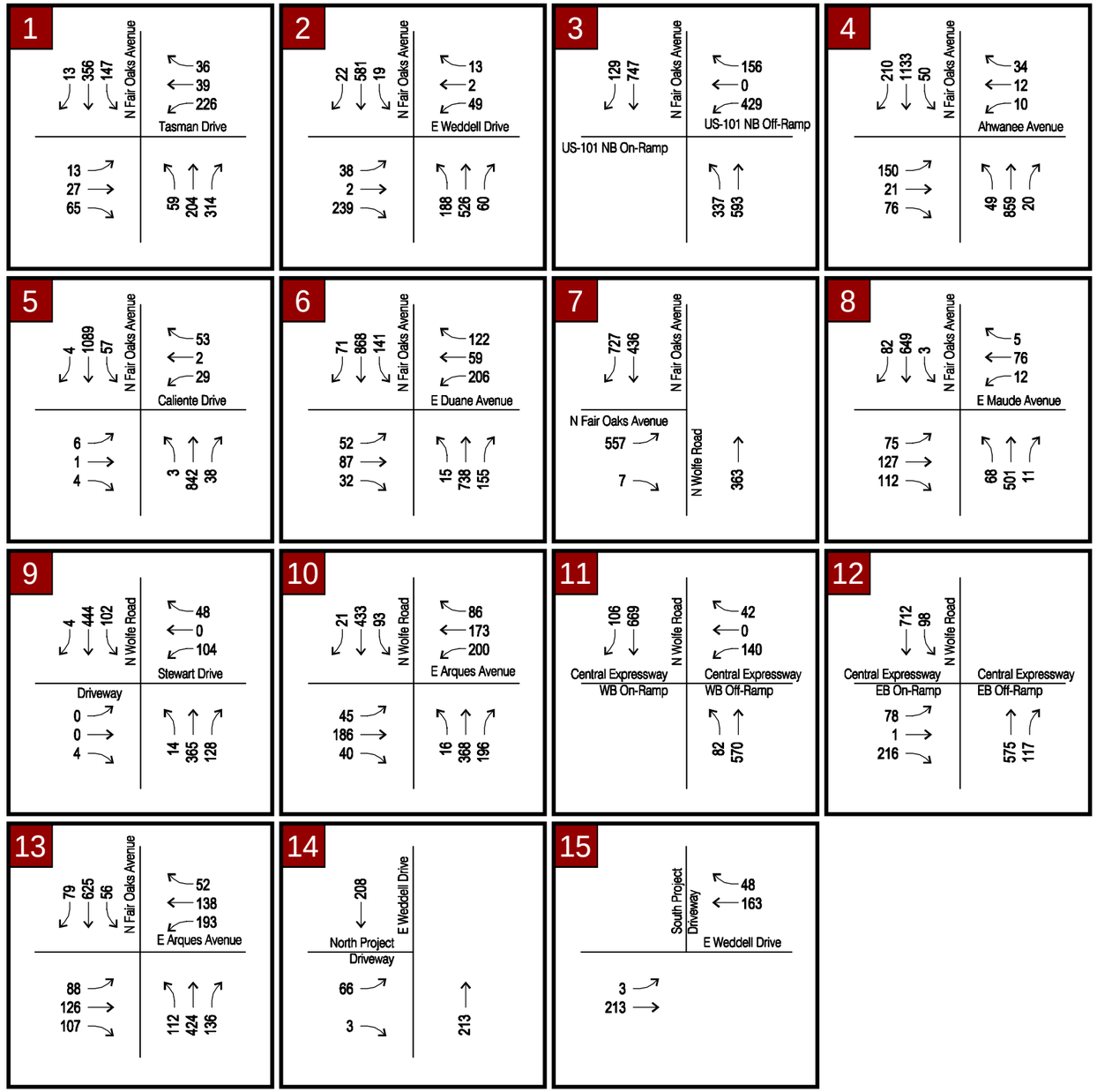


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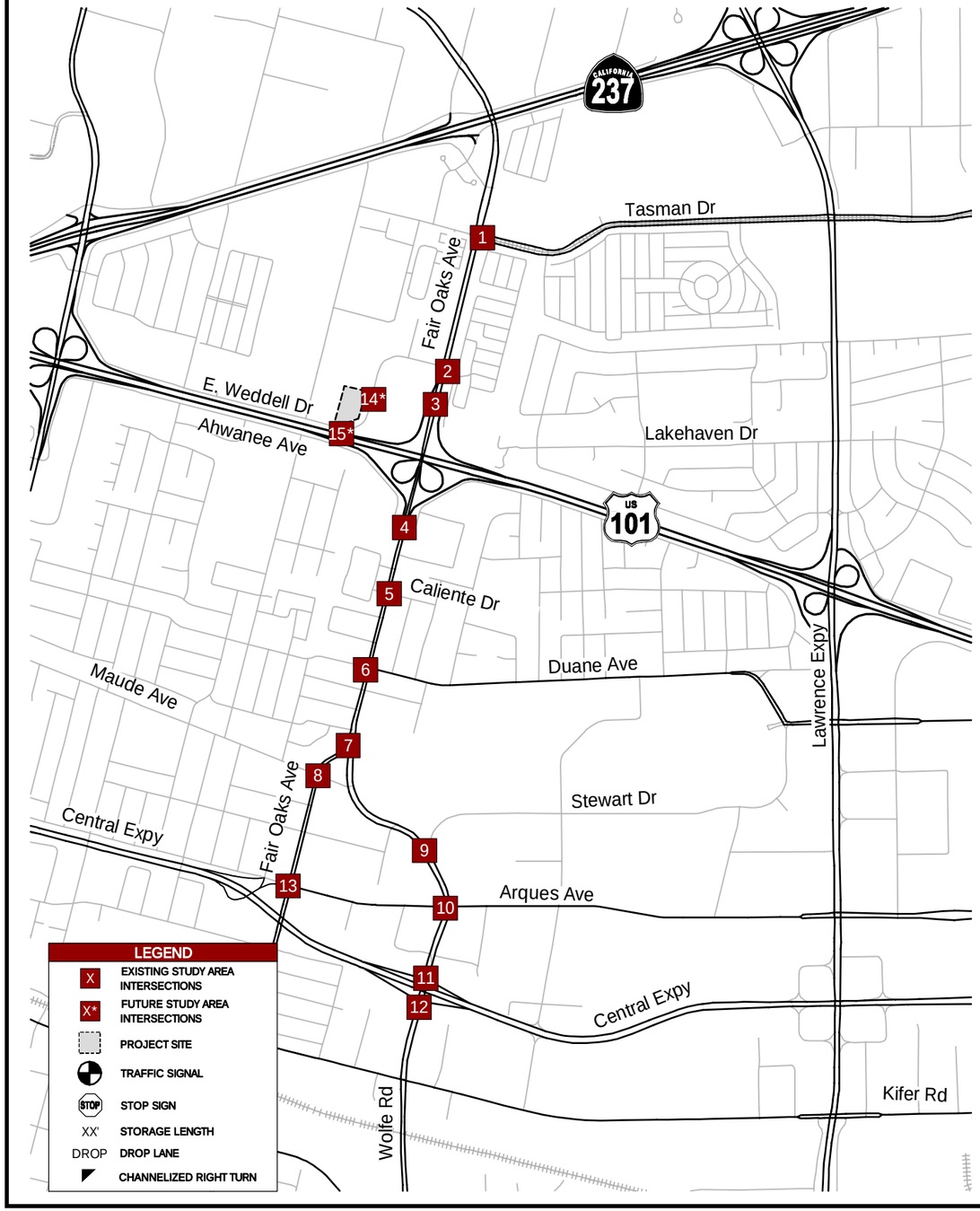
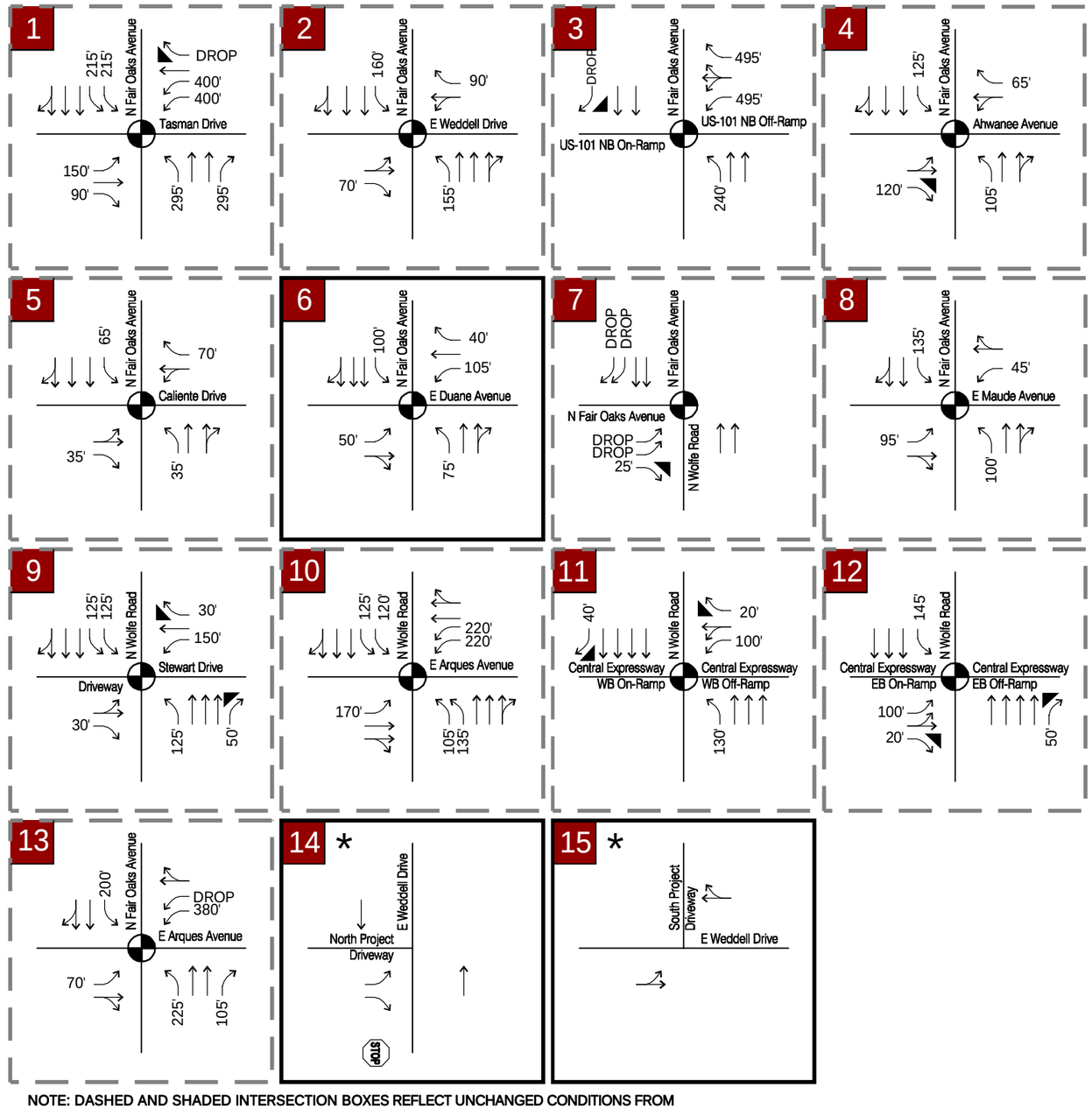
FIGURE 14
EXISTING PLUS PROJECT SCHOOL PM PEAK HOUR TURNING MOVEMENT VOLUMES

