**Council Meeting: December 4, 2012**

**SUBJECT: Discussion and Possible Action Regarding Comprehensive School Traffic Study - STUDY ISSUE**

## BACKGROUND

The City Council approved a 2012 study issue to prepare a Comprehensive School Traffic Study (Attachment A – Study Issue DPW 09-01). This study per Council's revised direction as part of the 2012 budget issues process, focuses on evaluation of school traffic in Sunnyvale from an operational perspective and identifies potential traffic control improvements. The study identifies whether a set of actions exists beyond current traffic controls to improve school zone traffic flow and enhance pedestrian safety. The study maps school routes for Sunnyvale public elementary and middle schools per the California Manual of Uniform Traffic Control Devices (CA-MUTCD) methodology, and evaluates all school route intersections. Data inputs include existing intersection traffic control and approach signing and markings, traffic volume, collision information, speed limits, and roadway classification. Intersection improvement options are then developed using criteria based on guidance and requirements developed from a number of sources, including the (CA-MUTCD), the National Center for Safe Routes to Schools, and examples from other municipalities. The study presents recommendations for nine different types of traffic control modifications to improve pedestrian and bicycling conditions for school age travelers at all City public elementary and middle schools. Over 200 locations are recommended for further detailed evaluation (Attachment B).

This study is separate from a joint Council of Santa Clara Health Department/City of Sunnyvale project to evaluate travel behavior and interface with school administrations and parent groups to develop Transportation Demand Management (TDM) programs for City schools. This multi-year effort has a goal to establish school TDM programs in 80% of Sunnyvale schools.

## EXISTING POLICY

Land Use and Transportation Chapter, LT-5.4g Conduct periodic analyses of roadway facilities and collision data in order to assure traffic safety.

Land Use and Transportation Chapter, LT-5.4b Install permanent and painted pavement markings.

Land Use and Transportation Chapter, LT-5.3d Make appropriate hardware and software improvements to traffic signals.

**DISCUSSION**

The comprehensive school traffic study issue considers new or enhanced traffic controls and pedestrian or bike features on school routes (Attachment C). The methodology is based on school route maps that illustrate existing controls and features and applying in a Geographic Information Systems-based query format a comprehensive set of data on traffic volume, safety, and controls on a school-specific basis. Criteria have been established to determine locations for subsequent detailed engineering evaluation for the installation of new or enhanced traffic devices (controls, warning signs, lighted crosswalks, paddle signs, enhanced striping, etc.). These maps will be used to guide future detailed study and implementation of controls, and also for scoping of possible future Safe Routes to School or other grant applications to implement traffic improvements.

The study considers nine different types of school area traffic control improvements. These are listed below and some examples are illustrated in Attachment D:

1. Rectangular rapid flashing beacons
2. In pavement lighted crosswalks
3. Raised crosswalks/traffic calming
4. Marked/improved crosswalks at uncontrolled intersections
5. High visibility crosswalks at Yield controlled intersections
6. Stop control and improved crosswalks at marked crosswalks
7. Marked crosswalks at Stop controlled intersections
8. Improved traffic signals
9. Fifteen mile per hour school zones

The criteria developed for determining traffic control improvement recommendations contains some flexibility in making recommendations for crosswalk and traffic signal improvements. Depending upon the conditions cited for making a recommendation, the study makes a range of conservative to liberal options for the recommendations on the marking of crosswalks and improvement of existing traffic signals. For example, when considering whether to mark crosswalks at stop controlled intersections along school routes, the study identifies five different criteria for installation. These range from proximity (mark crosswalks at all stop controlled intersections within ½ mile of a school), to traffic volume (mark if volume is over 2,000 vehicles/day, VPD), to collision history and street classification, to marking of only three and four-way controlled intersections with a higher traffic volume (2,000 VPD). The result are options for marking high visibility crosswalks at a range of locations from two intersections to 257 intersections. Staff intends to apply the study results by conducting more detailed investigations beginning with the more conservative criteria results and moving to the more liberal. Location-specific investigations and judgments will need to be made to balance the in-the-field conditions with the resources available to install and maintain traffic controls.

The Comprehensive School Traffic Study provides a focused framework for moving forward on making school area traffic control improvements. It is anticipated that location specific investigations will advance over the next year utilizing funds approved by the City Council and contracting for professional services to conduct location-specific studies. Installation of improvements will primarily occur with grant funds that are pursued and secured based on completion of location-specific studies and development of competitive projects. Some items will be "just do it" items within the existing resources of the City and justified by the Comprehensive School Traffic Study, such as limited signing and striping improvements like crosswalks, yield bars, and warning signs. Existing operating budgets likely cannot cover the cost of widespread signing and striping improvements in the near term, however. Items such as higher cost lighted systems and traffic signal systems will require grant resources.

15 Mile Per Hour School Zones

At its February 28, 2012 meeting, the City Council considered the blanket establishment of 15 mile per hour school zones at qualifying locations per State law and acted not to enact the zones Citywide. This action still remains in the toolbox of school traffic controls, however. State law was modified in 2008 to allow local jurisdictions the authority to establish 15 mile per hour speed zones near schools. This is a certain exception in the California Vehicle Code (CVC) to the required method for establishing speed limits. Local authorities may adopt 15 mile per hour school area speed zones adjacent to schools in residential areas and on streets where the posted speed limit is 30 miles per hour or less. Reduced speeds can lower the rate and severity of collisions. An ordinance or resolution must be approved in support of creation of the 15 mile per hour zones

Staff has developed a criterion as part of the Comprehensive School Traffic Study to allow consideration of 15 mile per hour zones on those qualifying street segments that have documented higher traffic speeds. The criterion proposed is for those school area streets that have an 85 percentile speed greater than 25 miles per hour during school commute times, establishment of a 15 mile per hour zone would be recommended. Staff would utilize this criterion by conducting speed surveys to determine which school area streets are experiencing high traffic speeds, and may warrant corrective action. Any change in speed limits would still require Council action by resolution.

Bicycle and Pedestrian Advisory Commission Recommendation

The Sunnyvale Bicycle and Pedestrian Advisory Commission considered this item at its November 15, 2012 meeting and recommended that the City Council support the staff recommendation. During their discussion of the item, a BPAC member requested that the report be shared with school administrators. Staff will follow up to assure this happens.

## FISCAL IMPACT

Additional detailed study of locations will be done utilizing funding approved for preparation and implementation of the Comprehensive School Traffic Study. Implementation of traffic control modifications will be done within the confines of the Public Works operating budget, augmented by grant funding as it is secured for future school traffic safety projects.

## PUBLIC CONTACT

Public contact was made by posting the Council agenda on the City's official-notice bulletin board outside City Hall, at the Sunnyvale Senior Center, Community Center and Department of Public Safety; and by making the agenda and report available at the Sunnyvale Public Library, the Office of the City Clerk and on the City's Web site.

The Bicycle and Pedestrian Advisory Commission held a public hearing on a draft Report to Council at its November 15, 2012 meeting (Attachment E – Draft meeting minutes).

## ALTERNATIVES

1. Accept the Comprehensive School Traffic Study and direct staff to implement the study results.

2. Do not accept the Comprehensive School Traffic Study and direct staff to conduct additional analysis.

3. Do not accept the Comprehensive School Traffic Study and take no further action.

**RECOMMENDATION**

Staff and the Bicycle and Pedestrian Advisory Commission recommend Alternative No. 1: Accept the Comprehensive School Traffic Study and direct staff to implement the study results.

The Comprehensive School Traffic Study provides a useful tool for planning and implementing school area traffic control improvements, and positioning the City for future grant funding opportunities for school traffic safety projects.

Reviewed by:

Kent Steffens, Director, Public Works
Prepared by: Jack Witthaus, Transportation and Traffic Manager

Approved by:

Gary M. Luebbers
City Manager

**Attachments**

A. Study Issue DPW 09-01 Comprehensive School Traffic Study
B. Summary of Study Recommendations
C. Comprehensive School Traffic Study
D. School Traffic Control Devices
E. Draft Bicycle and Pedestrian Advisory Commission Meeting Minutes of November 15, 2012

2012 Council Study Issue

# DPW 09-01 Comprehensive School Traffic Study (Combined SI's School TDM Opportunities & School Zone Traffic Controls and Enforcement)

**Lead Department** Public Works

**History** **1 year ago** Deferred **2 years ago** Above the line

1. **What are the key elements of the issue? What precipitated it?**

This issue would comprehensively investigate and evaluate school traffic in Sunnyvale from both an operational and programmatic perspective. Three primary areas will be assessed: Transportation Demand Management (TDM), traffic controls, and traffic enforcement. Travel patterns and vehicle and pedestrian conditions at schools, including mode choice, alternative transportation resources, pedestrian patterns, location of pedestrian facilities (especially crosswalks), driving behaviors (especially speeding, right of way compliance and illegal turns), and speed controls will be assessed. For TDM, the study would look at appropriate levels of resources for the City to invest in encouraging effective TDM for schools within the City. The study would look at interfaces between school district and City operations, and opportunities for the City to invoke regulations or encourage TDM to school commuters. The outcome of the TDM evaluation would be recommendations for policy, actions, and resources for a transportation demand management program targeted at City schools. For traffic controls and enforcement, the study would identify whether a set of actions exists beyond current traffic controls and enforcement resources to improve school zone traffic flow and enhance pedestrian safety. This study would include a review of the applicability of CVC 22358.4 provisions regarding lowering of speed limits in school areas. The purpose of the study is to consider concerns that school area loading and unloading is chaotic in many areas and that a high proportion of parents drive their children to school. TDM, additional controls and/or enforcement may improve efficiency and safety.

