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## EXECUTIVE SUMMARY

### Introduction

Cuesta Drive and Arboleda Drive are both two-lane roadways that runs through the City of Los Altos, CA. The Cuesta Drive Traffic Calming Project (Project) includes the addition of traffic calming measures along both corridors and Campbell Avenue including: Speed Tables along Cuesta Drive, Speed Humps along Arboleda Drive, new Multi-Way STOP Controls at select intersections, and signage & striping improvements. The proposed improvements, provided in **Appendix E**, were developed as part of an extensive community engagement process.

This analysis evaluates the Existing traffic conditions and a comparison Project analysis where improvements are proposed. The analysis focuses on a Level of Service (LOS) comparison, as a measure of Delay. The analysis also includes the processing of Establishment Criteria where Multi-Way STOP controls are proposed against industry-standard measures.

The purpose of the Project is to provide enforceable vehicle speeds on Cuesta Drive, provide complementary traffic calming measures along Arboleda Drive, increase accessibility to biking and walking in the neighborhood, and to document street characteristics of adjacent streets for future comparison.

### Scope of Work

This traffic analysis includes a review and operational analysis of the Cuesta Drive corridor (S. El Monte Ave. to Springer Rd.), Arboleda Drive corridor (Cuesta Dr. to Springer Rd.), and several adjacent intersections within the surrounding neighborhood, with respect to mobility of people walking, bicycling, and driving. Specifically, Alta has performed an existing conditions operational analysis and an analysis of the operational impacts from the proposed roadway changes, as well as Multi-Way STOP control warrant analyses for the intersections where a change to a Multi-Way Stop control is proposed. LOS, delay, and queuing were evaluated to assess the operational impacts as they can provide a quantitative comparison between the existing and proposed conditions.

For the purposes of this analysis, the proposed Project consists of introducing new intersection controls, adding new crosswalks at specific intersections, and implementing traffic calming measures along Cuesta Drive and Arboleda Drive all in order to reduce vehicle speeds. The impacts of these improvements were assessed at the following intersections:

1. Cuesta Drive & S. El Monte Avenue
2. Cuesta Drive & Arboleda Drive
3. Cuesta Drive & Campbell Avenue
4. Cuesta Drive & S. Clark Avenue
5. Cuesta Drive & Springer Road
6. Arboleda Drive & Campbell Avenue
7. Arboleda Drive & Springer Road
8. Campbell Avenue & Rosita Avenue

## Conclusions and Recommendations

The Project intersections currently operate at an acceptable Level of Service (LOS D or better) in the Existing condition and are expected to continue to do so under the Project conditions, with the exception of Cuesta Drive & Springer Rd (where the existing and proposed conditions experience a LOS F).

Three new Multi-Way STOP controls are recommended based on the findings from the warrants completed as part of this analysis: Cuesta Drive & S Clark Avenue, Arboleda Drive & Campbell Avenue, and Campbell Avenue & Rosita Avenue

It is recommended that the City pursue the installation of the proposed new Multi-Way STOP control intersections pending the community engagement process of resident support. The proposed traffic calming measures along Cuesta Drive and Arboleda Drive are also recommended including Speed Table and Speed Humps respectively.

The intersection of Cuesta Drive & Springer Road was analyzed to consider a reduction in the number of lanes on the eastbound approach of Cuesta Drive from the existing 2-lanes to 1-lane but this not recommended due to significant impacts to LOS at the intersection.

See the **Conclusions and Recommendation Section** at the end of this report for further details.

## Traffic Analysis

The following section summarizes the results of a preliminary traffic analysis for implementing the proposed Project conditions at the study intersections.

Currently, the existing Project Area consists of signalized and stop controlled intersections. Cuesta Drive is categorized as a collector road according to the City of Los Altos General Plan, Circulation Element (2002). Springer Road and El Monte Avenue are also collector roads, while other corridors in the Project Area, including Arboleda Drive and Campbell Ave., are considered local roads.

The traffic analysis is based upon observed physical conditions, 12-hour turning movement counts collected March 12, 2019, and 24-hour speed counts collected on March 12, 2019. Detailed summaries of the collected data can be found in Appendix A.

Alta performed an analysis of the operational impacts from the proposed Project conditions. Level of Service (LOS), approach/intersection delay, and queuing were the primary conditions evaluated to assess the operational impacts.

