Appendix C:

Traffic Study

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TRANSPORTATION ENGINEERING / PLANNING
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MEMORANDUM

Date: January 5, 2016

Project #: 17851

To: Doug Giffin
Chamberlin Associates
5860 W Las Positas Blvd, Suite 21
Pleasanton, CA 94588

From: Amy López

Project: Summit K2 Charter School: High School Expansion Transportation Impact Analysis

Subject: Addendum: Clarifications and Revisions per Comments from City Staff

This memorandum has been prepared in response to City of El Cerrito staff comments on the Summit K2 Charter School: High School Expansion Transportation Impact Analysis.

Summit K2 Charter School is proposing to expand enrollment to high school grade levels at its current site at 1800 Elm Street in the City of El Cerrito (Project). The school is located in a residential neighborhood near El Cerrito del Norte BART station. Summit K2 Charter School began operations in the Fall of 2014 with grade 7 enrollment of 125 students and continues operations in the Fall of 2015 with 240 7th and 8th grade students. A study was conducted to analyze and address the traffic and transportation concerns that might be associated with the expansion in enrollment for high school grade levels at Summit K2 Charter School. The results of that analysis were documented in a report in June 2015 (June 2015 report).

City of El Cerrito staff (City staff) requested clarification of certain features and assumptions of the analysis as well as revision of the mitigations proposed at the Elm Street/Hill Street/Key Boulevard intersection and the Key Boulevard/Cutting Boulevard intersection. This memorandum is an addendum to the June 2015 report and documents the clarifications and revisions requested by City staff.

COMMENTS FROM CITY STAFF

These comments were provided by City staff regarding the analysis of and suggested improvements to the study intersections.

1. During the ATP Grant Application process, City engineers worked with Mr. Doug Giffin and his team in developing optional plans for the school routes to Summit K2 Charter School. The project is responsible for measures to accommodate the additional project-generated pedestrian, bicycle,

and vehicle traffic and the potential conflicts between these modes, especially for the primary entrance to the school at the Elm Street/Hill Street/Key Boulevard intersection. These measures include upgrades to signal heads and related equipment if any signal phasing changes are needed as well as pedestrian and bicycle improvements, consistent with those identified in the City's final draft Active Transportation Plan (August 2015). The proposed project must address the needs for users at this intersection.

2. The current signal phasing and striping at the Elm Street/Hill Street/Key Boulevard intersection does not allow eastbound through movements from Hill Street. Turning movements in the analysis show an increase in through movements with the expansion of the school. What are the assumptions for vehicles traveling from Hill Street into the project site?
3. Mitigation measures at the Elm Street/Hill Street/Key Boulevard intersection must maintain crosswalks that are protected by the signal phases and/or turning traffic. Due to the vertical and horizontal geometry of the intersection, the level of control/protection for these crosswalks must not be reduced.
4. Optimization of signal timing/phasing is proposed at the Elm Street/Hill Street/Key Boulevard intersection as a mitigation measure. The suggested changes to the existing signal phasing would require upgrades to signal heads. Also, confirm the signal timing optimization accounts for the addition of pedestrian/bicycle volumes and the minimum times to serve them.
5. Please explain how traffic was redistributed at the San Pablo Avenue/Hill Street/Eastshore Boulevard/Peerless Avenue intersection when the intersection improvements described in the San Pablo Avenue Specific Plan were incorporated into the analysis.[1] Were the trips redistributed from the Specific Plan?
6. The mitigation measure of installing 100' of red curb on the east side of Key Boulevard at Cutting Boulevard to provide a second northbound lane is not acceptable because the parking removal would directly affect the two property owners on the east side of Key Boulevard. Public Works would not object to 100' of red curb on the west side of Key Boulevard as there are no residences on that side. If this mitigation measure is to be delayed pending growth in enrolled, the intersection operations at the Key Boulevard/Cutting Boulevard intersection must be monitored and analyzed with incremental growth in enrollment: for example, every 100 students.

RESPONSES TO COMMENTS FROM CITY STAFF

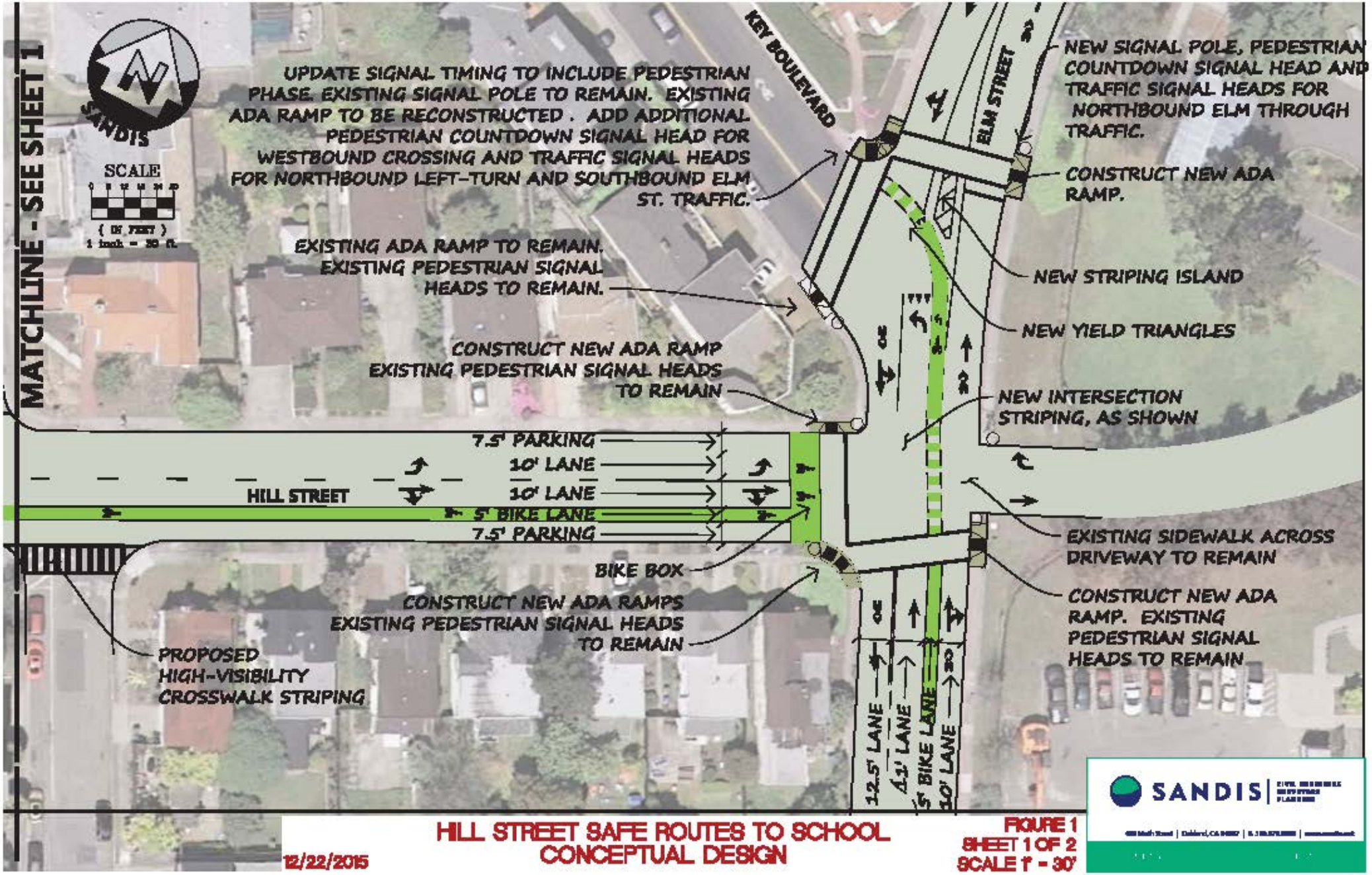
This section documents the requested clarification of certain features and assumptions of the analysis as well as revision of the mitigations proposed at the Elm Street/Hill Street/Key Boulevard intersection and the Key Boulevard/Cutting Boulevard intersection.

1. The proposed Project would address the needs for users at the Elm Street/Hill Street/Key Boulevard intersection and would be consistent with and go beyond the improvements identified in the City's final draft Active Transportation Plan (August 2015) by implementing the measures shown in Figure 1. This memorandum revises the design of the mitigation at the Elm Street/Hill Street/Key Boulevard intersection to include installation of a bike lane and a bike box on Hill Street, as illustrated in Figure 1. This memorandum amends the mitigation previously proposed in the June 2015 report and amends Figure 22 of that report.

[1] Addendum: Evaluation of the San Pablo Avenue/Hill Street/Eastshore Boulevard/Peerless Avenue Intersection with the Configuration Proposed in San Pablo Avenue Specific Plan

2. Hill Street at the approach to the Elm Street/Hill Street/Key Boulevard intersection currently is marked with a dedicated left-turn lane and a dedicated right-turn lane. As City staff noted, the turning movement counts for existing conditions show many drivers make an eastbound through movement from Hill Street to the school driveway. Yvetteh Ortiz, Public Works Director/City Engineer, and Melissa Tigbao, Engineering Manager, verbally indicated that the Project's inclusion of striping for eastbound through movement on Hill Street and new signal heads to accommodate the movements and timing plan proposed by the Project would meet the City's traffic and safety standards.
3. With the proposed mitigations, as detailed above in the response to the first City comment, the level of control/protection for the crosswalks at the Elm Street/Hill Street/Key Boulevard intersection would not be reduced. For example, pedestrian phases and protected left-turn phases would be separated, and a new marked, signalized crossing would be provided across Elm Street at the north end of the intersection.
4. It is understood that certain hardware improvements would be necessary to implement the proposed mitigation at the Elm Street/Hill Street/Key Boulevard intersection, and the Project would be responsible for funding those improvements. Minimum pedestrian crossing times were identified and incorporated into the signal phasing to accommodate pedestrians in the near-term as well as over the course of the expansion of the school. Bicycle intersection-crossing times, particularly for northbound, uphill riders to cross the intersection, were incorporated into the minimum green time of the signal phasing.
5. An analysis of the San Pablo Avenue/Hill Street/Eastshore Boulevard/Peerless Avenue intersection was performed using the Year 2040 Cumulative plus Project traffic volumes assuming the improvements proposed in the San Pablo Avenue Specific Plan and signal timing corresponding to the timings used for analysis of transportation impacts in the San Pablo Avenue Specific Plan Final Environmental Impact Report.[2] With eastbound access prohibited, the volumes previously evaluated as entering the intersection eastbound from Peerless Avenue were reassigned to other movements within the intersection or were assumed not to pass through the intersection as follows:
    a. Eastbound left-turn volumes were removed from the intersection and assumed to access northbound San Pablo Avenue via Cutting Boulevard.
    b. Eastbound through volumes were added to southbound left turn volumes.
    c. Eastbound right turns to San Pablo Avenue volumes were added to southbound through volumes.
    d. Eastbound right turns to Eastshore Boulevard volumes were added to southbound right turn to Eastshore Boulevard volumes.
6. This memorandum revises the design of the mitigation at the Key Boulevard/Cutting Boulevard intersection such that on-street parking would be removed from the west side of Key Boulevard to accommodate a new northbound left-turn lane, as illustrated in Figure 2. This memorandum amends the mitigation previously proposed in the June 2015 report and amends Figure 23 of that report. Drivers moving southbound on Key Boulevard would experience a shift to the west while they drive through the intersection as the proposed mitigation moves the southbound receiving lane to the west of its current position in the street cross section. A similar lane shift already is present at this intersection for eastbound drivers on Cutting Boulevard, who must shift to the north as they drive through the intersection.

[2] Addendum: Evaluation of the San Pablo Avenue/Hill Street/Eastshore Boulevard/Peerless Avenue Intersection with the Configuration Proposed in San Pablo Avenue Specific Plan

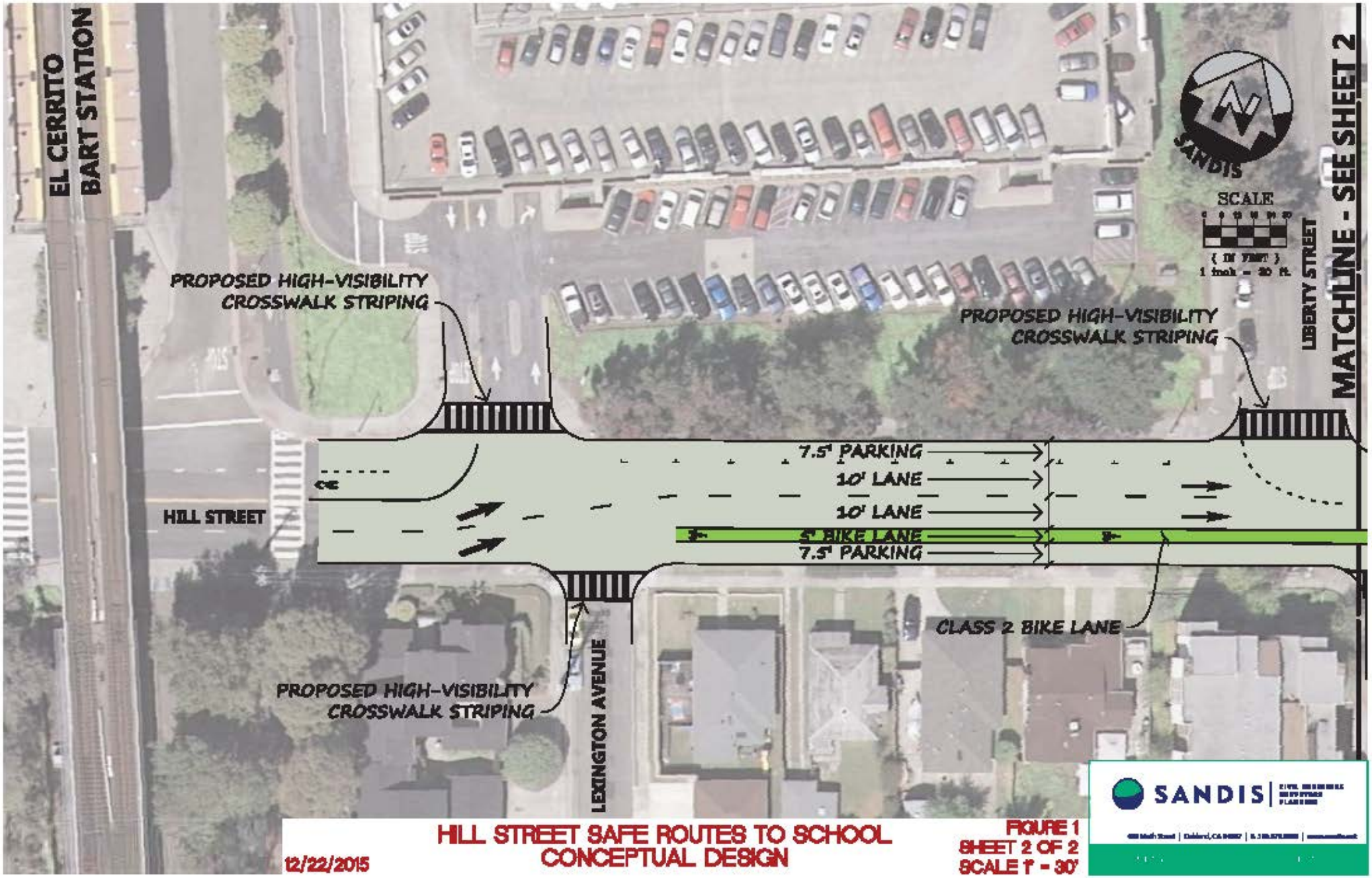


12/22/2015

HILL STREET SAFE ROUTES TO SCHOOL CONCEPTUAL DESIGN

FIGURE 1
SHEET 1 OF 2
SCALE 1" = 30'

SANDIS

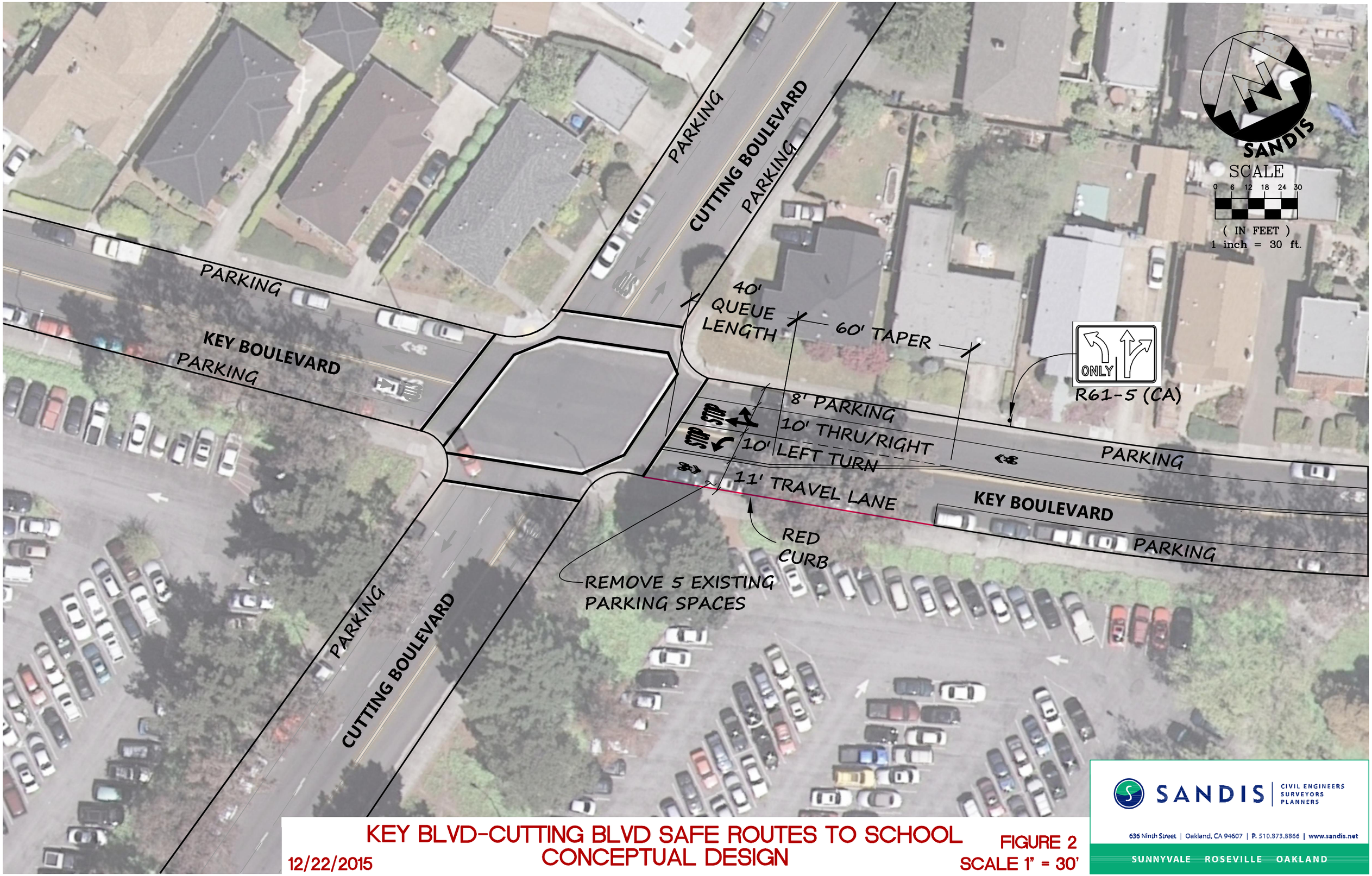


HILL STREET SAFE ROUTES TO SCHOOL
CONCEPTUAL DESIGN

12/22/2015

FIGURE 1
SHEET 2 OF 2
SCALE 1" = 30'

SANDIS



KEY BLVD-CUTTING BLVD SAFE ROUTES TO SCHOOL CONCEPTUAL DESIGN

12/22/2015

FIGURE 2
SCALE 1" = 30'

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636 Ninth Street | Oakland, CA 94607 | P. 510.873.8866 | www.sandis.net
SUNNYVALE ROSEVILLE OAKLAND

Memorandum

Date: October 14, 2015

Project: ECE007

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Lamphier-Gregory

From: Mark Spencer
mspencer@w-trans.com
Briana Byrne
bbyrne@w-trans.com

Subject: Peer Review Summary - K2 Charter School: High School Expansion Transportation Impact Analysis

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As requested, W-Trans has reviewed the supplied materials for the Summit K2 Charter School: High School Expansion project. This memo summarizes the peer review findings from the Draft Transportation Impact Analysis (TIA), Junes 2015, and the three addendums dated August 10, August 31, and September 3, 2015. Specific attention was given to the intersection of San Pablo Avenue/Hill Street/Peerless Avenue/Eastshore Boulevard as well as the overall consistency of the analysis and findings with the Contra Costa County and West Contra Costa County Transportation Advisory Committee (WCCTAC) guidelines for transportation impact analysis.

As indicated in the initial analysis, all impacts would be reduced to a less than significant level with mitigation except the San Pablo Avenue/Hill Street/Peerless Avenue/Eastshore Boulevard intersection. This intersection would operate at LOS F during the a.m. 2040 Cumulative scenario. Upon the addition of project-generated trips, the delay at the intersection would increase eight seconds. Traffic signal optimization was initially proposed to mitigate the impact and reduce the delay associated with the proposed project; however, the intersection was projected to continue operating unacceptably even with the proposed mitigation measure.

In the second Addendum dated August 31, 2015, further mitigation analysis for the intersection was performed using the proposed improvements described in the San Pablo Avenue Specific Plan (December 2014). The plan for Uptown San Pablo Avenue includes the following modifications at the San Pablo Avenue/Hill Street/Peerless Avenue/Eastshore Boulevard intersection:

- Eliminate the second southbound left-turn lane on San Pablo Avenue; and
- Modify access to Peerless Avenue to make it one-way inbound.

With these modifications to the intersection under the 2040 Cumulative and Cumulative plus Project conditions, the delay was projected to be reduced to an acceptable Level of Service under each scenario, and the project impact would be reduced to a less than significant level.

Our review of the analysis described in the June 2015 traffic study and the three addenda, including the relocation of outbound trips from Peerless Avenue to the roadway network, concluded that the analysis correctly applied the local regulatory standards and methods, and utilized proper engineering judgment. The analysis was consistent with the guidelines set forth by the County, WCCTAC and the City of El Cerrito. In addition, the mitigation measures currently proposed would be feasible, effective in reducing project impacts to a less than significant level, and be consistent with the San Pablo Avenue Specific Plan set forth by the City of El Cerrito.

MS/bkb/ECE007.M1

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MEMORANDUM

Date: September 3, 2015

Project #: 17851

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5860 W Las Positas Blvd, Suite 21
Pleasanton, CA 94588

From: Amy López

Project: Summit K2 Charter School: High School Expansion Transportation Impact Analysis

Subject: Addendum: Evaluation of Variation in Student Enrollment Composition

Summit K2 Charter School is proposing to expand enrollment to high school grade levels at its current site at 1800 Elm Street in the City of El Cerrito. The school is located in a residential neighborhood near El Cerrito del Norte BART station. Summit K2 Charter School began operations in the Fall of 2014 with grade 7 enrollment of 125 students and will continue operations in the Fall of 2015 with 240 7th and 8th grade students. A study was conducted to analyze and address the traffic and transportation concerns that might be associated with the expansion in enrollment for high school grade levels at Summit K2 Charter School. The results of that analysis were documented in a report in June 2015 (June 2015 report).

The June 2015 report defined a proposed Project comprised of the addition of up to 390 high school students to the existing charter middle school for a planned maximum enrollment of 600 middle and high school students plus or minus 5 percent (30 students). Estimated vehicle trips generated by the Project as well as how those trips were distributed and assigned onto the transportation network were discussed in that report, and analysis in that report was based on maximum enrollment of 630 students. Suggested improvements were identified to mitigate the impacts associated with the proposed Project. The suggested mitigations include improvements to the existing Elm Street/Hill Street/Key Boulevard/School driveway intersection and to the existing Key Boulevard/Cutting Boulevard intersection.[1]

Summit K2 School wants to have flexibility in the proportion of middle and high school students attending the school within the planned maximum enrollment. This memorandum is an addendum to

[1] See "Mitigation Measures" subsection and Figures 22 and 23 of June 2015 report.

the June 2015 report and was prepared to analyze the traffic impact of varying the proportion of middle and high school students attending the school within the planned maximum enrollment. Namely, this memorandum documents additional analysis for an alternative enrollment option wherein the school would be expanded to planned maximum enrollment of 600 students plus or minus 5 percent and would serve any mix of middle and high school students (Alternative Project).

TRANSPORTATION IMPACT ANALYSIS

Analysis of the Alternative Project was conducted for AM, after-school PM and PM peak hours for the Existing plus Alternative Project Condition and the Year 2040 Cumulative plus Alternative Project Condition.

Trip Generation, Distribution and Assignment

The approach to trip generation for the Project analyzed and documented in the June 2015 report used observed vehicle counts collected in September 2014 and June 2015 as well as information compiled in the 9th Edition of the Institute of Transportation Engineers (ITE) *Trip Generation* manual.[2] That approach is documented in Table 6 of the report. For this addendum, the same approach was used for developing middle school-only trip generation and is shown in Table 1.

As shown in Table 6 of the June 2015 report, middle school students generate more trips than high school students generate for a few reasons, including: 1) some high school students may drive themselves to school, which results in one inbound trip in the AM and one outbound trip in the PM, whereas middle schools students may be driven to school, which results in one inbound and one outbound trip in the AM and one inbound and one outbound trip in the PM; and 2) a larger share of high school students than middle school students may take transit or bike to school. Based on this information, a worst-case scenario was analyzed assuming the mix of students is 100 percent middle school and zero percent high school. The analysis documented here is based on maximum enrollment of 630 students.