As per Council action at the January 29, 2010 Study Issues Workshop, this study is the result of merging DPW 09-01, School Transportation Demand Management Opportunities, and DPW 10-08 School Zone Traffic Controls and Enforcement.

2. **How does this relate to the General Plan or existing City Policy?**

Land Use and Transportation Element Goal C3, Attain a transportation system that is effective, safe, pleasant and convenient.

3. **Origin of issue**

**Council Member(s)** Hamilton, Howe

**Board or Commission**

4. ***Staff effort required to conduct study*** Major

**Briefly explain the level of staff effort required**
This study would involve a citywide, school by school analysis of three significant topic areas - programmatic traffic demand actions, engineering/traffic control actions, and enforcement actions. Considerable field investigations, design efforts, and study of operating protocols would be involved. Siginficant coordination with school districts, individual schools, PTA's and other

stakeholders would be necessary. Such a comprehensive effort would require staffing augmentation by consultants and involvement of staff from several disciplines.

5. **Multiple Year Project?** Yes **Planned Completion Year** 2013

6. **Expected participation involved in the study issue process?**

| | |
|---|---|
| **Does Council need to approve a work plan?** | No |
| **Does this issue require review by a Board/Commission?** | Yes |
| **If so, which?** | Bicycle and Pedestrian Advisory Commission |
| **Is a Council Study Session anticipated?** | No |

7. **Briefly explain if a budget modification will be required to study this issue**

**Amount of budget modification required** 500000

**Explanation**
A total of 28 schools would be targeted by the study. Staff estimates 200 consultant hours per school would be required for data collection, meetings with stakeholders, and development of school-specific action plans. A budget modification of approximately $500,000 would be required. There would be staff time implications to the Department of Public Works and the Department of Public Safety.

8. **Briefly explain potential costs of implementing study results, note estimated capital and operating costs, as well as estimated revenue/savings, include dollar amounts**

**Are there costs of implementation?** Yes

**Explanation**
Should a TDM program be adopted, this could involve capital improvements to direct traffic or improve alternative transportation routes to schools. An ongoing program involving elements such as ridematching, walking school buses, or bike safety courses would require resources to manage the program, provide educational and promotional materials, etc. This study could also result in recommendations for new traffic controls at schools Citywide. This could represent a capital investment of considerable scope. The study could also result in recommendations for additional traffic enforcement or crossing guard resources, which can have a significant operating cost.

9. **Staff Recommendation**

**Staff Recommendation** Drop

**If 'Support', 'Drop' or 'Defer', explain**
Staff believes this issue is largely operational, and that a significant portion of the responsibility for school traffic should fall on school districts rather than the City. The City does, however, currently direct available resources to address school traffic issues as they arise. Also, the City, in partnership with the County Public Health Department, recently submitted a successful grant application for a comprehensive school traffic demand management program that will address many of the issues raised in the proposed study issue. This program will use a collaborative process to reach a minimum of 80% of Sunnyvale schools to design and implement transportation demand management programs and identify other measures that can be implemented within existing resource constraints. City staff from the Department of Public

Works and the Department of Public Safety are participating in the project, including site specific workshops with school staff and parents to design and implement transportation measures.