SUMMIT SCHOOL (539 E WEDDELL DRIVE) TRAFFIC IMPACT ANALYSIS





NOTE: DASHED AND SHADED INTERSECTION BOXES REFLECT UNCHANGED CONDITIONS FROM EXISTING CONDITIONS

* WITH THE ADDITION OF THE PROJECT

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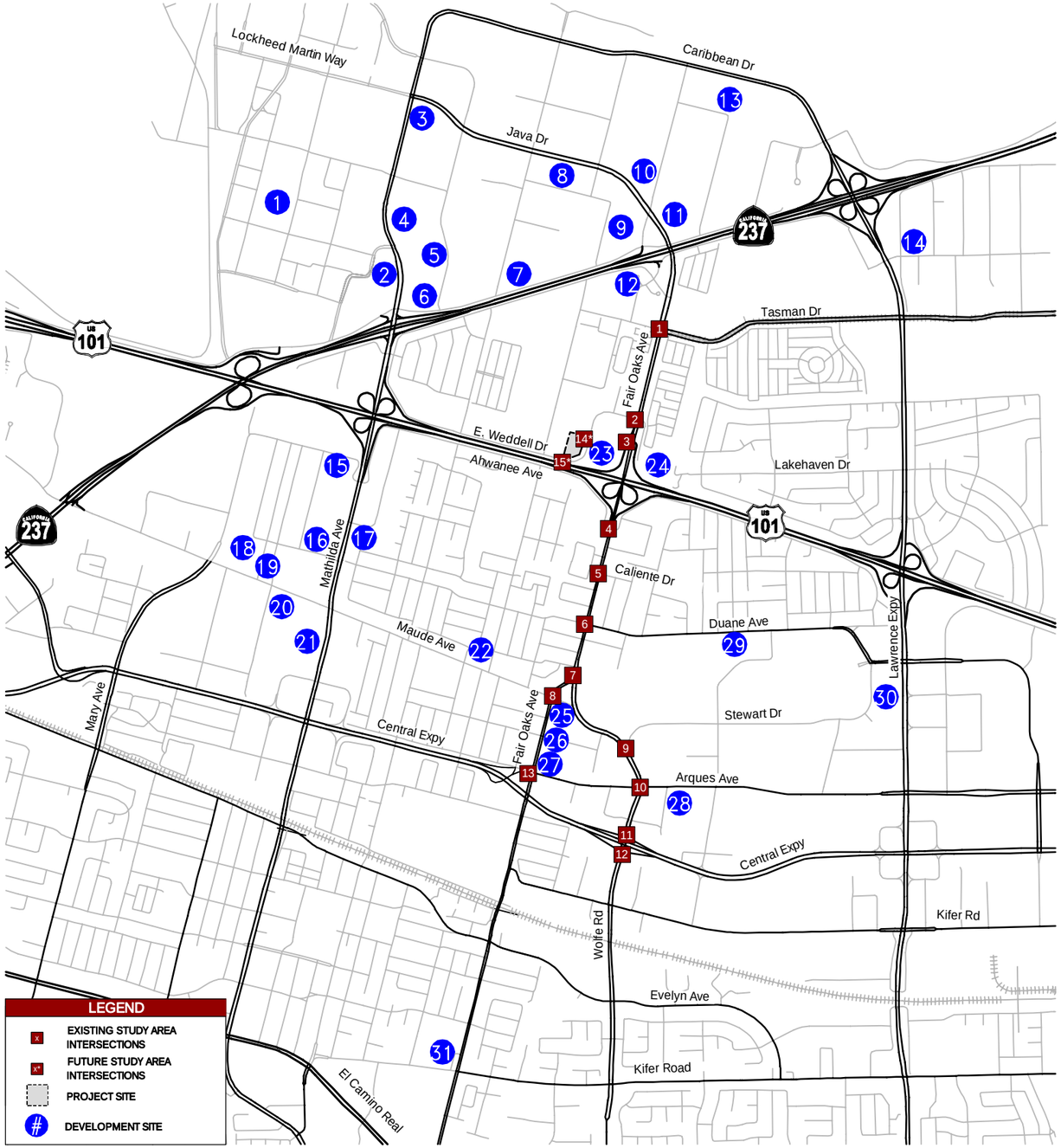
FIGURE 15
EXISTING PLUS BACKGROUND LANE GEOMETRY AND TRAFFIC CONTROL

SUMMIT SCHOOL (539 E WEDDELL DRIVE) TRAFFIC IMPACT ANALYSIS



APPROVED AND PENDING DEVELOPMENTS

1. 1111 LOCKHEED MARTING WAY*
2. 1081 INNOVATION WAY
3. 589 W JAVA DRIVE
4. 1184 N MATHILDA AVENUE*
5. 1152 BORDEAUX DRIVE
6. 1100 N MATHILDA AVENUE
7. 215 MOFFETT PARK DRIVE
8. 250 E JAVA DRIVE*
9. 1221 CROSSMAN AVENUE
10. 495 E JAVA DRIVE
11. 1240 CROSSMAN AVENUE*
12. 470 PERSIAN DRIVE
13. 549 BALTIC WAY
14. 1101 ELKO DRIVE
15. 520 ALMANOR AVENUE*
16. 615 N MATHILDA AVENUE*
17. 696 N MATHILDA AVENUE*
18. 845 W MAUDE AVENUE*
19. 815 W MAUDE AVENUE
20. 479 N PASTOIRA AVENUE
21. 433 N MATHILDA AVENUE
22. 423 E MAUDE AVENUE
23. 520–550 E WEDDELL DRIVE
24. 610 E WEDDELL DRIVE
25. 620 E MAUDE AVENUE
26. 625 E TAYLOR AVENUE
27. 617 E ARQUES AVENUE
28. 280 SANTA ANA COURT
29. 915 DEGUINGE DRIVE*
30. 1080 STEWART DRIVE*
31. 585 OLD SAN FRANCISCO ROAD

* PENDING PROJECTS ONLY INCLUDED IN CUMULATIVE CONDITIONS SCENARIO

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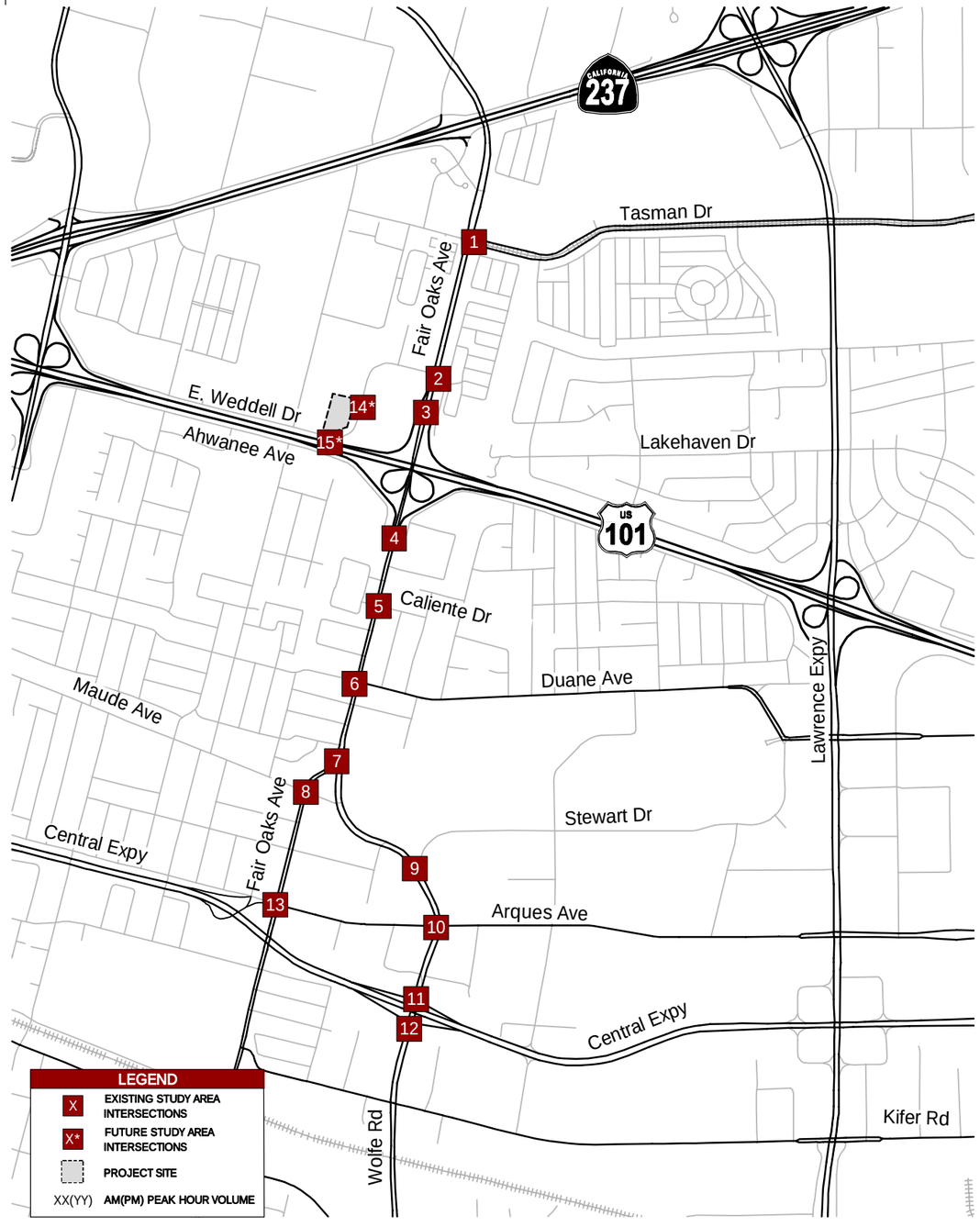
FIGURE 16
PENDING AND APPROVED PROJECT LOCATIONS