[2] *Trip Generation*, 9th Edition, Institute of Transportation Engineers, Washington, D.C. 2012

Table 1: Trip Generation

Trip Generation	Amount		Trip Rate and Directional Distribution			Trips Generated		
School Type			**AM Peak Hour**			**AM Peak Hour**		
			Total	**In**	**Out**	**In**	**Out**	**Total**
Middle School	505	Stu	1.37	52%	48%	360	331	691
School Type			**After-school PM Peak Hour**			**After-school PM Peak Hour**		
			Total	**In**	**Out**	**In**	**Out**	**Total**
Middle School	505	Stu	0.83	48%	52%	202	216	418

Trip distribution and assignment, as well as development of cumulative volumes, were performed in the same manner as in the June 2015 report.

Assumptions

Analysis of the Existing plus Alternative Project Condition assumes signal timing improvements at the Elm Street/Hill Street/Key Boulevard/school driveway intersection, which would improve operations without changes to intersection geometry, striping or signal hardware. This signal timing improvement is documented in the addendum dated August 10, 2015.[3] Analysis of the Year 2040 Cumulative plus Alternative Project Condition incorporates the mitigations proposed in the June 2015 report and the improvements planned for the Peerless Avenue intersection.

In addition, the addendum dated August 31, 2015, documents analysis of the San Pablo Avenue/Hill Street/Eastshore Boulevard/Peerless Avenue Intersection (Peerless Avenue intersection) assuming the improvements proposed for this intersection in the adopted San Pablo Avenue Specific Plan.[4] Like that addendum, the analysis documented in this addendum assumes the improvements at the Peerless Avenue intersection would be implemented by Year 2040.

Intersection Operations – Existing plus Alternative Project Condition

Table 2 displays the anticipated intersection operations at the study intersections for the Existing plus Alternative Project Condition. As shown, the study intersections would operate acceptably with the addition of Alternative Project traffic to Existing Conditions during all peak hours except at one

[3] Addendum: Alternative Signal Timing During Enrollment Growth Period

[4] Addendum: Evaluation of the San Pablo Avenue/Hill Street/Eastshore Boulevard/Peerless Avenue Intersection with the Configuration Proposed in San Pablo Avenue Specific Plan

intersection during the PM peak hour: the Key Boulevard/Cutting Boulevard intersection. Implementation of the mitigation identified in the June 2015 report for this intersection would lead to an improvement in operations so that the intersection would operate acceptably at LOS B.

Table 2: Intersection Level of Service – Existing plus Alternative Project Condition

No.	North-South Cross Street	East-West Cross Street	Control	AM		After-school PM		PM	
				Delay	LOS	Delay	LOS	Delay	LOS
1	Elm Street	Blake St	All-Way Stop	13.9	B	9.6	A	11.7	B
2	Elm Street	Hill St & Key Blvd & School Driveway	Signal	43.8	D	27.2	C	31.9	C
3	San Pablo Ave	Cutting Blvd	Signal	26.5	C	33.0	C	33.6	C
4	San Pablo Ave	Hill St & Peerless Ave & Eastshore Blvd	Signal	44.1	D	36.1	D	39.1	D
5	Key Blvd	Cutting Blvd	All-Way Stop	24.4	C	13.4	B	14.9*	B*
* Includes the mitigation from June 2015 report; without mitigation, delay would be 39.8s at LOS E.									
Delay denotes average vehicle delay in seconds.									
Worst approach average vehicle delay shown for stop-controlled intersections.									
LOS denotes level of service.									
Source: Kittelson & Associates, 2015									

A sensitivity test was performed to determine the maximum possible enrollment to occur before operations at the Key Boulevard/Cutting Boulevard intersection would deteriorate past an acceptable level of service. This sensitivity test found enrollment could grow by 480 additional students to a total enrollment of 605 students, and the Key Boulevard/Cutting Boulevard intersection would operate acceptably. Therefore, the improvements identified in the June 2015 report to mitigate traffic impacts at the Key Boulevard/Cutting Boulevard intersection would need to be in place prior to having more than 605 students at the site.

Intersection Operations – Year 2040 Cumulative plus Alternative Project Condition with Mitigation

Table 3 displays the anticipated intersection operations at the study intersections for the Year 2040 Cumulative plus Alternative Project Condition with Mitigations. As shown, with the proposed mitigations and the addition of Alternative Project traffic to the local transportation network, the study intersections would operate acceptably and meet City standards under Year 2040 Cumulative plus Alternative Project Condition.

Table 3: Intersection Level of Service – Cumulative plus Alternative Project Condition with Mitigations

No.	North-South Cross Street	East-West Cross Street	Control	AM		After-school PM		PM	
				Delay	LOS	Delay	LOS	Delay	LOS
1	Elm Street	Blake St	All-Way Stop	22.0	C	12.4	B	19.7	C
2	Elm Street	Hill St & Key Blvd & School Driveway	Signal	41.5	D	44.4	D	33.2	C
3	San Pablo Ave	Cutting Blvd	Signal	32.7	C	36.9	D	38.4	D
4	San Pablo Ave	Hill St & Peerless Ave & Eastshore Blvd	Signal	68.5	E	46.7	D	43.0	D
5	Key Blvd	Cutting Blvd	All-Way Stop	25.9	D	12.2	B	19.3	C
* Represents a 10-second increase in delay.									
Delay denotes average vehicle delay in seconds.									
Worst approach average vehicle delay shown for stop-controlled intersections.									
LOS denotes level of service.									
Source: Kittelson & Associates, 2015									

Student Loading and Unloading

As documented in the June 2015 report, with maximum enrollment of 630 students (middle school and high school students), the potential maximum queue during morning drop-off would be 20 vehicles, which would be accommodated within the existing on-site and on-street unloading capacity. The potential maximum queue during afternoon pick-up would be 40 vehicles, which would extend beyond the project driveway. Under the Alternative Project Condition wherein the maximum enrollment could be 630 middle school students (or another mix of middle and high school students), the potential maximum queue during the morning drop-off and afternoon pick-up would extend beyond the project driveway.

In order to accommodate expected maximum queues during morning drop-off and afternoon pick-up activities, the school could encourage students to use a mode other than a personal vehicle in order to achieve a reduction in morning drop-off and after-school pick-ups commensurate to the potential share of the queue overflowing the driveway (e.g., 15 percent or greater reduction). Alternatively, the school could assure that 15 percent or more of the students arrive at the campus 15 minutes earlier in the morning and leave the campus 15 minutes later in the afternoon than the majority of students to achieve reduced maximum queues that could be accommodated within the on-site and on-street loading spaces.

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MEMORANDUM

Date: August 31, 2015

Project #: 17851

To: Doug Giffin
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5860 W Las Positas Blvd, Suite 21
Pleasanton, CA 94588

From: Amy López

Project: Summit K2 Charter School: High School Expansion Transportation Impact Analysis

Subject: Addendum: Evaluation of the San Pablo Avenue/Hill Street/Eastshore Boulevard/ Peerless Avenue Intersection with the Configuration Proposed in San Pablo Avenue Specific Plan

Summit K2 Charter School is proposing to expand enrollment to high school grade levels at its current site at 1800 Elm Street in the City of El Cerrito. The school is located in a residential neighborhood near El Cerrito del Norte BART station. Summit K2 Charter School began operations in the Fall of 2014 with grade 7 enrollment of 125 students and will continue operations in the Fall of 2015 with 240 7th and 8th grade students. A study was conducted to analyze and address the traffic and transportation concerns that might be associated with the expansion in enrollment for high school grade levels at Summit K2 Charter School. The results of that analysis were documented in a report in June 2015 (June 2015 report).

This memorandum is an addendum to that report and documents additional analysis for alternative geometry and access at the San Pablo Avenue/Hill Street/Eastshore Boulevard/Peerless Avenue intersection (Peerless Avenue intersection). The San Pablo Avenue Specific Plan (Plan) of December 2014 identifies geometric and access improvements at the Peerless Avenue intersection to be completed. The improvements would affect operations at the Peerless Avenue intersection. The Plan also establishes level of service (LOS) E as the standard for signalized intersections along San Pablo Avenue.

As documented in Table 10 of the June 2015 report, the Peerless Avenue intersection would operate unacceptably at LOS F during the AM peak hour under Year 2040 Cumulative Conditions. The addition of traffic associated with the full high school expansion would cause operations to deteriorate further by an estimated eight seconds of average delay per vehicle. This is documented in Table 11 of the June 2015 report.

OPERATIONS ANALYSIS

The San Pablo Avenue Specific Plan includes the following improvements at the Peerless Avenue intersection:

- Eliminating the second southbound left-turn lane on San Pablo Avenue, and
- Modifying access to Peerless Avenue as one-way inbound.[1]

An analysis of the Peerless Avenue intersection was performed for Year 2040 Cumulative plus Project traffic volumes assuming the improvements proposed in the Plan and signal timing corresponding to the timing used for analysis of transportation impacts in the Draft Environmental Impact Report for the Plan. With eastbound access prohibited, the volumes previously evaluated as entering the intersection eastbound from Peerless Avenue were reassigned to other movements within the intersection or were assumed not to pass through the intersection as follows:

- Eastbound left turn volumes were removed from the intersection.
- Eastbound through volumes were added to southbound left turn volumes.
- Eastbound right turn to San Pablo Avenue volumes were added to southbound through volumes.
- Eastbound right turn to Eastshore Boulevard volumes were added to southbound right turn to Eastshore Boulevard volumes.

Findings

With the assumptions described previously and the redistribution of eastbound volumes, the operations at the Peerless Avenue intersection would improve to an acceptable level in the AM peak hour and would operate acceptably during the other peak hours, as shown in Table 1.

Table 1: Intersection Level of Service – Alternative Geometry and Access at Peerless Avenue Intersection

North-South Cross Street	East-West Cross Street	Control	AM		After-school PM		PM	
			Delay	LOS	Delay	LOS	Delay	LOS
San Pablo Avenue	Hill Street & Eastshore Boulevard & Peerless Avenue	Signal	64.7	E	43.1	D	48.6	D

Delay denotes average vehicle delay in seconds.

LOS denotes level of service.

Source: Kittelson & Associates, 2015

[1] See CS Figure 41 of the Plan and the Transportation Appendix of the DEIR for the Plan.

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MEMORANDUM

Date: August 10, 2015

Project #: 17851

To: Doug Giffin
Chamberlin Associates
5860 W Las Positas Blvd, Suite 21
Pleasanton, CA 94588

From: Amy López

Project: Summit K2 Charter School: High School Expansion Transportation Impact Analysis

Subject: Addendum: Alternative Signal Timing During Enrollment Growth Period

Summit K2 Charter School is proposing to expand enrollment to high school grade levels at its current site at 1800 Elm Street in the City of El Cerrito. The school is located in a residential neighborhood near El Cerrito del Norte BART station. Summit K2 Charter School began operations in the Fall of 2014 with grade 7 enrollment of 125 students and will continue operations in the Fall of 2015 with 240 7th and 8th grade students. A study was conducted to analyze and address the traffic and transportation concerns that might be associated with the expansion in enrollment for high school grade levels at Summit K2 Charter School. The results of that analysis were documented in a report in June 2015 (June 2015 report).

This memorandum is an addendum to that report and documents additional analysis for an alternative signal phasing plan at the Elm Street/Hill Street/Key Boulevard/school driveway intersection (school driveway intersection). The alternative signal phasing plan could be implemented as early as Fall of 2015 and would remain in place at least through the 2019-2020 academic year, the period during which school enrollment would increase annually to include grades 7 through 12 with eventual total enrollment of 600 students plus or minus 5 percent.

INTERSECTION OPERATIONS

As documented in Table 8 of the June 2015 report, the intersection at the school driveway would operate unacceptably during the AM and PM peak hours with the addition of traffic associated with the full high school expansion (school expansion traffic). Figure 22 of the June 2015 report illustrates suggested improvements to the school driveway intersection, which, along with signal phasing changes associated with the geometric improvements and updating of traffic signal hardware. As documented in Table 12 of the June 2015 report, with these suggested improvements, the

intersection would operate acceptably during all peak hours. Unlike the signal phasing analyzed in the June 2015 report, the alternative signal phasing analyzed for this addendum could be implemented at the school driveway intersection with the existing geometric configuration and would not require updating of traffic signal hardware.

The current signal phasing plan at the school driveway intersection separates all approaches; i.e., each leg of the intersection is served with green time independent of any other leg. The proposed signal phasing plan would serve vehicles exiting the school driveway and vehicles turning right from Key Boulevard during the same phase. The movements made from these two legs of the intersection do not conflict as left turns from Key Boulevard are prohibited, and left turns from the school driveway are prohibited.

Findings

With implementation of the alternative signal phasing without geometric improvments, the school driveway intersection would operate acceptably during all peak hours, as shown in Table 1.

Table 1: Intersection Level of Service – Alternative Signal Phasing at School Driveway Intersection

North-South Cross Street	East-West Cross Street	Control	AM		After-school PM		PM	
			Delay	LOS	Delay	LOS	Delay	LOS
Elm Street	Hill St & Key Blvd & School Driveway	Signal	40.4	D	26.6	C	29.6	C

Delay denotes average vehicle delay in seconds.

LOS denotes level of service.

Source: Kittelson & Associates, 2015

Transportation Impact Analysis

Summit K2 Charter School: High School Expansion

El Cerrito, California

Draft

June 2015

Transportation Impact Analysis

Summit K2 Charter School: High School Expansion

El Cerrito, California

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Project Principal: Alice Chen, AICP

Project No. 17851

June 2015

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Section 1
Executive Summary

EXECUTIVE SUMMARY

Summit K2 Charter School is proposing to expand enrollment to high school grade levels at its current site at 1800 Elm Street in the City of El Cerrito. The school is located in a residential neighborhood near El Cerrito del Norte BART station. Summit K2 Charter School began operations in the Fall of 2014 with grade 7 enrollment of 125 students and will continue operations in the Fall of 2015 with 240 7th and 8th grade students. The purpose of this study is to analyze and address the traffic and transportation concerns that might be associated with the expansion in enrollment for high school grade levels at Summit K2 Charter School.

The results of this study indicate that the increased high school enrollment can be accommodated while maintaining acceptable traffic operations at the study intersections, access and circulation associated with student unloading and loading, and parking, assuming provision of the recommended improvements.

FINDINGS

Existing Conditions

- All study intersections are operating acceptably at LOS D or better during the AM, after-school PM and PM peak hours.
- The maximum queues observed during the morning drop-off and afternoon pick-up did not exceed the available queuing areas on-site.
- Only 7 of the available 61 parking spaces on--site were occupied.

Proposed Development Plan

The proposed high school expansion (Project) is to increase enrollment to 600 students plus or minus 5 percent in grades 7 through 12 by Fall 2019. The Project is estimated to generate 415 vehicle trips (216 inbound, 199 outbound) during the weekday AM peak hour and 312 vehicle trips (151 inbound, 161 outbound) during the weekday after-school PM peak hour.

Baseline Conditions

- Under Baseline conditions, all study intersections would operate acceptably at LOS D or better during each peak hour.
- With the addition of Project traffic to Baseline conditions, the Elm Street/Hill Street/Key Boulevard/School driveway intersection would operate unacceptably at LOS E or F during the AM and PM peak hours, and the Key Boulevard/Cutting Boulevard intersection would

operate at LOS F during the PM peak hour. All other intersections would operate acceptably at LOS D or better during each peak hour.

Student Unloading and Loading

- At maximum enrollment of 630 students, the potential maximum queue during morning drop-off would be 20 vehicles, which could be accommodated on-site.
- At maximum enrollment of 630 students, the potential maximum queue during afternoon pick-up would be 40 vehicles, which would extend beyond the project driveway.

Parking

- As proposed with 61 parking spaces on-site, the Project would be one parking space short of the code parking requirement of 62 spaces.

Cumulative Conditions

- Under Cumulative conditions, three of the study intersections are projected to operate acceptably at LOS D or better during each peak hour. The San Pablo Avenue/Hill Street/Peerless Avenue/Eastshore Boulevard intersection would operate unacceptably at LOS F during the AM peak hour and acceptably during other peak hours. The Key Boulevard/Cutting Boulevard intersection would operate unacceptably at LOS F during the PM peak hour and acceptably during other peak hours.
- With the addition of Project traffic to Cumulative conditions, two intersections would operate acceptably at LOS D or better during each peak hour. The Elm Street/Hill Street/Key Boulevard/School driveway intersection would operate unacceptably at LOS E or F during each peak hour. The San Pablo Avenue/Hill Street/Peerless Avenue/Eastshore Boulevard intersection would operate unacceptably at LOS F during the AM peak hour and acceptably during other peak hours. The Key Boulevard/Cutting Boulevard intersection would operate unacceptably at LOS F during the PM peak hour and acceptably during other peak hours.

RECOMMENDATIONS

The following list provides a summary of the mitigation measures recommended as part of this proposed development.

- Intersection Operations
    - At the Elm Street/Hill Street/Key Boulevard/School driveway intersection, upgrade the signal and optimize the signal phasing, and install push button actuation for a new pedestrian crossing on the north leg of Elm Street.

- At the Key Boulevard/Cutting Boulevard intersection, install a northbound left-turn lane and remove on-street parking at the location of the new travel lane.
- At the intersection of San Pablo Avenue/Hill Street/Peerless Avenue/Eastshore Boulevard, optimize the signal timing.

- After-school Student Loading
  - Encourage carpooling and alternatives to driving, or
  - Ten percent of the students could leave the campus 15 minutes later than the majority of students.
- Parking
  - Encourage carpooling and alternatives to driving, or
  - Apply for a ten-percent reduction to the code requirement, based on the proximity to transit, or
  - The school could stripe one additional parking stall.

Additional details of the study methodology, findings, and recommendations are provided within this report.

Section 2
Introduction

INTRODUCTION

The purpose of this study is to analyze and address the traffic and transportation concerns that might be associated with the expansion in enrollment for high school grade levels at Summit K2 Charter School Charter School. Summit K2 Charter School is located at 1800 Elm Street in El Cerrito in a residential neighborhood near El Cerrito del Norte BART station. Summit K2 Charter School began operations in the Fall of 2014 with grade 7 enrollment of 125 students and will continue operations in Fall of 2015 with 240 7th and 8th grade students. Figure 1 shows the school's location and surrounding neighborhood.

Figure 1: Project Location

Aerial provided by Google Earth Pro

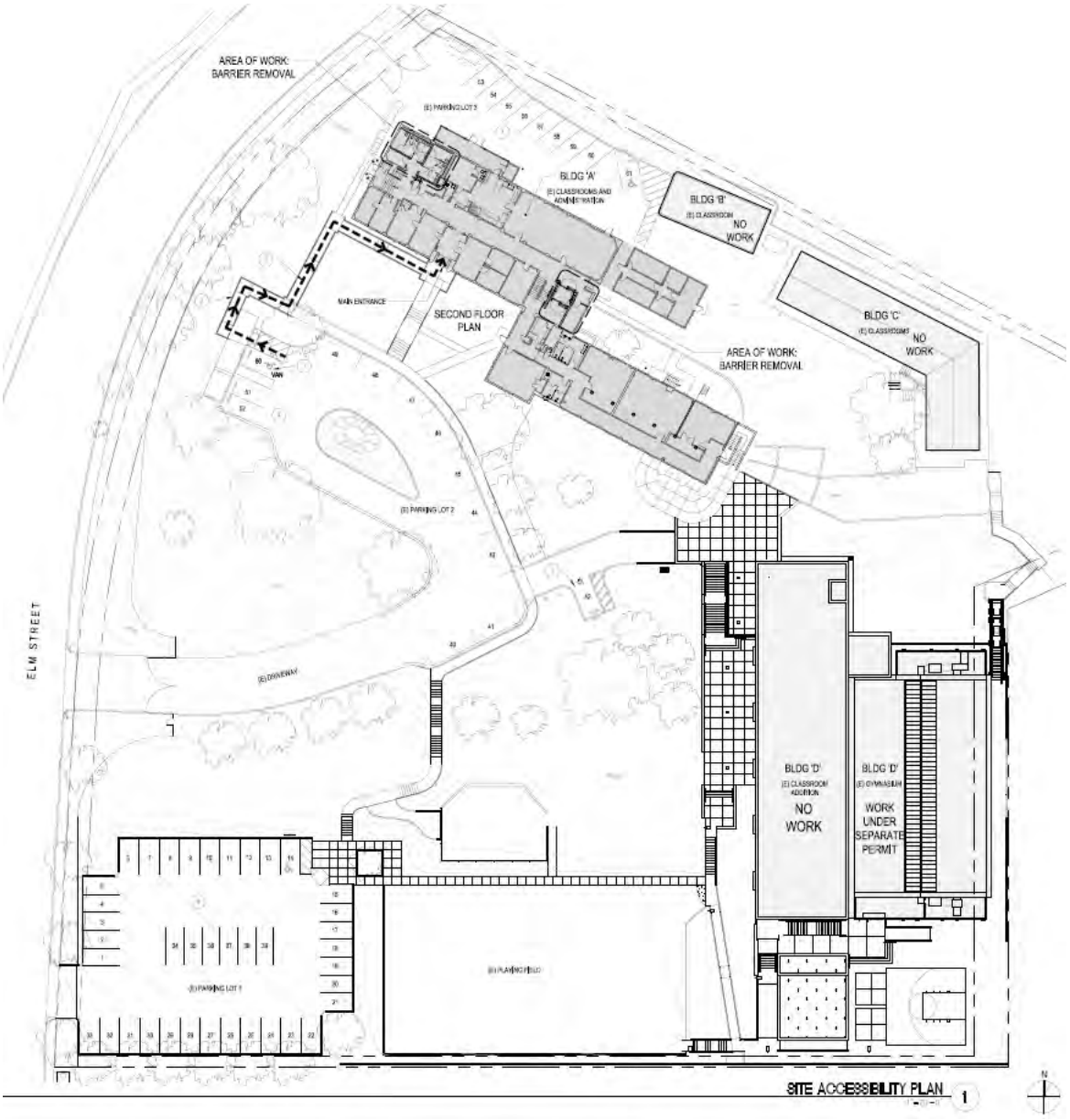
BACKGROUND

Summit K2 Charter School was previously operated as Windrush School, a private school serving kindergarten through 8th grade students. Windrush School developed a master plan that was summarized in the *Windrush School Master Plan Initial Study/Mitigated Negative Declaration* and approved by City Council in 2007. The plan included a maximum enrollment of 347 students.

Summit K2 Charter School began operation in Fall 2014 with 7th grade enrollment of 125 students and will be adding its 8th grade class in Fall 2015. This will bring the total enrollment to 240 students, as allowed under the conditional use permit. The school has completed Phase 3 of the 2007 Master Plan for Windrush School, which involves renovation of the historical building's interior, in order to

accommodate the planned rise of student enrollment. Figure 2 shows the site plan currently under construction.

Figure 2: Summit K2 School Site Plan



Source: Site Accessibility Plan from Studio Bondy Architecture

Conditional Use Permit

Summit K2 Charter School is currently operating under the conditions of approval of the conditional use permit (CUP) for the site. A summary of the current CUP conditions as they pertain to this study are as follows:

- Regular school year is generally mid-August through June
- Maximum enrollment of 347 students during the regular school year combined between elementary and middle school programs
- 61 on-site parking spaces

PROJECT DESCRIPTION

The Proposed Project is to increase enrollment to 600 students plus or minus 5 percent (30 students) in grades 7 through 12 by the fall of 2019. Analyses presented below reflect transportation operations assuming the maximum enrollment of 630 students under existing and future (Year 2040) conditions.

STUDY OBJECTIVES

This study analyzes the transportation effects of the Proposed Project. In particular, it focuses on:

- Operations at five intersections in close proximity to the school;
- Vehicle queuing resulting from student unloading and loading; and
- Parking supply and occupancies on-site and on-street in close proximity to the school.

The City of El Cerrito's significance standards for levels of service were used to determine the acceptability of operations at intersections under the Proposed Project conditions. Optional improvements are suggested as mitigations for impacts identified through the analyses.

SCOPE OF THE REPORT

The analyses performed for this report determine the transportation-related impacts associated with the proposed high school expansion of Summit K2 Charter School and was prepared in accordance with the City of El Cerritos and Contra Costa Transportation Authority (CCTA) requirements for traffic impact studies. The study intersections were selected after consultation with the City staff. Operational analyses were performed at these intersections:

- Elm Street and Blake Street
- Elm Street and Hill Street/Key Boulevard/School Driveway
- San Pablo Avenue and Cutting Boulevard
- San Pablo Avenue and Hill Street/Peerless Avenue/Eastshore Boulevard

- Key Boulevard and Cutting Boulevard

This report evaluates these transportation issues:

- Existing (2014) conditions within the site vicinity during the weekday AM, after-school PM, and PM peak periods;
- Baseline conditions during the weekday AM, after-school PM, and PM peak periods, which include the increase in traffic volumes associated with 8th grade enrollment starting Fall 2015;
- Trip generation and distribution estimates for the proposed high school expansion;
- Baseline conditions during the weekday AM, after-school PM, and PM peak periods with maximum high school enrollment;
- Cumulative (2040) background traffic conditions during the weekday AM, after-school PM, and PM peak periods;
- Cumulative (2040) background traffic conditions during the weekday AM, after-school PM, and PM peak periods with maximum high school enrollment;
- Access and circulation associated with student unloading and loading with the proposed high school expansion; and
- Parking with the proposed high school expansion.

Section 3
Existing Conditions

EXISTING CONDITIONS

The existing conditions analysis identifies the site conditions and current operational and geometric characteristics of the key intersections as well as transit services and bicycling and pedestrian facilities within the study area.

ROADWAY NETWORK

The regional roadway network in the study area is comprised of the freeway system that serves West Contra Costa County. Specifically, Interstate 80 (I-80) operates from its terminus in downtown San Francisco northeast across the San Francisco-Oakland Bay Bridge to Oakland and other East Bay cities. It also provides direct connections with other interstate freeways such as Interstate 580 and Interstate 880.

The Project site is located on Elm Street, a north-south minor arterial, approximately 1/3 mile east of I-80. East-west access to the site is provided primarily via Hill Street, Cutting Boulevard, Key Boulevard and Potrero Avenue, all classified as minor arterials. Other local roads provide access to the Project site and connection to the regional network, including San Pablo Avenue, a north-south principal arterial parallel to I-80 in the Project vicinity. The Project is located approximately two blocks east of San Pablo Avenue.