**Reviewed by**

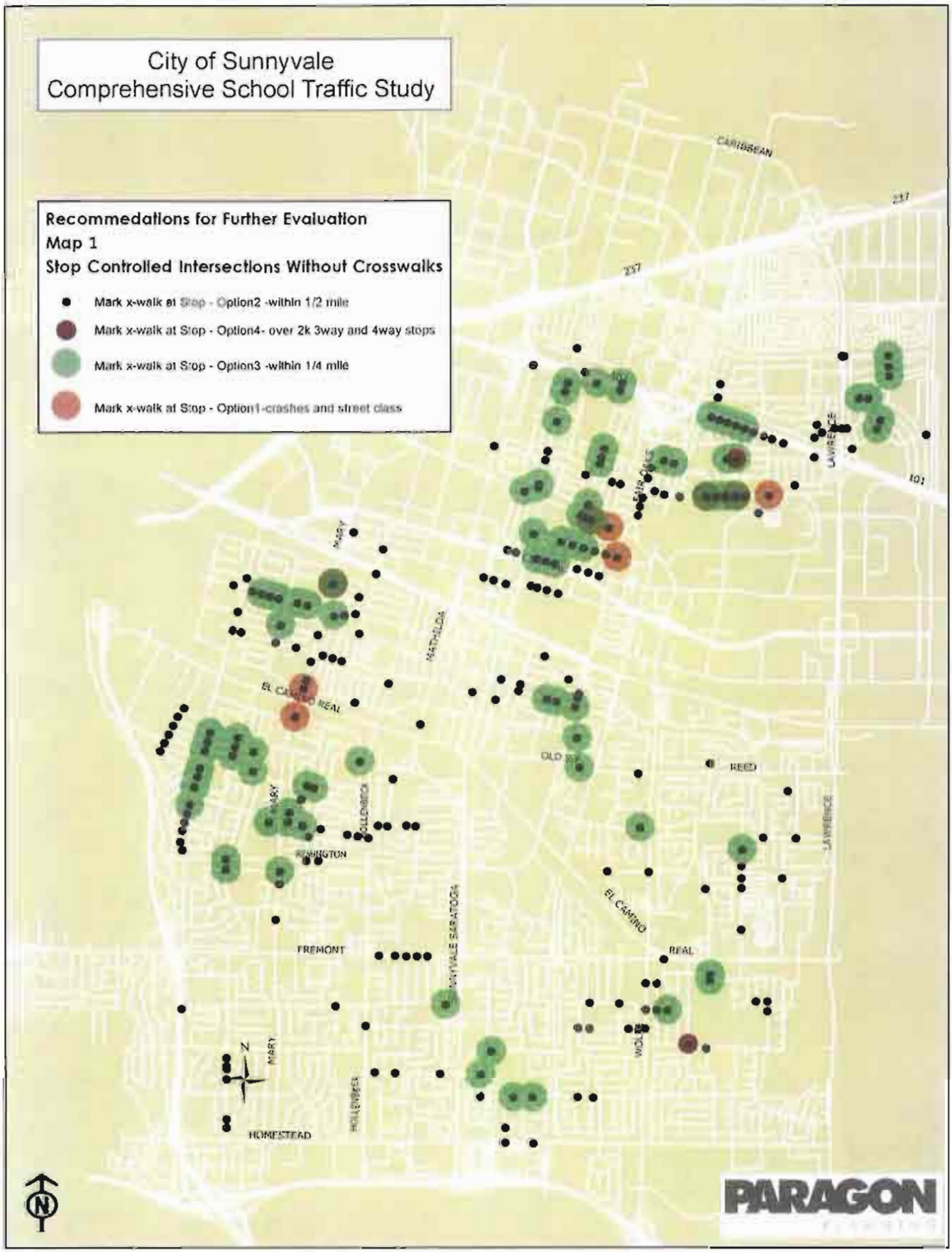
Kent Steffens 10-3-11

**Department Director** **Date**

**Approved by**

10-4-11

**City Manager** **Date**


City of Sunnyvale
Comprehensive School Traffic Study
Recommedations for Further Evaluation
Map 1
Stop Controlled Intersections Without Crosswalks
Mark x-walk at Stop - Option2 -within 1/2 mile
Mark x-walk at Stop - Option4- over 2k 3way and 4way stops
Mark x-walk at Stop - Option3 -within 1/4 mile
Mark x-walk at Stop - Option1-crashes and street class
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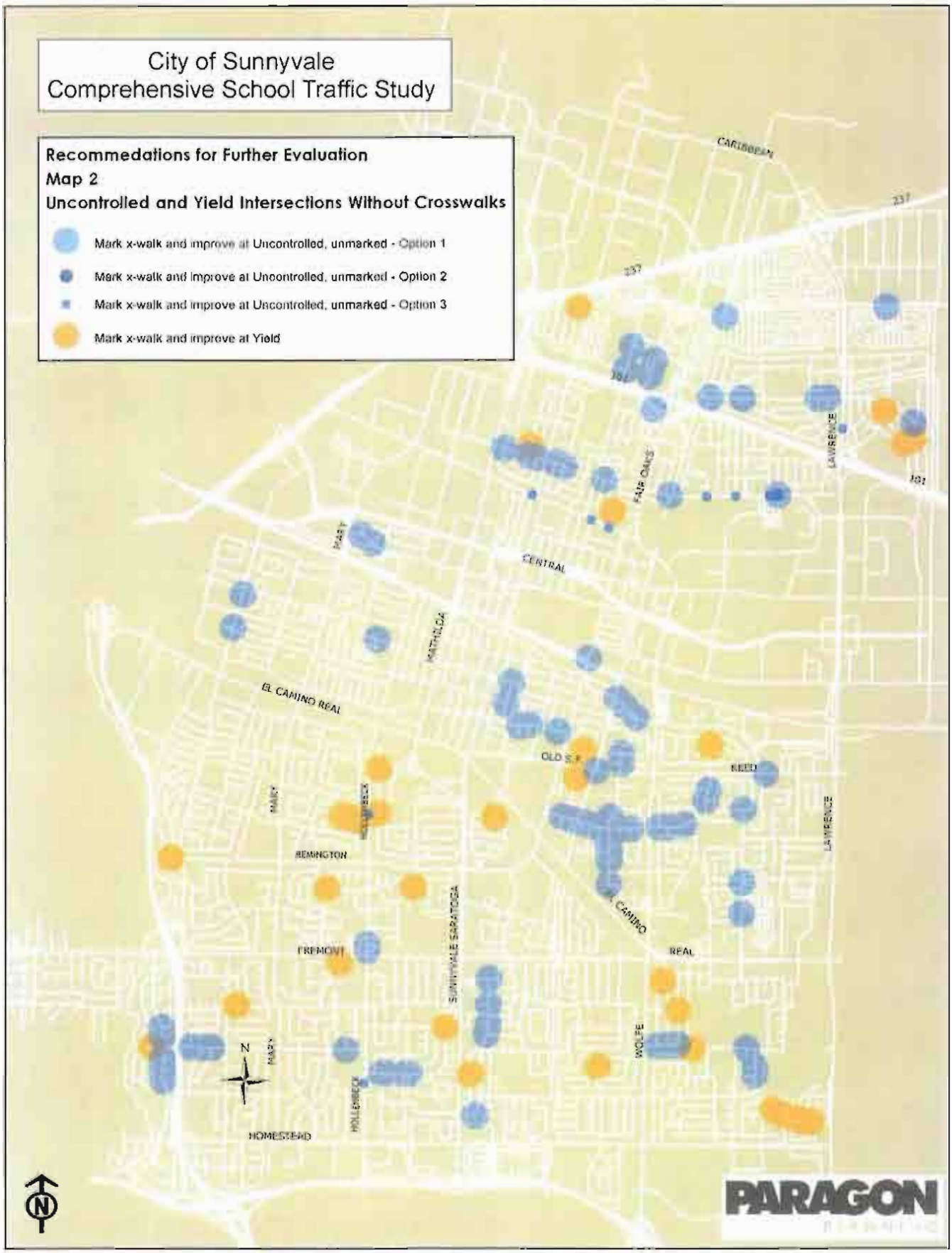
City of Sunnyvale
Comprehensive School Traffic Study
Recommedations for Further Evaluation
Map 2
Uncontrolled and Yield Intersections Without Crosswalks
Mark x-walk and improve at Uncontrolled, unmarked - Option 1
Mark x-walk and improve at Uncontrolled, unmarked - Option 2
Mark x-walk and improve at Uncontrolled, unmarked - Option 3
Mark x-walk and improve at Yield
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FAIR OAKS
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CENTRAL
MATHILDA
EL CAMINO REAL
OLD S.F.
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MARY
HOLLENBECK
REMINGTON
SUNNYVALE SARATOGA
FREMONT
WOLFE
HOMESTEAD
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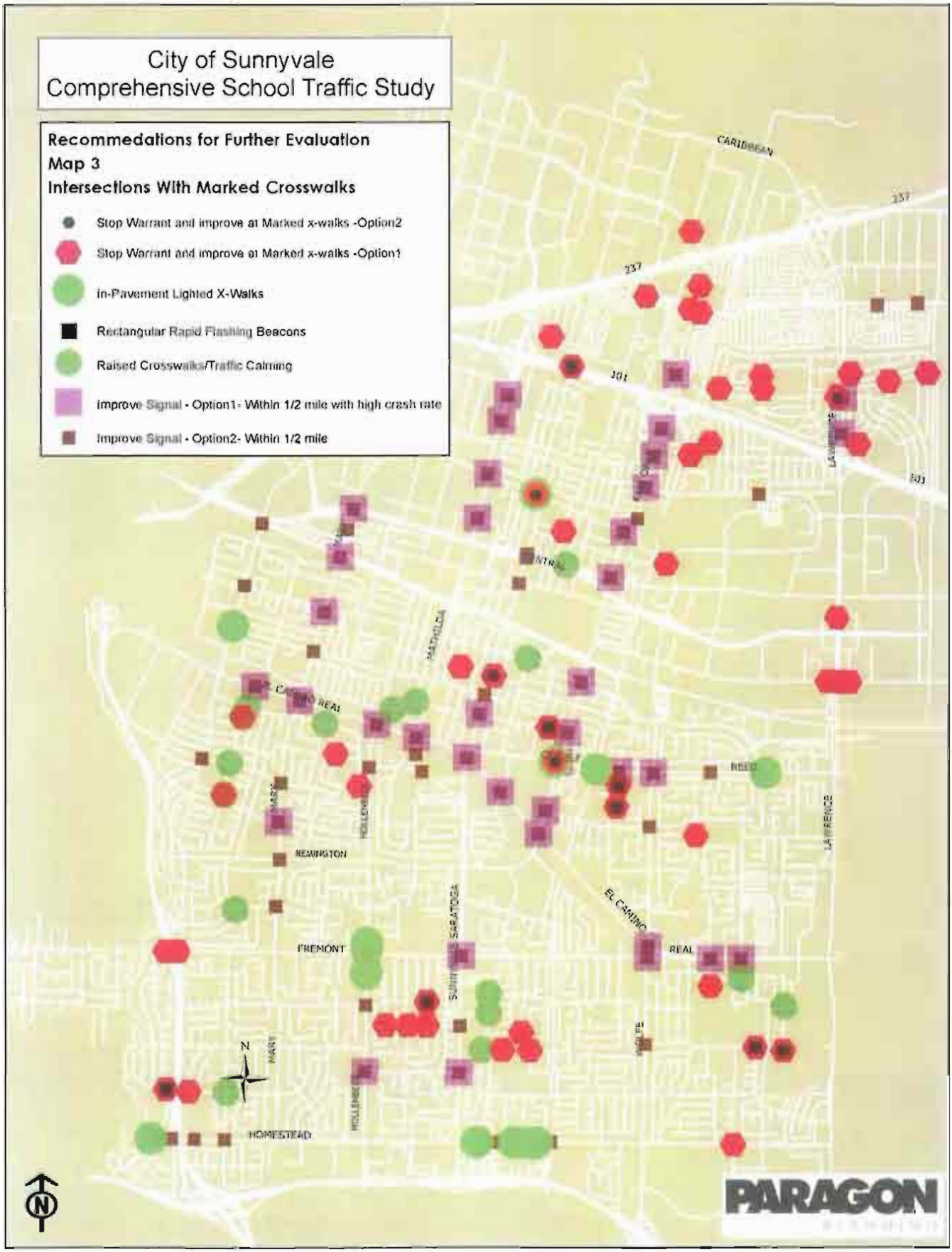
PARAGON


City of Sunnyvale
Comprehensive School Traffic Study
Recommedations for Further Evaluation
Map 3
Intersections With Marked Crosswalks
Stop Warrant and improve at Marked x-walks -Option2
Stop Warrant and improve at Marked x-walks -Option1
In-Pavement Lighted X-Walks
Rectangular Rapid Flashing Beacons
Raised Crosswalks/Traffic Calming
Improve Signal - Option1- Within 1/2 mile with high crash rate
Improve Signal - Option2- Within 1/2 mile
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SARATOGA
WOLFE
PARAGON


City of Sunnyvale
Comprehensive School Traffic Study
Recommedations for Further Evaluation
School Zone Speed Limits - 15 MPH
Muni Code Section 10.28.010
School
School Zone Speed Limit Change - 15 MPH
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# City of Sunnyvale

# Comprehensive School Traffic Study

November 2012

PARAGON
PLANNING

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# SECTION 1
# INTRODUCTION

The goal of the Sunnyvale Comprehensive School Traffic Study is to proactively and uniformly identify intersections for improvement and/or further study along routes used by children to walk and bike to school.

The study aggregated existing transportation data for all intersections along school routes within the City of Sunnyvale. The data included intersection traffic control, traffic volume, collision information, speed limit, roadway classification, and existing signs and markings.

Intersection treatment options and criteria for implementation were then compiled to serve as a tool box for implementation of enhanced traffic control along routes used by children to walk to school. This was developed using the guidance and requirements from the Manual on Uniform Traffic Control Devices (MUTCD), current research from the National Center for Safe Routes to School, the 2007 Sunnyvale

Pedestrian Safety and Opportunities Study, examples from other municipalities, along with a number of other sources. This is detailed in Section 2 of the report.

The implementation criteria in conjunction with the transportation data were used to uniformly identify locations for further analysis. This is detailed in Section 3 of the report. The tables in Section 3 describe the existing traffic control and markings, the enhanced treatment options for consideration, and the criteria used to identify possible candidate intersections. In some cases multiple criteria were applied, varying from broad to restrictive. This is the case when "Options" are specified. The tables are also meant to accompany both the city wide and the school specific maps.

Future work will include a more detailed evaluation of each intersection and will identify locations where pedestrian counts, turning movement counts, speed surveys, and gap analysis should be collected.

# SECTION 2
# IMPROVEMENT OPTIONS AND CRITERIA

There are many different ways that an intersection can be modified to improve the safety, comfort, and convenience for children and families walking to school. This section describes a number of these intersection treatments that may be relevant for school routes in Sunnyvale. For each treatment there is a description, recommended implementation criteria for Sunnyvale, MUTCD Guidance, and a description of other precedence or details to consider.