SUMMIT SCHOOL (539 E WEDDELL DRIVE) TRAFFIC IMPACT ANALYSIS



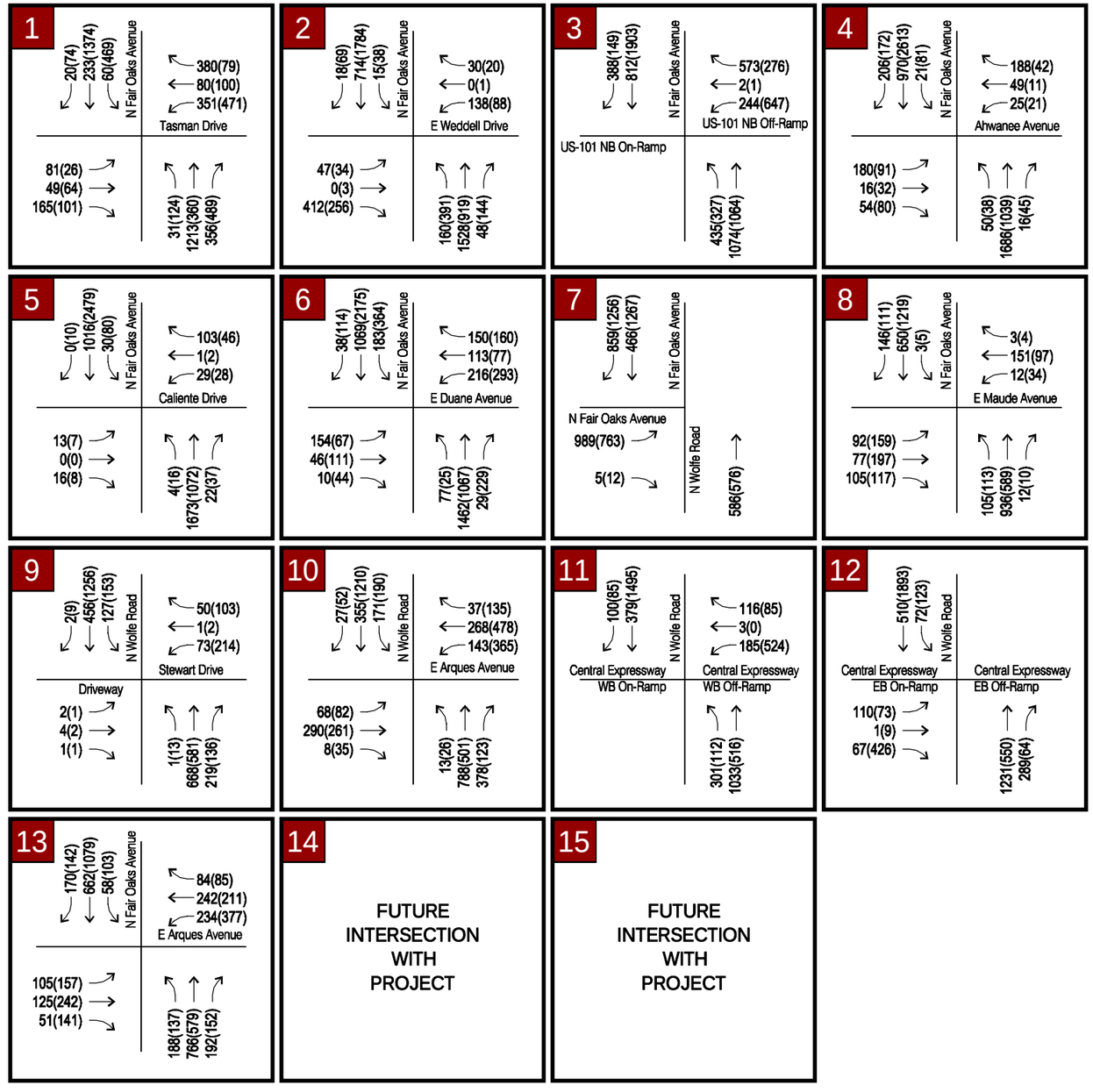


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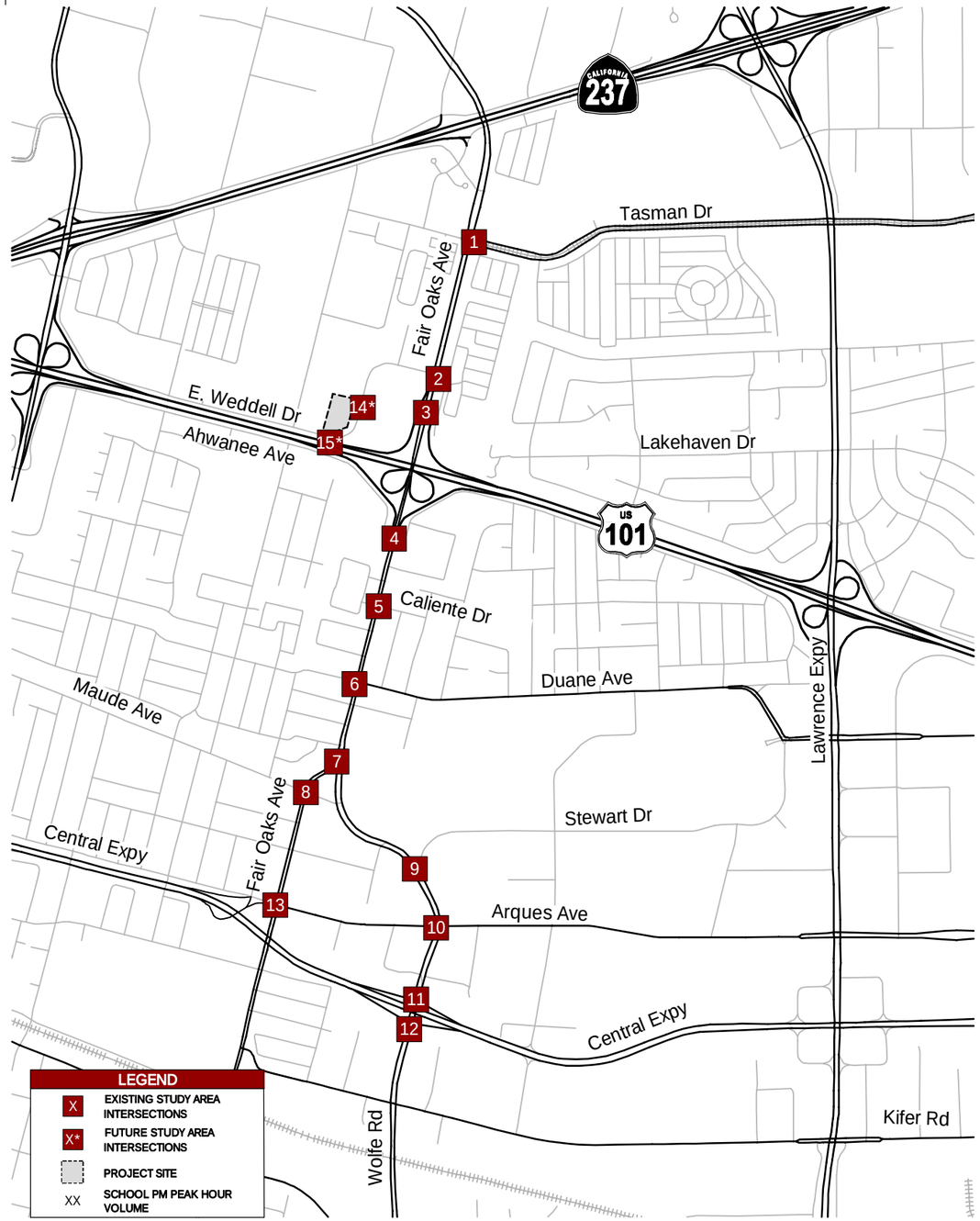
FIGURE 17
EXISTING PLUS BACKGROUND WEEKDAY PEAK HOUR TURNING MOVEMENT VOLUMES

SUMMIT SCHOOL (539 E WEDDELL DRIVE) TRAFFIC IMPACT ANALYSIS



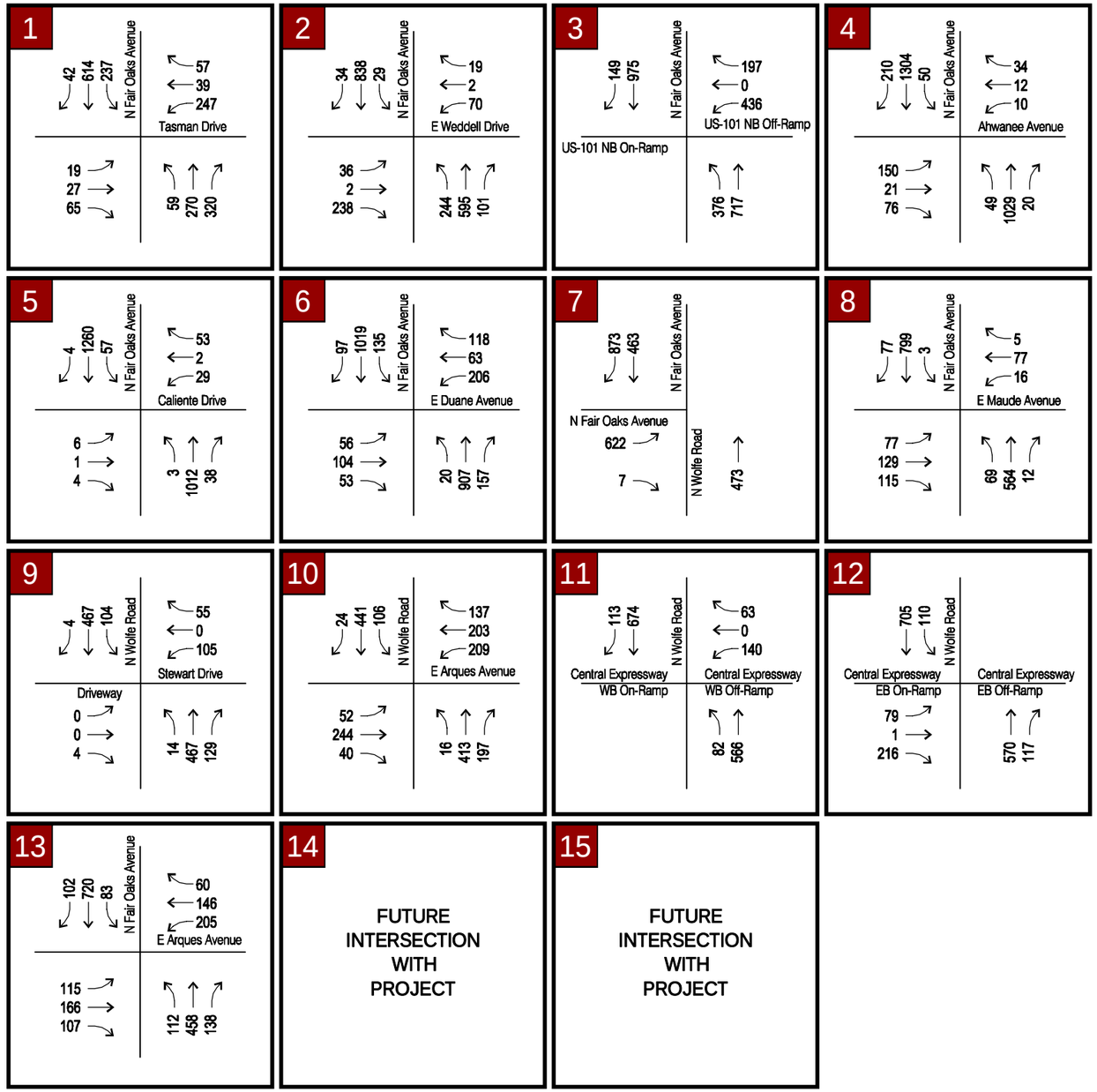


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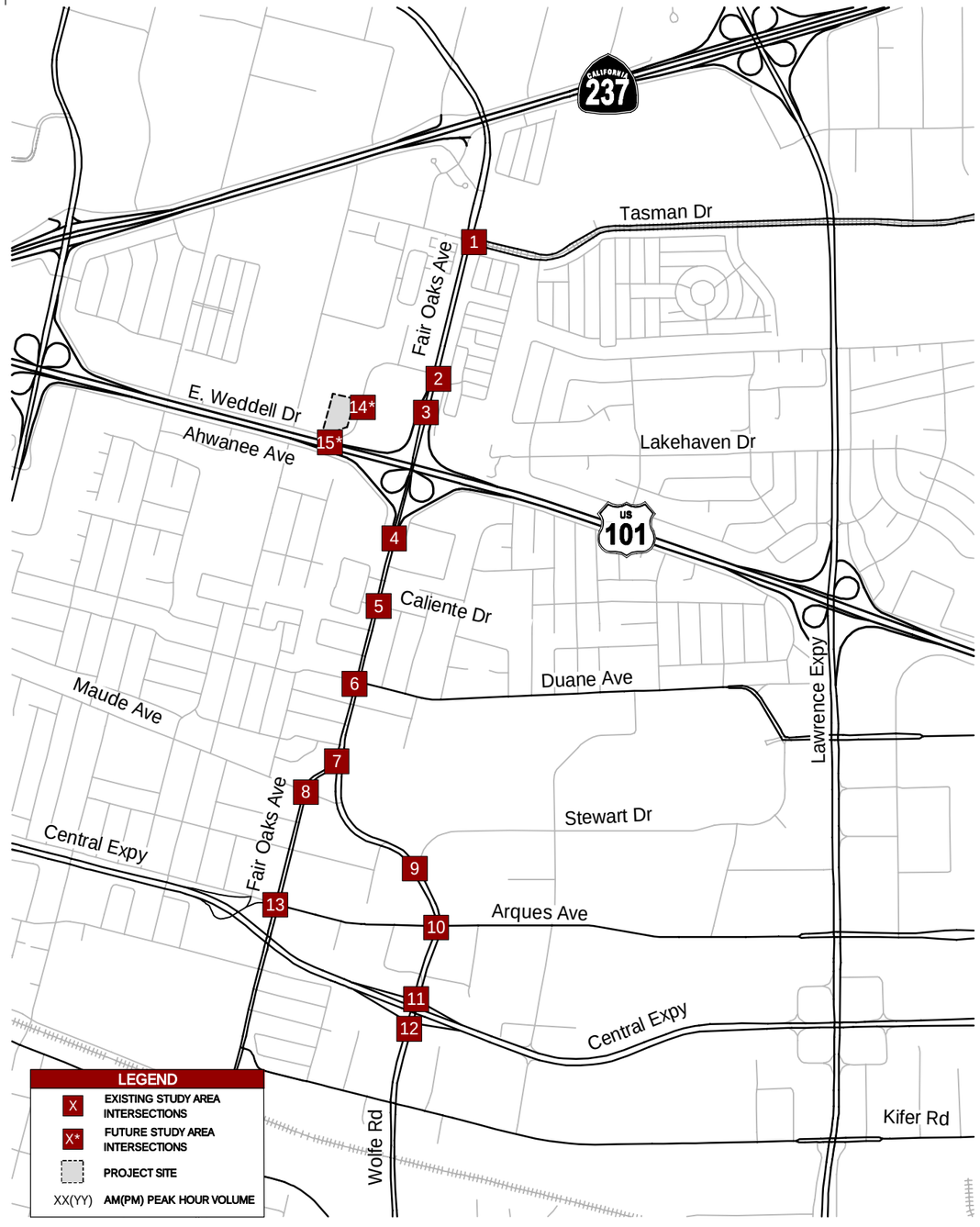
FIGURE 18
EXISTING PLUS BACKGROUND SCHOOL PM PEAK HOUR TURNING MOVEMENT VOLUMES