Pedestrian facilities are abundant in the Project vicinity with access provided to the site via sidewalks on both sides of all local roads. Marked pedestrian crossings are located at the intersections of the school's main driveway and Elm Street, the Elm Street/Blake Street intersection, the San Pablo Avenue/Cutting Boulevard intersection, the San Pablo/Hill Street/Peerless Avenue/Eastshore Boulevard intersection, and the Key Boulevard/Cutting Boulevard intersection.

Bicycle facilities are provided in the Project vicinity. The Ohlone Greenway is a Class I facility (separated bike trail) providing north-south access through and beyond the limits of El Cerrito. It is located two blocks west of the Project site underneath the elevated BART tracks. Elm Street and Hill Street are Class III facilities (on-street, signed bike routes) with "sharrow" markings on the pavement to signal that drivers and cyclists share the road.

The transit system in the study area includes regional passenger service provided by Bay Area Rapid Transit District (BART) and bus services provided by Alameda-Contra Costa Transit District (AC Transit) and West Contra Costa County Transit (WestCat). The nearest bus stops are located within two blocks of the Project site on Elm Street and Hill Street. The El Cerrito del Norte BART station is located two block west of the Project site along Hill Street.

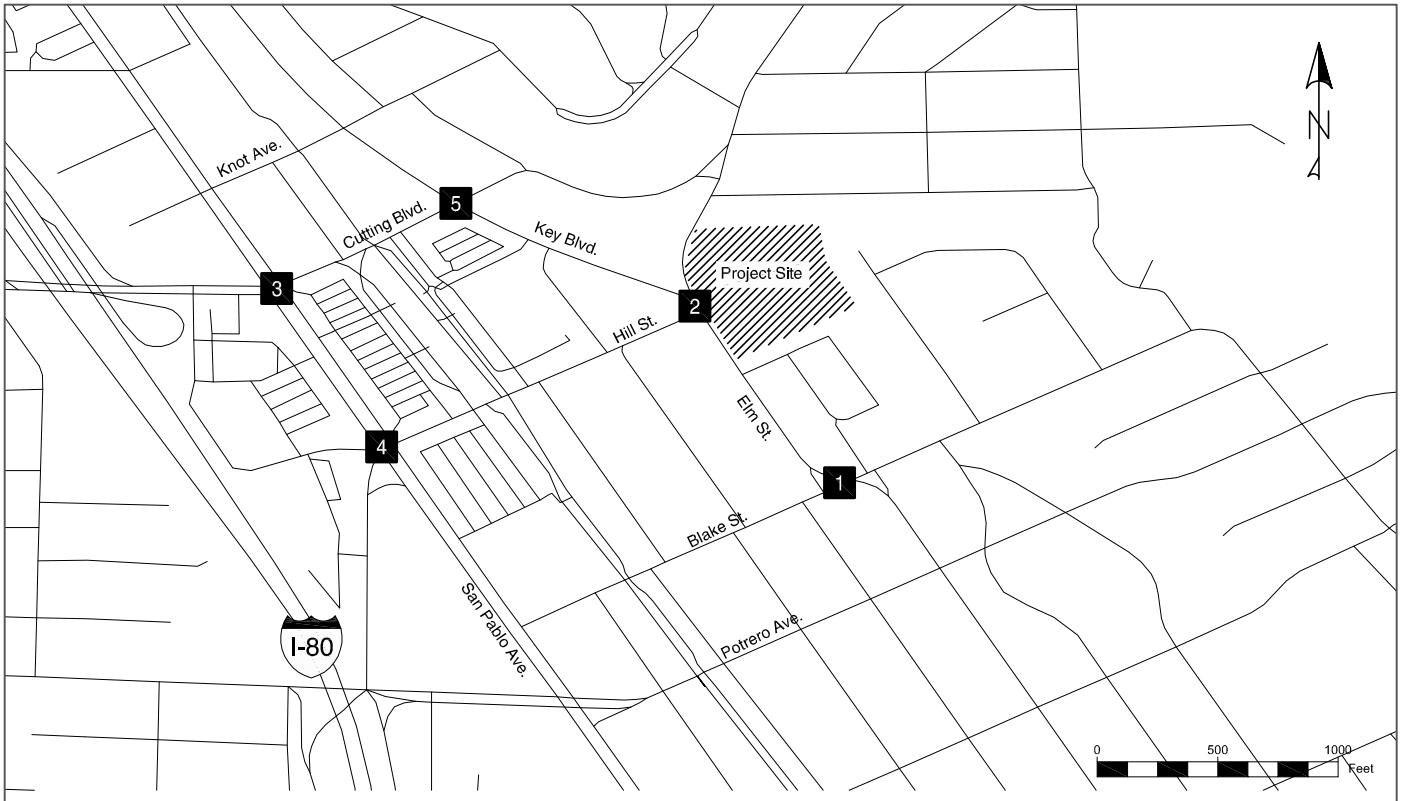
Direct access to the Project site is provided via three driveways along Elm Street: 1) the main driveway at the intersection with Hill Street, 2) the driveway for a small parking lot on the northern side of the site, and 3) the driveway for a parking lot on the southern side of the site.

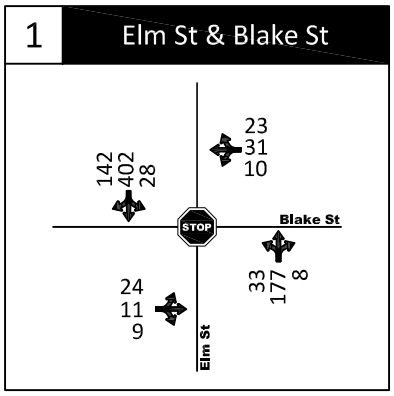
EXISTING TRAFFIC VOLUMES

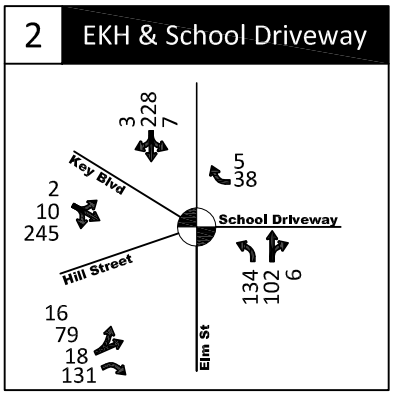
The following five key intersections were identified for evaluation of the effects of Project-related traffic on the roadway network in the vicinity of the Project site:

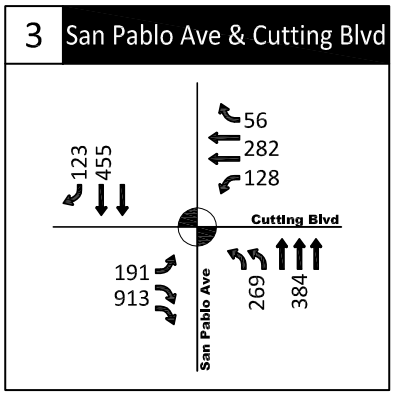
- Elm Street/Blake Street
- Elm Street/Hill Street/Key Boulevard/School driveway
- San Pablo Avenue/Cutting Boulevard
- San Pablo Avenue/Hill Street
- Key Boulevard/Cutting Boulevard

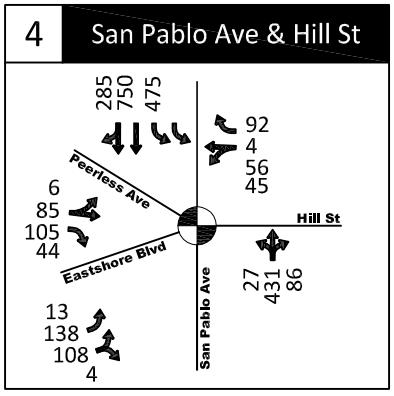
To establish a basis for analysis in this study, turning movement counts, pedestrian and bicycle counts, and parking occupancy data were collected at four of the five intersections on Thursday, September 25, 2014, during the morning peak period between 7:00 – 9:00 AM and during the afternoon peak period between 2:00 PM and 6:00 PM. Turning movement counts were collected at the Except for the Key Boulevard/Cutting Boulevard intersection on June 2, 2015 during the same morning and afternoon peak periods. The existing geometries and peak hour volumes are shown in Figure 3 through 5.

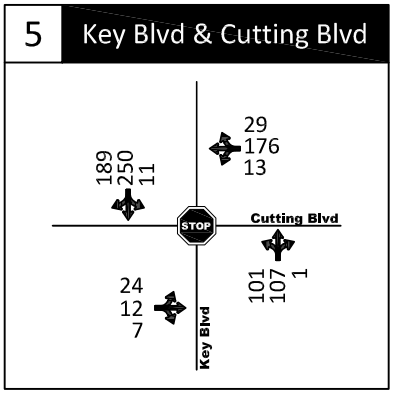












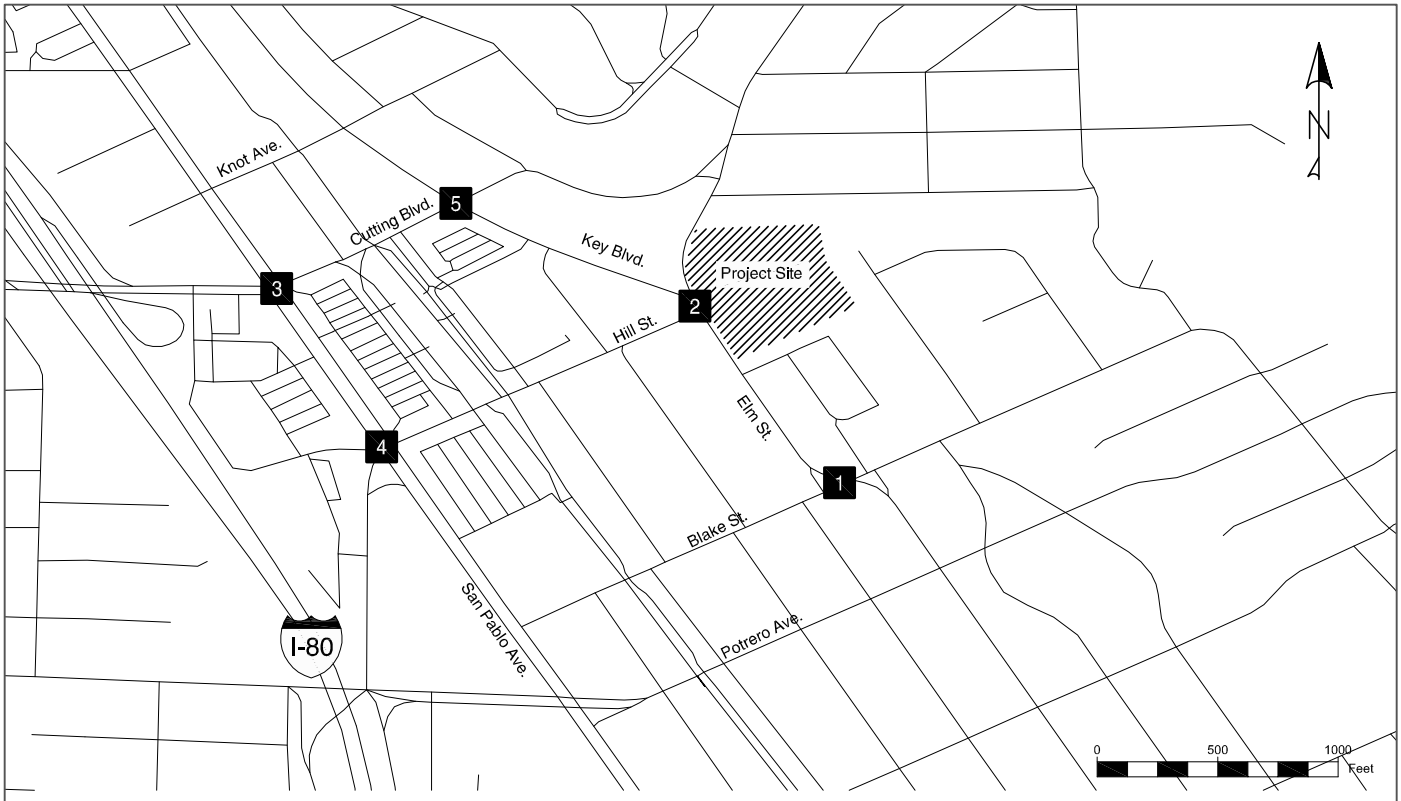
STOP = All-Way Stop

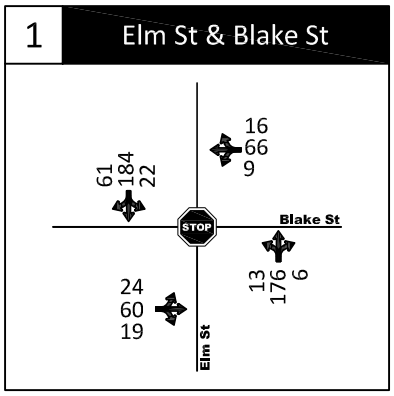
= Traffic Signal

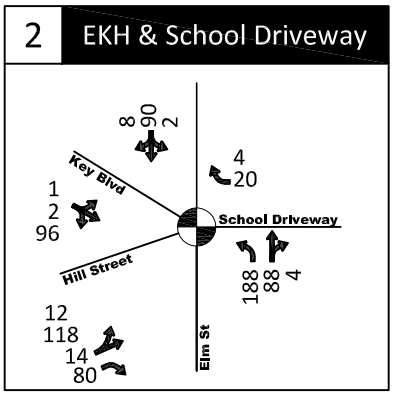
= Lane Geometry

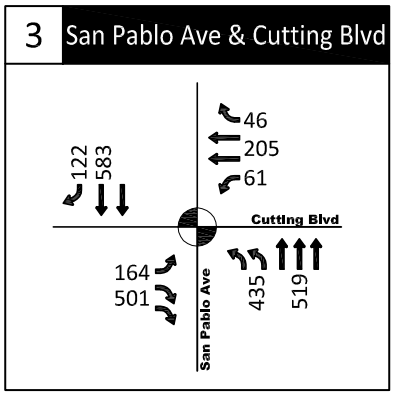
AM Peak Hour Vehicle Volumes
Existing Conditions

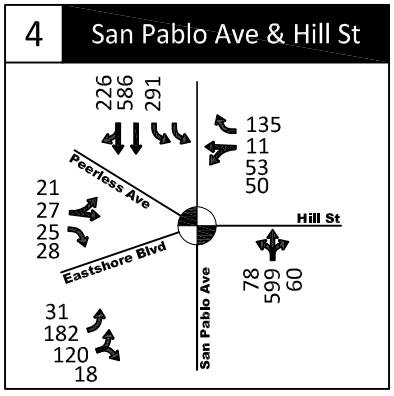
Figure **3**

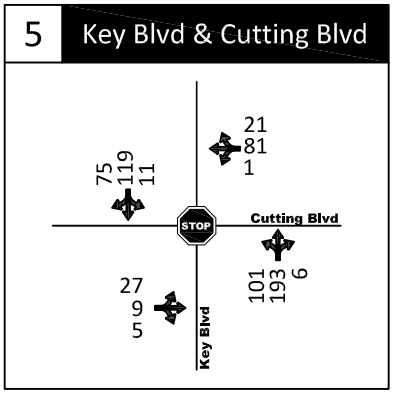












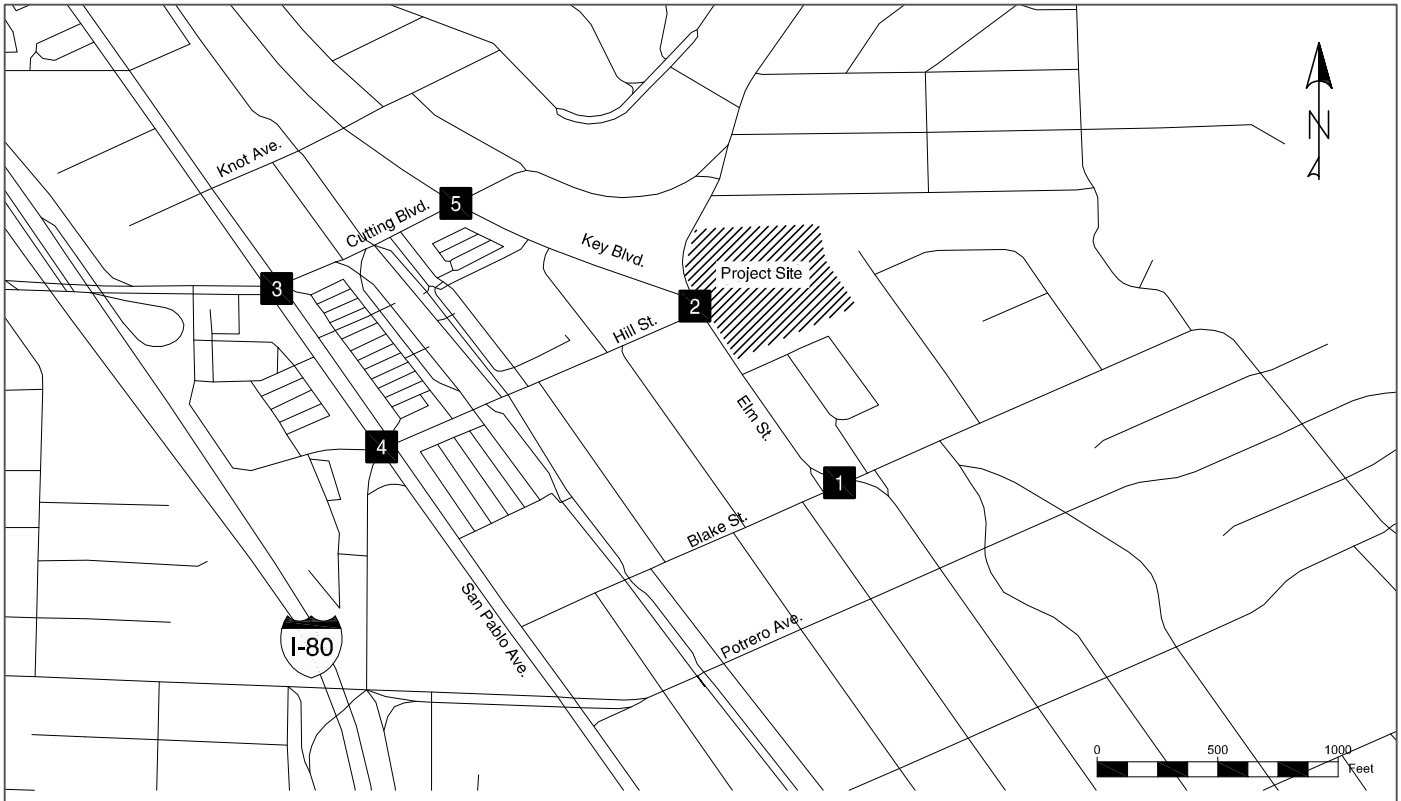
STOP = All-Way Stop

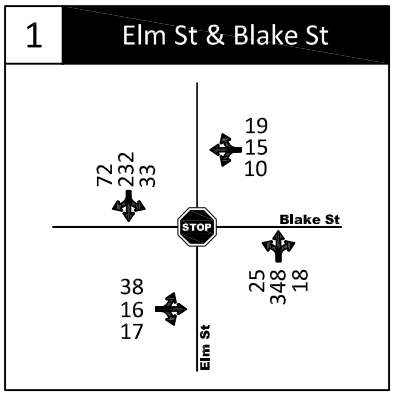
= Traffic Signal

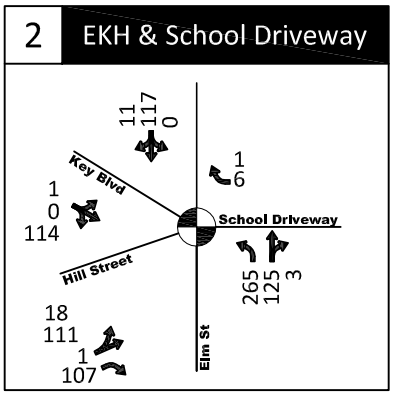
= Lane Geometry

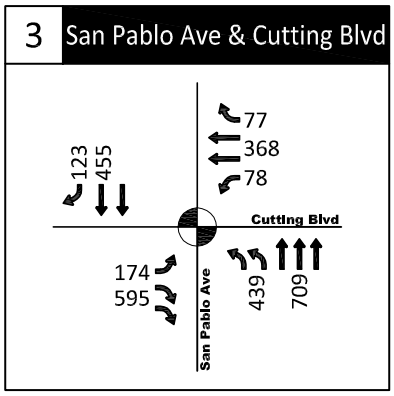
After-school PM Peak Hour Vehicle Volumes
Existing Conditions

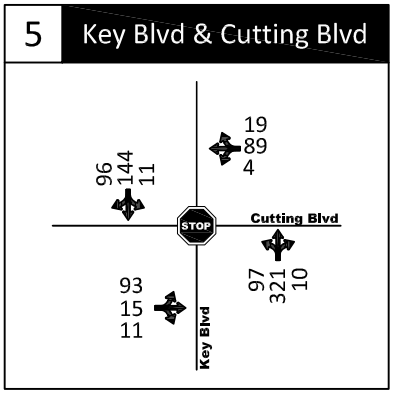
Figure **4**











STOP = All-Way Stop

= Traffic Signal

= Lane Geometry

PM Peak Hour Vehicle Volumes
Existing Conditions

Figure **5**

INTERSECTION OPERATIONS

Level of service (LOS) describes the operating conditions experienced by motorists. LOS is a qualitative measure of the effect of a number of factors, including speed and travel time, traffic interruptions, freedom to maneuver, driving comfort, and convenience. LOS A through LOS F covers the entire range of traffic operations that might occur. Motorists using a facility that operates at LOS A experience very little delay, while those using a facility that operates at LOS F will experience long delays. These conditions are generally described in Table 1. Specific LOS definitions are located in the appendix.

Table 1: General Level of Service Definitions

LOS	Description
A	**Free Flow or Insignificant Delays:** Vehicles are completely unimpeded in their ability to maneuver within the traffic stream. Control delay at signalized intersections is
B	**Stable Operation or Minimal Delays:** The ability to maneuver within the traffic stream is only slightly restricted, and control delay at signalized intersections are not significant.
C	**Stable Operation or Acceptable Delays:** The ability to maneuver and change lanes is somewhat restricted, and average travel speeds may be about 50 percent of the free
D	**Approaching Unstable or Tolerable Delays:** Small increases in flow may cause substantial increases in delay and decreases in travel speed.
E	**Unstable Operation or Significant Delays:** Significant delays may occur and average travel speeds may be 33 percent or less of the free flow speed.
F	**Forced Flow or Excessive Delays:** Congestion, high delays, and extensive queuing occur at critical signalized intersections with urban street flow at extremely low speeds.

Source: Highway Capacity Manual, Transportation Research Board, Washington D.C., 2000.

City Thresholds of Significance

The City of El Cerrito General Plan[1] sets LOS D or better as a standard for vehicular traffic at all intersections. The San Pablo Avenue Specific Plan[2] has set a goal of LOS E for intersections on San Pablo Avenue.

[1] El Cerrito General Plan Section 5-4, Transportation and Circulation, 1999

[2] El Cerrito San Pablo Avenue Specific Plan, 2014.

Analysis of the study intersections was performed using intersection LOS procedures from the 2000 Highway Capacity Manual[3] (HCM), operationalized using Synchro 8 software. CCTA's *Technical Procedures*[4]*,* which includes traffic impact guidelines, states that 2010 HCM procedures should be used, but a number of issues in Synchro's results for 2010 HCM have been observed, particularly with regard to 5-legged intersection, of which this study has two. CCTA has recognized these issues and has been employing 2000 HCM for its own analyses of five-legged intersections. For these reasons, the analysis was performed using the 2000 HCM procedures.

As was previously described, data were collected during the AM peak period between 7:00 – 9:00 AM as well as during a four-hour PM peak period between 2:00 PM and 6:00 PM. This extended PM observation period was identified to capture travel activity during the typical peak period for the school (2:00 – 4:00 PM) as well as during the peak period for the adjacent street (4:00 – 6:00 PM). Analyses were performed to evaluate travel activity during these three peak periods. Peak hours were identified for each peak period based on the highest volumes observed during four consecutive 15-minute observations. These peak hours are AM (7:45 – 8:45 AM), after-school PM (2:45 – 3:45 PM), and PM (4:45 – 5:45 PM).

Table 2: Intersection Level of Service – Existing Conditions

No.	North-South Cross Street	East-West Cross Street	Control	AM		After-school PM		PM	
				Delay	LOS	Delay	LOS	Delay	LOS
1	Elm Street	Blake St	All-Way Stop	12.2	B	9.3	A	11.7	B
2	Elm Street	Hill St & Key Blvd & School Driveway	Signal	43.6	D	29.5	C	29.9	C
3	San Pablo Ave	Cutting Blvd	Signal	22.6	C	32.4	C	32.7	C
4	San Pablo Ave	Hill St & Peerless Ave & Eastshore Blvd	Signal	43.3	D	34.7	C	36.9	D
5	Key Blvd	Cutting Blvd	All-Way Stop	16.5	C	11.0	B	20.4	C

Delay denotes average vehicle delay in seconds.

Worst approach average vehicle delay shown for stop-controlled intersections.

LOS denotes level of service.

Source: Kittelson & Associates, 2015

[3] Transportation Research Board, Washington, D.C., 2000

[4] Contra Costa Transportation Authority. *Technical Procedures*, 2012

The existing operations at the five study intersections are shown in Table 2. The results indicate that all study intersections are operating acceptably at LOS D or better during the AM, after-school PM and PM peak hours.

STUDENT UNLOADING AND LOADING

The main driveway was measured to have 360 feet of available queuing area on-site. Typically when analyzing driver behavior in a "slow-moving queue" while dropping students off at school, it is assumed that drivers allow 10 feet of space between the front of their vehicle and the rear of the vehicle ahead of them. Assuming an average vehicle length of 15 feet, this yields an effective vehicle length of 25 feet. Based on observations, the morning drop-offs occur as a "slow-moving queue." Given the assumed effective vehicle length of 25 feet under "slow-moving queue" conditions, the main driveway has capacity for a queue of up to 14 vehicles.