Engineering criteria for devices on school routes allows for a lot of discretion. This toolbox of treatments and information associated with each treatment is aimed at standardizing Sunnyvale's application of improvements comprehensively, rather than on a reactionary basis. This section of the plan relates to the City of Sunnyvale General Plan Policy Policy LT –5.11 – The City should consider enhancing standards for pedestrian facilities.

# Pavement Markings

Marked Crosswalks

Painted pedestrian crossings that specify proper locations for pedestrians to cross the street. Design may vary. Two parallel lines are standard. Ladder style is considered high–visibility.

Possible general criteria to consider in analysis:
–Speed limit under 40 mph
–Fewer than 4 lanes of traffic (unless there is a median island)
–Fewer than 12,000 ADT
–Over 20 student crossings in a peak hour.
–Consider crosswalks at intervals of 250 feet.

Recommended Implementation Criteria

Crosswalks should be marked at all intersections on established routes to a school where there is substantial conflict between motorists, bicyclists, and student movements; where students are encouraged to cross between intersections; where students would not otherwise recognize the proper place to cross; or where motorists or bicyclists might not expect students to cross.

Controlled Intersections (signal or stop): Use if a sidewalk exists on both sides of the street.

Uncontrolled Intersections: Must be convenient, accessible and in the direct pedestrian route to school.

Multi–lane or high volume marked crosswalks need substantial treatments so that crash risk does not increase.

Consider midblock crosswalks only if: there is adequate sight distance, protected intersection crossings are more than 200 feet away, the combination of traffic and pedestrian volume justify the installation, gap analysis shows that the frequency and adequacy of gaps in traffic is insufficient. Do not use in locations with speeds greater than 40 mph or Volumes greater than 20,000 vpd.

MUTCD Guidance

Section 3B –18 New marked crosswalks alone, without other measures designed to reduce traffic speeds, shorten crossing distances, enhance driver awareness of the crossing, and/or provide active warning of pedestrian presence, should not be installed across uncontrolled roadways where the speed limit exceeds 40 mph and either:
A. The roadway has four or more lanes of travel without a raised median or pedestrian refuge island and an ADT of 12,000 vehicles per day or greater; or
B. The roadway has four or more lanes of travel with a raised median or pedestrian refuge island and an ADT of 15,000 vehicles per day or greater.

Section 7A.03 Important to determine frequency and adequacy of gaps in the traffic stream. Use Traffic Control Devices Handbook Section 1A.11

Section 7C.02 Guidance: Crosswalks should be marked at all intersections on established routes to a school where there is substantial conflict between motorists, bicyclists, and student movements; where

Other Precedence/Details to Consider

Most installation guidance exempts school routes. ITE Recommended Practice on Design and Safety of Pedestrian Facilities Guidance for locations with

young pedestrians based on ped volume and ADT. Below are two examples from the table:
–Do not install with less than 15 peak hr ped crossings and under 7000 ADT
–2 lane street, with 25 peak hour peds requires 6,000 ADT to meet requirements.

FHWA Study (and Ped SOS):
–Below 12,000ADT there is no significant difference in safety between marked and unmaked for 2 lane roads.
–For multi lane roads and speeds over 40mph, don't install a crosswalk.
–Roads with speeds less than 35mph, and under 12,000 ADT could be a candidate for a marked crosswalk.

San Luis Obispo Installation Guidelines:
–40 or more peak hour peds, or 30 groupings of 2 or more during a 2 hr. period twice per day
– 85% speed below 40mph
– less than 3 travel lanes in each direction
– proper sight distance
– 2,700 ADT or more
– No controlled crosswalk within one block or 660ft

Sacramento Installation Guidelines:
–20 peds per peak hour or 60 per 4 hours
–located near a school with the nearest marked crosswalk at least 300 feet away.
– 250 feet of visibility
– If it meets the criteria, a different level of crosswalk is recommended per level.

Transportation Association of Canada:
– counts each youth, or disabled as 2 adults, and each senior as 1.5 when considering ped volume
they take crossing opportunity into account. ie. Analysis of vehicle gaps. And community size
There is a warrant chart based on number of peds and crossing opportunity.

Brookline Guidelines:
– Speed limit 40mph or less
– 20 or more pedestrians during peak hour of vehicle traffic. Less can be considered for child population
– ADT exceeds 3000
– A sidewalk or adequate shoulder exists on both sides of the roadway
– no other crosswalks within 200ft
– adequate sight distance

AASHTO Green Book.
No marked crosswalks on ADT greater than 9000 with 3 or more lanes of traffic.

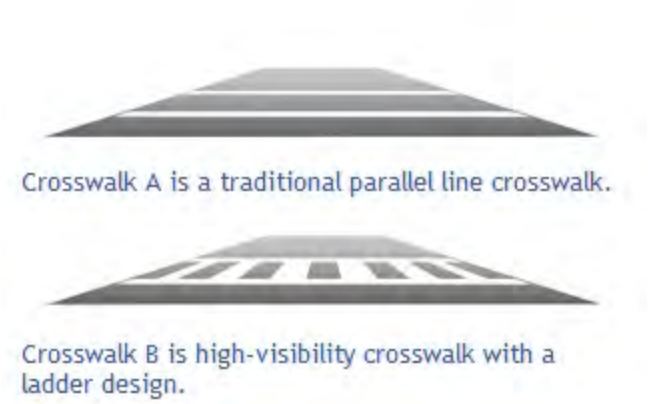


Image from National Center for Safe Routes to School. "Safe Routes to School Guide"

## Advanced Stop/Yield Lines

Advance stop or yield lines are used to indicate the optimal stopping point for vehicles. They encourage drivers to stop/yield further back from the crosswalk.

Recommended Implementation Criteria

Use to promote better visibility between pedestrians and motorists, and help to prevent multiple–threat collisions particularly at mid–block or uncontrolled crossings. Consider advanced stop or yield signs at marked crosswalks with more than one lane of traffic in one direction. Install yield lines and signs at all marked crosswalks along a school route.

MUTCD Guidance

Yield here for pedestrians signs and markings may be used in advance of a marked crosswalk that crosses an uncontrolled multi lane approach. Should be placed 20 to 50 feet in advance of the nearest crosswalk line.

Section 3B.16 – If used, stop and yield lines should be placed a minimum of 4 feet in advance of the nearest crosswalk line at controlled intersections, and at midblock crosswalks.

Stop lines at midblock signalized locations should be placed at least 40 feet in advance of the nearest signal indication (see Section 4D.14).

If yield or stop lines are used at a crosswalk that crosses an uncontrolled multi–lane approach, the yield lines or stop lines should be placed 20 to 50 feet in advance of the nearest crosswalk line, and parking should be prohibited in the area between the yield or stop line and the crosswalk (see Figure 3B–17)

California MUTCD Section 7C.03 – The SCHOOL pavement marking may be used to guide, warn, or regulate traffic. CVC 21368. Should not be used at controlled intersections.

Other Precedence/ Details to Consider

Michael Cynecki Study:

–Typical stop lines are 4 feet in advance of the crosswalk, 20 feet for a mid–block location.

Angled or offset stop lines can be considered at signaized intersections with a multi–lane approach to help improve sight distance in the right lane relative to pedestrians.

– Not used at most crosswalks

– Wider crosswalk or wider crosswalk lines can also be effective.

– They may occasionally be used at stop controlled intersections with unmarked crosswalks.

Brookline DPW Guidelines:

Install a stop line at all crosswalks at signalized intersections a min of 4 feet from the crosswalk line.

Heatherstone and Dale, at the SR 85 Ped Bridge

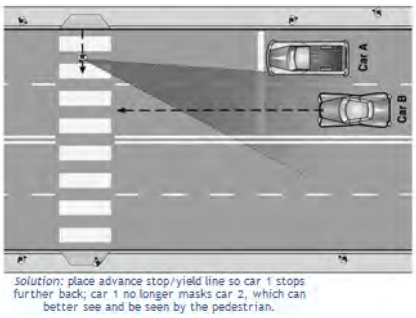



Image from National Center for Safe Routes to School. "Safe Routes to School Guide"

**Raised Crosswalk**

A speed table the width of a typical crosswalk stretching across an entire intersection, slowing traffic and keeping the crossing at grade with the sidewalk.

Recommended Implementation Criteria

Behaves more like a traffic calming device. Use traffic calming protocol for implementation.

Other Precedence/ data to consider

National Center for Safe Routes to School, Safe Routes to School Guide:

– Speed tables may increase the rate that vehicles yield to pedestrians

– Decreases vehicle speed.

Image from National Center for Safe Routes to School. "Safe Routes to School Guide"

# Signs, Lights, and Beacons

**Rectangular Rapid Flashing Beacons**

Rectangular rapid flashing beacons (RRFBs) are active warning devices used to alert motorists of crossing pedestrians at uncontrolled crossings. They remain dark until activated by pedestrians, at which point they emit a bright, rapidly flashing yellow light, which signals drivers to stop. Studies suggest that RRFBs can significantly increase yielding rates over standard pedestrian warning signs

Recommended Implementation Criteria

– Consider RRFB for midblock crosswalks or uncontrolled marked crosswalks.
– Should be installed on both the right and left side of the crosswalk.
– Do not install within 300 feet of a controlled crossing
– Consider for high volume and speed roadways
– Consider for ADT greater than 2000 ADT and 85% speed of 40mph or greater.