### Existing Traffic Analysis

Capacity analyses were performed for the existing AM and PM peak hour periods using Synchro software (v.10) to determine the LOS and delay for each of the study intersections. LOS analysis can help determine the ability of an intersection to accommodate vehicular traffic volume demand and the effect of changes to the number of lanes or storage capacity of turn pockets. The analysis uses Highway Capacity Manual (HCM) 2010 methodology, and accounts for roadway characteristics such as intersection geometry, traffic control devices, and traffic (vehicle and pedestrian) volumes.

LOS is defined by letter characters that range from A to F, with A representing the best traffic operating conditions that have little or no delay to vehicles utilizing the intersection and F characterizing poor conditions that have significant delay. LOS A through D are typically considered acceptable operations, while LOS E is representative of conditions where improvements could be needed if traffic volumes are expected to significantly increase in the future. LOS F is considered failing operations indicating the demand exceeds the capacity of the intersection as it is currently designed, and significant delays can be expected.

Additionally, a change in a LOS from A, B, C, or D to an E or F between the existing and Project conditions at signalized intersections may be considered significant and can indicate impacts resulting from the proposed Project conditions. Under these circumstances, improvements may be needed, in the form of traffic control modification, geometric changes, or a combination of both, for the purpose of reducing vehicle delay. This is supported by the City of Los Altos General Plan, which identifies the performance criterion at city-controlled intersections is LOS D or better. The delay limits for each LOS category, based on the HCM, are shown in **Table 1** below:

Table 1: Level of Service Delay Limits

Level of Service (LOS)	Signalized Intersection Delay per Vehicle (sec/veh)	Unsignalized Intersection Delay per Vehicle (sec/veh)
A	≤10.0	≤10.0
B	10.1 - 20.0	10.1 - 15.0
C	20.1 - 35.0	15.1 - 25.0
D	35.1 - 55.0	25.1 - 35.0
E	55.1 - 80.0	35.1 - 50.0
F	> 80.0	> 50.0

The existing conditions Synchro model incorporated all available traffic data including turning movement counts for all road users, heavy vehicle percentages, signal phases, vehicle speeds, and lane configuration data. The results of the Existing Conditions Analysis can be found in **Table 2**. A detailed LOS summary can be seen in the attached reports, in **Appendix B**.

Table 2: Peak Hour Intersection LOS – Existing Conditions (2018)

ID	Intersection	Existing Conditions 2018				
		Traffic Control	A.M. Peak		P.M. Peak	
			Delay	LOS	Delay	LOS
1	Cuesta Dr & S. El Monte Ave	Traffic Signal	12.8	B	11.3	B
2	Cuesta Dr & Arboleda Dr	1-Way Stop	16.2	C	15.0	C
3	Cuesta Dr & Campbell Ave	All Way Stop	18.3	C	13.3	B
4	Cuesta Dr & S. Clark Ave	1-Way Stop	14.6	B	13.6	B
5	Cuesta Dr & Springer Rd	All Way Stop	N/A	F	N/A	F
6	Arboleda Dr & Campbell Ave	2-Way Stop	11.6	B	11.0	B
7	Arboleda Dr & Springer Rd	1 Way Stop	19.7	C	N/A	F
8	Campbell Ave & Rosita Ave	2-Way Stop	B	13.5	B	10.5

Notes:

- HCM LOS 2010 Methodology was used.
- Delay is presented in seconds per vehicle; LOS = Level of Service
- Delay is average vehicle delay.
- Delay for two-way stop-controlled intersections is reported as the worst movement’s delay.
- Delay for signalized intersections and all-way stop controlled intersections is average vehicle delay.
- N/A for a stop-controlled intersection is a reported delay greater than 50.
- N/A for a signalized intersection is a reported delay greater than 80.

As shown in **Table 2**, the existing conditions operational analysis indicated that all of the intersections, except for two, operate at LOS D or better. The two intersections with existing operations below LOS D during the peak hour periods of the day are:

- Cuesta Dr & Springer Rd                      LOS F in AM and PM
- Arboleda Dr & Springer Rd                      LOS F in the PM

#### *Queuing Analysis*

Queuing analyses were performed for the existing AM and PM peak hour periods using Synchro software (v.10) and its associated modelling Software; Sim Traffic (v.10) to determine the 95<sup>th</sup> percentile queue lengths for each approach of the study intersections.