However, when vehicles arrive to wait in a queue, such as parking and waiting to pick up students after school, drivers allow less distance between vehicles due to reduced sensitivity to the risk of rear-ending a vehicle or being rear-ended. Under such "parked queue" conditions, the assumed distance between vehicles is 5 feet, yielding an effective vehicle length of 20 feet. Under "parked queue" conditions, the main driveway has capacity for 18 vehicles. Based on the September observations, the maximum queue observed in the afternoon occurs as a "parked queue."

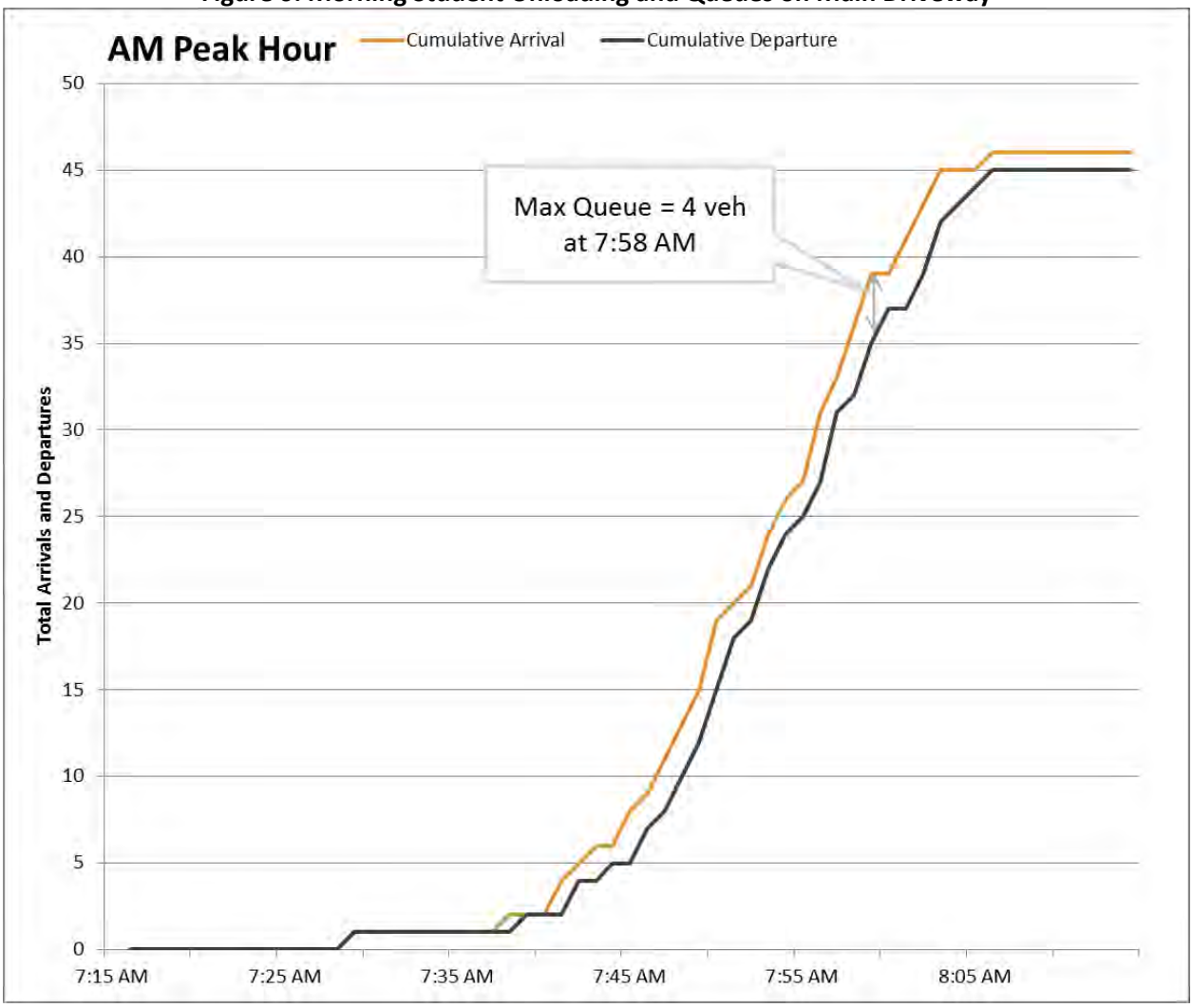
The lower parking lot was measured to have 170 feet of available queuing area within the parking aisles for unloading/loading activity. This parking lot has capacity for a "slow-moving queue" of 6 vehicles and a "parked" queue of 8 vehicles.

On Thursday, September 25, 2014, observations were made of morning unloading and afternoon loading practices on the main driveway to determine the extent of the vehicle queues. Observations were made of student unloading and loading activities on-site and on-street in close proximity to the school on this day to determine the student carpool rate. A total of 123 students were in attendance on the day of these observations. It should be noted that it rained on this observation day until 7:15 AM, which may have affected the number of students being driven to school and motorists' behavior. Motorists operating on the main driveway were directed by school staff to proceed as far as possible along the curb in front of the historic school building for student unloading and loading in order to maximize the queuing area's capacity.

Morning Drop-offs

Vehicle arrivals and departures were fairly consistent during the morning drop-offs, as shown in Figure 6. The maximum queue on the main driveway was 4 vehicles during the September morning observation period (7:15 – 8:15 AM), which occurred six times in the period from 7:50 AM to 8:02 AM. A cumulative total of 46 vehicles were observed on the main driveway from 7:15 to 8:15 AM.

Figure 6: Morning Student Unloading and Queues on Main Driveway



Source: Kittelson & Associates, Inc., September 2014.

Student drop-offs also occurred in the lower (south) parking lot as well as on Elm and Hill Streets in close proximity to the school during both morning observation periods. It is estimated from the observations of vehicle occupancy that 2 or 3 vehicles dropped off students in the lower parking lot at any one time on both days, which may have resulted in a 3-car maximum queue in the lower lot.

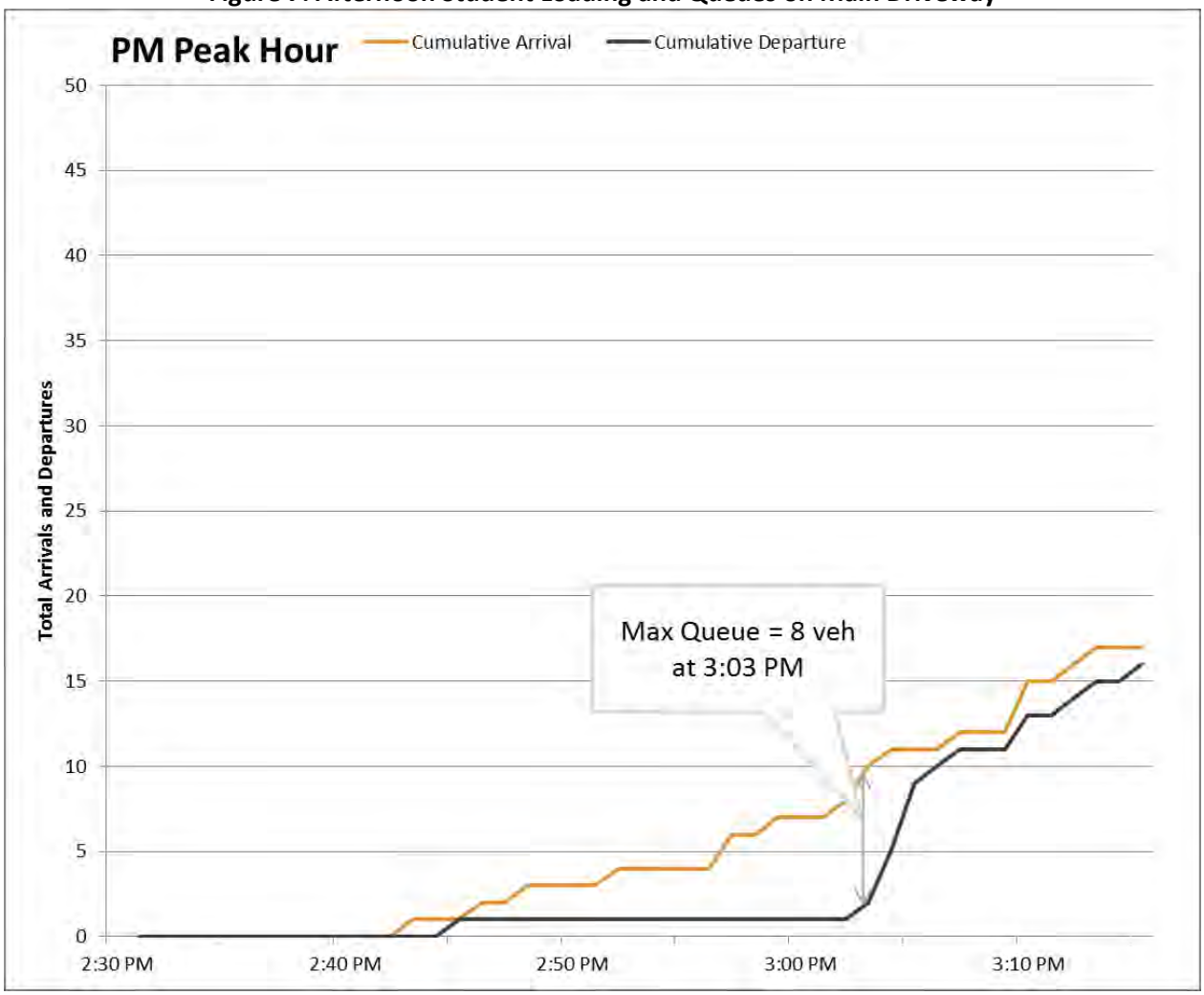
If student drop-offs were shifted from Hill Street and Elm Street to the main driveway, we estimate that the maximum queues on the main driveway would have reached 6 vehicles. This estimate is based on the vehicle occupancy counts arrival times noted in the appendix.

Afternoon Pick-Ups

Vehicle arrivals and departures were concentrated around the school's dismissal during the September afternoon pick-ups, as shown in Figure 7. The maximum queue on the main driveway was 8 vehicles during the afternoon observation period (2:30 – 3:15 PM), and it occurred only once at 3:03 PM. The afternoon's maximum back of queue was observed to be just south of the school's on-site internal

driveway. The maximum queue consisted mostly of motorists who arrived before the school's dismissal and "parked" in the queue. The 8 vehicles observed in the maximum queue situated along this distance of the driveway reflect the 20 feet per vehicle assumption for the "parked queue" discussed above. These queues were well-contained within the available storage of the main driveway. A cumulative total of 40 vehicles were observed picking up students on the main driveway from 2:00 to 6:00 PM.

Figure 7: Afternoon Student Loading and Queues on Main Driveway



Source: Kittelson & Associates, Inc. September 2014

Student pick-ups also occurred in the lower (south) parking lot and on Elm Street and Hill Street in close proximity to the school during the observation period. It is estimated from the observations of vehicle occupancy that 2 or 3 vehicles picked up students in the lower (south) parking lot at any one time, which may have resulted in a 3-car maximum queue in the lower lot.

If student pick-ups were shifted from Hill Street and Elm Street to the main driveway, we estimate that the maximum queues on the main driveway would not have changed. This estimate is based on the vehicle occupancy counts and departure times noted in the appendix.

CARPOOL RATES

Observations were made of the number of school-associated people being dropped off in the morning (7:00 to 9:00 AM) and picked up in the afternoon (2:00 to 6:00 PM) to estimate vehicle occupancies. They noted the time of drop-off and pick-up for each vehicle was noted as well as the number of Summit School students or staff entering or exiting vehicles observed at the following locations:

- The school's main driveway;
- The school's lower parking lot;
- Elm Street between Manor Circle and Glen Mawr Avenue;
- Key Boulevard between Liberty Street and Elm Street; and
- Hill Street between Liberty Street and Elm Street.

Data from the vehicle occupancy counts are contained in the appendix.

Morning Student Carpool Rate

The total student carpool rate for the morning drop-off, including the main driveway, is 1.21 students per vehicle, as indicated in Table 3 below.

Table 3: Student Carpool Rate for the Morning Drop-Offs

Location	Number of vehicles	Number of students	Students per vehicle
Elm Street	8	13	1.63
Hill Street	15	22	1.47
Main Driveway	46	50	1.09
Lower (south) lot	11	12	1.09
Total	**80**	**97**	**1.21**

Afternoon Student Carpool Rate

The total student carpool rate for the afternoon pick-up, including the main driveway, is 1.26 students per vehicle, as indicated in Table 4 below.

Table 4: Student Carpool Rate for the Afternoon Pick-Ups

Location	Number of vehicles	Number of students	Students per vehicle
Elm Street	2	7	3.50
Hill Street	1	1	1.00
Main Driveway	24	27	1.13
Lower (south) lot	12	14	1.17
Total	**39**	**49**	**1.26**

PARKING

The school has 61 parking stalls, which are utilized well below capacity under existing student enrollment. As shown in Table 5, the maximum observed occupancy was 7 vehicles between 9:00 AM and 2:00 PM. This occupancy count represents typical staff parking practice in the driveway and lower lot as well as non-typical construction vehicle parking practice in the upper lot. At the time of data collection, the school was undergoing short-term building and campus improvements.

Table 5: Parking Occupancy

		ON-STREET PARKING AREAS			OFF-STREET PARKING AREAS			
		Key Blvd	**Hill St**	**Elm St**	**Lower Lot**	**Main Entrance**	**Upper Lot[1]**	**TOTAL**
	Inventory:	554 Ft	243 Ft	658 Ft	39 Stalls	12 Stalls	10 Stalls	61 Stalls
	Details:	27 Effective Stalls	12 Effective Stalls	32 Effective Stalls	1 Disabled, 2 Zero-Emission	2 Disabled, 1 Zero-Emission	1 Disabled	4 Disabled, 3 Zero-Emission
Occupancy	**Before 7:00 AM**	15	9	14	0	0	0	0
	After 9:00 AM	20	12	14	7	0	0	7
	Before 2:00 PM	25	11	19	7	1	0	8
	After 6:00 PM	24	7	11	0	0	0	0

[1] Construction personnel were on site on the data collection day and parked in the upper lot. No staff or students parked in the upper lot that day.

Source: Kittelson & Associates, Inc., 2014.

On-street parking was observed and parking occupancy is also documented in Table 5; however, school-related parking was observed to occur in the on-site parking areas.

Section 4
Transportation Impact Analysis

TRANSPORTATION IMPACT ANALYSIS

The transportation impact analysis identifies how the study area's transportation system will operate when the proposed high school expansion is fully operational in 2019. The effects of traffic generated by the proposed high school expansion during the typical weekday AM, after-school PM and PM peak hours were examined as follows:

- Site-generated trips were estimated for maximum high school enrollment.
- Site trip-distribution patterns were derived after the existing traffic patterns and trip patterns from the CCTA Countywide Travel Demand Model.
- Existing conditions were analyzed at each of the study intersections during the weekday AM, after-school PM and PM peak hours.
- Traffic volumes were estimated for the addition of 8th grade to the existing conditions to establish Baseline conditions.
- Baseline (existing with the 8th grade) traffic conditions were analyzed at each of the study intersections during the weekday AM, after-school PM and PM peak hours both without and with maximum high school enrollment.
- Cumulative (2040) conditions were developed by applying the growth increment from the CCTA model to existing conditions to account for regional growth in the site vicinity and then adding 8th grade traffic.
- Cumulative (2040) conditions were analyzed at each of the study intersections during the weekday AM, after-school PM and PM peak hours both without and with maximum high school enrollment.
- On-site circulation issues and site-access operations associated with student loading and unloading were evaluated both without and with maximum high school enrollment.
- Parking with the proposed high school expansion was evaluated.

PROJECT ANALYSIS

The proposed Project is comprised of the addition of up to 390 high school students to the existing charter middle school for a planned maximum enrollment of 600 middle and high school students plus or minus 5 percent (30 students). The vehicle trips estimated to be generated by the Project as well as how these trips were distributed and assigned onto the transportation network are discussed in this section. The analyses are based on maximum enrollment of 630 students.

Trip Generation

Trip generation of the Project is based on the observed vehicle, pedestrian and bicyclist counts collected in September 2014 and June 2015 as well as information compiled in the 9th Edition of the Institute of Transportation Engineers (ITE) *Trip Generation* manual.[5] Vehicular trip generation rates and directional in/out percentages for middle school students were developed for AM and after-school PM peak hours based on the observed trip-making practices of the current 7th grade students. These rates were applied to the additional middle school portion of the student population (i.e., 115 new middle school students when 8th grade instruction begins in Fall 2015). AM and after-school PM rates were developed for the high school portion of the student population (i.e., 390 9th through 12th graders) by comparing ITE trip generation rates for middle schools (ITE code 522) and high schools (ITE code 530). For each peak hour of analysis, a ratio comparing the ITE rates for these two school types was applied to the middle school trip generation rate in order to develop a high school rate based on observed trip-making practices. The directional in/out percentages developed from observed activity were applied to the high school trip generation.

Table 6 displays these trip generation rates developed for the Proposed Project.

Table 6: Trip Generation

Trip Generation	**Amount**	**Trip Rate and Directional Distribution**			**Trips Generated**		
School Type		**AM Peak Hour**			**AM Peak Hour**		
		Total	**In**	**Out**	**In**	**Out**	**Total**
Middle School	115 Stu	1.37	52%	48%	82	75	157
High School	390 Stu	1.06			216	199	415
Total					**298**	**274**	**572**
School Type		**After-school PM Peak Hour**			**After-school PM Peak Hour**		
		Total	**In**	**Out**	**In**	**Out**	**Total**
Middle School	115 Stu	0.83	48%	52%	46	49	95
High School	390 Stu	0.80			151	161	312
Total					**197**	**210**	**407**

Pedestrian Volumes

During the observations made on September 25, a total of 25 students were observed walking to the school in the morning, and 32 students were observed departing after school on foot. The location and positioning of individuals collecting data on that day precluded data collectors from identifying which pedestrians were walking from or to transit (e.g., it could not be determined whether pedestrians along

[5] *Trip Generation*, 9th Edition, Institute of Transportation Engineers, Washington, D.C. 2012

Hill Street were walking between the school and the BART station), so counts of transit users were not collected.

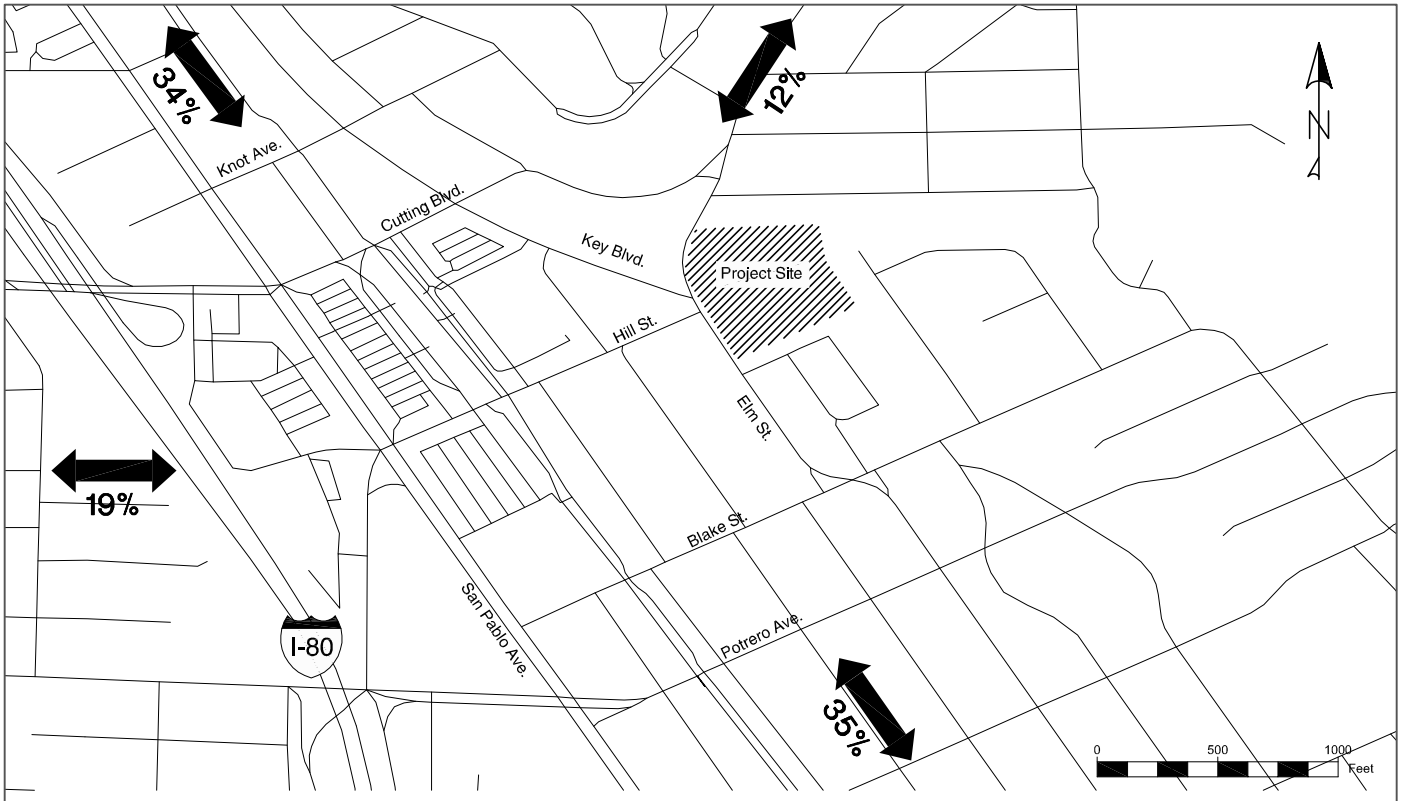
It was assumed that the addition of 8th grade classes in 2015 and near doubling of enrollment would generate double the number of pedestrians arriving in the morning and departing in the afternoon (i.e., 50 arriving before school and 64 departing after school). With high school enrollment, it was assumed that the increase in the number of pedestrians could be proportional to the increase in total enrollment (an increase of 390 high school students in addition to the 240 middle school students). Such a proportional increase would yield expected counts of approximately 130 pedestrians arriving before school and 170 pedestrians departing after school.

Bicycle Volumes

On the September observation day, one bicyclist was observed traveling to the school in the morning and zero cyclists were observed departing the school in the afternoon. This suggests opportunity for increases in bicyclist volumes as school enrollment increases. However, the low observed bicycling activity was an insufficient basis from which to perform analysis regarding expected bicyclist volumes in the future. The school could promote bicycling as an alternative to other modes, such as personal vehicles, in order to increase bicycling activity and to reduce future vehicle trip generation.

Trip Distribution and Assignment

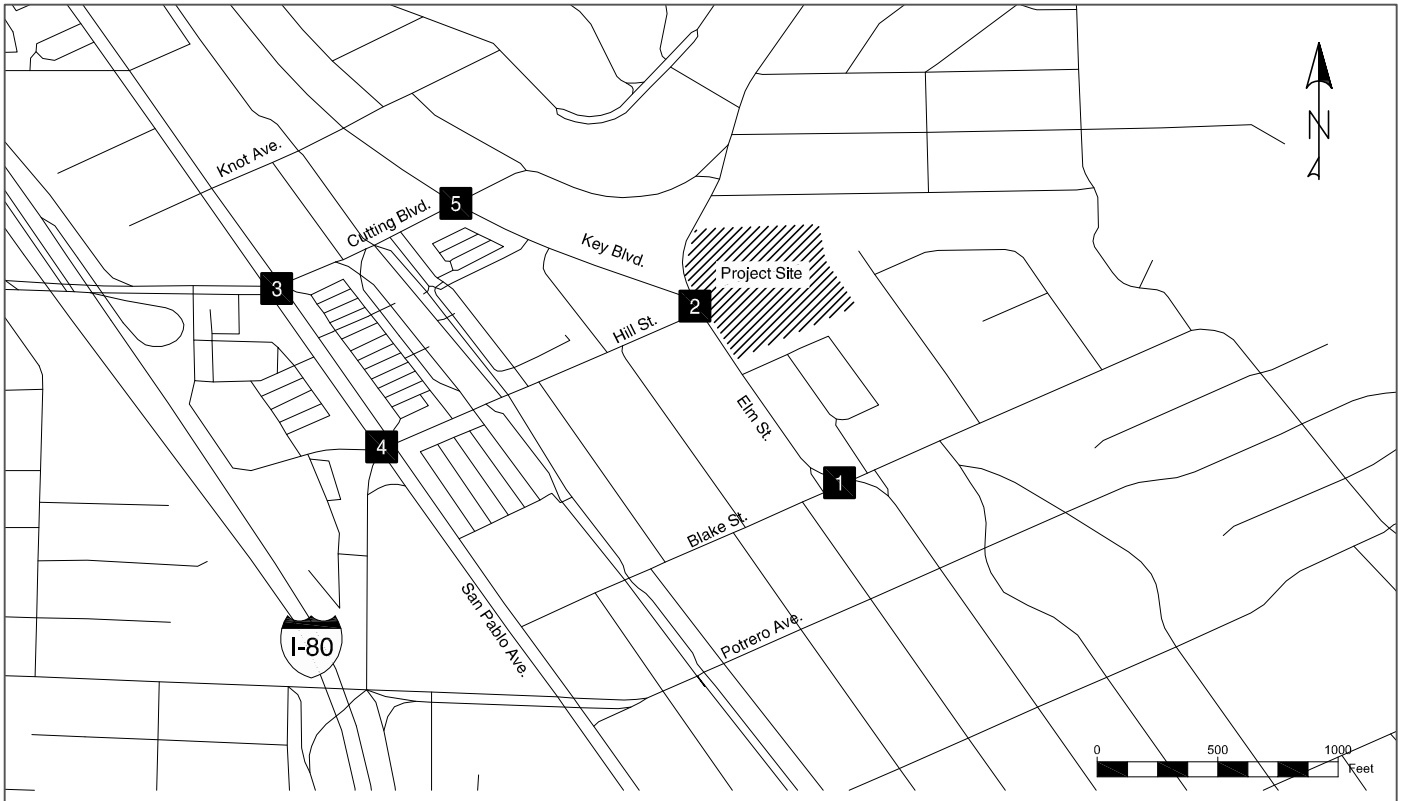
The distribution and assignment of Project-generated trips were derived from the Contra Costa Transportation Authority (CCTA) Model and knowledge of the proposed access locations associated with the Project. The CCTA Model zone within which the project is located was isolated, and the peak-hour trips for the "Middle School" and "High School" land use categories, which were the most applicable land use categories for the Project, were assigned to the future network. From this "select zone" assignment, the AM and PM peak hour distributions of inbound and outbound trips were estimated. The Project trip distribution percentages from the CCTA Model are presented in Figure 8. Project-only trips are shown in Figure 9.