MUTCD Guidance

They are not currently included in the MUTCD, but jurisdictions can use them if they obtain approval from FHWA.

Other Precedence/Details to Consider

National Center for Safe Routes to School, Safe Routes to School Guidelines recommends their us at midblock or marked uncontrolled crosswalks.


Image from Pedestrian and Bicycle Information Center
Image Library, Photographer Michael Frederick

**Flashing Beacons and Overhead Signs**

Overhead signs are easier for drivers to see in cases where on-street parking, street trees, or other visual obstructions. Flashing beacons at a marked crosswalk may draw additional attention to the crosswalk. In a busy urban environment, flashing beacons may not provide much benefit, while on a rural road, they may increase driver awareness of the crosswalk. Unlike the Rectangular Rapid Flashing Beacons, these are not pedestrian activated.

MUTCD Guidance

Section 4L.03 contains information regarding Warning Beacons to provide active warning of a pedestrian's presence.

Support:Typical applications of Warning Beacons include the following:

A. At obstructions in or immediately adjacent to the roadway;

B. As supplemental emphasis to warning signs;

C. As emphasis for midblock crosswalks;

Recommended Implementation Criteria

– Consider placement at mid-block crossings but can be used at intersections with uncontrolled crossings.

– Do not install within 300 feet of a controlled crossing

– Consider overhead sign for all uncontrolled marked crosswalks along the school route with ADT over 6000.

– Add flashing beacon if there are 70–100 vehicles/peak school hour and 20 pedestrians per peak school hour.

–Consider beacons for ADT greater than 2000 ADT and 85% speed of 40mph or greater.

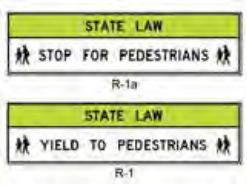
Other Precedence/Details to Consider

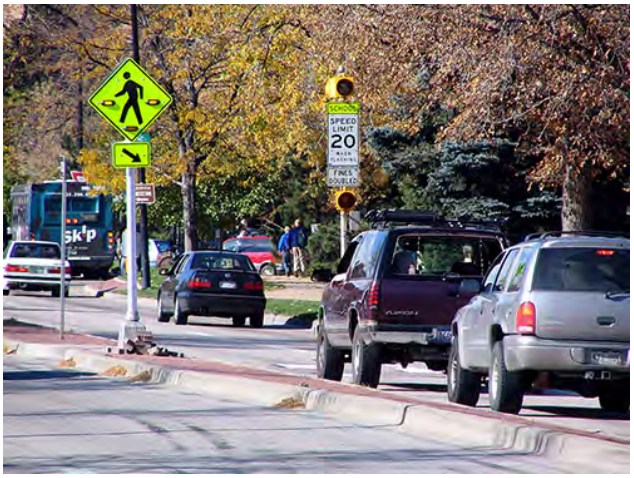
Los Angeles Guidelines**:**

– 300 feet of a controlled crossing

– Roadway to be crosssed is 50 feet or more.

– Point system based on peds more than 136 per peak hour (youth ect count as 2), vehicle volume greater than 2001 ADT, speed 85% of 40mph or faster, more than 7 lanes of traffic, and collision info.




Images from Pedestrian and Bicycle Information Center Image Library, Photographer Dan Burden

## In–Pavement Lights

Lights embedded in the crosswalk pavement that are activated when a pedestrian pushes a button or starts walking across the crosswalk.

Recommended Implementation Criteria
– Consider at uncontrolled marked crosswalks.
– ADT greater than 10,000
– Ped volumes greater than 100 per hour.
– 85% speed less than 35 mph
– 2 or more lanes of traffic in one direction.

MUTCD Guidance
Section 4N.02 contains information regarding In–Road Warning lights at crosswalks. They must be located at a marked crosswalk at an uncontrolled intersection. In–roadway lights may be installed at certain marked crosswalks, based on an engineering study or engineering judgment, to provide additional warning to road users.

Other Precedence/Data to Consider
San Luis Obispo Guidelines**:**
100 or more peds per hour, or
100 groupings of 2 peds for a 2hours period twice per day.
Ped volume after dark is 75 or more for any one hour or 25 or more for a period of any four hours during the night time.
10,000 ADT or more
85% of 35mph or less
2 or more lanes in one direction but 4 lanes or less in both directions.
Uncontrolled crossing

National Center for Safe Routes to School, Safe Routes to School Guidelines recommends them for use at some uncrontrolled marked crosswalks with high collision rate, high volumes and high speeds.

## In–Street Signs

These signs are usually installed at un–signalized pedestrian crossings to make the crosswalk more visible and increase driver yielding.

Recommended Implementation Criteria
Consider at uncontrolled marked crosswalks.
ADT greater than 10,000
Ped volumes greater than 100 per hour.
85% speed less than 35 mph
2 or more lanes of traffic in one direction.

MUTCD Guidance
Section 4N.02 contains information regarding In–Road Warning lights at crosswalks. They must be located at a marked crosswalk at an uncontrolled intersection. In–roadway lights may be installed at certain marked crosswalks, based on an engineering study or engineering judgment, to provide additional warning to road users.

Other Precedence/Data to Consider
San Luis Obispo Guidelines**:**
100 or more peds per hour, or
100 groupings of 2 peds for a 2hours period twice per day.
Ped volume after dark is 75 or more for any one hour or 25 or more for a period of any four hours during the night time.
10,000 ADT or more
85% of 35mph or less
2 or more lanes in one direction but 4 lanes or less in both directions.
Uncontrolled crossing

National Center for Safe Routes to School, Safe Routes to School Guidelines recommends them for use at some uncrontrolled marked crosswalks with high collision rate, high volumes and high speeds.

# Visibility and Crossing Distance

**Curb Extensions**

The extension of the curb out from the sidewalk and into the street, typically at an intersection. Curb extensions increase pedestrian visibility and decrease pedestrian exposure distance in the street, crossing time and vehicle turn speeds. Curb extensions can also provide additional space for curb ramps.

Recommended Implementation Criteria

Consider installation at intersections with: Wide streets, where visibility is limited, or on street parking is heavily utilized

Other Precedence/Data to Consider

This a traffic calming device. Use traffic calming criteria.

**Refuge Islands**

Raised medians in the middle of a street at an intersection, midpoint of the block, or continuously along street.

Recommended Implementation Criteria

Protect crossing pedestrians from oncoming traffic by serving as a barrier from motor vehicles, reduce crossing distance and allow pedestrians to focus on one direction of traffic at a time.

Best if used in streets with 4 lanes of traffic or more,

**Waiting areas/Stand Back Line**

Extra paving at busy crossings where large numbers of pedestrians can congregate before crossing the street without having to stand close to the busy street, or on landscaping, dirt or mud.

Recommended Implementation Criteria

Consider implementation if there are high volumes of pedestrians, waiting to cross streets with speeds of 35mph or greater.

**Reduce Corner Radius**

The reduction of a corner radius to produce a tighter turn results in decreases in turning speeds and improved motor vehicle and pedestrian site distances, and a shortened pedestrian crossing distance.

Recommended Implementation Criteria

Similar to criteria for a bulb out, but can be considered on roadways without the presence of on street parking. Consider installation at intersections with**:** Wide streets**,** where visibility is limited.

**Crossing Guards**

Adult crossing guards assist elementary age children while crossing the street. They help provide a gap in traffic where engineering studies show that adequate gaps do not occur naturally.

Recommended Implementation Criteria

Consider an adult crossing guards if the following conditions exist:

Uncontrolled Intersections:

no alternate controlled crossing within 600 feet; and

In urban areas where the vehicular traffic volume exceeds 350 during each of any two hours (not necessarily consecutive) in which 40 or more school pedestrians cross daily while going to or from school;

or In rural areas where the vehicular traffic volume exceeds 300 during each of any two hours (not necessarily consecutive) in which 30 or more school pedestrians cross daily while going to or from school.

Whenever the critical (85th percentile) approach speed exceeds 40 mph, the guidelines for rural areas should be applied.

Stop controlled Intersections:

Where the vehicular traffic volumes on undivided highways of four or more lanes exceeds 500 per hour during any period when the school pedestrians are going to or from school.

Signal Controlled Intersections:

Where the number of vehicular turning movements through the school crosswalk exceeds 300 per hour while school pedestrians are going to or from school; or

Where justified through analysis of the operations of the intersection.

MUTCD Guidance

The State of California provides criteria for the placement of adult school crossing guards in the MUTCD 2012, California Supplement. Section 7D.02 Adult Crossing Guards

# Intersection Control

**Stop Sign and Signal Installation**

The installation of a 2–way or 4–way stop sign at an intersection legally requires vehicles to stop before proceeding through an intersection. This provides an opportunity for pedestrians to cross. Traffic signals provide a protected phase where it is safe for pedestrians to cross.

Stop sign and signs installation must meet MUTCD/CA MUTCD warrants.

There are warrants for installing traffic control signals based on the volume of pedestrians. This is intended for situations where the vehicle volume is high creating excessive delay for pedestrians crossing.