Queue lengths are used to assess the amount of congestion that is predicted to occur at intersections, and determine if the queues will result in the blockage of adjacent intersections, major driveways, or other ingress/egress points. ‘Spill-over’ from one intersection into another intersection caused by excessive queuing can hinder the operating capacity of the overall network, creating ‘congestion swelling’ at various adjoining intersections. Intersection blocking can also result in vehicles illegally stopping in an intersection due to queues, which can create unnecessary delays for all movements. Blocked intersections create more dangerous conditions for all users, but especially for bicyclists and pedestrians who may have their paths of travel blocked, and may not be able to predict the actions of vehicles that are within the blocked intersections.

The purpose of the queuing analysis for this project is to assess the current queuing conditions, compare them to the predicted queuing of the project conditions to assess the impacts of the project, and determine if queues caused by the project conditions result in the blocking of signalized or all-ways stop controlled intersections in the Project Area (particularly, Cuesta Dr. at S. El Monte Ave., Cuesta Dr. at Campbell Ave., and Cuesta Dr. at Springer Rd.).

When reporting queue lengths, 95<sup>th</sup> percentile queues are used. These queues represent the ‘worst-case scenario’ that may be experienced on an average day for an intersection. Queue lengths were averaged between 5 separate hour-based model runs, with 15-minute seeding periods for the models, in order to ensure a higher accuracy of the results. Queueing models are simulations generated by Sim Traffic, based upon the Synchro models generated for the LOS analysis.

The results of the Existing Conditions Queuing Analysis can be found in **Table 3**. A detailed queuing summary can be seen in the attached reports, in **Appendix B**.

**Table 3: Peak Hour Intersection Queueing – Existing Conditions (2018)**

ID	Intersection	Existing Conditions 2018		
		Traffic Control	A.M. Queue (FT)	P.M. Queue (FT)
1	Cuesta Dr. & S. El Monte Ave.	Signal	205	144
2	Cuesta Dr & Arboleda Dr	1-Way Stop	38	33
3	Cuesta Dr & Campbell Ave	All Way Stop	118	132
4	Cuesta Dr & S. Clark Ave	1-Way Stop	57	54
5	Cuesta Dr & Springer Rd	All Way Stop	297	341
6	Arboleda Dr & Campbell Ave	2-Way Stop	46	47
7	Arboleda Dr & Springer Rd	1 Way Stop	126	91
8	Campbell Ave & Rosita Ave	2-Way Stop	59	47

Notes: table is labeled LOS but shows queue lengths

- *Queue lengths are reported in feet (ft.).*
- *Reported intersection queue lengths are the 95<sup>th</sup> percentile for the worst approach lane of the intersection.*
- *-E- for an intersection indicates that the queue lengths exceed the Project Area or reach a signalized intersection.*

As shown in **Table 3**, the queue lengths of the existing conditions do not generate a ‘spill-over’ condition for either the AM or PM peak hours for any intersections within the Project Area, when compared to the distances between intersections. The intersection with the largest queues is Cuesta Dr & Springer Rd at 341-FT in the PM peak hour but the closest adjacent intersection at Cuesta Dr & S Clark Ave is approximately 1,300-FT away. These queues reported are for the westbound approach in the AM peak hour, and the eastbound approach for the PM peak hour. These queues may generate temporary blockages of resident driveways. The extent of these queue lengths is related to the failing LOS and delay from each intersection.

*Speed Analysis*

Speed data was collected for streets within the Project Area. The locations where these speeds were collected, as well as the 85<sup>th</sup> percentile speeds that were observed, can be found in **Table 4**.

**Table 4: 85<sup>th</sup> Percentile Speed Collection Data within Project Area**

ID	Street	Cross-streets Between	Direction 1 (MPH)	Direction 2 (MPH)
A	Cuesta Dr	Arboleda Dr & Campbell Ave	<b>34.6 (EB)</b>	<b>34.2 (WB)</b>
B	Cuesta Dr	S. Clark Ave & Springer Rd	<b>36.1 (EB)</b>	<b>35.1 (WB)</b>
C	Arboleda Dr	Cuesta Dr & Campbell Ave	31.4 (EB)	27.5 (WB)
D	Arboleda Dr	Parma Wy & Springer Rd	33.8 (EB)	30.6 (WB)
E	Campbell Ave	Arboleda Dr & Glen Alta Dr	32.7 (NB)	31.4 (SB)

Notes:

- *Speeds shown represent 85<sup>th</sup> percentile speeds as calculated from consecutive 24-hour counts performed at the identified locations*
- *Speeds shown are per direction of travel*
- *EB = Eastbound, WB = Westbound, NB = Northbound, SB = Southbound)*
- ***Bolden*** *represents non-enforceable 85<sup>th</sup> percentile speeds*

Along Cuesta Drive, the primary project corridor, the 85<sup>th</sup> percentile speeds range between 34.2-MPH and 36.1-MPH in the eastbound and westbound directions. The current 25-MPH posted speed limit is not enforceable as it would be considered a Speed Trap.