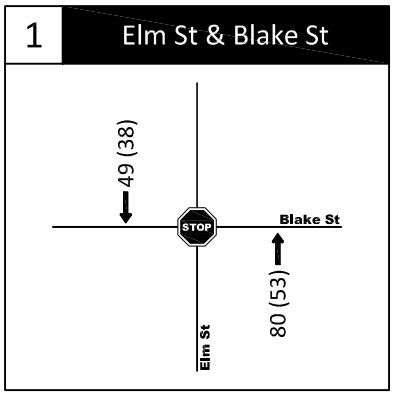


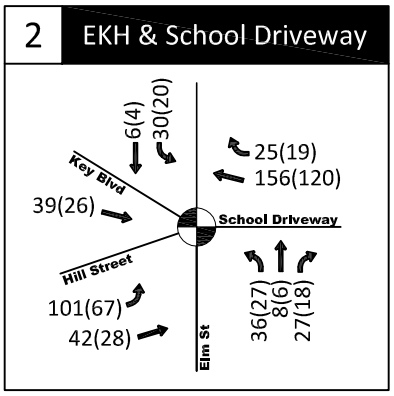
XX% = Directional Distribution of Trips

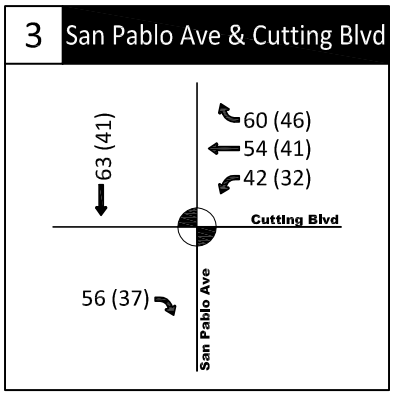
Project Trip Distribution

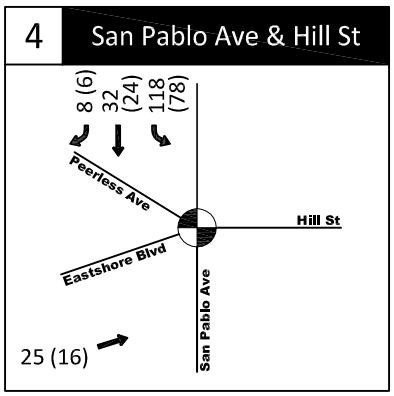
Figure **8**

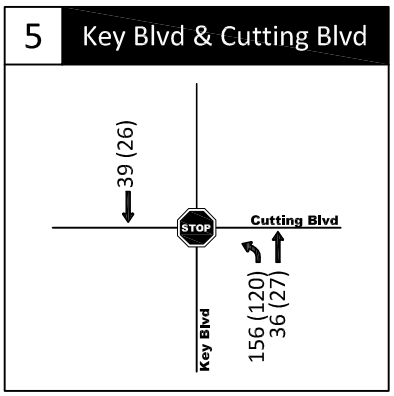












STOP = All-Way Stop

= Traffic Signal

AM (After-school PM)

= Lane Geometry

AM & After-school PM Peak Hour Project Trips

Figure **9**

BASELINE CONDITIONS

Operations at study intersections as well as parking and student unloading/loading practices under Baseline conditions are discussed in this section.

Intersection Operations

Traffic volumes for both the Baseline and Baseline plus Project conditions were developed using an additive approach. Estimated traffic generated by the addition of 8th grade was first added to the existing volumes on the roadway network to develop the Baseline volumes. As shown in Table 7, all study intersections would operate acceptably at LOS D or better during each peak hour.

Traffic generated by the proposed Project was added to Baseline volumes to develop the volumes for the Baseline plus Project conditions. As shown in Table 8, with the addition of Project-generated traffic, the Elm Street/Hill Street/Key Boulevard/School driveway intersection would operate unacceptably at LOS E or F during the AM and PM peak hours, and the Key Boulevard/Cutting Boulevard intersection would operate at LOS F during the PM peak hour. All other intersections would operate acceptably at LOS D or better during each peak hour. Baseline and Baseline plus Project turning movement volumes are shown in Figure 10 through 15.

Table 7: Intersection Level of Service – Baseline Conditions

No.	North-South Cross Street	East-West Cross Street	Control	AM		After-school PM		PM	
				Delay	LOS	Delay	LOS	Delay	LOS
1	Elm Street	Blake St	All-Way Stop	12.8	B	9.0	A	12.0	B
2	Elm Street	Hill St & Key Blvd & School Driveway	Signal	51.8	D	33.6	C	35.6	D
3	San Pablo Ave	Cutting Blvd	Signal	23.3	C	32.5	C	32.9	C
4	San Pablo Ave	Hill St & Peerless Ave & Eastshore Blvd	Signal	43.8	D	35.0	C	37.3	D
5	Key Blvd	Cutting Blvd	All-Way Stop	18.2	C	11.8	B	24.6	C

Delay denotes average vehicle delay in seconds.

Worst approach average vehicle delay shown for stop-controlled intersections.

LOS denotes level of service.

Source: Kittelson & Associates, 2015

Table 8: Intersection Level of Service – Baseline plus Project Conditions

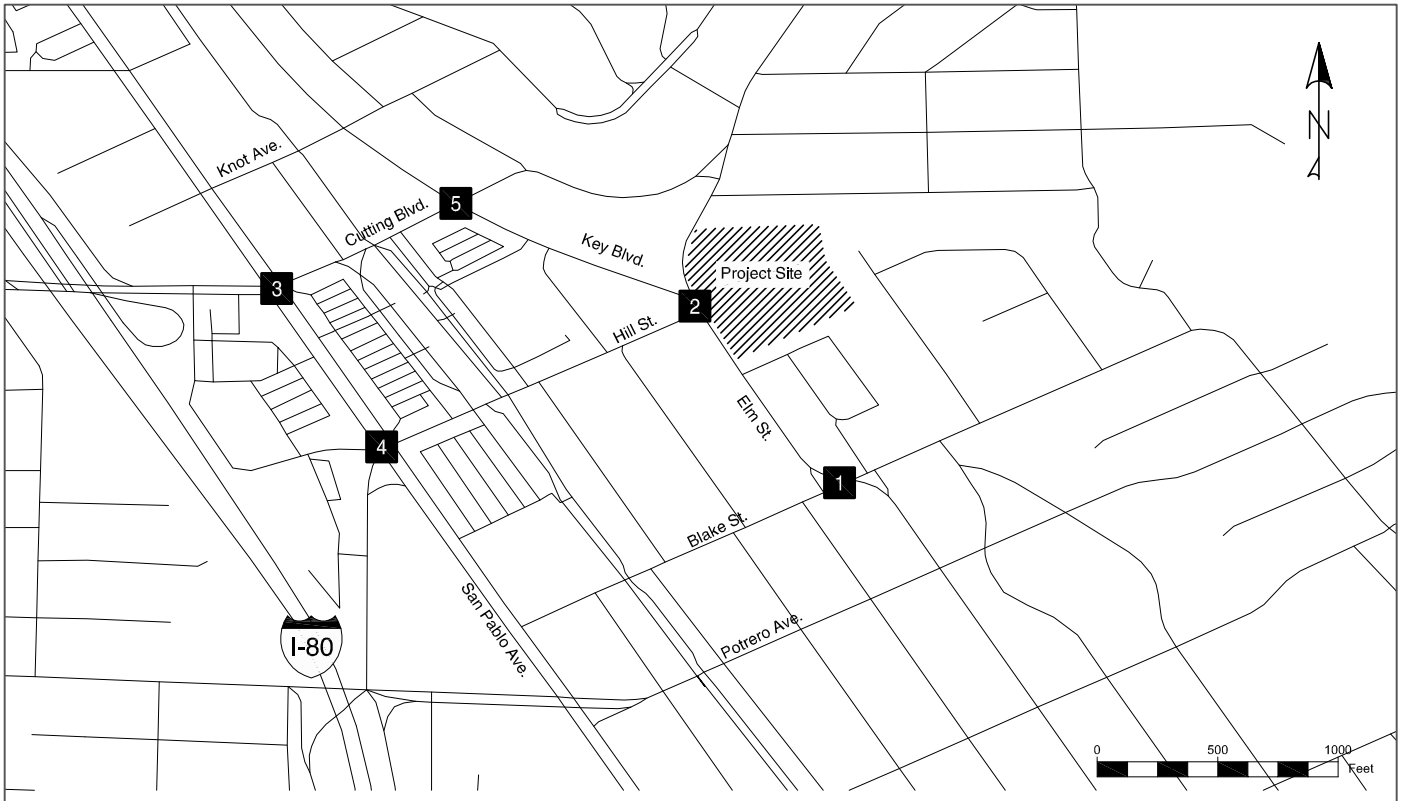
No.	North-South Cross Street	East-West Cross Street	Control	AM		After-school PM		PM	
				Delay	LOS	Delay	LOS	Delay	LOS
1	Elm Street	Blake St	All-Way Stop	14.8	B	10.1	B	13.4	B
2	Elm Street	Hill St & Key Blvd & School Driveway	Signal	**89.2**	**F**	46.4	D	**60.4**	**E**
3	San Pablo Ave	Cutting Blvd	Signal	25.7	C	33.0	C	33.6	C
4	San Pablo Ave	Hill St & Peerless Ave & Eastshore Blvd	Signal	44.8	D	35.8	D	39.0	D
5	Key Blvd	Cutting Blvd	All-Way Stop	25.2	D	16.0	C	**60.7**	**F**

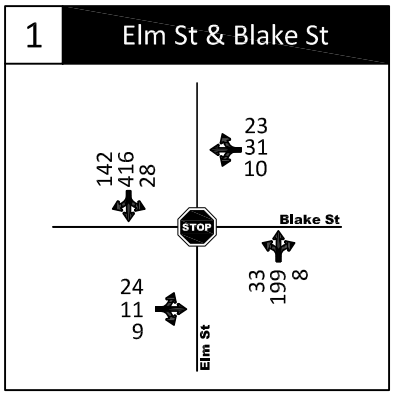
Delay denotes average vehicle delay in seconds.

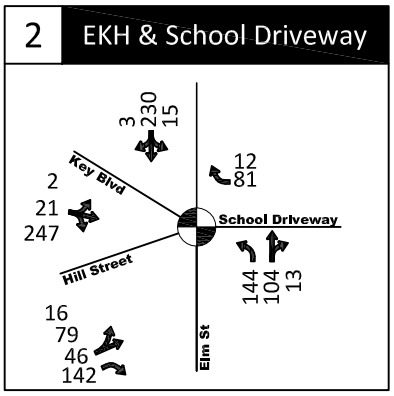
Worst approach average vehicle delay shown for stop-controlled intersections.

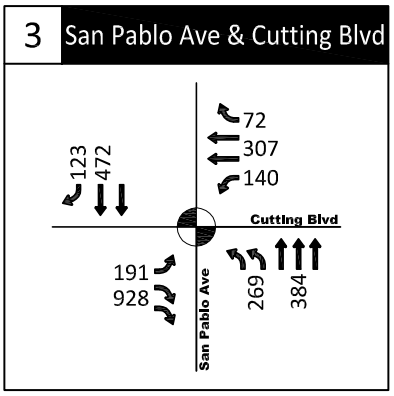
LOS denotes level of service.

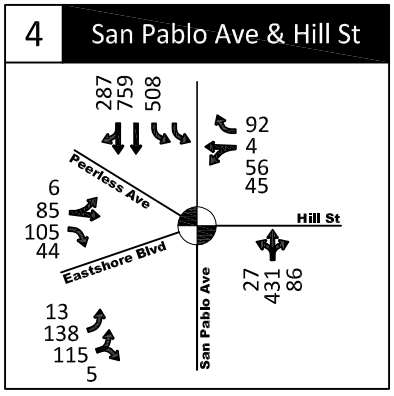
Source: Kittelson & Associates, 2015

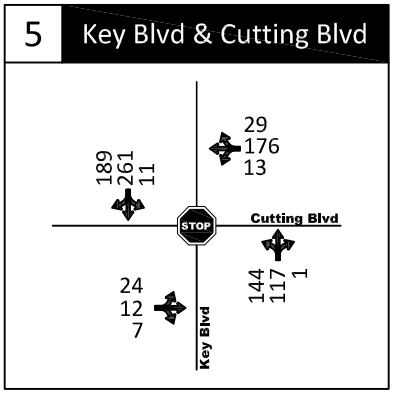












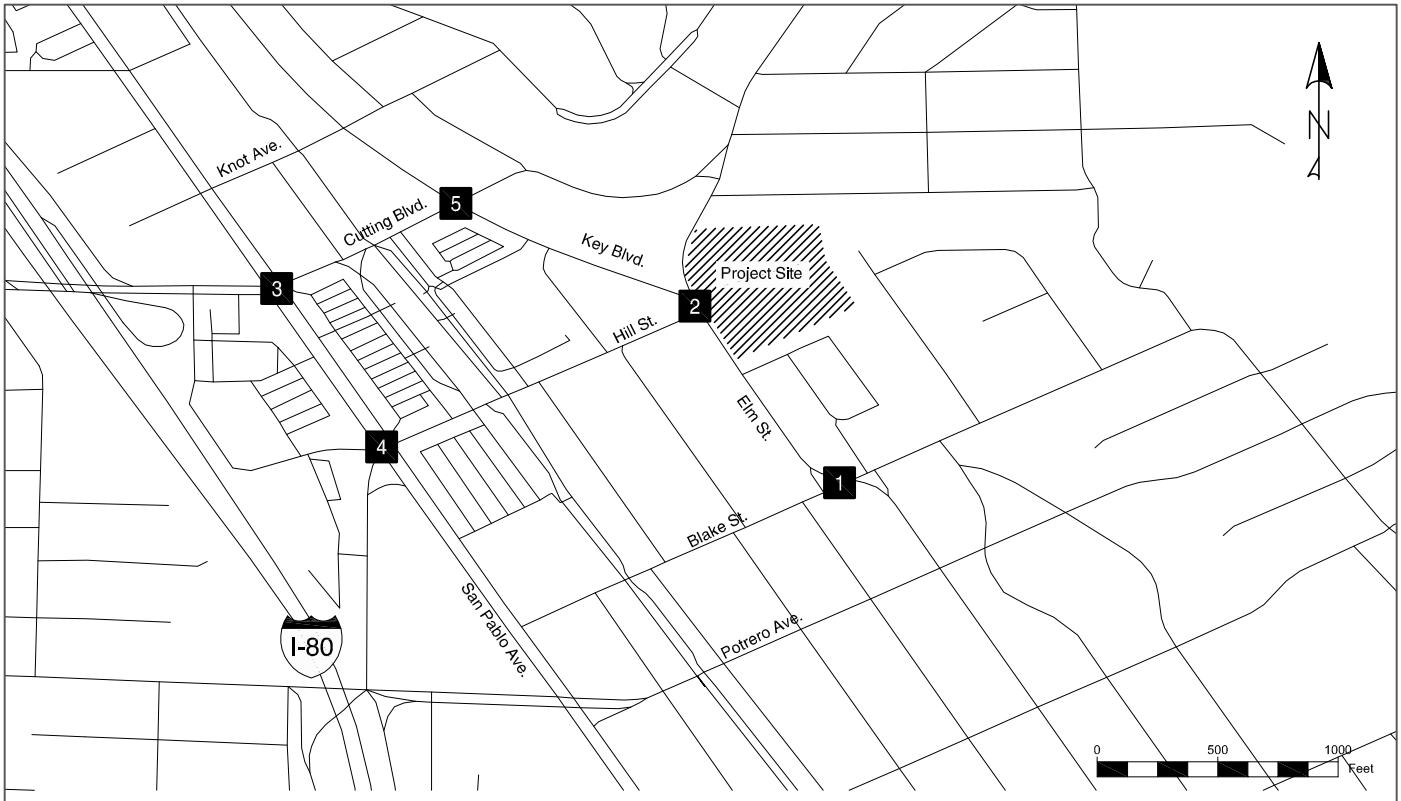
STOP = All-Way Stop

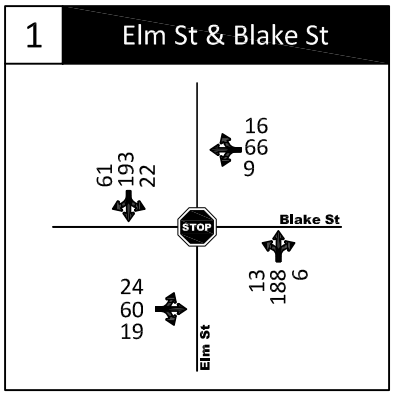
= Traffic Signal

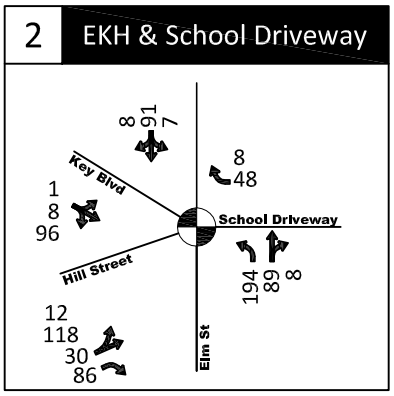
= Lane Geometry

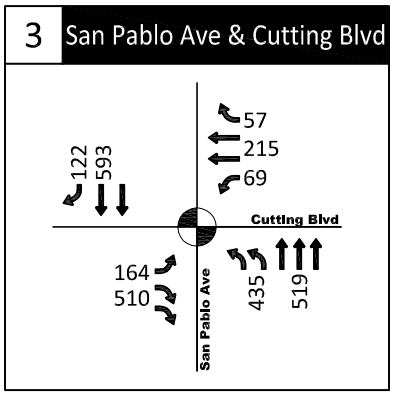
AM Peak Hour Vehicle Volumes
Baseline Conditions

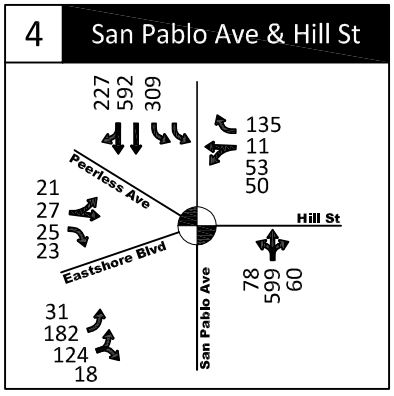
Figure **10**

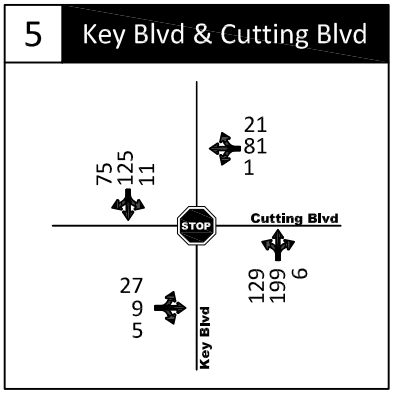












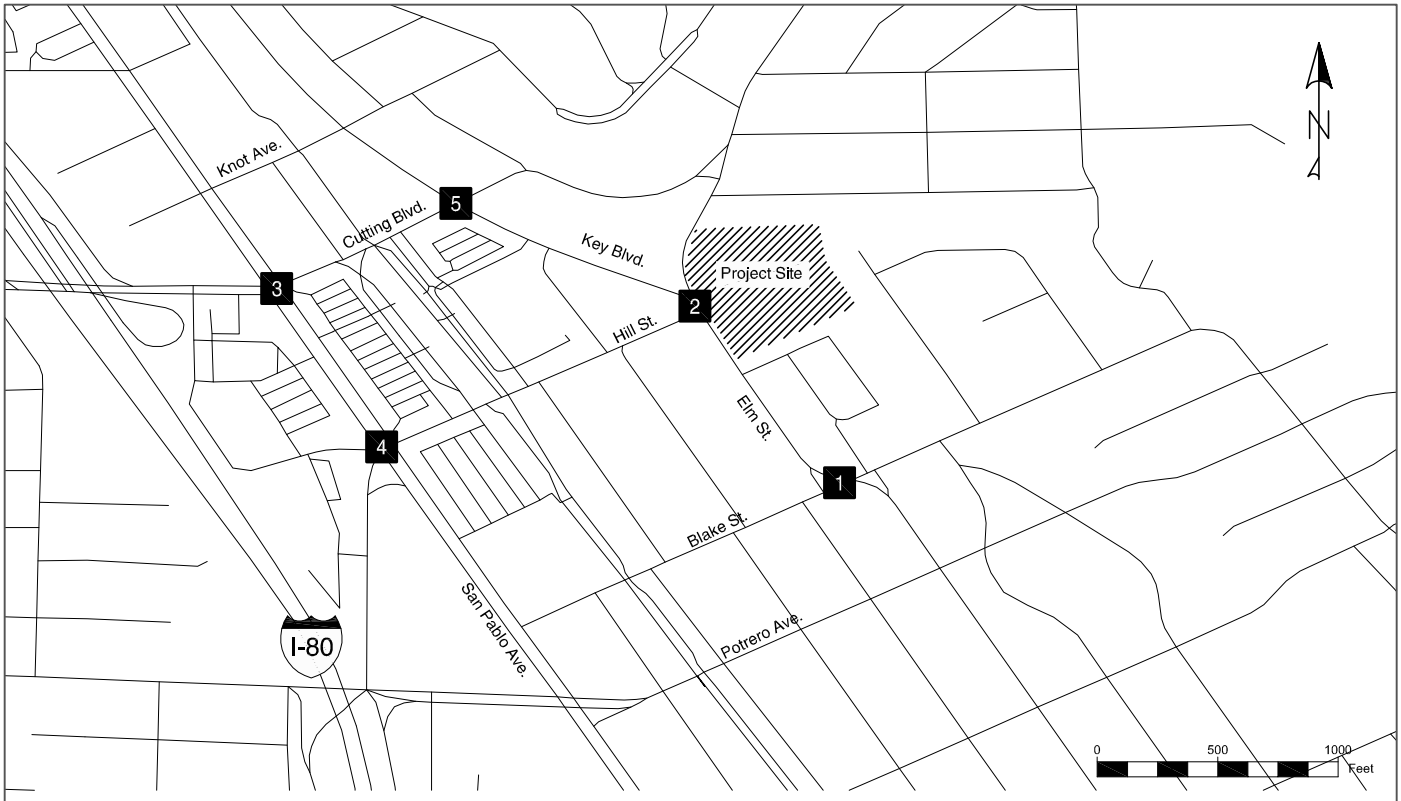
STOP = All-Way Stop

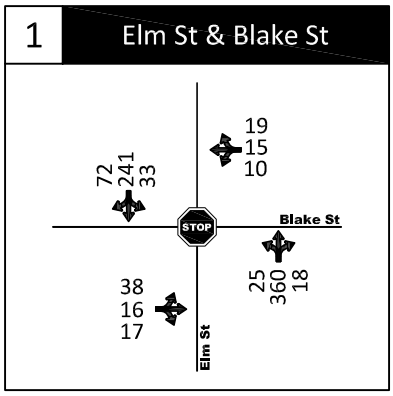
= Traffic Signal

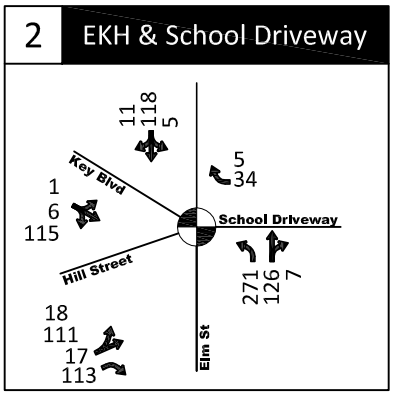
= Lane Geometry

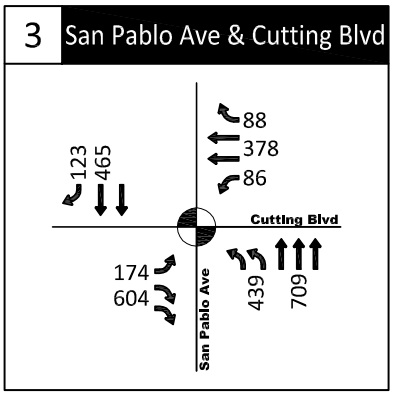
After-school PM Peak Hour Vehicle Volumes
Baseline Conditions