Recommended Implementation Criteria

MUTCD

6000vpd/2500 vpd

3 collisions in 1 year

5 collisions in 2 years

must be classified residential collector

MUTCD Guidance

Other Precedence/Data to Consider

Brookline DPW Guidelines:

All signalized intersections shall have marked crosswalks on the roadway approaches that have sidewalks on both sides, or if adequate shoulder exists.

Crosswalk design should be two parallel lines 8–10 feet wide

Install a stop line all signalized intersections.

**Pedestrian Actuated Signal / Pedestrian Hybrid Beacons**

Traffic signals that are only activated when a pedestrian is present. They provide a controlled crossing for pedestrians without delaying motorists unnecessarily. They remain dark until activated by a pedestrian. Activation results in a sequence of amber and red beacon lights, which signal to drivers when to stop for crossing pedestrians and when to go again after pedestrians have cleared the crosswalk.

Recommended Implementation Criteria

No fewer than 20 pedestrian crossings per peak hour.

Inadequate gaps in vehicle traffic to allow for crossing.

Vehicle speed too high

excessive pedestrian delay

MUTCD Guidance

Chapter 4F contains information on Pedestrian Hybrid Beacons.

Support: A pedestrian hybrid beacon is a special type of hybrid beacon used to warn and control traffic at an unsignalized location to assist pedestrians in crossing a street or highway at a marked crosswalk.

**Treatments for Signalized Intersections**

The following should be considered at all signalized intersections along school routes: marked crosswalks on all legs, countdown pedestrian heads, ADA pedestrian push buttons, minimize pedestrian wait time, and increase pedestrian clearance intervals.

Recommended Implementation Criteria

Consider implementing these treatments at all signalized intersections along the school route.

MUTCD Guidance

4E.06 Pedestrian Intervals and Signal Phases requires this interval to be calculated based on a minimum walking speed of 3.5 feet per second. The additional time provided by an extended pushbutton press to satisfy pedestrian clearance time needs may be added to either the walk interval or the pedestrian change interval.

Guidance: Where pedestrians who walk slower than 3.5 feet per second, or pedestrians who use wheelchairs, routinely use the crosswalk, a walking speed of less than 3.5 feet per second should be considered in determining the pedestrian clearance time.

Other Precedence/Data to Consider

National Center for Safe Routes to School, Safe Routes to School Guidelines**:**

Some pedestrians, especially large groups of children, may need additional time to cross. Consideration should be given to increasing the pedestrian clearance interval if a pedestrian signal must accommodate pedestrians that need more time to cross. However, these considerations should be balanced against the potential for increased wait times between 'Walk' signals. The longer people must wait to cross the street, the more likely they will decide to cross against the signal. Pedestrian wait time can be reduced by shortening the overall signal cycle length or by providing an actuated demand–responsive pedestrian signal.

**Right–turn–on–red restrictions/Leading pedestrian interval**

Pedestrian and motor vehicle conflicts are a common occurrence when motorists get a green light and pedestrians get a green light or a "Walk" signal at the same time. While motorists are required to stop for pedestrians, conflicts are likely to occur. One solution is to install a "leading pedestrian interval" (LPI) which illuminates the pedestrian 'Walk' signal, while the motor vehicle signal remains red. The LPI gives pedestrians an opportunity to start walking and establish a presence in the crosswalk before motorists can begin their turn. The leading pedestrian interval is usually about three seconds or more. Prohibiting right–turn–on–red is also an option to reduce pedestrian/vehicle conflict.

Recommended Implementation Criteria

LPI should be considered for all signalized intersections along the school route.

MUTCD Guidance

MUTCD 4E.06 Pedestrian Intervals and Signal Phases

Sections 4E.09 through 4E.13

## References

National Center for Safe Routes to School, Safe Routes to School Guide
http://guide.saferoutesinfo.org/engineering/index.cfm

2009 MUTCD
http://mutcd.fhwa.dot.gov/kno_2009r1r2.htm

2012 California MUTCD Edition
http://www.dot.ca.gov/hq/traffops/signtech/mutcdsupp/ca_mutcd2012.htm

Crosswalks and Stop Lines
Michael J. Cynecki, PE

TCRP/NCHRP: Improving Pedestrian Safety at Unsignalized Crossings, Appendix F Pedestrian Crossing Installation Guidelines

Village of Brookline Department of Public Works, Crosswalk Policy and Design Guidelines

Sunnyvale Pedestrian Safety and Opportunities Study, 2007

Cover Image : BIcycle and Pedestrian Resource Center, Image Library, Photographer Dan Burden

# SECTION 3
# IMPROVEMENT IDENTIFICATION

There are sixteen schools with the City of Sunnyvale, most schools are within the Sunnyvale Unified School District, but some are within the Cupertino Unified School District or Santa Clara School District. Previous work by the Sunnyvale DPW, Division of Transportation and Traffic identified walking routes for all 16 schools.

For this study. all intersections on along these school routes were categorized by existing traffic control, signing and the presence of marked crosswalks. A data base and geographic information systems (GIS) map was then created for these intersections with information about speed limit, roadway classification, collision data, and traffic volume for each intersection.

The implementation criteria identified in Section 2 was applied to the intersection data collected in the GIS data base to identify specific locations where improvements should be considered.

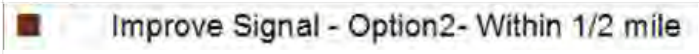
Traffic control devices typically have very specific rules standards for implementation. However, treatments for intersections along school routes allows for a significant amount of flexibility and use of engineering judgment. For this reason, many of the recommendations include a number of options using criteria that range from broad to conservative. For example, one query might identify all stop controlled intersections within a ½ mile of a school – this would be a broad option. A conservative option would include only stop controlled intersections within ½ mile of the school on collector streets, with more than 3 collisions in 5 years.

The information in this section details the type of intersection, the improvement to consider, the specific sql query that was used (so that it can be recreated in the future), the name of the GIS file, and the GIS map symbol (so that it can be identified on the accompanying maps)

# Signalized Intersections

| | |
|---|---|
| Improvements to Consider | **Install High Visibility Crosswalks, Advanced Stop Bar, Leading Pedestrian Interval, Countdown Pedestrian signal, ADA Push Buttons, Minimize Ped Wait time, Increase Ped Clearance Intervals** |
| Criteria | **Option 1**<br>**Signalized intersections within ½ mile of a school, on a school route, with 3 or more crashes in 1 year, or 5 or more crashes in 2 years.** |
| Query | "Control" = 'signalized' AND ( "Crash1yr" = 3 OR "Crash2yr" = 5 ) AND "School" <> 'not school' AND "In_half_mi" = 'yes' |
| Result file name | signals_for_Improvement.shp<br>38 intersections |
| Map Label and Symbol |  Improve Signal - Option1- Within 1/2 mile with high crash rate |

| # | Signalized Intersections – Option 1 | School |
|---|---|---|
| 1 | N MATHILDA AV & INDIO WY | Bishop |
| 2 | N MATHILDA AV & W MAUDE AV | Bishop |
| 3 | N MATHILDA AV & SAN ALESO AV | Bishop |
| 4 | ALMANOR AV & N MATHILDA AV & W AHWANEE AV | Bishop |
| 5 | OLD SAN FRANCISCO RD & GAIL AV | Braly |
| 6 | S MARY AV & W KNICKERBOCKER DR | Cumberland |
| 7 | HOLLENBECK AV & S PASTORIA AV & W EL CAMINO REAL | Cumberland |
| 8 | S MATHILDA AV & W EL CAMINO REAL | Ellis |
| 9 | S'VALE SARATOGA RD & S'VALE AV & E EL CAMINO REAL | Ellis |
| 10 | E OLIVE AV & S SUNNYVALE AV | Ellis |
| 11 | CEZANNE DR & E EL CAMINO REAL | Ellis |
| 12 | E REMINGTON DR & S FAIR OAKS AV & E EL CAMINO REAL | Ellis |
| 13 | S FAIR OAKS AV & IRIS AV | Ellis |
| 14 | OLD SAN FRANCISCO RD & S FAIR OAKS AV | Ellis |
| 15 | S FAIR OAKS AV & E OLIVE AV | Ellis |
| 16 | S FAIR OAKS AV & E EVELYN AV | Ellis |
| 17 | RAMP LAW SB N101 & LAWRENCE EX | Fairwood |
| 18 | SANDIA AV & LAKEHAVEN DR & LAWRENCE EX | Fairwood |
| 19 | RAMP N101 & N FAIR OAKS AV | Lakewood |
| 20 | REED AV & S WOLFE RD & OLD SAN FRANCISCO RD | Ponderosa |
| 21 | POPLAR AV & E EL CAMINO REAL | Ponderosa |
| 22 | HENDERSON AV & E EL CAMINO REAL | Ponderosa |
| 23 | E ARQUES AV & N FAIR OAKS AV | San Miguel |
| 24 | MAUDE AV & N FAIR OAKS AV | San Miguel |
| 25 | E DUANE AV & N FAIR OAKS AV | San Miguel |
| 26 | SAN CONRADO TE & N FAIR OAKS AV & CALIENTE DR | San Miguel |
| 27 | E AHWANEE AV & N FAIR OAKS AV | San Miguel |
| 28 | ALBERTA AV & HARWICK WY & SUNNYVALE SARATOGA RD | Stocklmeir |
| 29 | W FREMONT AV & SUNNYVALE SARATOGA RD | Stocklmeir |
| 30 | E FREMONT AV & S WOLFE RD | Stocklmeir |
| 31 | S WOLFE RDE EL CAMINO REAL | Stocklmeir |
| 32 | W EL CAMINO REAL & GRAPE AV | Vargas |
| 33 | W EL CAMINO REAL & S MARY AV | Vargas |
| 34 | S MARY AV & W WASHINGTON AV | Vargas |
| 35 | S MARY AV & W EVELYN AV | Vargas |
| 36 | N MARY AV & CX | Vargas |
| 37 | ALBERTA AV & HOLLENBECK AV | West Valley |
| 38 | W FREMONT AV & HOLLENBECK AV | West Valley |

| | |
|---|---|
| Improvements to Consider | **Install High Visibility Crosswalks, Advanced Stop Bar, Leading Pedestrian Interval, Countdown Pedestrian signal, ADA Push Buttons, Minimize Ped Wait time, Increase Ped Clearance Intervals** |
| Criteria | **Option 2**<br>**Signalized intersections within ½ mile of a school, on a school route.** |
| Query | "Control" = 'signalized' AND "School" <> 'not school' AND "In_half_mi" = 'yes' |
| Result file name | signals_for_Improvement_option2.shp<br>78 intersections |
| Map Label and Symbol |  |