The local streets studied also have 85<sup>th</sup> percentile speeds exceeding 25-MPH but are enforceable without the need for an Engineering & Traffic Survey (Speed Survey) by Prima Facie definition within the California Vehicle Code.

*Proposed Conditions Traffic Analysis*

Operational analyses were performed for the proposed condition AM and PM peak hour periods using Synchro software (v.10) to determine the LOS and delay for each of the study intersections with the proposed conditions. The analyses used the same methodology and inputs as those outlined in the Existing Traffic Analysis section, with the exception that the inputs changed to meet the proposed conditions outlined below. The delay limits for each LOS category remains the same as thresholds outlined in **Table 1**.

The proposed conditions included the following changes:

- All-way Stop control at Cuesta Drive at S. Clark Avenue
- All-way stop control at Arboleda Drive at Campbell Avenue
- All-way stop control at Rosita Avenue at Campbell Avenue
- Traffic calming along Cuesta Drive and Arboleda Drive to reduce 85<sup>th</sup> percentile speeds to an enforceable speed (<30 MPH) in the form of speed humps and speed tables
- Removal of the eastbound right-turn lane at Cuesta Drive at Springer Road

These conditions were modelled by changing the control types at the intersection with an all-way stop control conversion, reducing the modelled travel speeds to 25 MPH, and removing the eastbound right turn lane from the intersection of Cuesta Dr. at Springer Rd [which approach?].

The resulting intersection LOS for the study intersections are summarized in **Table 5**. A detailed LOS summary can be seen in the attached reports, in **Appendix B**.

Table 5: Peak Hour Intersection LOS - Existing Plus Project Conditions

ID	Intersection	Existing Conditions 2018				Existing Plus Project Conditions 2018					
		Traffic Control	A.M. Peak		P.M. Peak		Traffic Control	A.M. Peak		P.M. Peak	
			Delay	LOS	Delay	LOS		Delay	LOS	Delay	LOS
1	Cuesta Dr & S. El Monte Ave	Signal	12.8	B	11.3	B	Signal	12.8	B	11.3	B
2	Cuesta Dr & Arboleda Dr	1-Way Stop	16.2	C	15.0	C	1-Way Stop	16.2	C	15.0	C
3	Cuesta Dr & Campbell Ave	All-Way Stop	18.3	C	13.3	B	All-Way Stop	18.3	C	13.3	B
4	Cuesta Dr & S. Clark Ave	<b>1-Way Stop</b>	14.6	B	13.6	B	<b>All-Way Stop</b>	13.4	B	11.3	B
5	Cuesta Dr & Springer Rd	All-Way Stop	N/A	F	N/A	F	All-Way Stop	N/A	F	N/A	F
6	Arboleda Dr & Campbell Ave	<b>2-Way Stop</b>	11.6	<b>B</b>	11.0	<b>B</b>	<b>All-Way Stop</b>	8.8	<b>A</b>	8.1	<b>A</b>
7	Arboleda Dr & Springer Rd	1-Way Stop	19.7	C	N/A	F	1-Way Stop	19.7	C	N/A	F
8	Rosita Ave & Campbell Ave	<b>2-Way Stop</b>	<b>B</b>	13.5	<b>B</b>	10.5	<b>All-Way Stop</b>	8.9	<b>A</b>	7.9	<b>A</b>

Notes:

- *HCM LOS 2010 Methodology was used.*
- *Delay is presented in seconds per vehicle; LOS = Level of Service*
- *Delay is average vehicle delay.*
- *Delay for two-way stop-controlled intersections is reported as the worst movement’s delay.*
- *Delay for signalized intersections and all-way stop controlled intersections is average vehicle delay.*
- *N/A for a stop-controlled intersection is a reported delay greater than 50.*
- *N/A for a signalized intersection is a reported delay greater than 80.*
- **Bolden** indicates a change in LOS or change in control type.

As shown in **Table 5**, the proposed Project conditions operational analysis indicates that all intersections are expected to operate acceptably (LOS D or better) with the exception of the intersections of Cuesta Dr & Springer Rd and Arboleda Dr & Springer Rd. The LOS for these two intersections remain the same as the existing conditions.