SUMMIT SCHOOL (539 E WEDDELL DRIVE) TRAFFIC IMPACT ANALYSIS



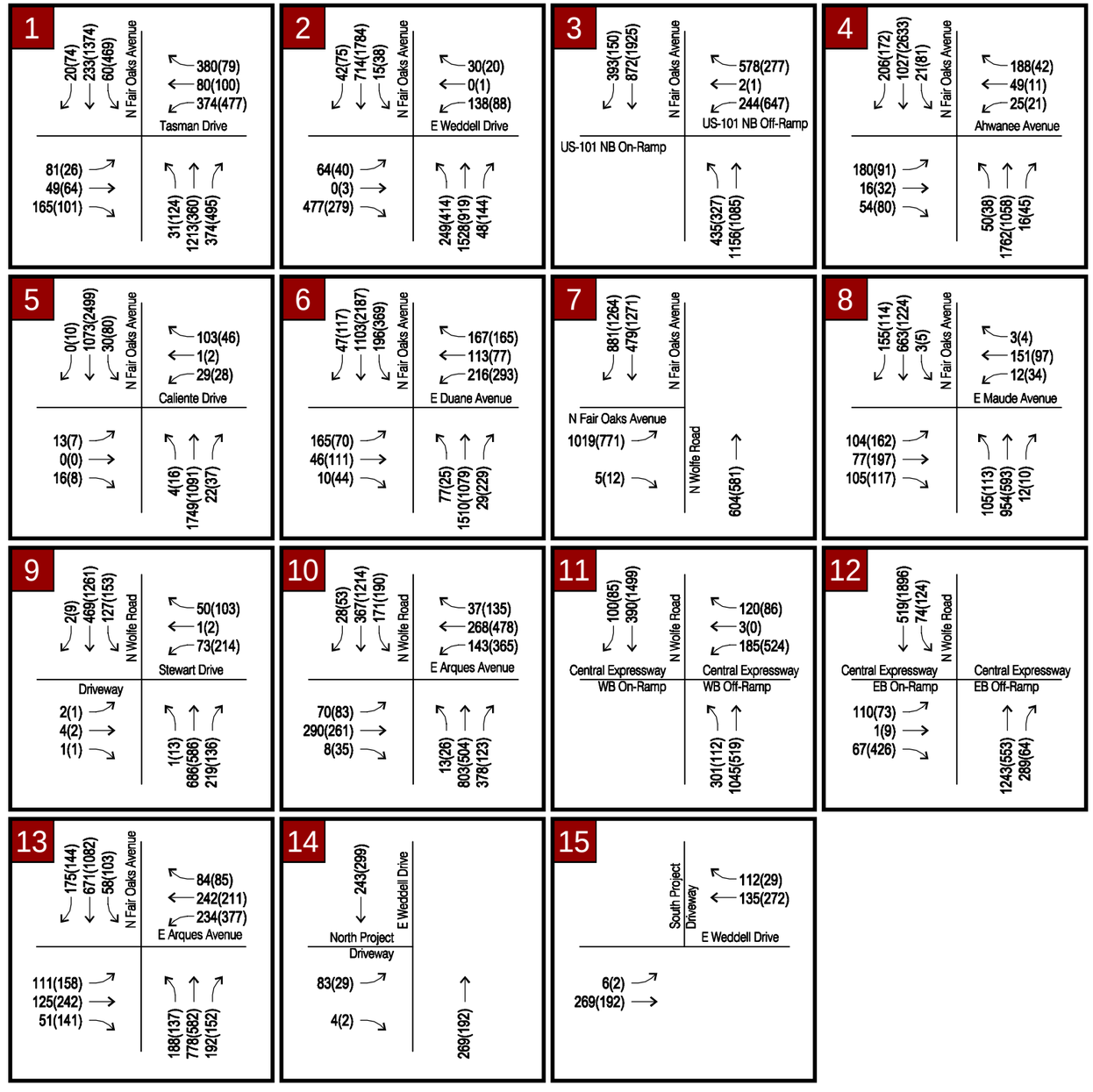


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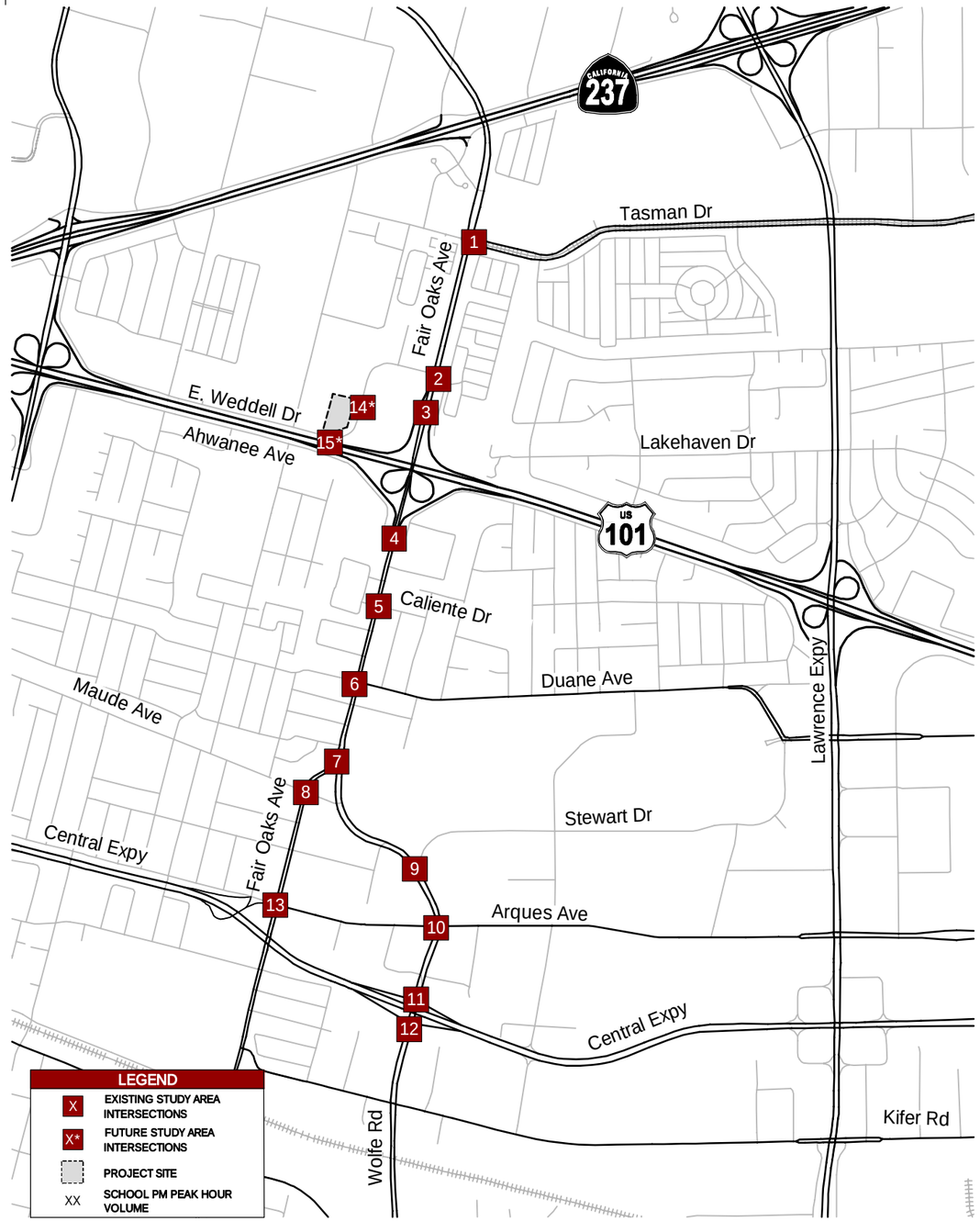
FIGURE 19
EXISTING PLUS BACKGROUND PLUS PROJECT WEEKDAY PEAK HOUR TURNING MOVEMENT VOLUMES