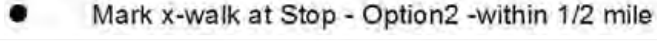
| | Signalized Intersections – Option 2 | School |
|---|---|---|
| 1 | N MATHILDA AV & INDIO WY | Bishop |
| 2 | N MATHILDA AV & W MAUDE AV | Bishop |
| 3 | N MATHILDA AV & SAN ALESO AV | Bishop |
| 4 | ALMANOR AV & N MATHILDA AV & W AHWANEE AV | Bishop |
| 5 | E CALIFORNIA AV & N SUNNYVALE AV & N SUNNYVALE AV* | Bishop |
| 6 | CX & N SUNNYVALE AV | Bishop |
| 7 | WCX & N SUNNYVALE AV | Bishop |
| 8 | E ARQUES AV & N SUNNYVALE AV | Bishop |
| 9 | N SUNNYVALE AV & E MAUDE AV | Bishop |
| 10 | OLD SAN FRANCISCO RD & GAIL AV | Braly |
| 11 | S BERNARDO AV & HEATHERSTONE WY | Cherry Chase |
| 12 | S MARY AV & TICONDEROGA DR | Cherry Chase |
| 13 | S MARY AV & W KNICKERBOCKER DR | Cumberland |
| 14 | S MARY AV & W REMINGTON DR | Cumberland |
| 15 | HEATHERSTONE AV & S MARY AV | Cumberland |
| 16 | DANFORTH DR & HOLLENBECK AV | Cumberland |
| 17 | HOLLENBECK AV & S PASTORIA AV & W EL CAMINO REAL | Cumberland |
| 18 | S MATHILDA AV & SENECA TE | Ellis |
| 19 | S MATHILDA AV & W EL CAMINO REAL | Ellis |
| 20 | TENNIS CENTER WY & S MATHILDA AV | Ellis |
| 21 | S'VALE SARATOGA RD & S'VALE AV & E EL CAMINO REAL | Ellis |
| 22 | E OLIVE AV & S SUNNYVALE AV | Ellis |
| 23 | S SUNNYVALE AV & E IOWA AV | Ellis |
| 24 | E MC KINLEY AV & S SUNNYVALE AV | Ellis |
| 25 | CEZANNE DR & E EL CAMINO REAL | Ellis |
| 26 | E REMINGTON DR & S FAIR OAKS AV & E EL CAMINO REAL | Ellis |
| 27 | S FAIR OAKS AV & IRIS AV | Ellis |
| 28 | OLD SAN FRANCISCO RD & S FAIR OAKS AV | Ellis |
| 29 | S FAIR OAKS AV & E OLIVE AV | Ellis |
| 30 | S FAIR OAKS AV & E EVELYN AV | Ellis |
| 31 | RAMP LAW SB N101 & LAWRENCE EX | Fairwood |
| 32 | SANDIA AV & LAKEHAVEN DR & LAWRENCE EX | Fairwood |
| 33 | TASMAN DR & BIRCHWOOD DR | Fairwood |
| 34 | BIRCHWOOD DR & LR | Fairwood |
| 35 | REAMWOOD AV & TASMAN DR | Fairwood |
| 36 | REAMWOOD AV & LR | Fairwood |
| 37 | RAMP N101 & N FAIR OAKS AV | Lakewood |
| 38 | S WOLFE RD & IRIS AV | Ponderosa |

| # | Signalized Intersections – Option 2 | School |
|---|---|---|
| 39 | REED AV & S WOLFE RD & OLD SAN FRANCISCO RD | Ponderosa |
| 40 | POPLAR AV & E EL CAMINO REAL | Ponderosa |
| 41 | SEQUOIA DR & REED AV | Ponderosa |
| 42 | HENDERSON AV & E EL CAMINO REAL | Ponderosa |
| 43 | E EVELYN AV & REED AV | Ponderosa |
| 44 | E ARQUES AV & N FAIR OAKS AV | San Miguel |
| 45 | MAUDE AV & N FAIR OAKS AV | San Miguel |
| 46 | N WOLFE RD & N FAIR OAKS AV | San Miguel |
| 47 | E DUANE AV & N FAIR OAKS AV | San Miguel |
| 48 | SAN CONRADO TE & N FAIR OAKS AV & CALIENTE DR | San Miguel |
| 49 | E AHWANEE AV & N FAIR OAKS AV | San Miguel |
| 50 | E DUANE AV & DE GUIGNE DR | San Miguel |
| 51 | ALBERTA AV & HARWICK WY & SUNNYVALE SARATOGA RD | Stocklmeir |
| 52 | CHEYENNE DR & CONNEMARA WY & SUNNYVALE SARATOGA RD | Stocklmeir |
| 53 | W FREMONT AV & SUNNYVALE SARATOGA RD | Stocklmeir |
| 54 | E HOMESTEAD RD & BLUE JAY DR | Stocklmeir |
| 55 | BLUEJAY DR & HOMESTEAD RD | Stocklmeir |
| 56 | E HOMESTEAD RD & N BLANEY AV | Stocklmeir |
| 57 | N BLANEY AV & HOMESTEAD RD | Stocklmeir |
| 58 | MARION WY & S WOLFE RD | Stocklmeir |
| 59 | E FREMONT AV & S WOLFE RD | Stocklmeir |
| 60 | S WOLFE RDE EL CAMINO REAL | Stocklmeir |
| 61 | S BERNARDO AV & W WASHINGTON AV | Vargas |
| 62 | W EL CAMINO REAL & GRAPE AV | Vargas |
| 63 | S BERNARDO AV & W EVELYN AV & E EVELYN AVE | Vargas |
| 64 | W EL CAMINO REAL & S MARY AV | Vargas |
| 65 | S MARY AV & W IOWA AV | Vargas |
| 66 | S MARY AV & W WASHINGTON AV | Vargas |
| 67 | S MARY AV & W EVELYN AV | Vargas |
| 68 | W CALIFORNIA AV & N MARY AV & BUENA VISTA AV | Vargas |
| 69 | N MARY AV & CX | Vargas |
| 70 | BARRANCA DR & HOMESTEAD RD | West Valley |
| 71 | BELLEVILLE WY & W HOMESTEAD RD | West Valley |
| 72 | MAXINE AV & HOMESTEAD RD | West Valley |
| 73 | RAMP S85 HOMESTEAD & W HOMESTEAD RD | West Valley |
| 74 | S BERNARDO AV & RAMP HOMESTEAD N85 & W HOMESTEAD * | West Valley |
| 75 | WRIGHT AV & W HOMESTEAD RD | West Valley |
| 76 | ALBERTA AV & HOLLENBECK AV | West Valley |
| 77 | HOLLENBECK AV & CASCADE DR | West Valley |
| 78 | W FREMONT AV & HOLLENBECK AV | West Valley |