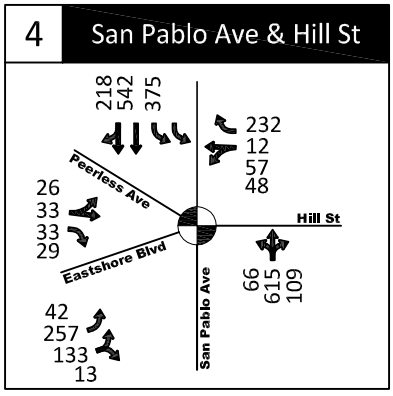
Figure **11**

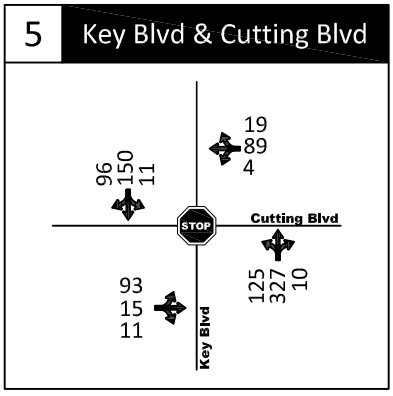












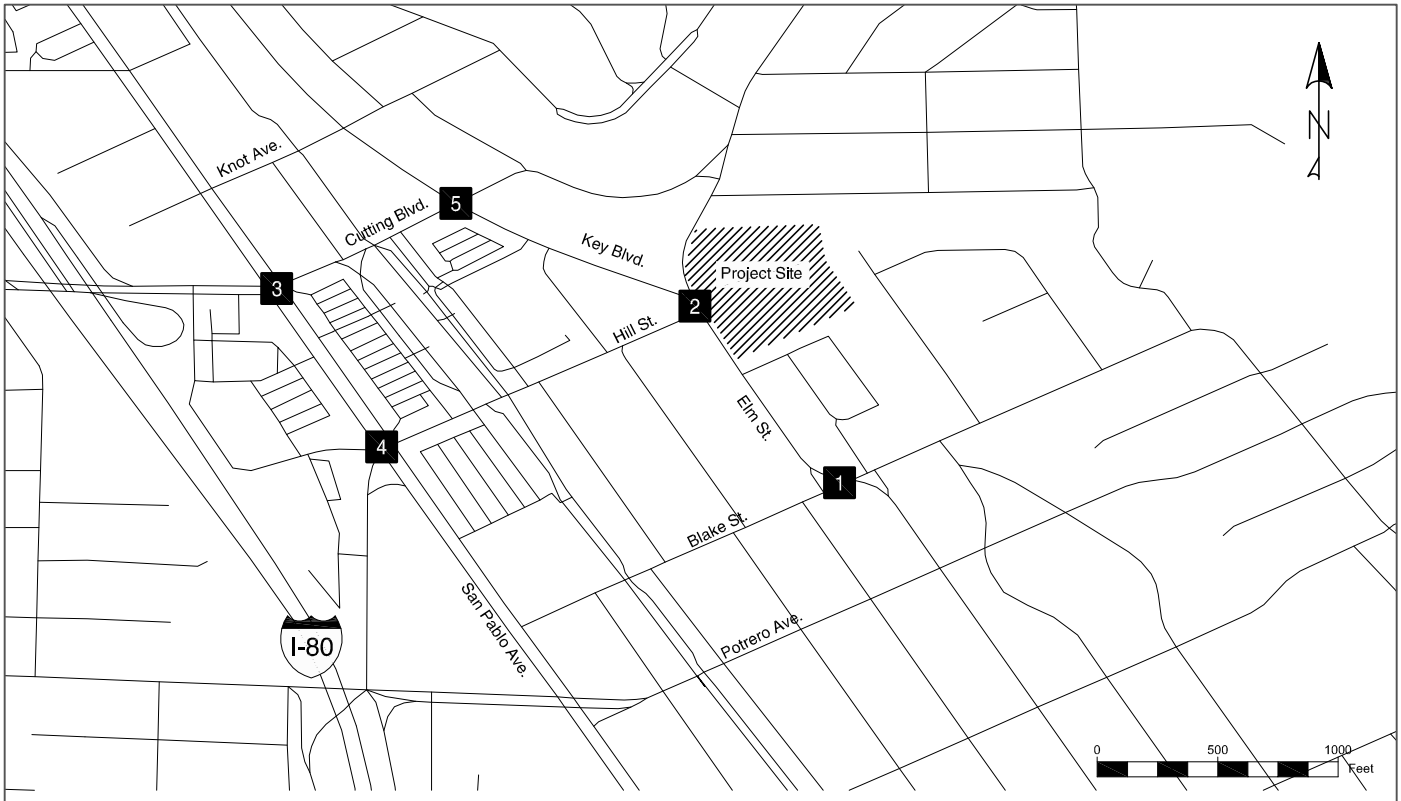
STOP = All-Way Stop

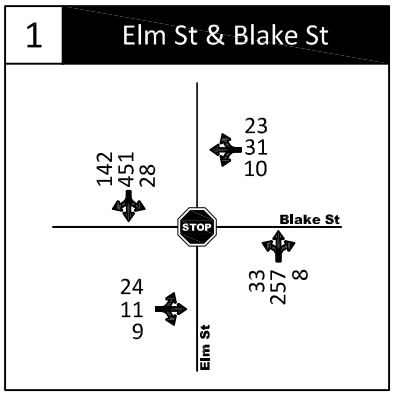
= Traffic Signal

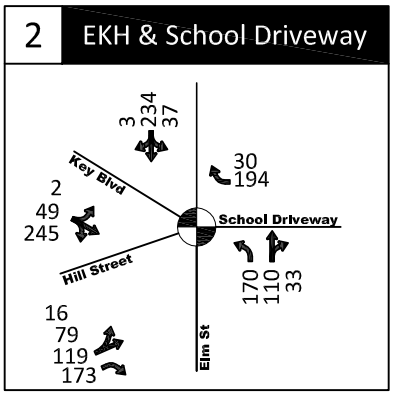
= Lane Geometry

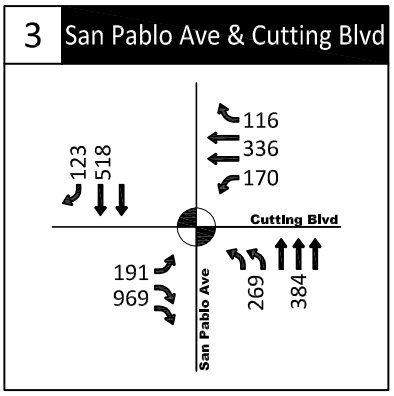
PM Peak Hour Vehicle Volumes
Baseline Conditions

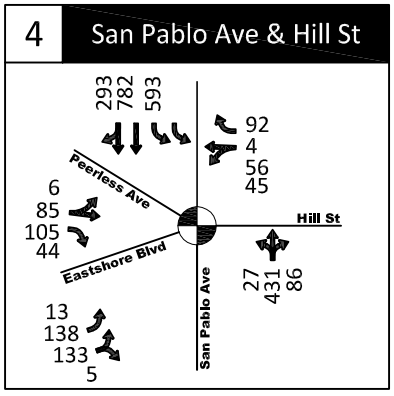
Figure **12**

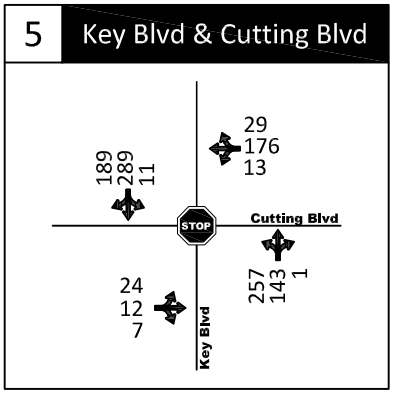












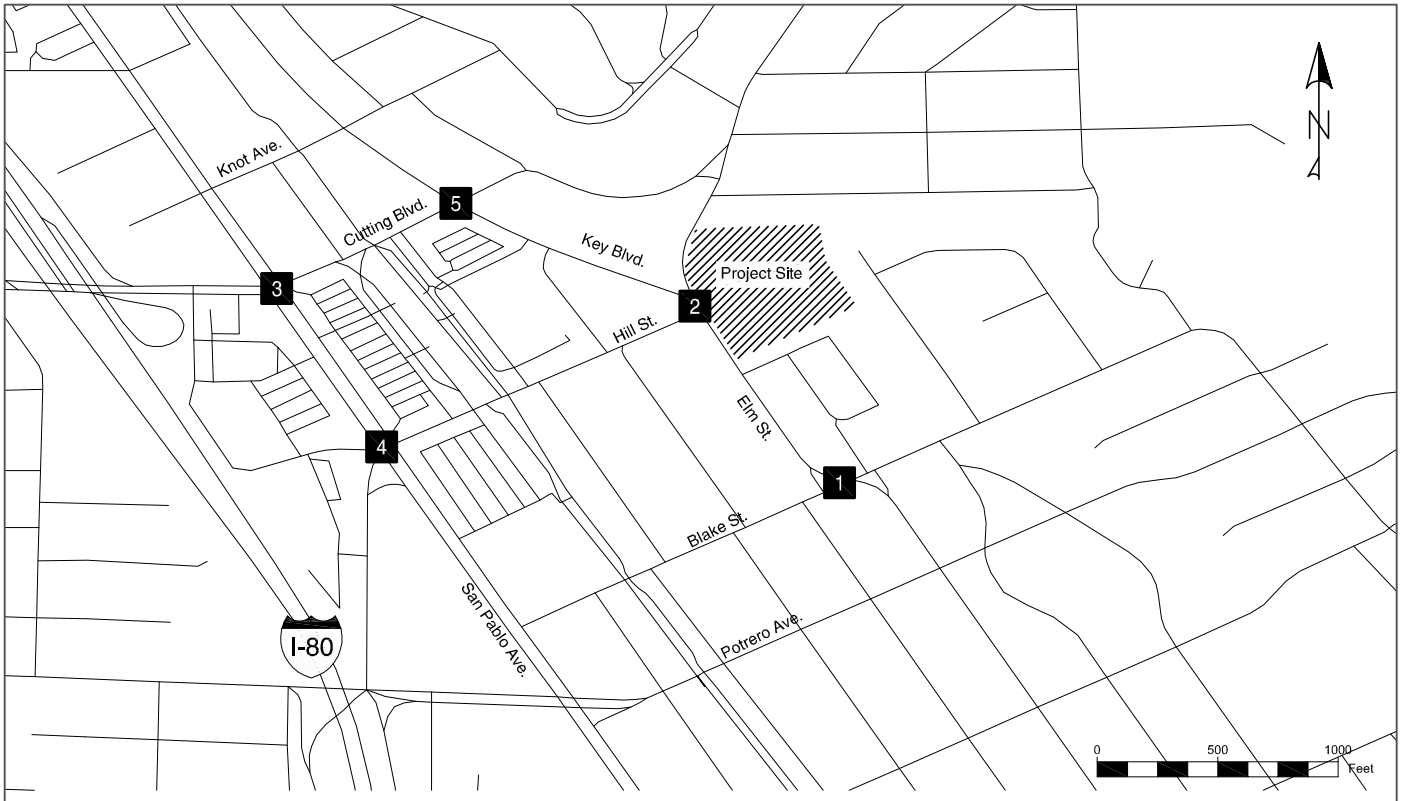
STOP = All-Way Stop

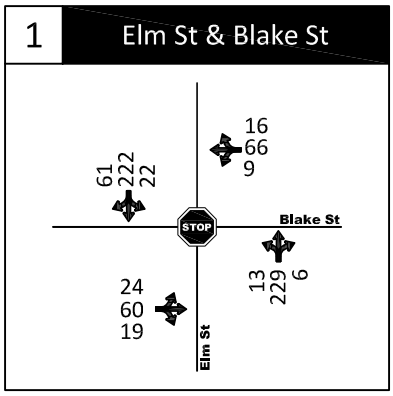
= Traffic Signal

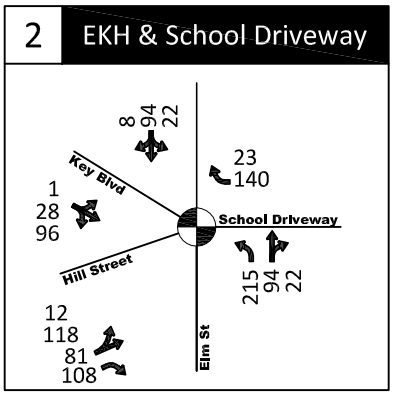
= Lane Geometry

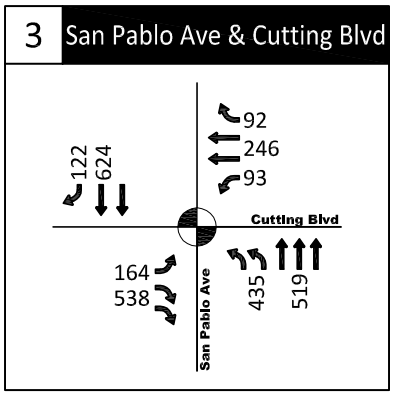
AM Peak Hour Vehicle Volumes
Baseline plus Project Conditions

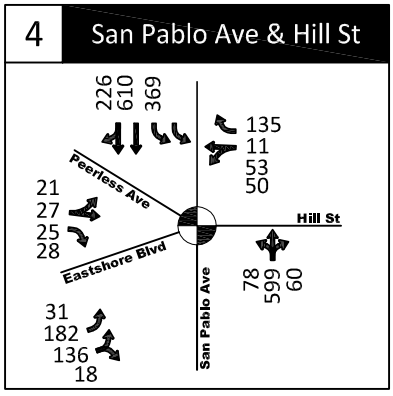
Figure **13**

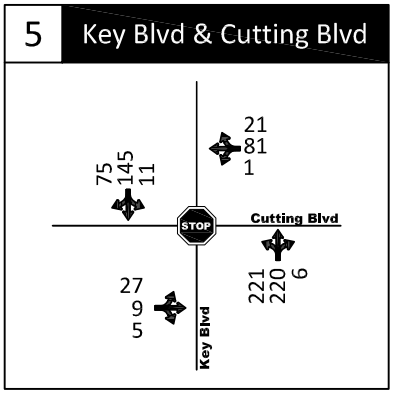












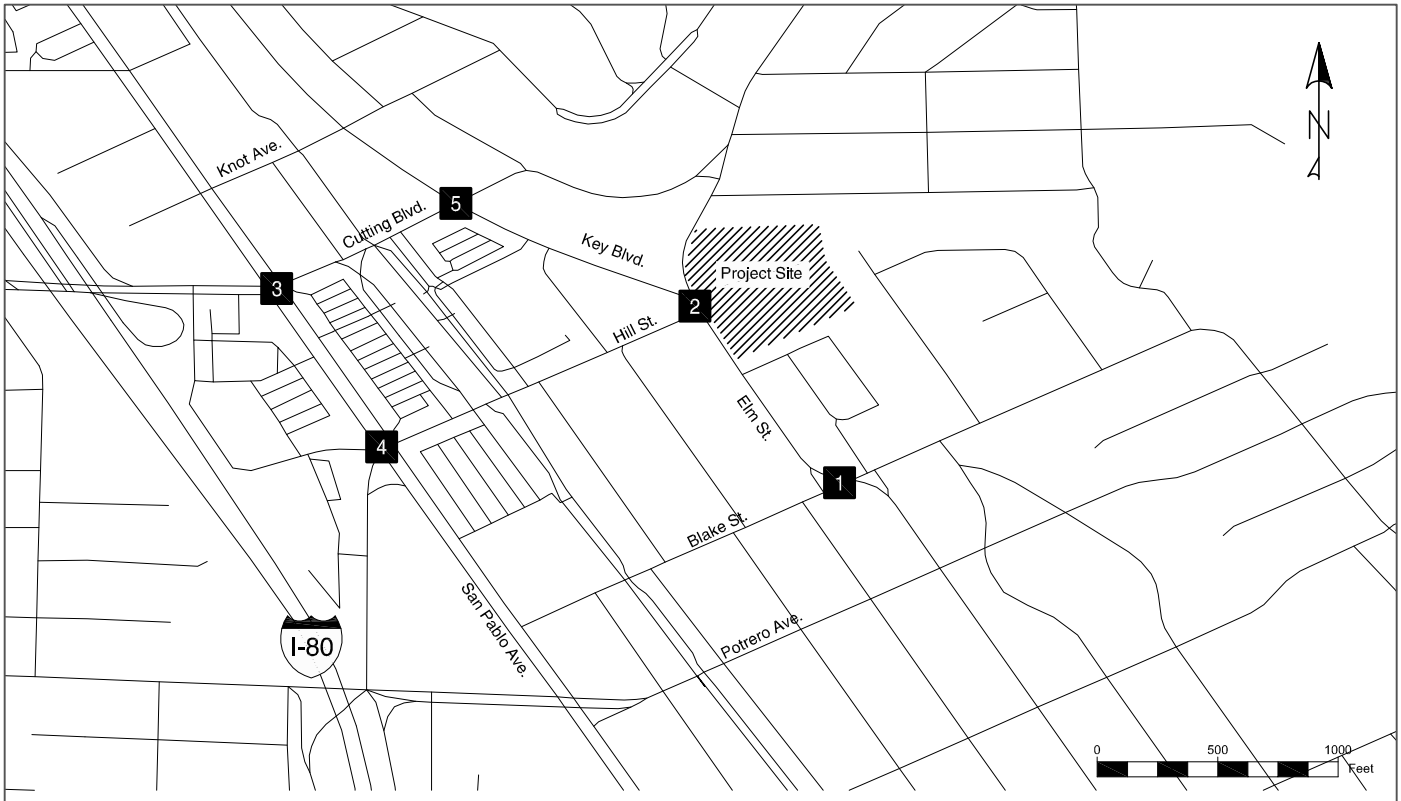
STOP = All-Way Stop

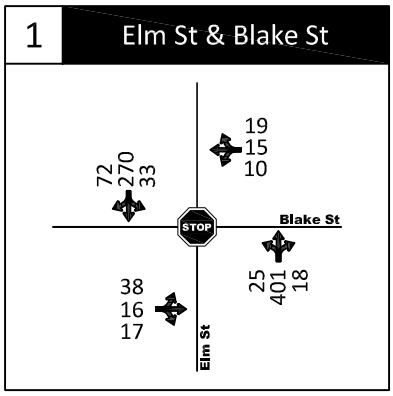
= Traffic Signal

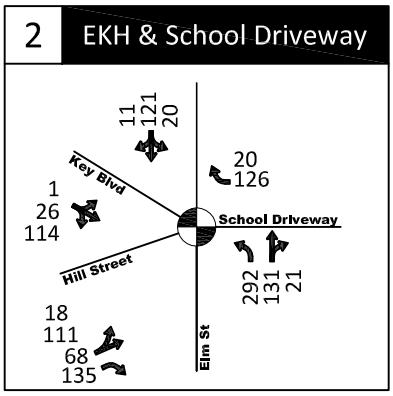
= Lane Geometry

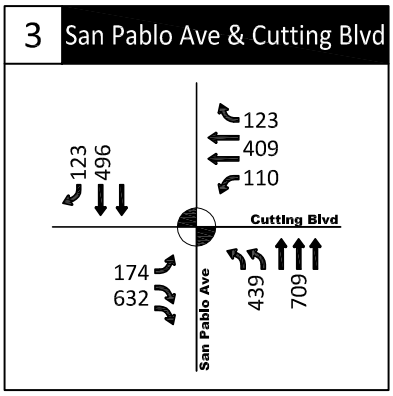
After-school PM Peak Hour Vehicle Volumes
Baseline plus Project Conditions

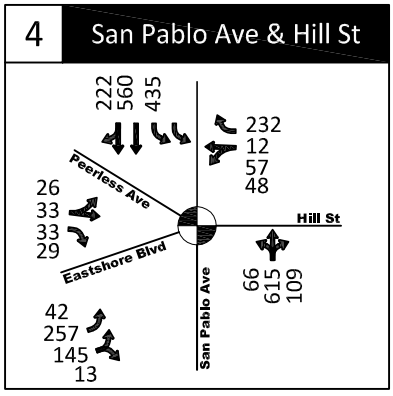
Figure **14**

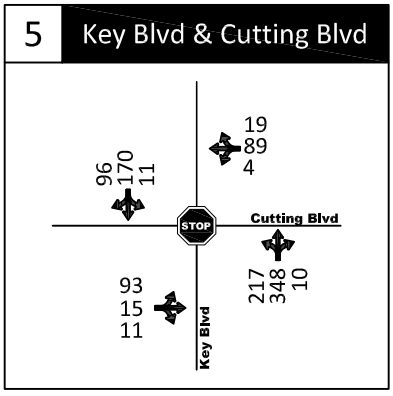












STOP = All-Way Stop

= Traffic Signal

= Lane Geometry

PM Peak Hour Vehicle Volumes
Baseline plus Project Conditions

Figure **15**

Student Unloading and Loading

Anticipated queues resulting from student unloading before school and student loading after school were analyzed by applying a growth factor of 5.04 to the vehicle queue lengths observed in September under existing student enrollment conditions. This growth factor represents the increase in student enrollment from the current 2014 level of 125 students to the potential maximum enrollment in 2019 of 630 students.

As described previously, morning queuing activity occurs as a "slow-moving queue" with 25-foot effective length for vehicles. After-school queues present as "parked queues" with smaller buffer spaces left between vehicles, yielding a 20-foot effective length of vehicles. Assuming these effective vehicle lengths, on-site capacity for queuing is 20 vehicles during morning drop-offs and 26 vehicles during afternoon pick-ups. The on-street capacity for queuing was found to be 220 feet along the east side of Elm Street immediately north of Key Boulevard, amounting to 8 vehicles in the morning and 11 vehicles in the afternoon. Total available capacity would be 28 vehicles for morning drop-offs and 37 vehicles for afternoon pick-ups.

At maximum enrollment of 630 students, the potential maximum queue during morning drop-off would be 20 vehicles, which would be accommodated within the existing on-site and on-street unloading capacity. The potential maximum queue during afternoon pick-up would be 40 vehicles and would extend beyond the project driveway and available on-street loading space on Elm Street by 60 feet, the equivalent of 3 vehicles. A 10 percent decrease in the number of after-school pick-ups due to a shift in student travel mode would reduce the maximum queue to 36 vehicles, which could be accommodated within the on-site and on-street loading spaces. Alternatively, if 10 percent of students were released 15 minutes later than the majority of students, the maximum queue would be 36 vehicles and could be accommodated within the existing loading spaces. This staggered end-of-school schedule generally would prevent queues from spilling beyond the intended pick-up locations during after-school pick-up activities.

Parking

The Project would provide 61 parking spaces on-site. The number of parking spaces required on site, according to the use classification of the City's Zoning Code Section 19.24.040, is indicated in Table 9. The school will have 17 classrooms, approximately eight of which will be used for middle school classes and nine of which will be used for high school instruction. Additionally, the school will have approximately 1800 sq. ft. of office area, so the school would be required to provide 62 parking spaces, one more space than currently exist on-site. The Project applicant may apply for a ten percent reduction in the required parking based on the school's proximity to transit, the school's operator could commit to ensure that demand for parking on-site would not exceed capacity, or the school could stripe one additional parking stall on site.

Table 9: Off-Street Parking– City Zoning Code Requirements

Zoning Land Use Category	Application to Project	Code Requirement for Parking	Project Parking Required
Schools, Private (Junior High/Elementary)	Middle School	1 stall per classroom	8
Schools, Private (High School)	High School	1 stall per classroom and 1 stall per 10 students	9 + 39
Schools, Private (Junior High/Elementary, High School)	Middle and High School	1 stall per 300 sq. ft. of office area	6

Section 5
Cumulative Conditions

CUMULATIVE CONDITIONS

The potential contribution of the Proposed Project to cumulative traffic impacts at the study intersections is discussed in this section.

Cumulative 2040 No Project

The latest available CCTA Model was used to develop future volume forecasts for Cumulative 2040 conditions. The model assumes future development throughout the region consistent with regional totals projected by the Association of Bay Area Governments (ABAG) in their *Projections 2011*[6] report. Therefore, the traffic forecasts reflect traffic from growth in El Cerrito, as well as traffic in the region that may use the local roadways. Model base year (Year 2013) and future year (Year 2040) forecasts were extracted from the model and used to estimate growth. The full 27-year increment of growth projected by the model was applied to the 2014 counts to arrive at the adjusted forecasted volumes for Cumulative conditions. The projected AM, after-school PM, and PM peak hour traffic volumes for Cumulative conditions (No Project) are provided in Figure 16 through 18.

The Cumulative operations at the study intersections are shown in Table 10. The analysis of Cumulative operations at the Elm Street/Hill Street/Key Boulevard/School driveway intersection assumes optimized signal timing for that intersection. These results for Cumulative conditions indicate that three of the study intersections are projected to operate acceptably at LOS D or better during each peak hour. The San Pablo Avenue/Hill Street/Peerless Avenue/Eastshore Boulevard intersection would operate unacceptably at LOS F during the AM peak hour and acceptably during other peak hours. The Key Boulevard/Cutting Boulevard intersection would operate unacceptably at LOS F during the PM peak hour and acceptably during other peak hours.

[6] Association of Bay Area Governments. *Projections 2011*.