SUMMIT SCHOOL (539 E WEDDELL DRIVE) TRAFFIC IMPACT ANALYSIS



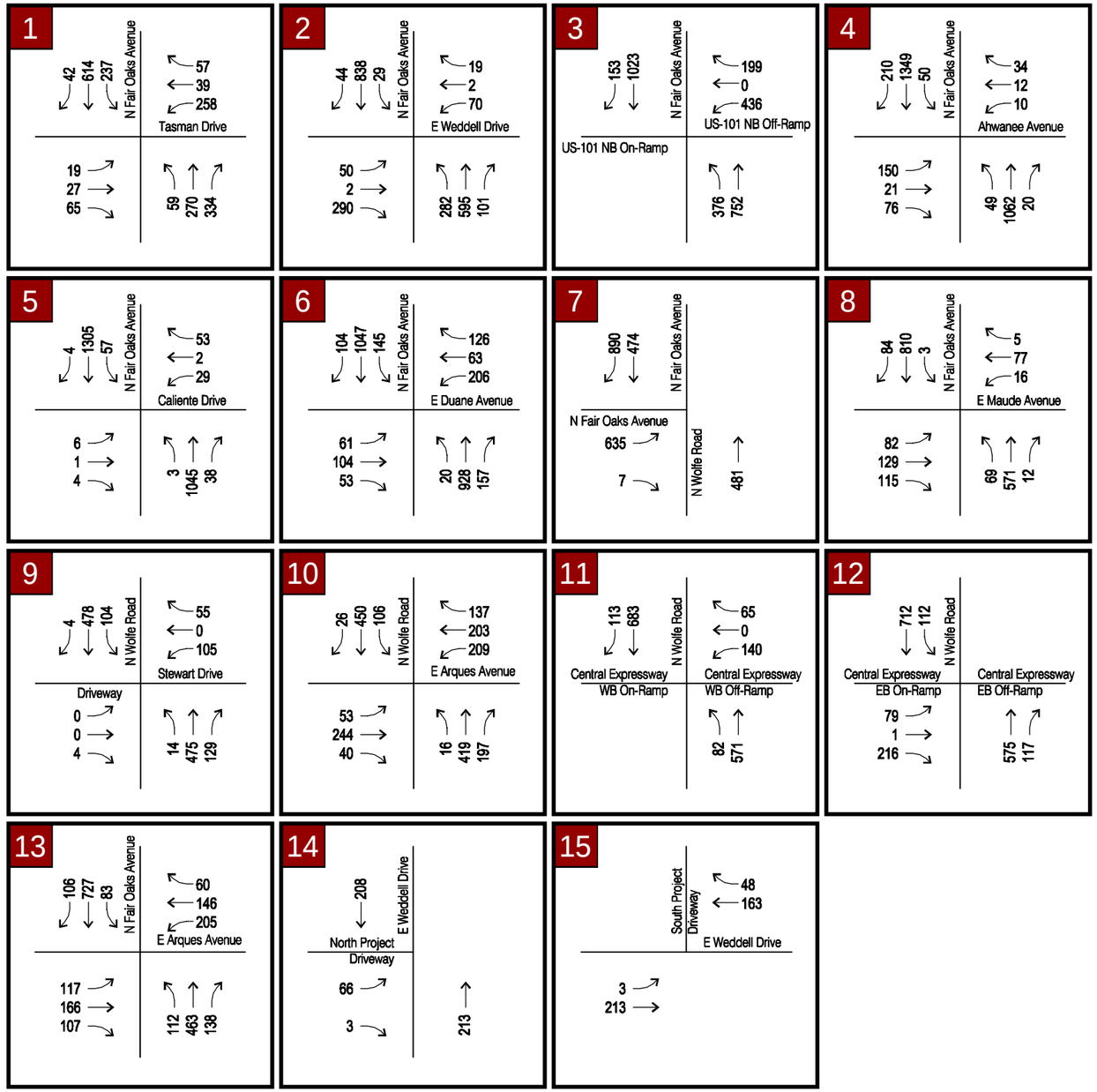


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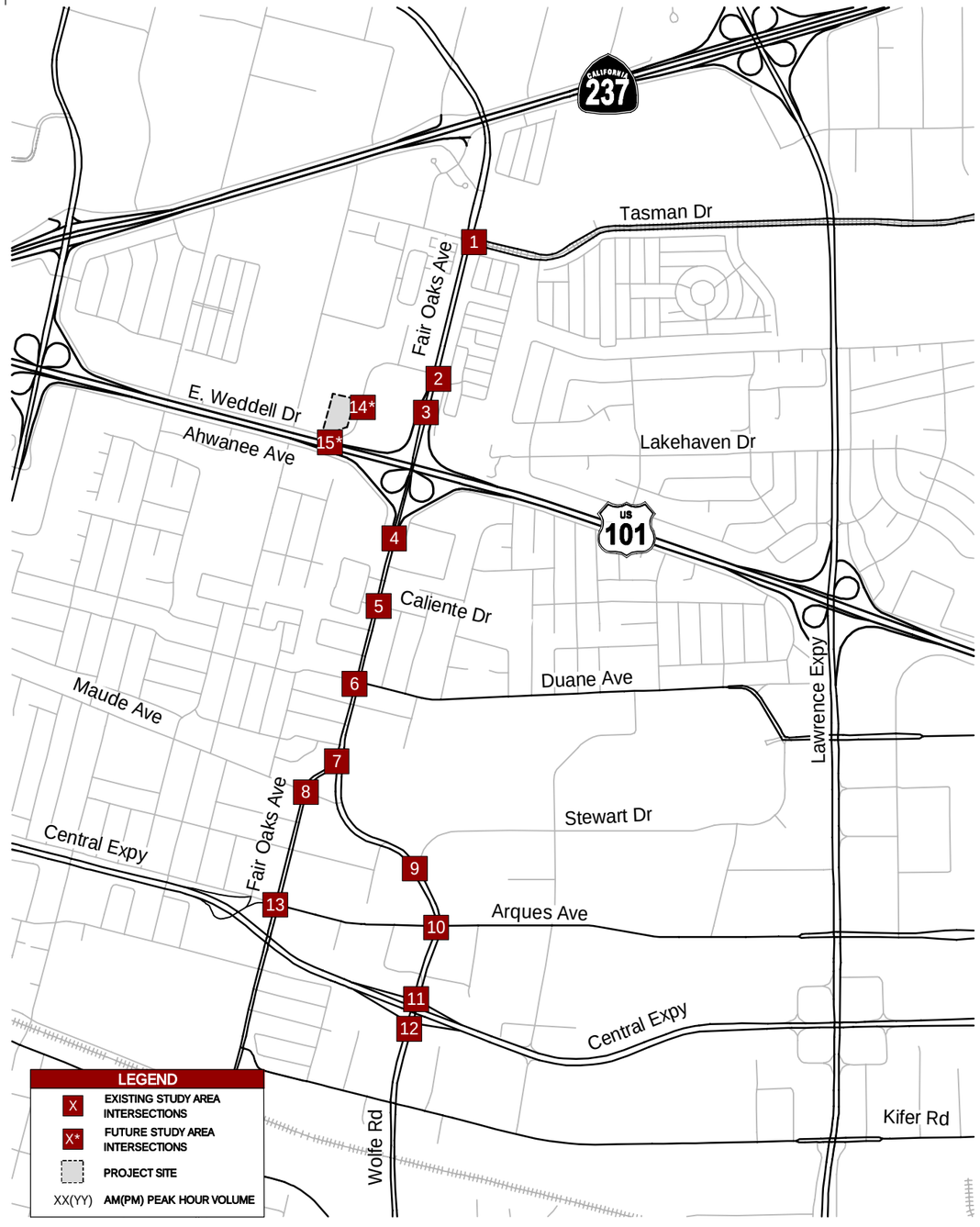
FIGURE 20
EXISTING PLUS BACKGROUND PLUS PROJECT SCHOOL PM PEAK HOUR TURNING MOVEMENT VOLUMES

SUMMIT SCHOOL (539 E WEDDELL DRIVE) TRAFFIC IMPACT ANALYSIS



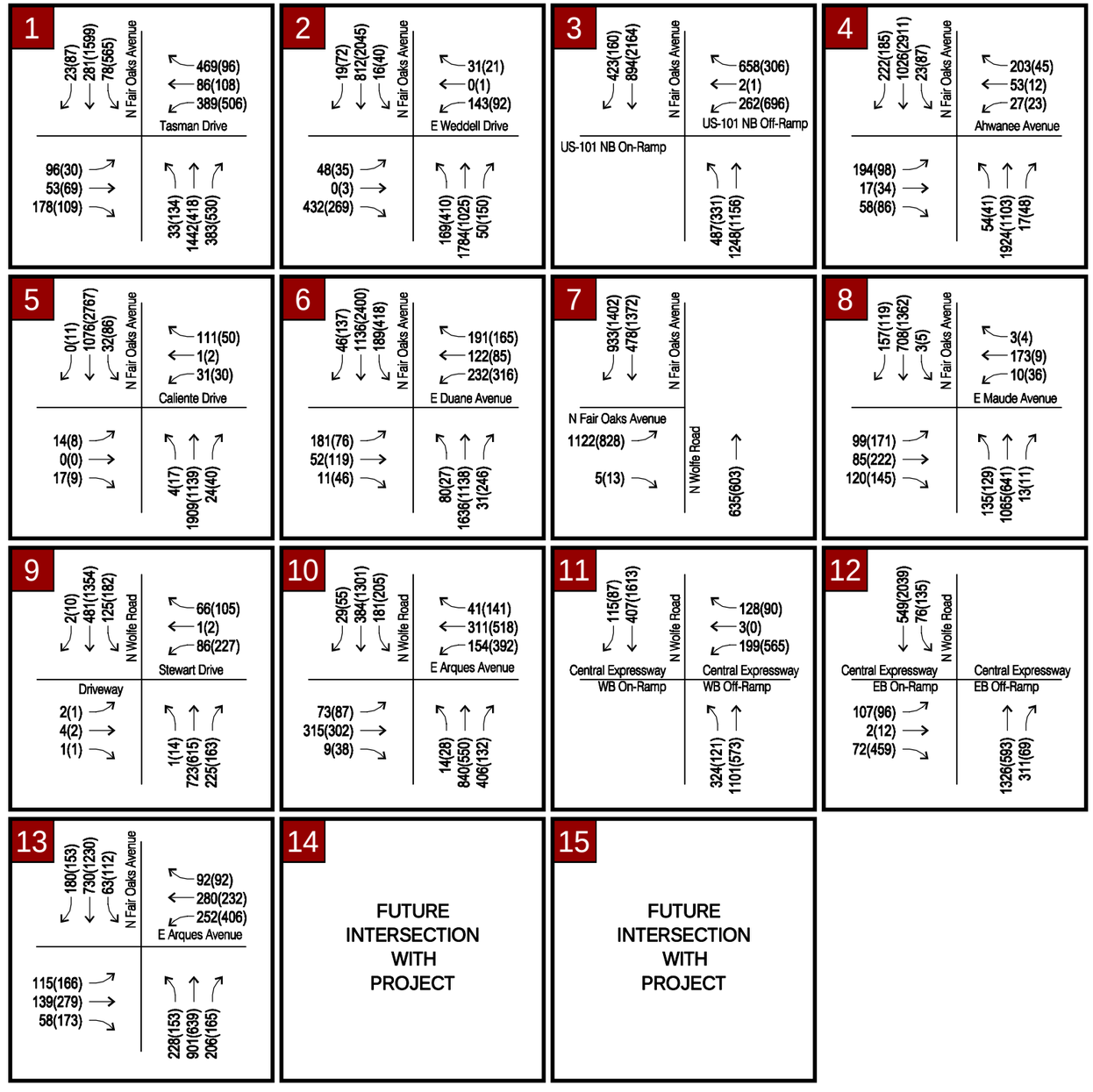


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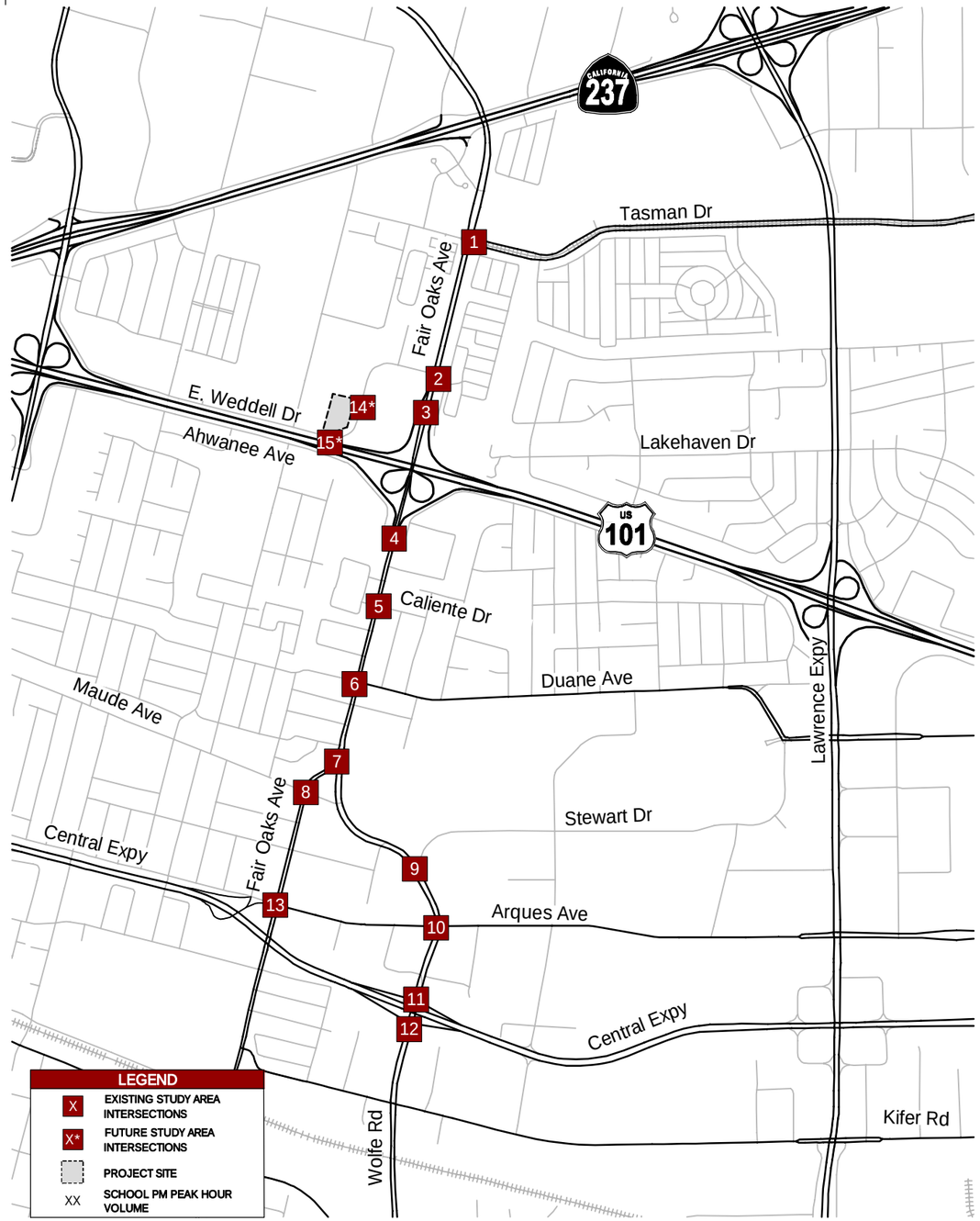
FIGURE 21
CUMULATIVE WEEKDAY PEAK HOUR TURNING MOVEMENT VOLUMES