As can be seen at the intersections of Cuesta Dr & Arboleda Dr and Cuesta Dr & Campbell Ave, the change in the modelling speed for the two corridors, as well as the inclusion of crosswalks at these intersections, do not have any measurable impact on the reported LOS or delay.

The Project improvements also increase operational characteristics for the intersections of Cuesta Dr & S. Clark Ave, Arboleda Dr & Campbell Ave, and Campbell Ave where the proposed Multi-Way STOP condition helps to better facilitate traffic improving the overall delay experienced by motorists at the intersections. Two of these intersections (Arboleda Avenue & Campbell Ave and Campbell Ave & Rosita Ave) experience a positive change in LOS from B to A, in both the AM and PM peak hours for the intersections. The intersection of Cuesta Dr & S. Clark Ave experienced a reduction in average vehicle delay, and the LOS remains the same for both AM and PM peak hours.

The introduction of the Multi Way STOP controls at these intersections reduces the delay of the minor street approaches. The major street approaches receive some increase in delay, due to the change from free-flowing traffic, where delay can only occur for left-turning vehicles, or be created by pedestrian conflicts, to stop controlled, where every vehicle must stop at the intersection, and give the right of way to vehicles already at the intersection from other approaches. The minor street approaches then receive a decrease in average vehicle delay, as their opportunity for making their movement increases. Due to the low volume of vehicles on both corridors (minus peak hours of the day), and the ratio of traffic volumes between the major and minor street approaches, the intersections experience an overall increase in operational conditions.

See **Appendix B** for detailed LOS summaries, and see **page 11** for the detailed discussion on the **Multi Way Stop Control Analysis** conducted as part of this report.

Queuing Analysis

Table 6: Peak Hour Intersection Queue - Existing Plus Project Conditions

ID	Intersection	Existing Conditions 2018			Existing Plus Project Conditions 2018		
		Traffic Control	A.M. Queue (FT)	P.M. Queue (FT)	Traffic Control	A.M. Queue (FT)	P.M. Queue (FT)
1	Cuesta Dr & S. El Monte Ave	Signal	205	144	Signal	208	151
2	Cuesta Dr & Arboleda Dr	1-Way Stop	38	33	1-Way Stop	39	34
3	Cuesta Dr & Campbell Ave	All-Way Stop	118	132	All-Way Stop	114	132
4	Cuesta Dr & S. Clark Ave	<b>1-Way Stop</b>	57	54	<b>All-Way Stop</b>	76	78
5	Cuesta Dr & Springer Rd	All-Way Stop	297	341	All-Way Stop	<b>752</b>	<b>-E-</b>
6	Arboleda Dr & Campbell Ave	<b>2-Way Stop</b>	46	47	<b>All-Way Stop</b>	56	53
7	Arboleda Dr & Springer Rd.	1-Way Stop	126	91	1-Way Stop	157	101
8	Campbell Ave & Rosita Ave	<b>2-Way Stop</b>	59	47	<b>All-Way Stop</b>	56	52

Notes:

- Queue lengths are reported in feet (ft.).
- Reported intersection queue lengths are the 95<sup>th</sup> percentile for the worst approach lane of the intersection.
- **-E-** for an intersection indicates that the queue lengths exceed the Project Area or reach a signalized intersection.
- **Bolden** indicates a significant change in queue length or change in control type.

As shown in **Table 6**, the intersection of Cuesta Dr & Springer Rd experiences a significant increase in queue lengths for both AM and PM peak hours as a result of the proposed lane removal. Both reported queues for the intersection under project conditions are for the eastbound approach. The PM peak hour queue length exceeds the length between the intersections with Springer Rd and S. Clark Ave on Cuesta Dr, which results in queues ‘spilling-over’ to the intersection of S. Clark Ave. and hindering operational conditions for that intersection. Both queue lengths also block minor drive-way access along the corridor, preventing left-turn ingress into the driveways from opposing traffic. These queues are not expected to frequently clear, and create impacts to the roadway operation that are not accounted for in the model by blocking these driveways.

The significant impact on these queues is a result of the existing failing LOS and delay for the intersection of Cuesta Dr at Springer Rd, in combination with the removal of the right-turn turn bay at the intersection as proposed.