Table 10: Intersection Level of Service – Cumulative Conditions

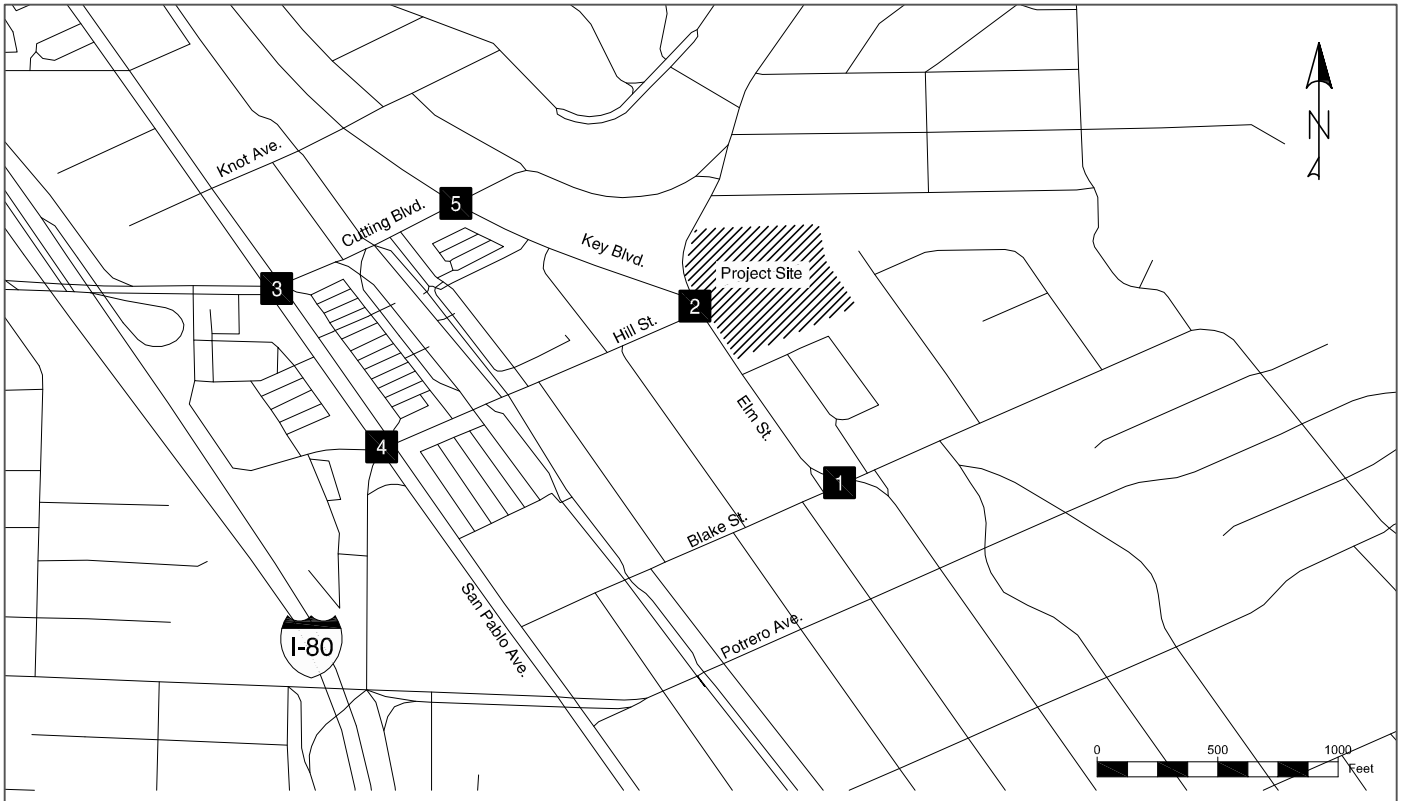
No.	North-South Cross Street	East-West Cross Street	Control	AM		After-school PM		PM	
				Delay	LOS	Delay	LOS	Delay	LOS
1	Elm Street	Blake St	All-Way Stop	19.8	C	10.3	B	21.0	C
2	Elm Street	Hill St & Key Blvd & School Driveway	Signal	51.6	D	39.2	D	41.4	D
3	San Pablo Ave	Cutting Blvd	Signal	28.9	C	33.6	C	35.2	D
4	San Pablo Ave	Hill St & Peerless Ave & Eastshore Blvd	Signal	**> 100**	**F**	62.0	E	71.1	E
5	Key Blvd	Cutting Blvd	All-Way Stop	22.4	C	16.4	C	**66.2**	**F**

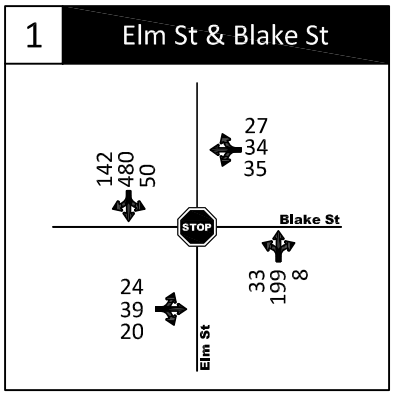
Delay denotes average vehicle delay in seconds.

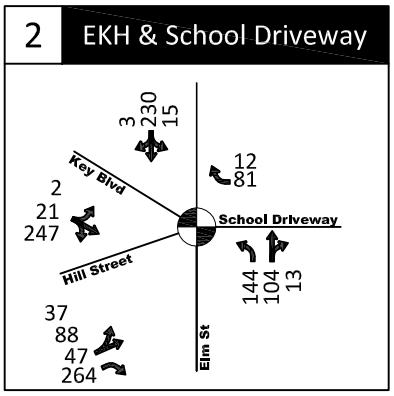
Worst approach average vehicle delay shown for stop-controlled intersections.

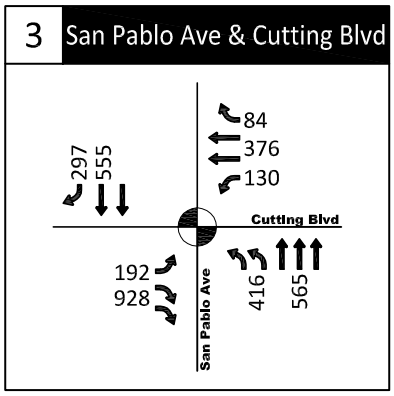
LOS denotes level of service.

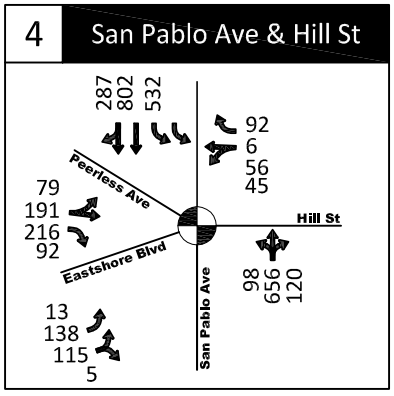
Source: Kittelson & Associates, 2015

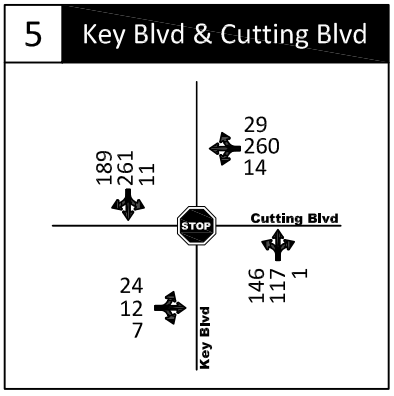












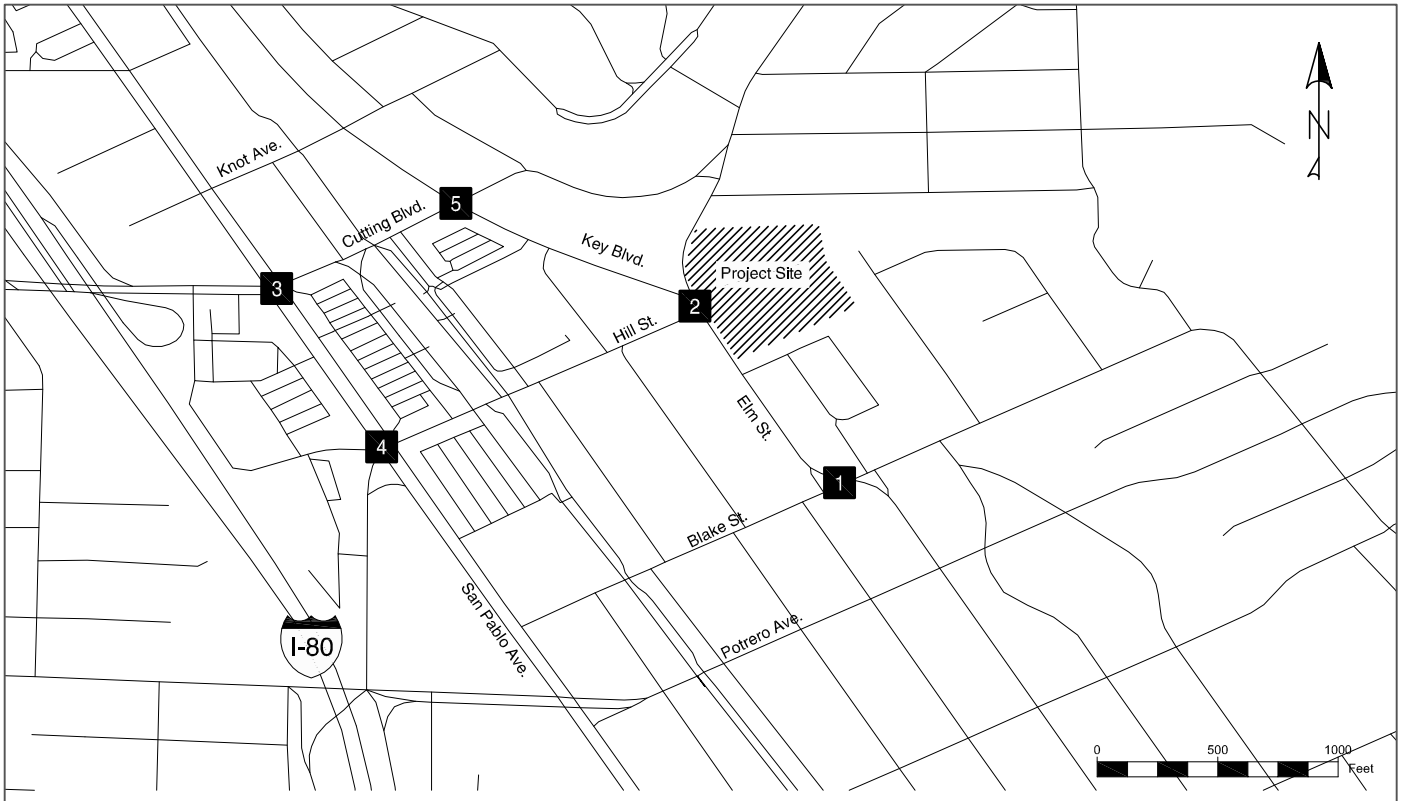
STOP = All-Way Stop

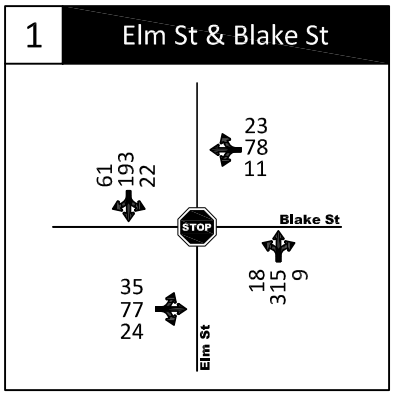
= Traffic Signal

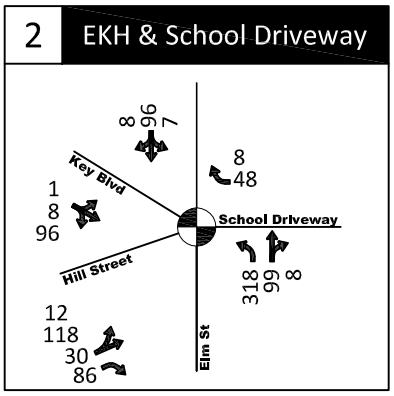
= Lane Geometry

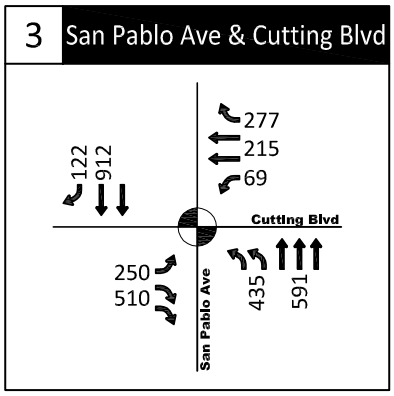
AM Peak Hour Vehicle Volumes
Cumulative Conditions

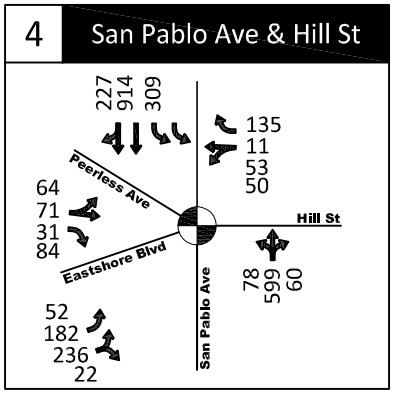
Figure **16**

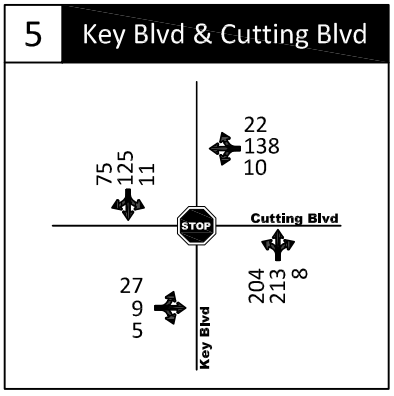












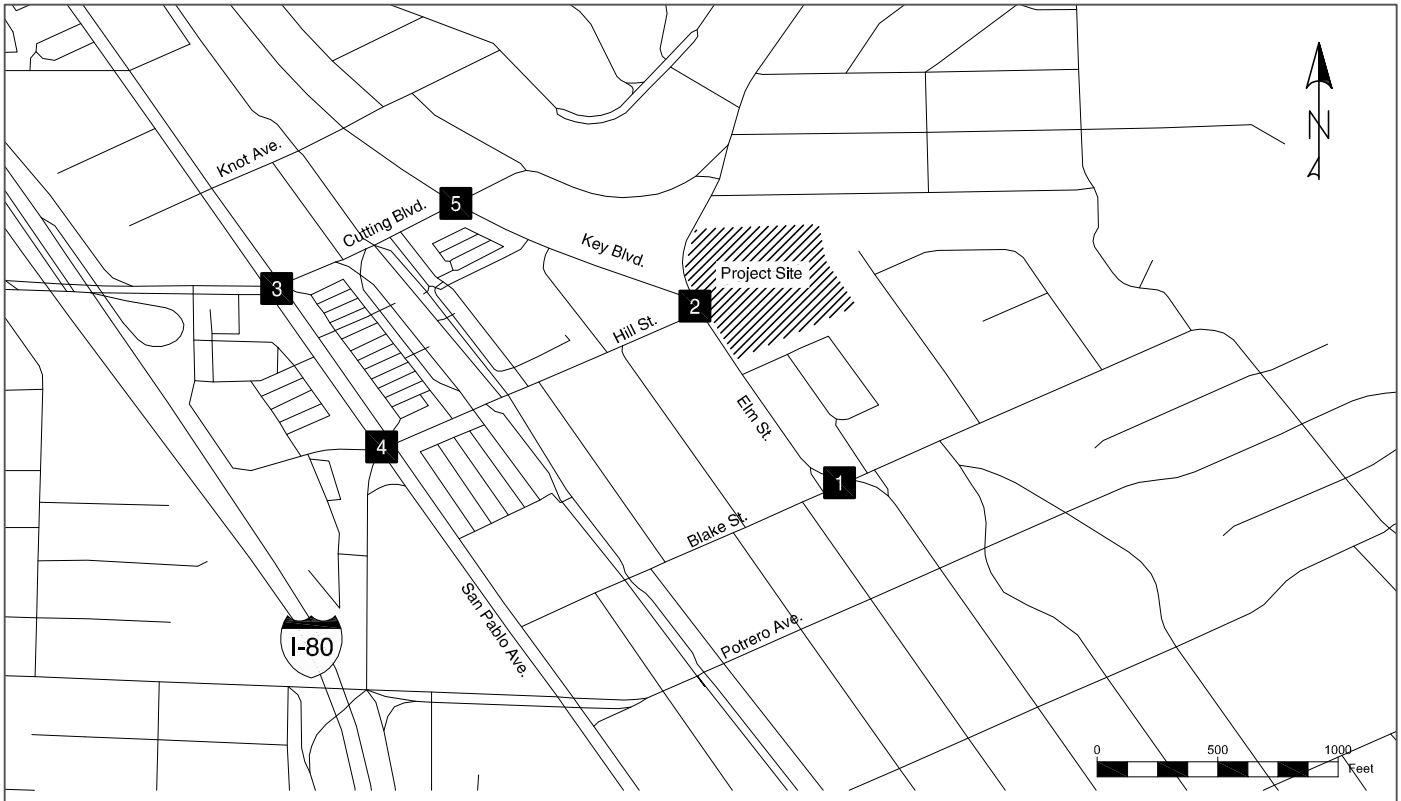
STOP = All-Way Stop

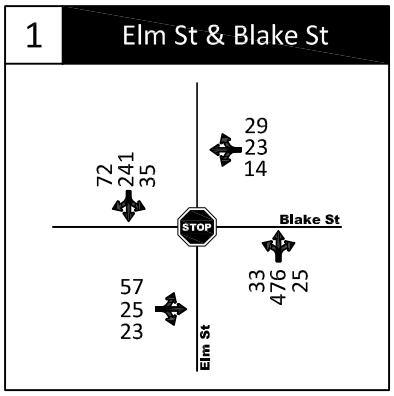
= Traffic Signal

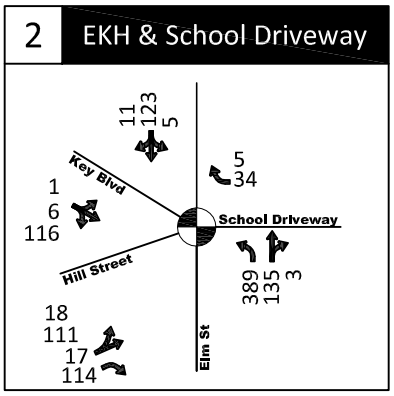
= Lane Geometry

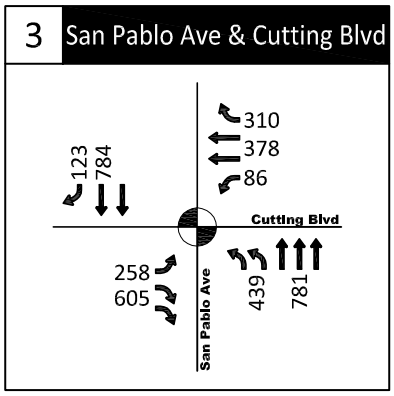
After-school PM Peak Hour Vehicle Volumes
Cumulative Conditions

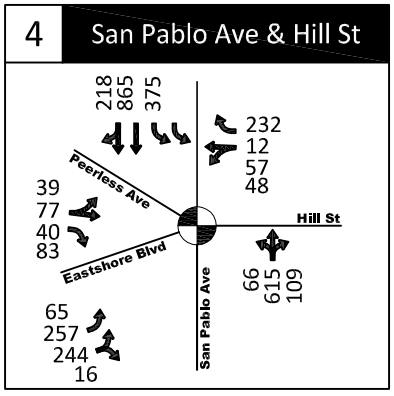
Figure **17**

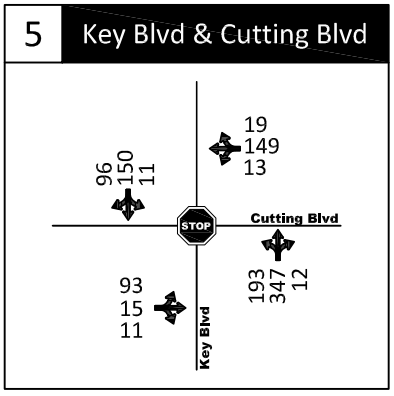












= All-Way Stop

= Traffic Signal

= Lane Geometry

PM Peak Hour Vehicle Volumes
Cumulative Conditions

Figure **18**

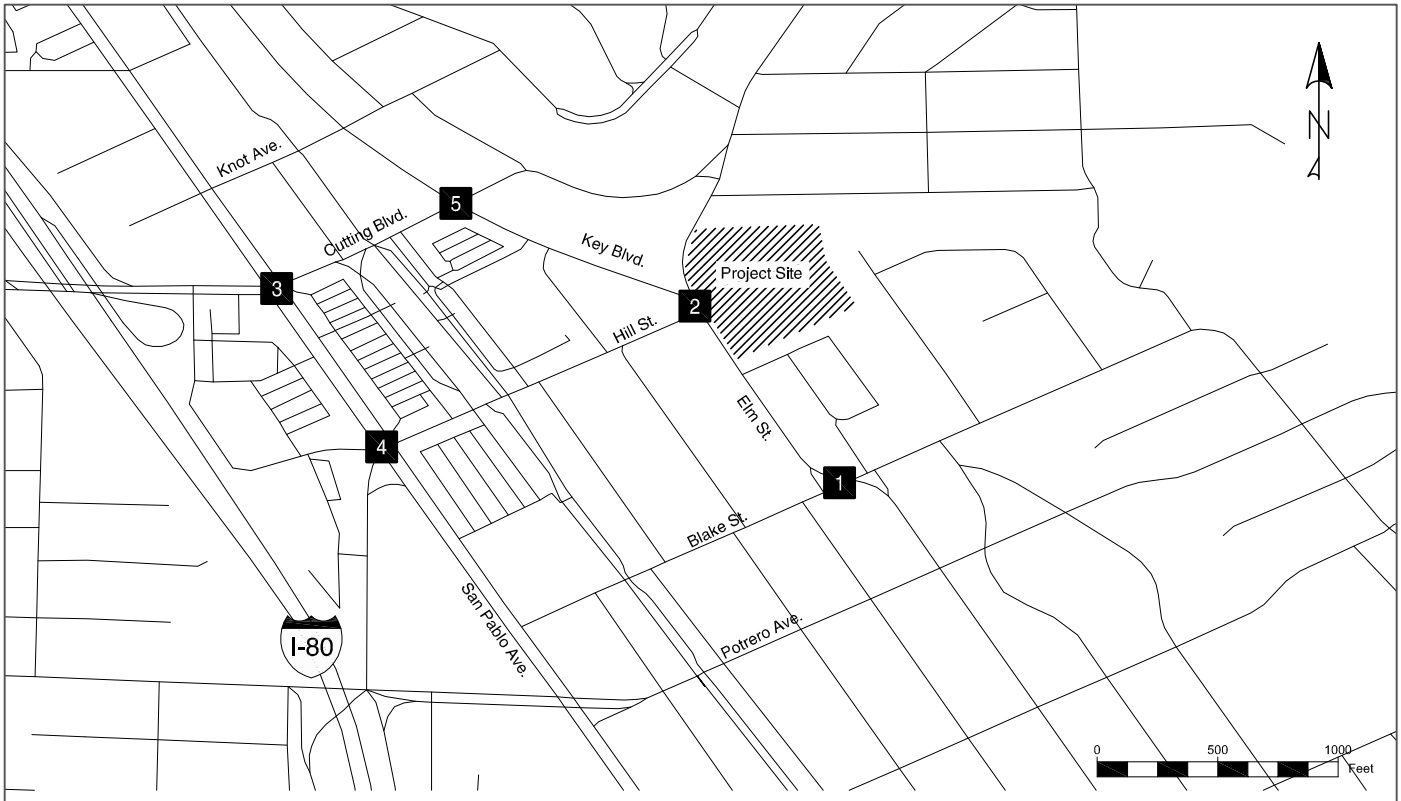
Cumulative Plus Project

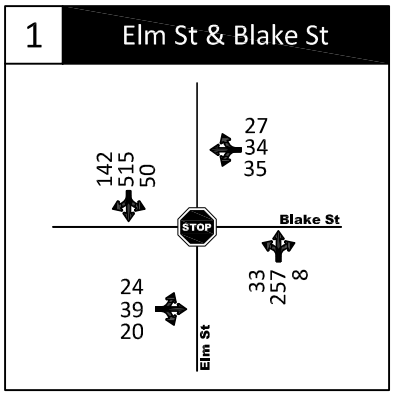
The projected AM, after-school PM and PM peak hour traffic volumes for Cumulative plus Project conditions are provided in Figure 19 through 21. The Cumulative plus Project operations at the study intersections are shown in Table 11. These results indicate that, with the addition of Project traffic to Cumulative conditions, two intersections would operate acceptably at LOS D or better during each peak hour. The Elm Street/Hill Street/Key Boulevard/School driveway intersection would operate unacceptably at LOS E or F during each peak hour. The San Pablo Avenue/Hill Street/Peerless Avenue/Eastshore Boulevard intersection would operate unacceptably at LOS F during the AM peak hour and acceptably during other peak hours. The Key Boulevard/Cutting Boulevard intersection would operate unacceptably at LOS F during the PM peak hour and acceptably during other peak hours.