SUMMIT SCHOOL (539 E WEDDELL DRIVE) TRAFFIC IMPACT ANALYSIS



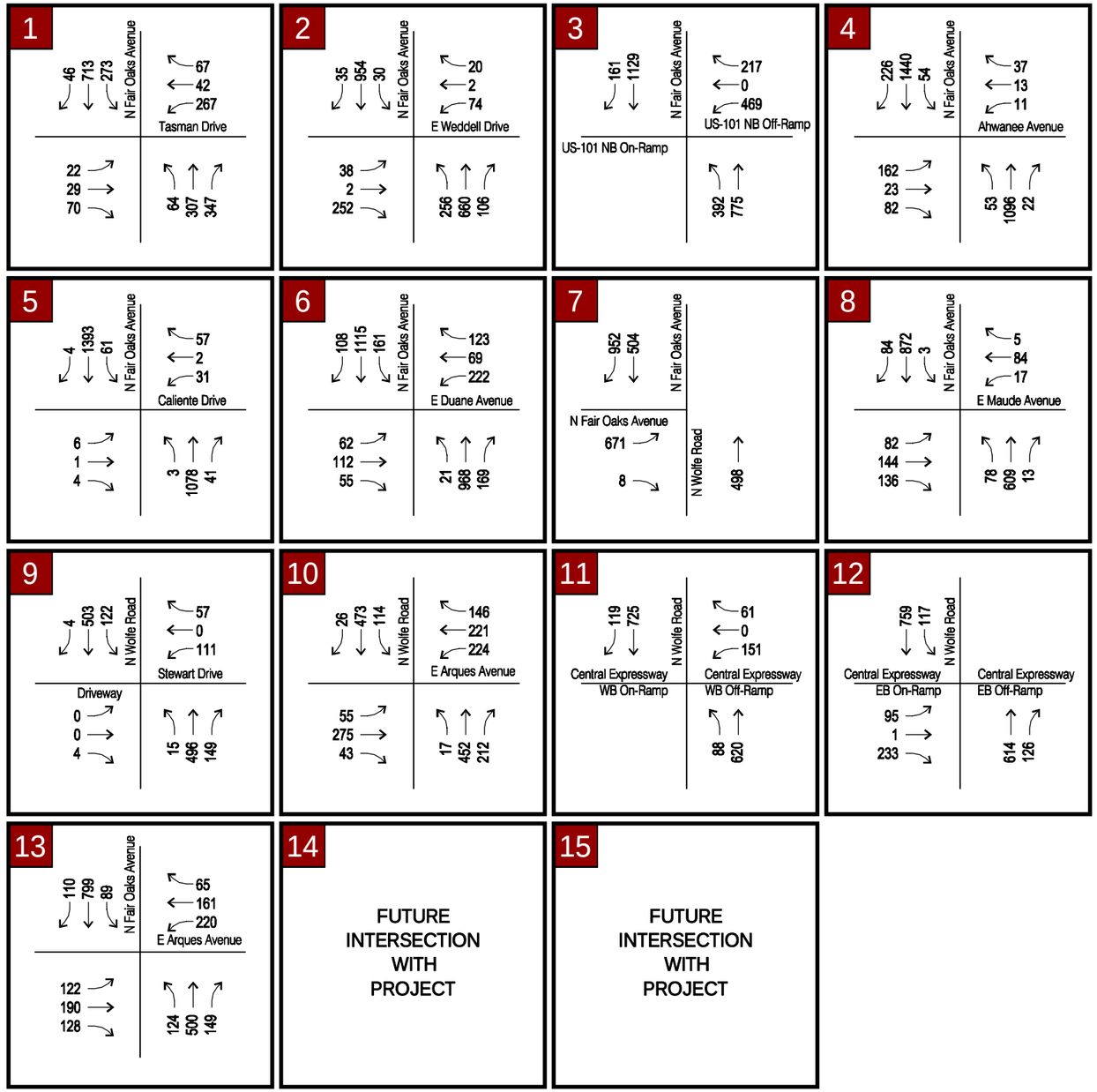


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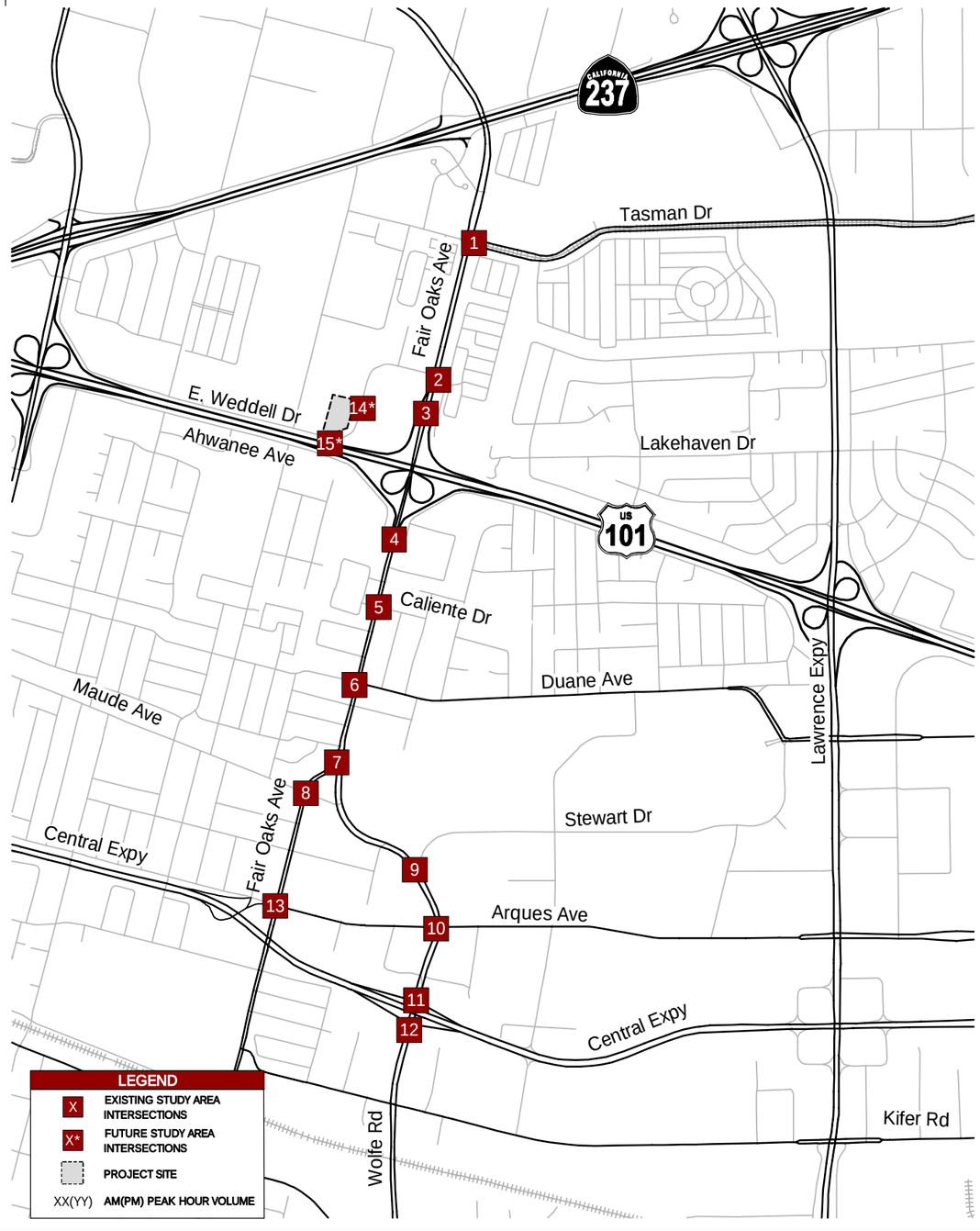
FIGURE 22
CUMULATIVE SCHOOL PM PEAK HOUR TURNING MOVEMENT VOLUMES