## Stop Warrant Analyses

All-way Stop Warrant analyses were performed for the intersections identified in the Project area that would experience a change in intersection control type, from 1-way or 2-way stop controls to all-way stop controls. These intersections include:

- **4:** Cuesta Dr & S. Clark Ave
- **6:** Arboleda Dr & Campbell Ave
- **8:** Rosita Ave & Campbell Ave

Stop warrant analyses are based upon the 2014 California - Manual on Uniform Traffic Control Devices (CA-MUTCD).

**Section 2B.07 of the CA-MUTCD**, titled “Multi-Way Stop Applications,” identifies the criteria used to establish whether or not a multi-way stop control is warranted at an intersection. These criteria include:

- A. Where traffic control signals are justified, the multi-way stop is an interim measure that can be installed quickly to control traffic while arrangements are being made for the installation of the traffic control signal.
- B. Five or more reported crashes in a 12-month period that are susceptible to correction by a multi-way stop installation.<sup>1</sup>
- C. Minimum volumes:
  1. The vehicular volume entering the intersection from the major street approaches (total of both approaches) averages at least 300 vehicles per hour for any 8 hours of an average day; *and*
  2. The combined vehicular, pedestrian, and bicycle volume entering the intersection from the minor street approaches (total of both approaches) averages at least 200 units per hour for the same 8 hours, with an average delay to minor-street vehicular traffic of at least 30 seconds per vehicle during the highest hour; *but*
  3. If the 85th-percentile approach speed of the major-street traffic exceeds 40 mph, the minimum vehicular volume warrants are 70 percent of the values provided in Items 1 and 2.
- D. Where no single criterion is satisfied, but where Criteria B, C.1, and C.2 are all satisfied to 80 percent of the minimum values. Criterion C.3 is excluded from this condition.

The CA-MUTCD also identifies the following as optional criteria to consider for the all-way stop analyses:

- The need to control left turn conflicts
- The need to control vehicle/pedestrian conflicts near locations that generate high pedestrian volumes
- Locations where a road user, after stopping, cannot see conflicting traffic and is not able to negotiate the intersections unless conflicting cross traffic is also required to stop; and
- An intersection of two residential neighborhood collector (through) streets of similar design and operating characteristics where multi-way stop control would improve traffic operational characteristics of the intersection.

For the purpose of this study, the optional criteria will be considered.

All three intersections identified above were assessed with these criteria. Traffic volume, speed, and delay data were used from the counts from the LOS and queuing analyses of this report, and the crash data was provided by the City of Los Altos Police Department. See **Appendix A** for detailed count data and **Appendix D** for collisions data. The results of the analysis can be found in **Table 9**. See **Appendix C** for detailed stop warrant worksheets.

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<sup>1</sup> Such crashes include right-turn and left-turn collisions, as well as right-angle collisions.

## City of Los Altos, Stop Control Policies & Precedence

The City of Los Altos has an established STOP Sign Policy. The policy indicates that any intersection considered for a STOP sign within the City limits shall be analyzed through an engineering study, in accordance with the criteria established by the CAMUTCD. In addition, the City identifies the following criteria that may also be assessed in a stop-control analysis:

- **Unusual Intersection Geometrics** – Installation of a STOP sign may be justified where unusual intersection design or geometrics (horizontal and/or vertical curves, or intersection offsets) require the installation of a stop sign.
- **Visible Signs** – Installation of a STOP sign may be justified where visible signs of potential traffic problems exist, such as, skid marks, evidence of fixed object collisions, etc.
- **Volume Equilibrium** – Installation of a STOP sign may be justified if the intersection approach volumes for the minor/major legs near equilibrium (45%/55%).

The City also identifies that if the following criteria are met, the intersection may be considered to be in a residential area and the volume warrant thresholds may be reduced by 60% of the MUTCD values:

1. Both streets have residential frontages with existing 25 mph speed limits
2. Neither street is classified as a collector or arterial street within the General Plan Circulation Element
3. Both streets are two-lane streets
4. No existing stop sign or signal is located on the more heavily traveled street within a distance of 200 feet, minimum
5. Intersection with streets extending 500 feet or more away from the intersection on at least three sides
6. Installation of a multi-way stop is compatible with the overall traffic circulation needs for the residential area

City policy, which is supported by the CA-MUTCD policies, establishes that even if an intersection meets one or more of the criteria for a Multi-Way STOP control intersection, it does not necessarily justify the installation of the STOP signs. Los Altos Public Works Department reserves the right to exercise engineering judgment on a case-by-case basis to determine if the need for STOP signs is justified based on which criteria and considerations are satisfied. The purpose of this Multi-Way STOP control analysis is to identify which criteria are met, and provide recommendations to the City of Los Altos in regards to the installation of Multi-Way STOP controls.