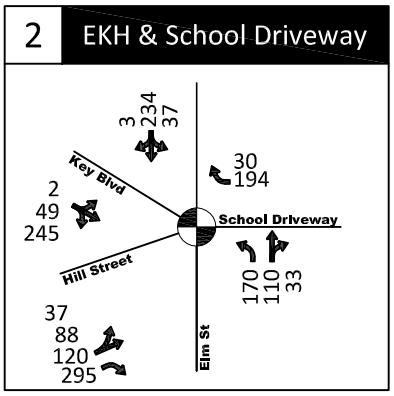
Table 11: Intersection Level of Service – Cumulative plus Project Conditions

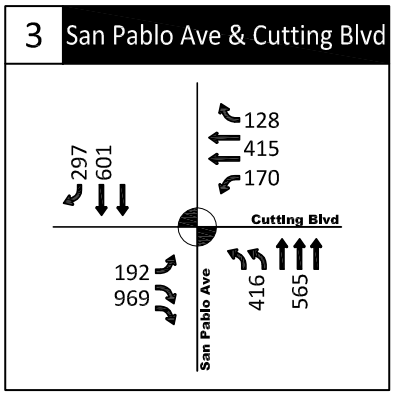
No.	North-South Cross Street	East-West Cross Street	Control	AM		After-school PM		PM	
				Delay	LOS	Delay	LOS	Delay	LOS
1	Elm Street	Blake St	All-Way Stop	25.9	D	14.8	B	26.8	D
2	Elm Street	Hill St & Key Blvd & School Driveway	Signal	**86.4**	**F**	**57.1**	**E**	**62.6**	**E**
3	San Pablo Ave	Cutting Blvd	Signal	32.0	C	36.9	D	38.4	D
4	San Pablo Ave	Hill St & Peerless Ave & Eastshore Blvd	Signal	**> 100***	**F**	66.5	E	74.2	E
5	Key Blvd	Cutting Blvd	All-Way Stop	34.9	D	27.6	D	**> 100**	**F**

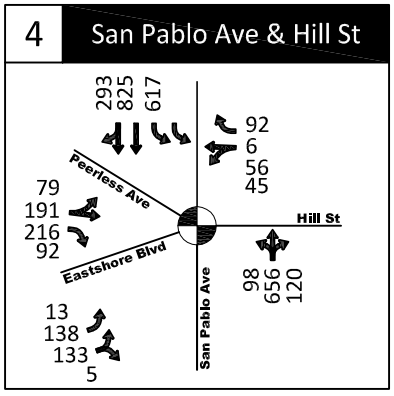
* Represents an 8-second increase in delay.
Delay denotes average vehicle delay in seconds.
Worst approach average vehicle delay shown for stop-controlled intersections.
LOS denotes level of service.
Source: Kittelson & Associates, 2015

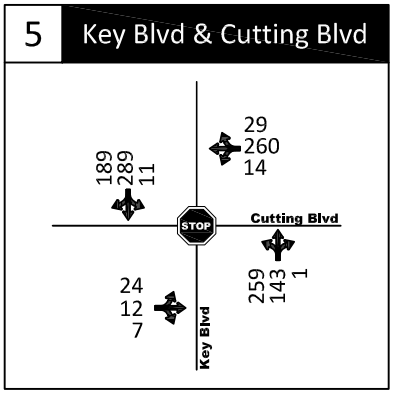












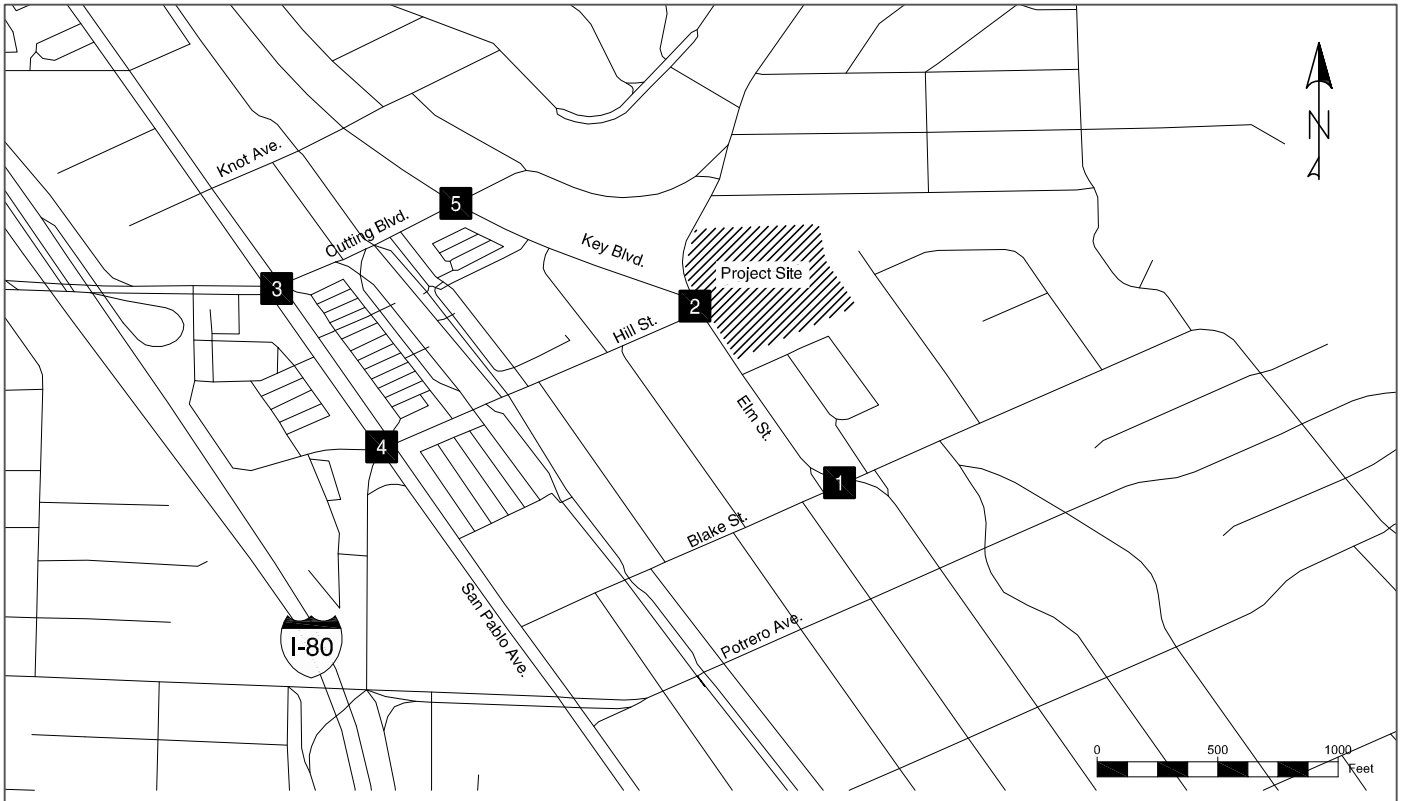
= All-Way Stop

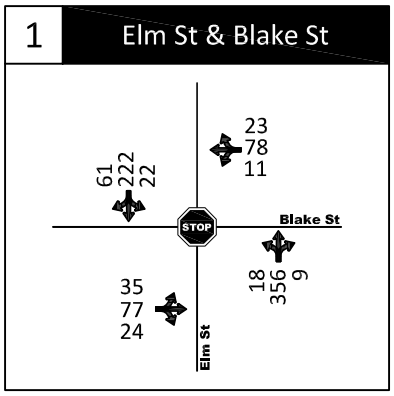
= Traffic Signal

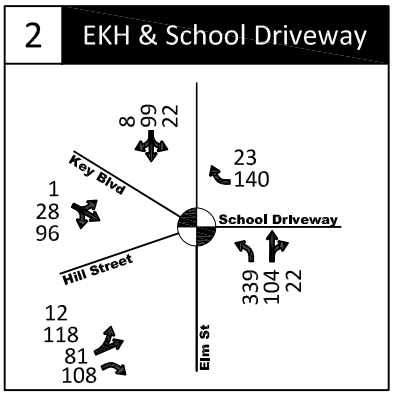
= Lane Geometry

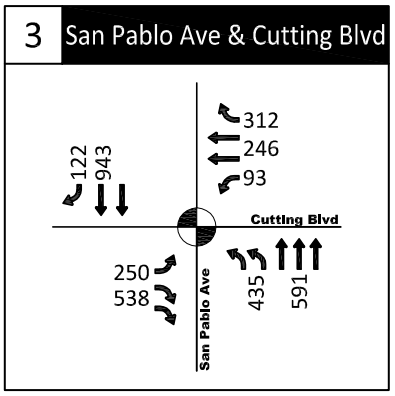
AM Peak Hour Vehicle Volumes
Cumulative plus Project Conditions

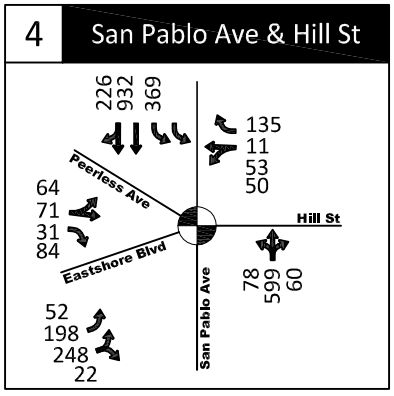
Figure **19**

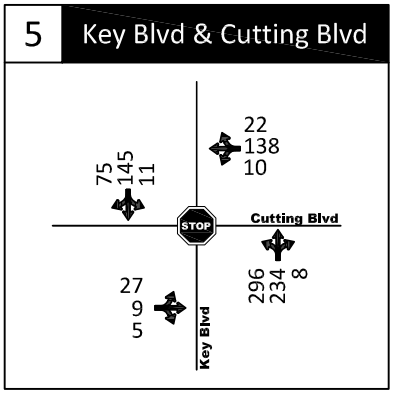












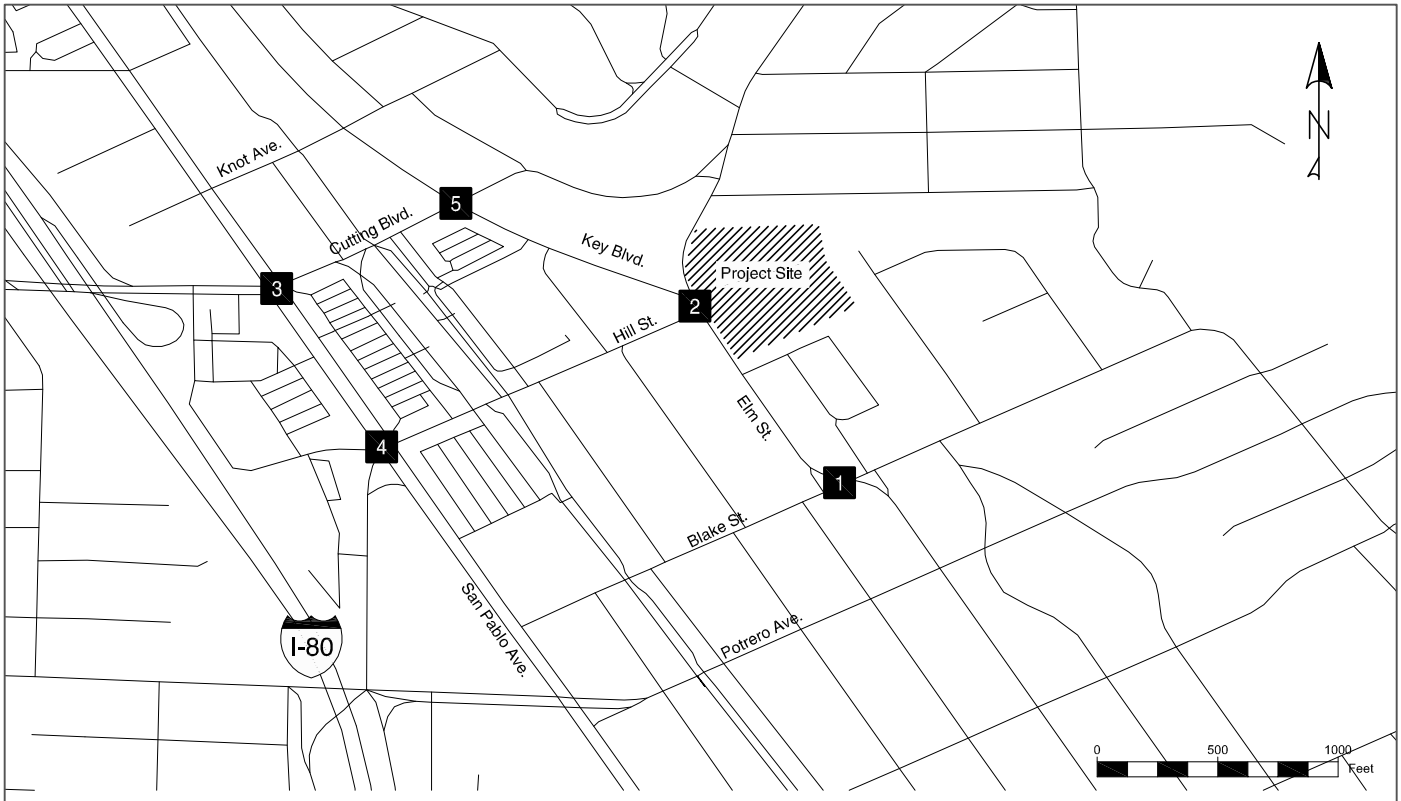
STOP = All-Way Stop

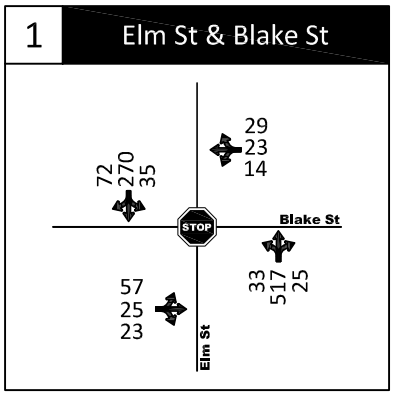
= Traffic Signal

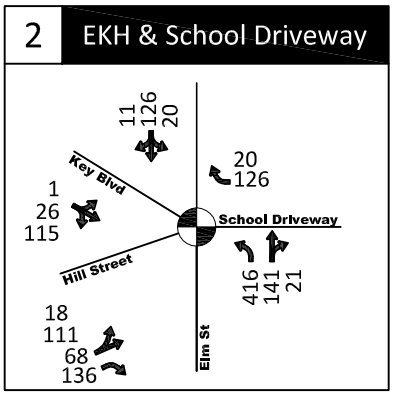
= Lane Geometry

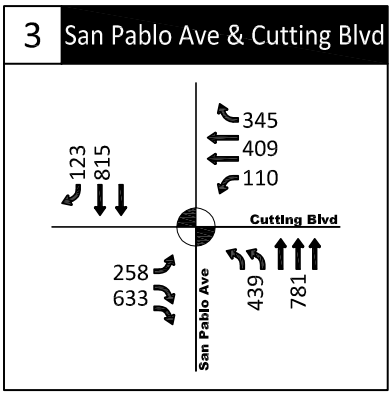
After-school PM Peak Hour Vehicle Volumes
Cumulative plus Project Conditions

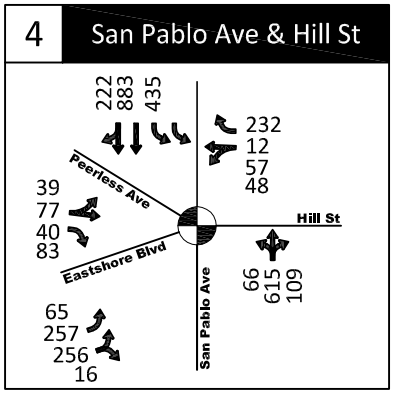
Figure **20**

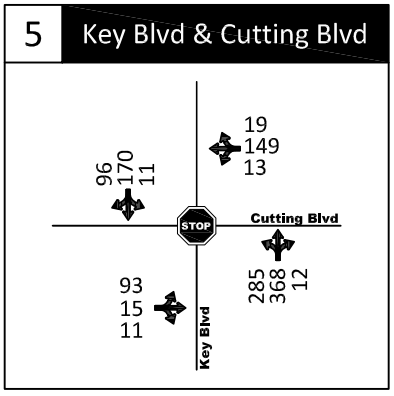












STOP = All-Way Stop

= Traffic Signal

= Lane Geometry

PM Peak Hour Vehicle Volumes
Cumulative plus Project Conditions

Figure **21**

Section 6
Conclusions and Recommendations

CONCLUSIONS AND RECOMMENDATIONS

The results of the traffic impact analysis indicate that the proposed high school expansion at Summit K2 Charter School can be accommodated while maintaining acceptable levels of service and safety on the surrounding transportation system as long as the appropriate mitigations are in place. The findings of this analysis are summarized, and the recommendations to mitigate these impacts are discussed below.

INTERSECTION OPERATIONS

The analyses indicate that the addition of proposed Project traffic to the street network would result in impacts at some study intersections.

- With the addition of traffic associated with the proposed Project to the Baseline traffic and roadway network conditions, the Elm Street/Hill Street/Key Boulevard/School driveway intersection was found to operate unacceptably at LOS F in during all peak hours. The Key Boulevard/Cutting Boulevard intersection was found to operate unacceptably at LOS F during the PM peak hour.
- With the addition of traffic associated with the proposed Project to the Cumulative Year 2040 traffic and roadway network conditions, the Elm Street/Hill Street/Key Boulevard/School driveway intersection was found to operate unacceptably at LOS F during all peak hours. The San Pablo/Hill Street/Peerless Avenue/Eastshore Boulevard intersection was found to operate unacceptably at LOS F during the AM peak hour. The Key Boulevard/Cutting Boulevard intersection was found to operate unacceptably at LOS F during the PM peak hour.

Mitigation Measures

Suggested improvements were identified to mitigate the impacts. These suggested mitigations include improvements to the existing Elm Street/Hill Street/Key Boulevard/School driveway intersection and to the existing Key Boulevard/Cutting Boulevard intersection, as illustrated in Figure 22 and 23.

Operations at all study intersections are shown in Table 12 and 13 for Baseline plus Project conditions with Mitigations and for Cumulative plus Project conditions with Mitigations, respectively. With these improvements to the local transportation network, the study intersections would operate acceptably and meet City standards under Baseline plus Project and Cumulative plus Project conditions (excepting the San Pablo Avenue/Hill Street/Peerless Avenue/Eastshore Boulevard intersection, which would operate at LOS F under Cumulative and Cumulative plus Project conditions during the AM peak hour).

Table 12: Intersection Level of Service – Baseline plus Project Conditions with Mitigations

No.	North-South Cross Street	East-West Cross Street	Control	AM		After-school PM		PM	
				Delay	LOS	Delay	LOS	Delay	LOS
1	Elm Street	Blake St	All-Way Stop	14.8	B	10.1	B	13.4	B
2	Elm Street	Hill St & Key Blvd & School Driveway	Signal	30.8	C	32.1	C	23.9	C
3	San Pablo Ave	Cutting Blvd	Signal	25.7	C	33.0	C	33.6	C
4	San Pablo Ave	Hill St & Peerless Ave & Eastshore Blvd	Signal	44.8	D	35.8	D	39.0	D
5	Key Blvd	Cutting Blvd	All-Way Stop	25.2	C	16.0	C	16.4	C

Delay denotes average vehicle delay in seconds.

Worst approach average vehicle delay shown for stop-controlled intersections.

LOS denotes level of service.

Source: Kittelson & Associates, 2015

Table 13: Intersection Level of Service – Cumulative plus Project Conditions with Mitigations

No.	North-South Cross Street	East-West Cross Street	Control	AM		After School PM		PM	
				Delay	LOS	Delay	LOS	Delay	LOS
1	Elm Street	Blake St	All-Way Stop	25.9	D	14.8	B	26.8	D
2	Elm Street	Hill St & Key Blvd & School Driveway	Signal	36.6	D	44.9	D	33.2	C
3	San Pablo Ave	Cutting Blvd	Signal	32.0	C	36.9	D	38.4	D
4	San Pablo Ave	Hill St & Peerless Ave & Eastshore Blvd	Signal	**> 100**	**F**	66.5	E	74.2	E
5	Key Blvd	Cutting Blvd	All-Way Stop	34.9	D	27.6	D	22.7	C

Delay denotes average vehicle delay in seconds.

Worst approach average vehicle delay shown for stop-controlled intersections.

LOS denotes level of service.

Source: Kittelson & Associates, 2015

Figure 22: Proposed Improvements to Elm Street/Hill Street/Key Boulevard/School Driveway Intersection

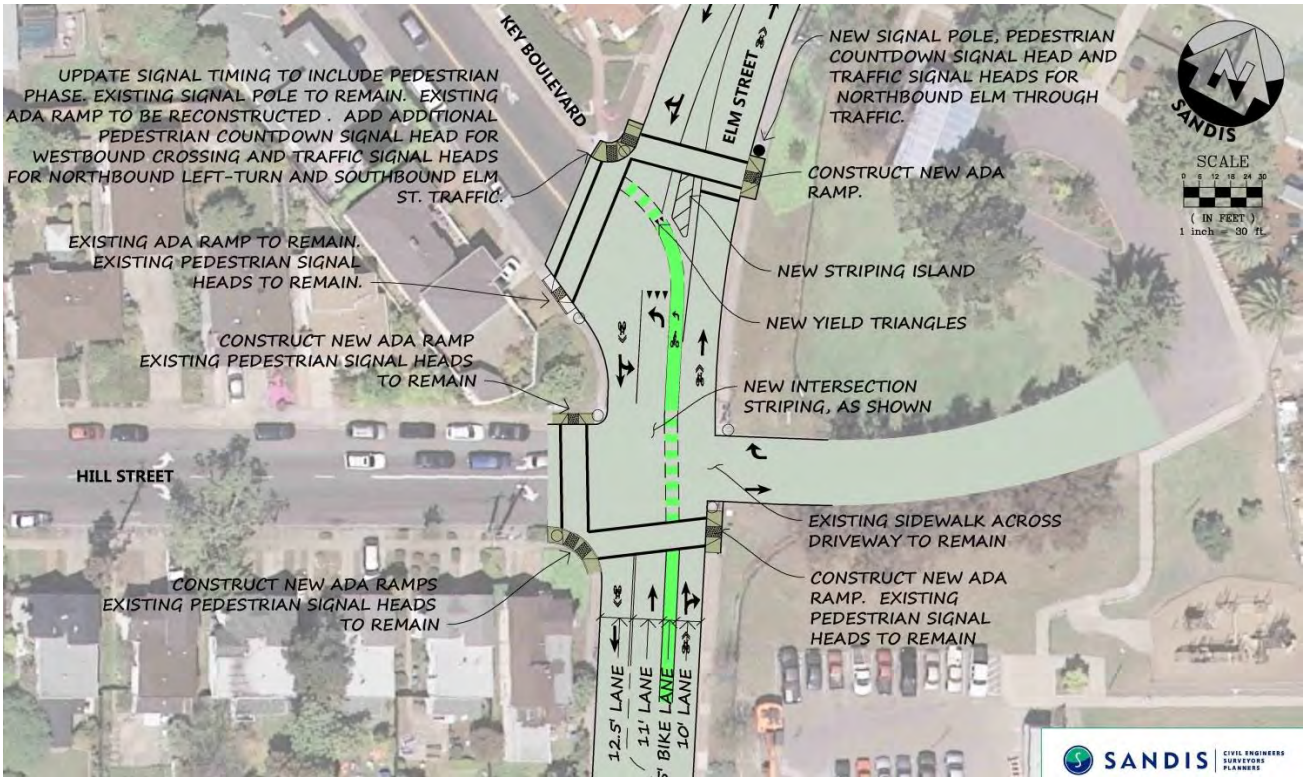
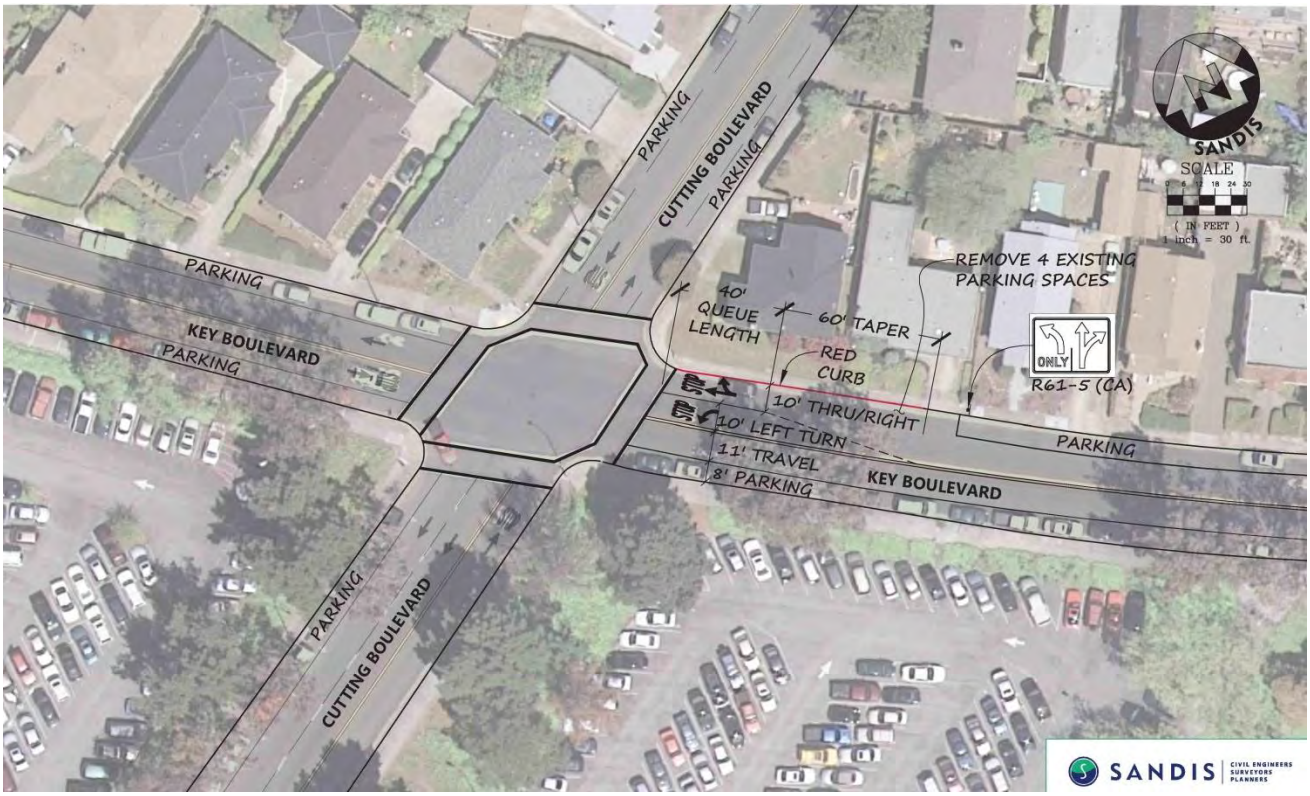


Figure 23: Proposed Improvements to Key Boulevard/Cutting Boulevard Intersection



STUDENT UNLOADING AND LOADING

At maximum enrollment of 630 students, the potential maximum queue during the afternoon pick-up would be 40 vehicles, which would extend beyond the project driveway.

In order to accommodate expected maximum queues during afternoon pick-up activities, the school could encourage students to use a mode other than a personal vehicle in order to achieve a 10 percent or greater reduction in after-school pick-ups. Alternatively, the school could assure that 10 percent or more of the students leave the campus 15 minutes later than the majority of students to achieve a reduced maximum queue that could be accommodated within the on-site and on-street loading spaces.

PARKING

The Proposed Project would not meet the City code requirements for off-street parking.

Because the Project is in close proximity to transit, the school operator may choose to apply for a parking reduction of 10 percent so that the existing provision of 61 parking stalls would meet City parking requirements. Alternatively, the school may stripe one additional parking stall on site.

Section 7
References

REFERENCES

1. El Cerrito General plan Section 5-4, Transportation and Circulation, 1999.
2. El Cerrito San Pablo Avenue Specific Plan, 2015.
3. Transportation Research Board. *Highway Capacity Manual*. Washington, D.C., 2000.
4. Contra Costa Transportation Authority. *Technical Procedures*, 2012.
5. Institute of Transportation Engineers. 9*th Edition, Trip Generation Manual*. Washington, D.C., 2012.
6. Associate of Bay Area Governments. *Projections 2011*.