SUMMIT SCHOOL (539 E WEDDELL DRIVE) TRAFFIC IMPACT ANALYSIS



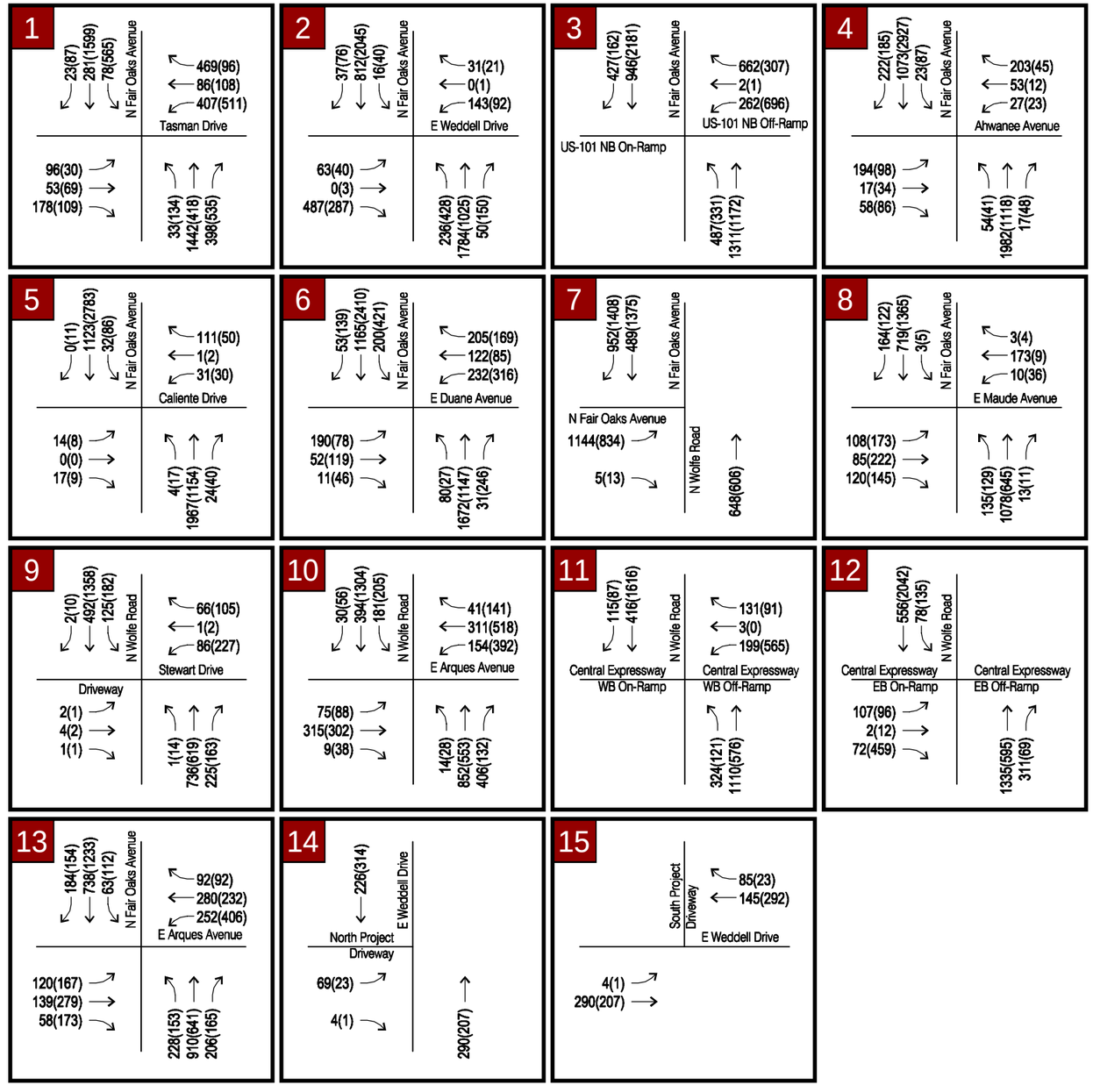


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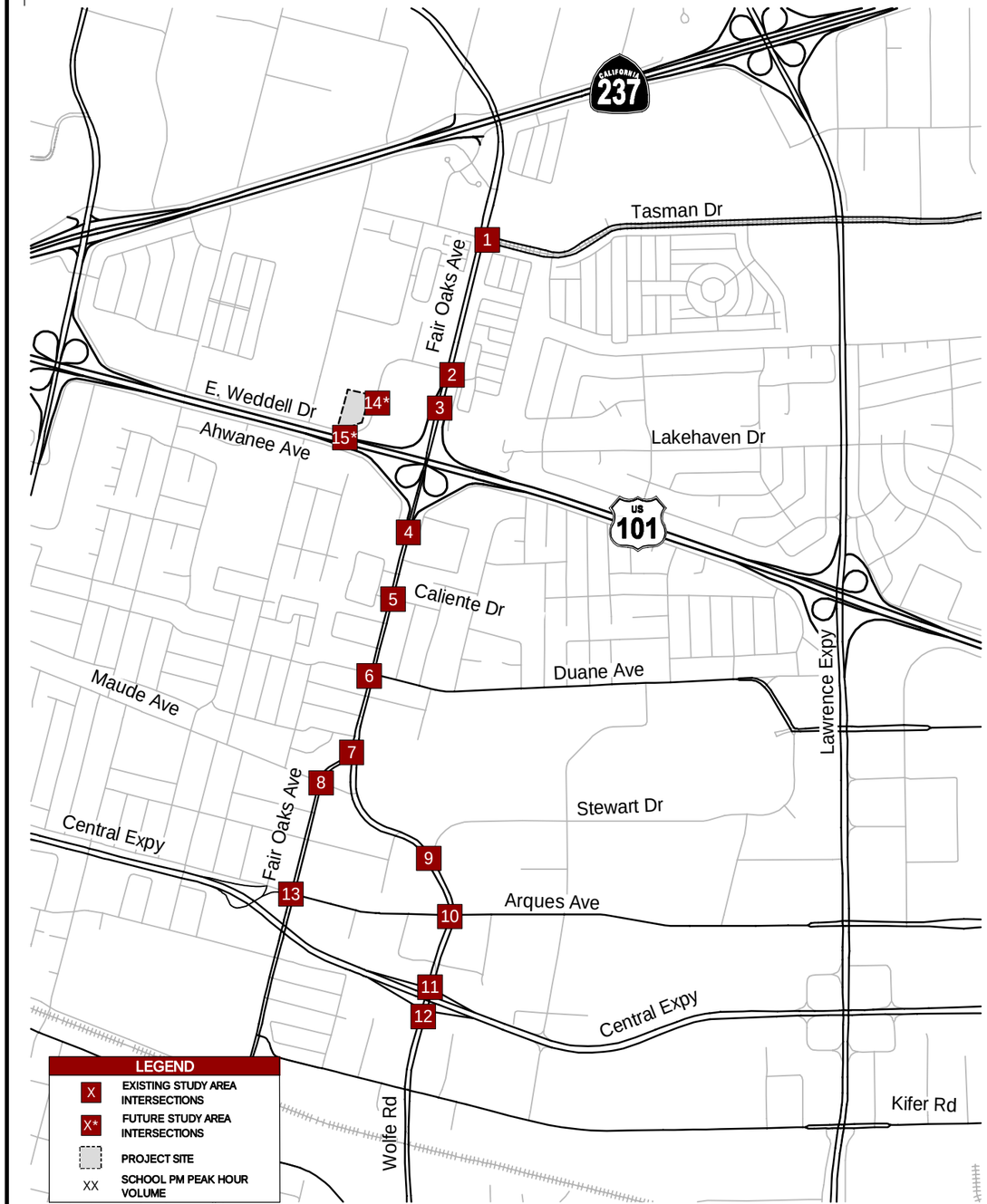
FIGURE 23
CUMULATIVE PLUS PROJECT WEEKDAY PEAK HOUR TURNING MOVEMENT VOLUMES