According to City Policy, if the criteria of a STOP-control analysis is not met, the City may approve the installation of a STOP sign if the following findings may be made:

- Installation of the STOP sign will not prevent the street from operating consistent with its functional classification level (arterial, collector or local street) as defined in the General Plan Circulation Element.
- Installation of the STOP sign will not unduly restrict the delivery of emergency services to the surrounding neighborhood.
- Installation of the STOP sign will not create any potentially hazardous conflicts with driveways near the intersection.
- Installation of a STOP sign will not create any significant queuing at the intersection.
- Installation of a STOP sign is not expected to result in additional accidents at the intersection.
- The installation of a STOP sign will not adversely affect any adjacent controlled intersection.
- There are no other feasible methods to successfully address the traffic issues associated with the request for the stop sign.

In addition to the City's STOP Sign Policy, STOP signs are also identified in the City of Los Altos Neighborhood Traffic Management Program (2005) as a Category I Neighborhood Traffic Management Device. However, it identifies that a STOP sign may not be installed as a stand-alone traffic calming measure, used as a 'speed breaker,' but identifies that corridor traffic calming measures shall be installed in conjunction with STOP signs. It also identifies that STOP signs should only be installed when they meet the city policies, outlined above.

Table 7: Multi-Way STOP Establishment Criteria Findings (2019)

ID	Intersection	Criteria Met?						
		Existing Controls	A Interim to Traffic Signal	B <sup>2</sup> Crash History	C Volume Thresholds	D <sup>2</sup> Volume Thresholds 80%	E Qualitative Factors	All-Way STOP Installation Recommended
4	Cuesta Dr & S. Clark Ave	1-Way Stop	No	No	No	No	Yes	Yes
6	Arboleda Dr & Campbell Ave	2-Way Stop	No	No	No	No	Yes	Yes
8	Rosita Ave & Campbell Ave	1-Way Stop	No	No	No	No	Yes	Yes

As shown in **Table 7**, all three intersections analyzed for all-way stop controls met the criteria for Section E (*optional criteria*) as set forth by the CAMUTCD.

- **The intersection of Cuesta Dr & S. Clark Ave. meets Criteria E.B., in regards to pedestrian conflicts.** This intersection is identified as a safe route to school in the SRTS Maps for Blach Intermediate School and Covington Elementary School (*both updated October 2014*). Roadway geometry on Cuesta Dr requires pedestrians from S Clark Ave to cross Cuesta Dr and walk on the south side of the street. This requires students to cross the non-controlled, major approaches of the intersection. Community members identified this route as one of the more popular routes amongst Covington Elementary School students during public outreach events.
- **The intersection of Arboleda Dr & Campbell Ave meets Criteria E.B., in regards to pedestrian conflicts.** It is a part of the SRTS maps for Blach Intermediate School and Covington Elementary School. Covington Elementary School also has a back entrance on Arboleda Dr that the public has identified as a popular point of access. In order to access this entrance, any students east of Campbell Ave would need to cross Campbell Ave, and this intersection represents the most convenient location. This is supported by the pedestrian counts taken at the intersection (See **Appendix A** for detailed count data), which shows pedestrians crossing all legs of the intersection.
- **The intersection of Campbell Ave & Rosita Ave meets Criteria E.B., in regards to pedestrian conflicts.** This intersection is identified as a safe route to school in the SRTS Maps for Blach Intermediate School and Covington Elementary School, similar to Cuesta Dr & S. Clark Ave, and both route maps recommend crossing Campbell Ave, which is the uncontrolled corridor of the intersection. This intersection also has a Class I, shared use path terminate at its northwest corner. This may be considered unique geometry for the intersection and a pedestrian generator. Covington Elementary School Campus is also less than 500 feet from the intersection, which is considered a major, nearby pedestrian generator.

<sup>2</sup> Collision data provided by the City of Los Altos Police Department did not include collision types. As a conservative approach, it was assumed that all collisions reported, unless involving fixed objects, at the study locations were possible to be mitigated by the all-way stop control. Even with this assumption, the collision volumes were not high enough to trigger Warrants B or D for any intersection, in accordance with the CAMUTCD criteria, which means that the collision types do not affect the outcomes defined in this study.

### Data Collection Beyond the Project Area

As part of the data collection process, 24-hour vehicle volumes and 85<sup>th</sup> percentile speeds were collected at adjacent neighborhood corridors (Benvenue Ave, San Luis Ave, Paco Dr, and S. Clark Ave). This data was collected with the purpose of establishing a baseline of the existing conditions, which will be compared to the conditions after the project is completed. The data was also collected in order to inform the City of existing volumes and speeds on these corridors, for future considerations of traffic calming measures. The 85<sup>th</sup> percentile speeds and 24-hour volumes can be found in Table 8:

**Table 8: 85<sup>th</sup> Percentile Speed Collection Data within Project Area**

ID	Street	Cross-streets Between	Volume (VPD)	Direction 1 (MPH)	Direction 2 (MPH)
F	Paco Dr	Ramon Dr & Silva Dr	228	28.7 (EB)	28.7 (WB)
G	Paco Dr	S. Clark Ave & Springer Rd	443	33.4 (EB)	31.4 (WB)
H	S. Clark Ave	San Luis Ave & Benvenue Ave	1493	29.1 (NB)	30.0
I	San Luis Ave	Lerida Ave & S. El Monte Ave	259	25.6 (EB)	25.8 (WB)
J	San Luis Ave	S. Clark Ave & Amador Ave	186	27.7 (EB)	25.5 (WB)

**Notes:**

- *Speeds shown represent 85<sup>th</sup> percentile speeds as calculated from consecutive 24-hour counts performed at the identified locations*
- *Volumes represent vehicles per day as observed from consecutive 24-hour counts performed at the identified locations*
- *Speeds shown are per direction of travel*
- *Volumes shown are for both directions of travel*
- *EB = Eastbound, WB = Westbound, NB = Northbound, SB = Southbound)*
- ***Bolden*** *represents non-enforceable 85<sup>th</sup> percentile speeds*

The local streets studied beyond the project area also have 85<sup>th</sup> percentile speeds exceeding 25-MPH but are enforceable without the need for an Engineering & Traffic Survey (Speed Survey) by Prima Facie definition within the California Vehicle Code.

## Conclusions and Recommendations

The traffic analysis conducted herein provides insight on how the proposed Refined Concept Plan Line for the Cuesta Dr-Arboleda Dr traffic calming project would operate compared to the existing street conditions.

The Project Conditions result in acceptable operational level of service and delay at most locations, including locations where Multi-Way STOP controls are proposed. **Alta recommends implementing the following Project conditions throughout the project area:**

- Traffic calming measure along Cuesta Drive and Arboleda Drive including Speed Tables on Cuesta Drive and Speed Humps on Arboleda Drive
- Proposed crosswalks
- Multi-WAY STOP controls at Cuesta Dr & S. Clark Ave
- Multi-Way STOP controls at Arboleda Dr & Campbell Ave
- Multi-Way STOP controls at Rosita Ave & Campbell Ave

It is recommended that the City of Los Altos considers all three proposed Multi-Way STOP controls, per City policy.

The three proposed Multi-Way STOP controls are along the SRTS maps for two separate neighborhood schools, and implementing the proposed STOP controls will offer the benefit of deterring vehicles from using Arboleda Dr and Campbell Avenue as an alternative route from Cuesta Drive, once these traffic calming measures are installed. The balancing of traffic calming measures between Arboleda Drive, Campbell Avenue, and Cuesta Drive is designed so that the existing preferred routes for vehicles does not change due to the project conditions. The Multi-Way STOP control is part of this balanced traffic calming design and is predicted to help ensure the preferred circulation of traffic through the neighborhood.

Not all of the proposed Project improvements are recommended by this report without further investigation. Specifically, no changes to the intersection of Cuesta Dr & Springer Rd are recommended at this time due to impacts to intersection LOS and queue impacts. The analysis considered as part of this study that considers a reduction in the amount of eastbound lanes from two to one on the Cuesta Dr approach shows this option as not feasible. Alternative considerations for the Cuesta Dr & Springer Rd can include treatments such as traffic signal controls but this is an option not considered by the community engagement process for the Cuesta Dr-Arboleda Dr traffic calming project so this was not analyzed as part of this study.

**Implementing the proposed traffic calming measures along Cuesta Drive (Speed Tables spaced at ~400-FT) and Arboleda Drive (Speed Humps spaced at ~250-FT) is recommended in order to achieve the project goals of reaching an enforceable 85<sup>th</sup> percentile speed on Cuesta Drive and preserving Arboleda Drive from potential traffic spillover.** It is recommended that the City continues to monitor speeds and volumes at the study locations after the installation of the project in order to continue to assess the project impacts.