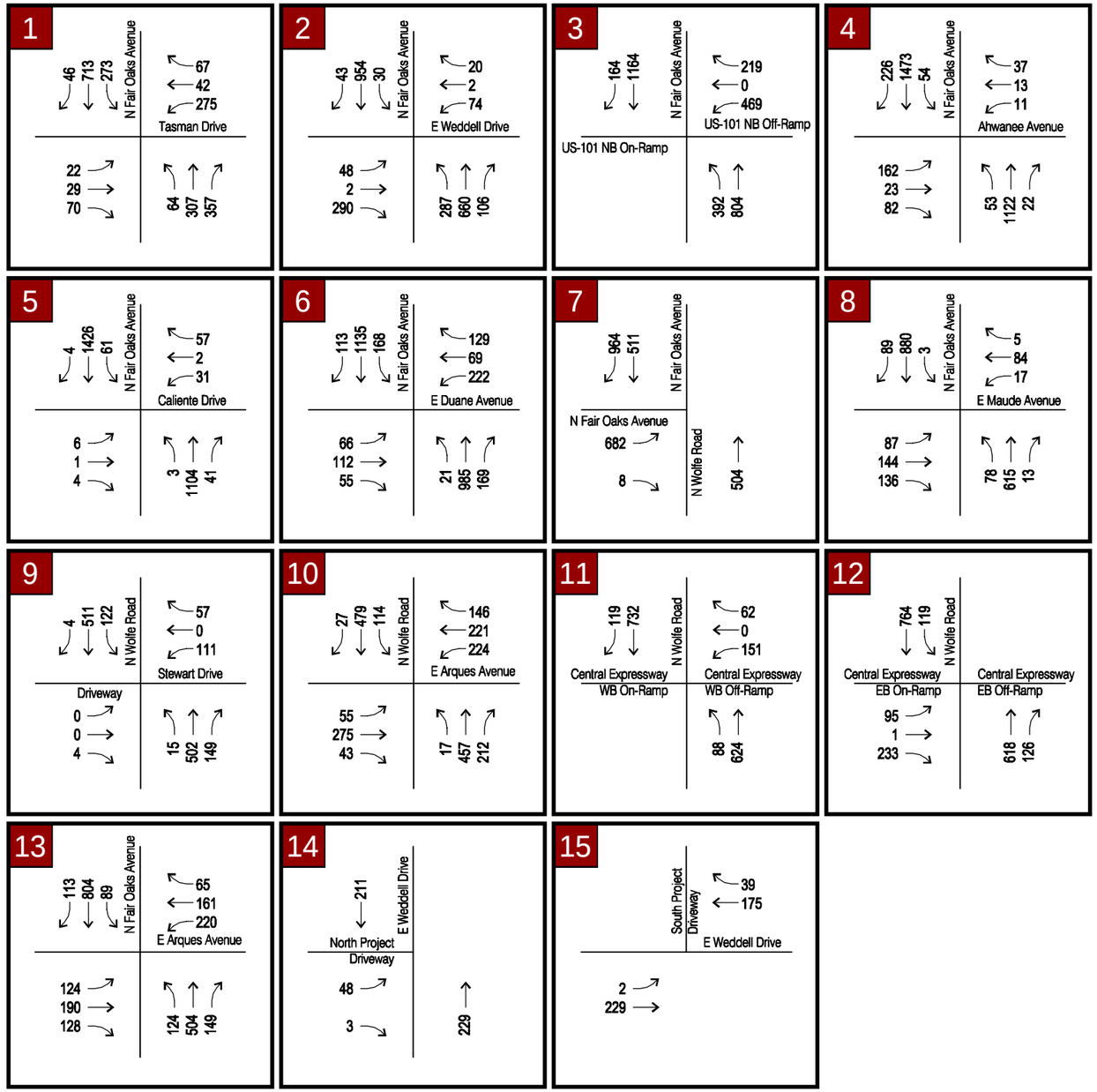


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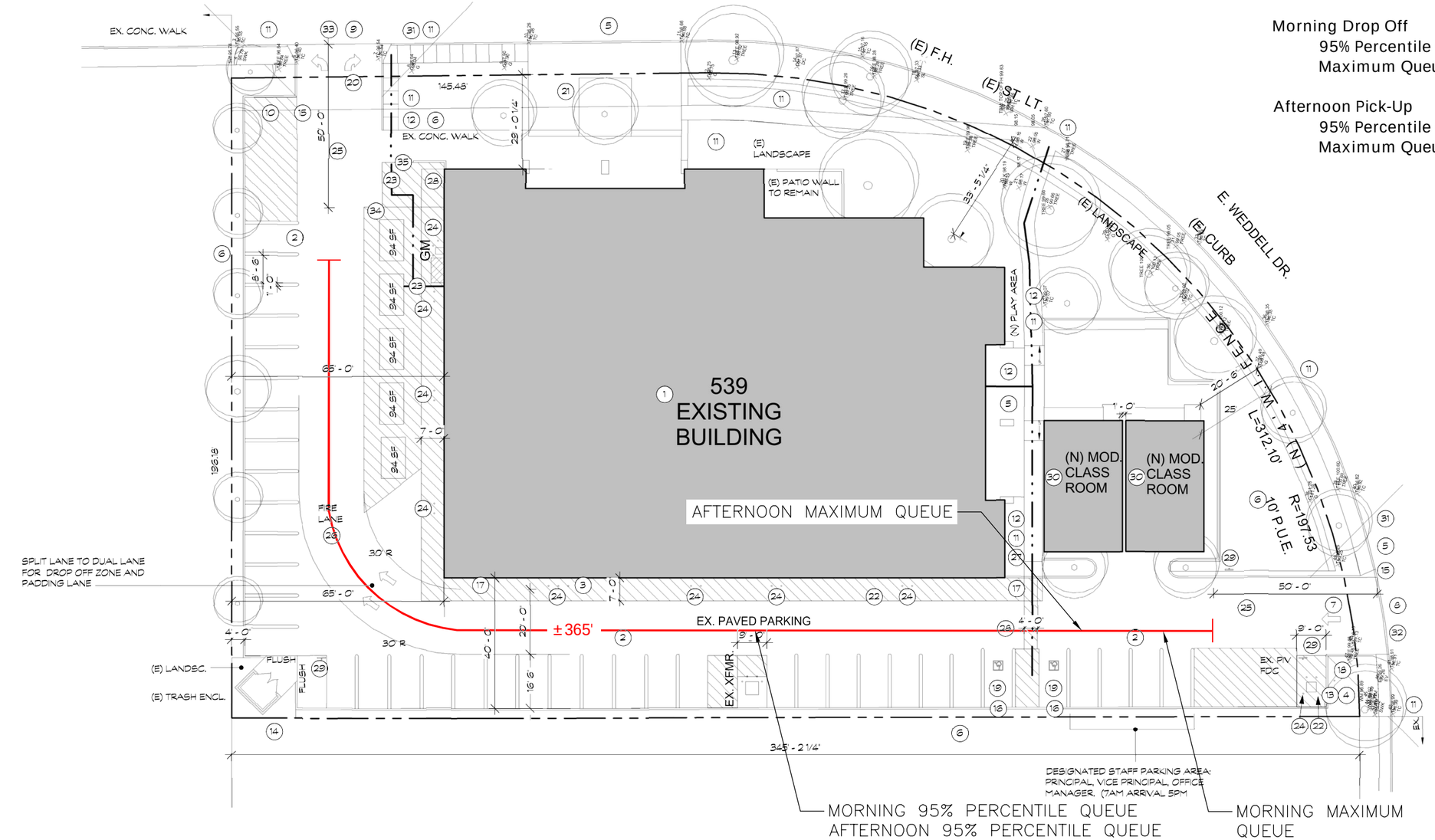
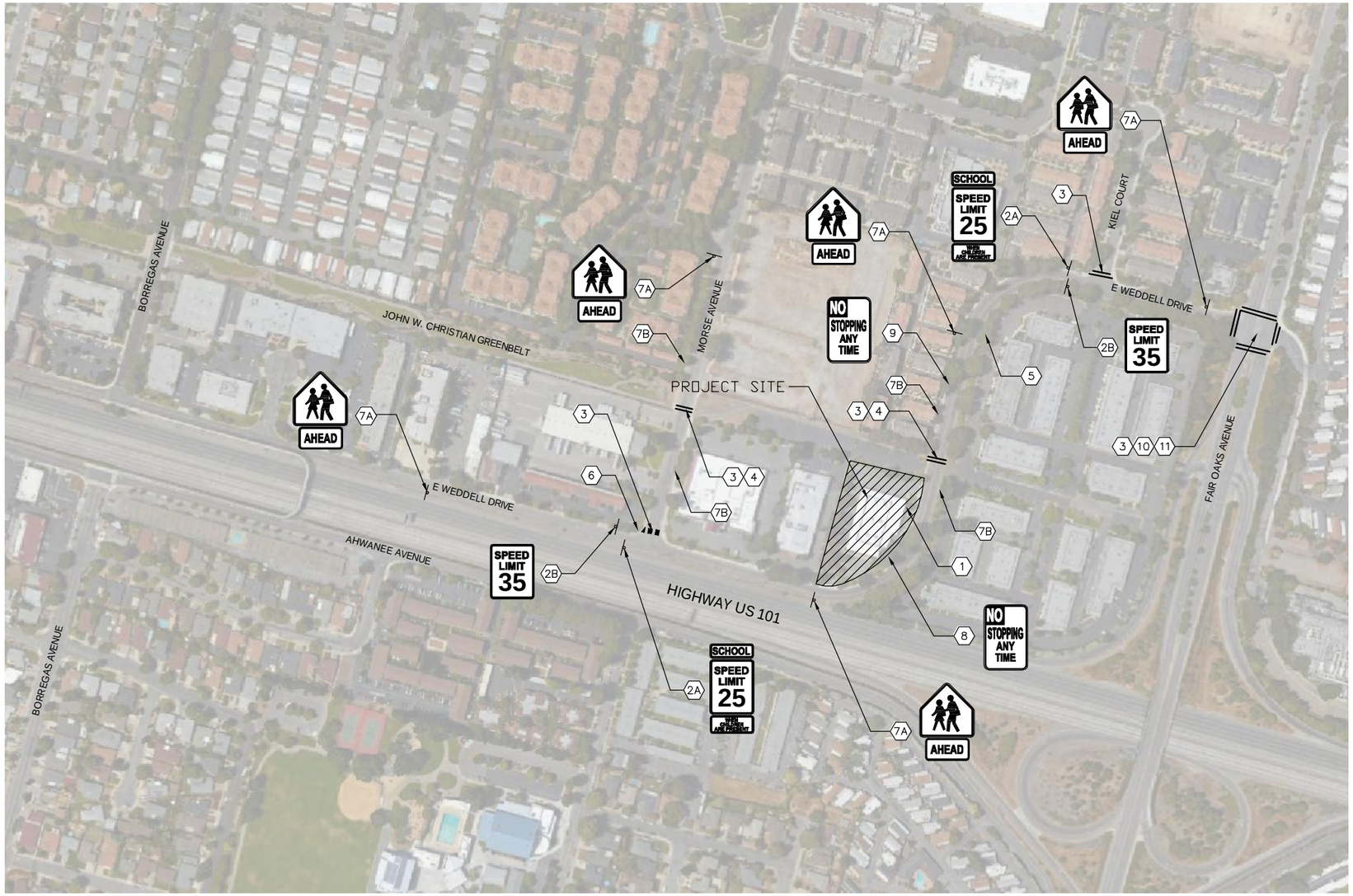
FIGURE 24
CUMULATIVE PLUS PROJECT SCHOOL PM PEAK HOUR TURNING MOVEMENT VOLUMES
SUMMIT SCHOOL (539 E WEDDELL DRIVE) TRAFFIC IMPACT ANALYSIS

Total Queue Storage:	365 feet (14 vehicles)
Morning Drop Off	
95% Percentile Queue	225 feet (9 vehicles)
Maximum Queue	350 feet (14 vehicles)
Afternoon Pick-Up	
95% Percentile Queue	225 feet (9 vehicles)
Maximum Queue	325 (13 vehicles)



1 PROPOSED SITE PLAN
1" = 200'



GENERAL NOTES

1. RELOCATE MAIN ENTRANCE FOR SCHOOL TO NORTH SIDE OF BUILDING

2A. INSTALL SCHOOL SPEED LIMIT SIGN (ASSEMBLY C) 500' FROM SCHOOL GROUNDS

2B. INSTALL 35 MPH SPEED LIMIT (R2-1) 500' FROM SCHOOL GROUNDS

3. INSTALL SCHOOL CROSSWALK (YELLOW HIGH VISIBILITY LADDER)

4. INSTALL RECTANGULAR RAPID FLASHING BEACON (RRFB) CROSSWALK

5. INSTALL SIDEWALK

6. INSTALL PEDESTRIAN RAMP

7A. INSTALL SCHOOL AHEAD SIGN (ASSEMBLY D)

7B. INSTALL 'SLOW SCHOOL XING' PAVEMENT MARKINGS YIELD LINES AND CORRESPONDING SCHOOL ASSEMBLY B AND R1-5 SIGN IN ADVANCE OF CROSSWALK

8. INSTALL NO STOPPING SIGN (R26(S))

9. REPLACE NO PARKING SIGNS WITH NO STOPPING SIGN (R26(S))

10. STATION CROSSING GUARD (IF WARRANTED)

11. INTERSECTION IMPROVEMENTS

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FIGURE 26
SCHOOL SAFETY ASSESSMENT RECOMMENDED IMPROVEMENTS

SUMMIT SCHOOL (539 E WEDDELL DRIVE) TRAFFIC IMPACT ANALYSIS

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MEMORANDUM

To:	Momoko Ishijima Associate Planner, City of Sunnyvale
From:	Mike Mowery, P.E. Kimley-Horn and Associates, Inc.
Date:	April 20, 2016
Subject:	Updated Summit School On-Site Queuing Analysis

An updated on-site queuing analysis was conducted to evaluate on-site queuing for the proposed Summit School if staggered drop-off and pick-up periods were to be implemented. During the morning, 6th through 8th grade students would be dropped off within a 30 minute period between 7:30 AM and 8:00 AM and 9th grade students would be dropped off within a 30 minute period between 8:30 AM and 9:00 AM. During the afternoon pick-up period, 6th through 8th grade students would be picked up within a 30 minute period between 3:00 PM and 3:30 PM and 9th grade students would be picked up within a 30 minute period between 4:00 PM and 4:30 PM.

Morning Drop-off Period

Table 1 presents a summary of the queuing analysis during the morning drop-off period. It was assumed that 89 vehicles and 29 vehicles would arrive during the first and second drop-off periods, respectively. These volumes were based on the number of inbound middle school trips generated by the site. The arrival rate equates to 2.97 vehicles per minute and 0.97 vehicles per minute for the first and second drop-off periods, respectively. Both morning drop-off periods assume a conservative average dwelling time of 30 seconds, which equates to a departure rate of 10 vehicles per minute (5 vehicles in drop-off zone ÷ [30 seconds dwell time/ 60 seconds per minute]). Using a micro-simulation model within an excel spreadsheet, the maximum queue will be 300 feet and 125 feet for the first and second drop-off periods, respectively. Both maximum queues are less than the total available queue storage of 365 feet. Therefore, it is anticipated that the on-site queuing will not spill onto E Weddell Drive during either morning drop-off periods.

Table 1: Morning Drop-Off Period Queuing Summary

Drop-off Period	Arriving Vehicles	Arrival Rate (veh/min)	Departure Rate (veh/min)	Maximum Queue (feet)
7:30 AM – 8:00 AM	89	2.97	10	300
8:30 AM – 9:00 AM	29	0.97	10	125

Afternoon Pick-Up Period

Table 2 presents the summary of queuing analysis during the afternoon pick-up period. It was assumed that 74 vehicles and 26 vehicles would arrive during the first and second pick-up periods, respectively. These volumes were based on the combined number of outbound trips for the midday school dismissal and PM periods. These periods closely overlap and therefore the volumes are analyzed together as a conservative estimate. The arrival rate equates to 2.47 vehicles per minute and 0.87 vehicles per minute for the first and second pick-up periods, respectively. Both afternoon pick-up periods assume a conservative average dwelling time of 60 seconds, which equates to a departure rate of 5 vehicles per minute (5 vehicles in drop-off zone ÷ [60 seconds dwell time/ 60 seconds per minute]). Using a micro-simulation model within an excel spreadsheet, the maximum queue will be 225 feet and 150 feet for the first and second pick-up periods, respectively. Both maximum queues are less than the total available queue storage of 365 feet. Therefore, it is anticipated that the on-site queuing will not spill onto E Weddell Drive during either afternoon pick-up periods.

Table 2: Afternoon Pick-Up Period Queuing Summary

Pick-up Period	Arriving Vehicles	Arrival Rate (veh/min)	Departure Rate (veh/min)	Maximum Queue (feet)
3:00 PM – 3:30 PM	74	2.47	5	225
4:00 PM – 4:30 PM	26	0.87	5	150

Conclusion

An additional on-site queuing analysis was conducted to evaluate the on-site queuing if the proposed school implemented staggered drop-off and pick-up times during the first school year. The analysis concluded that the maximum queuing lengths were within the available queue storage during each drop-off and pick-up period and no queuing is expected to spill onto E Weddell Drive.

Although the analysis estimates no queuing issues, it is recommended that the City administers a condition for the proposed school to monitor its queue during the morning and afternoon peak periods to address concerns by community members and the City. If a consistent spill over exists, the school would be responsible for developing and enforcing new drop-off/pick-up procedures to ensure queues do not spill onto E Weddell Drive.