# Stop Controlled – Without Marked X-Walks

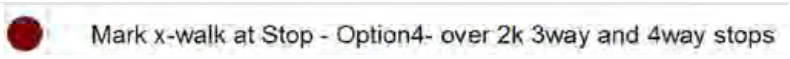
| | |
|---|---|
| Improvements to Consider | **Install High Visibility Crosswalks** |
| Criteria | **Option 1**<br>**Stop controlled intersections, along a school route, with no crosswalks, within ½ mile of a school, with 3 crashes in 1 year or 5 crashes in 2 years, on an arterial or collector** |
| Query | "Control" = 'stop' AND "School" <> 'not school' AND "In_half_mi" = 'yes' AND "Crosswalk" = ' ' AND ( "Crash1yr" = 3 OR "Crash2yr" = 5 ) AND ( "Collector" = 'yes' OR "Arterial" = 'yes') |
| Result file name | Install_Crosswalks_stopcontrol_Option1.shp<br>9 Intersections |
| Map Label and Symbol |  |

| # | Stop Controlled with no X-Walks Option 1 | School |
|---|---|---|
| 1 | ROOSEVELT AV & E MAUDE AV | Bishop |
| 2 | WORLEY AV & E MAUDE AV | Bishop |
| 3 | S MARY AV & BLAIR AV | Cumberland |
| 4 | E TAYLOR AV & N FAIR OAKS AV | San Miguel |
| 5 | E DUANE AV & SAN LUISITO WY | San Miguel |
| 6 | SANTA PAULA AV & E DUANE AV | San Miguel |
| 7 | E DUANE AV & SAN RAFAEL ST | San Miguel |
| 8 | W OLIVE AVS MARY AV | Vargas |
| 9 | CARSON DR & CARSON DR & S MARY AV | Vargas |

| | |
|---|---|
| Improvements to Consider | **Install High Visibility Crosswalks** |
| Criteria | **Option 2**<br>**Stop controlled intersections, along a school route, with no crosswalks, within ½ mile of a school** |
| Query | "Control" = 'stop' AND "School" <> 'not school' AND "In_half_mi" = 'yes' AND "Crosswalk" = ' ' |
| Result file name | stops_for_improvementbroad.shp<br>256 intersections |
| Map Label and Symbol |  |

| | |
|---|---|
| Improvements to Consider | **Install High Visibility Crosswalks** |
| Criteria | **Option 3**<br>**Stop controlled intersections, along a school route, with no crosswalks, within ¼ mile of a school** |
| Query | "Control" = 'stop' AND "School" <> 'not school' AND "quarter_mi" = 'Yes' AND "Crosswalk" = ' ' |
| Result file name | Install_Crosswalks_stopcontrol_Option3.shp<br>88 intersections |
| Map Label and Symbol |  Mark x-walk at Stop - Option3 -within 1/4 mile |

| # | Stop Controlled with no X-Walks Option 3 | School |
|---|---|---|
| 1 | STOWELL AV & W MAUDE AV | Bishop |
| 2 | E TAYLOR AV & N SUNNYVALE AV | Bishop |
| 3 | SCHROEDER ST & E ARQUES AV | Bishop |
| 4 | BORREGAS AV & E ARBOR AV | Bishop |
| 5 | W ARBOR AV & BORREGAS AV | Bishop |
| 6 | JACKSON ST & E ARQUES AV | Bishop |
| 7 | N BAYVIEW AV & E ARQUES AV | Bishop |
| 8 | BORREGAS AV & W FERNDALE AV | Bishop |
| 9 | N BAYVIEW AV & E TAYLOR AV | Bishop |
| 10 | BORREGAS AV & E HEMLOCK AV & W HEMLOCK AV | Bishop |
| 11 | BORREGAS AV & ALTURAS AV | Bishop |
| 12 | MORSE AV & E TAYLOR AV | Bishop |
| 13 | MORSE AV & E MAUDE AV | Bishop |
| 14 | ROOSEVELT AV & E TAYLOR AV | Bishop |
| 15 | MORSE AV & E MAUDE AV | Bishop |
| 16 | MORSE AV & E ARBOR AV | Bishop |
| 17 | ROOSEVELT AV & E MAUDE AV | Bishop |
| 18 | ALTURAS AV & E AHWANEE AV | Bishop |
| 19 | MORSE AV & WADDINGTON AV | Bishop |
| 20 | S FERNWOOD CL & MORSE AV | Bishop |
| 21 | N FERNWOOD CL & MORSE AV | Bishop |
| 22 | MORSE AV & E AHWANEE AV | Bishop |
| 23 | LUSTERLEAF DR & IRIS AV | Braly |
| 24 | S BERNARDO AV & LAFAYETTE & DR | Cherry Chase |
| 25 | S BERNARDO AV & JAMESTOWN DR | Cherry Chase |
| 26 | S BERNARDO AV & W CARDINAL DR | Cherry Chase |
| 27 | S BERNARDO AV & MORNINGSIDE DR | Cherry Chase |
| 28 | S BERNARDO AV & SUSAN WY & SUSAN WY | Cherry Chase |
| 29 | S BERNARDO AV & LYNN WY | Cherry Chase |
| 30 | S BERNARDO AV & PARKINGTON AV | Cherry Chase |
| 31 | ROCKEFELLER DR & LIME DR | Cherry Chase |
| 32 | W REMINGTON DR & LIME DR | Cherry Chase |
| 33 | SUSAN WY & GRAPE AV | Cherry Chase |
| 34 | LYNN WY & GRAPE AV | Cherry Chase |
| 35 | PARKINGTON AV & GRAPE AV | Cherry Chase |
| 36 | HEATHERSTONE AV & LOIS AV | Cherry Chase |
| 37 | LOIS AV & LYNN WY | Cherry Chase |
| 38 | MARANTA AV & W KNICKERBOCKER DR | Cherry Chase |
| 39 | S MARY AV & ROCKEFELLER DR | Cherry Chase |
| 40 | W KNICKERBOCKER DR & ITHACA AV | Cumberland |
| 41 | NORFOLK PINE AV & ITHACA AV | Cumberland |
| 42 | PEPPER AV & W KNICKERBOCKER DR | Cumberland |
| 43 | PEACH AV & HANOVER AV & HEATHERSTONE AV | Cumberland |
| 44 | HANOVER AV & PIPPIN AV | Cumberland |
| 45 | CUMBERLAND DR & QUETTA AV | Cumberland |
| 46 | E MC KINLEY AV & CENTRAL AV | Ellis |
| 47 | E MC KINLEY AV & KENMORE AV | Ellis |
| 48 | E MC KINLEY AV & S FAIR OAKS AV | Ellis |
| 49 | FIRLOCH AV & E OLIVE AVE OLIVE AV | Ellis |
| 50 | OLD SAN FRANCISCO RD & GRAND FIR AV | Ellis |
| 51 | BURNTWOOD AV & SANDIA AV & BURNTWOOD CT | Fairwood |
| 52 | SANDIA AV & CANDLEWOOD CT & CANDLEWOOD AV | Fairwood |
| 53 | FAIRWOOD AV & TUCSON AV | Fairwood |
| 54 | FAIRWOOD AV & CANDLEWOOD AV & TORRANCE AV | Fairwood |
| 55 | PALAMOS AV & FAIRWOOD AV | Fairwood |
| 56 | PECOS WY & FAIRWOOD AV | Fairwood |
| 57 | FAIRWOOD AV & PRESCOTT AV | Fairwood |
| 58 | MORSE AV & E WEDDELL DR | Lakewood |
| 59 | S CASCADE TE & YUKON DR & CASCADE DR | Nimitz |
| 60 | ELIZABETH WY & RAMON DR | Peterson |
| 61 | BRYANT WY & POPLAR AV | Peterson |
| 62 | BRYANT WY & POPLAR AV | Peterson |
| 63 | HENDERSON AV & LUPINE DR | Ponderosa |
| 64 | BERNAL AV & CALIENTE DR | San Miguel |
| 65 | CALIENTE & JOHANNA AV & DR | San Miguel |
| 66 | E DUANE AV & SAN LUISITO WY | San Miguel |
| 67 | SAN JUNIPERO DR & E AHWANEE AV | San Miguel |
| 68 | SAN MIGUEL AV & E DUANE AV | San Miguel |
| 69 | SAN MATEO CT & E AHWANEE AV | San Miguel |
| 70 | E DUANE AV & SAN PATRICIO AV | San Miguel |
| 71 | SAN PABLO AV & AMADOR AV | San Miguel |
| 72 | SAN PABLO AV & E AHWANEE AV | San Miguel |
| 73 | SANTA PAULA AV & E DUANE AV | San Miguel |
| 74 | SANTA PAULA AV & AMADOR AV | San Miguel |
| 75 | SANTA PAULA AV & E AHWANEE AV | San Miguel |
| 76 | SAN RAMON AV & E AHWANEE AV | San Miguel |
| 77 | BITTERN DR & HARWICK WY | Stocklmeir |
| 78 | DUNHOLME WY & BLACKHAWK DR & BLACKHAWK CT | Stocklmeir |
| 79 | INVERNESS WY & CROW CT | Stocklmeir |
| 80 | MARIANI DR & INVERNESS WY | Stocklmeir |
| 81 | CORRAL AV & W WASHINGTON AV | Vargas |
| 82 | W WASHINGTON AV & GABILAN AV | Vargas |
| 83 | W WASHINGTON AV & LANITOS AV | Vargas |
| 84 | W MC KINLEY AV & LEOTA AV | Vargas |
| 85 | W WASHINGTON AV & LIEBRE CT | Vargas |
| 86 | LOMETA AV & W WASHINGTON AV | Vargas |
| 87 | CARSON DR û CARSON DR & S MARY AV | Vargas |
| 88 | W WASHINGTON AV & MATADERO DR | Vargas |

| | |
|---|---|
| Improvements to Consider | **Install High Visibility Crosswalks** |
| Criteria | **Option 4**<br>**Stop controlled intersections, along a school route, with no crosswalks, within1/2 mile of the a school, with traffic volume greater than 2,000AWDT or on a collector street, 3-way or 4-way stop only** |
| Query | "Control" = 'stop' AND "School" <> 'not school' AND "Crosswalk" = ' ' AND "In_half_mi" = 'yes' AND( "ADT_EW" > 2000 OR "ADT_NS" > 2000 OR "Collector" = 'yes' ) AND( "Stop_Type" = '3-way' OR "Stop_Type" = '4-way' ) |
| Result file name | Install_Crosswalks_stopcontrol_Option4.shp<br>2 intersections |
| Map Label and Symbol |  |

| # | Stop Controlled with no X-Walks Option 4 | School |
|---|---|---|
| 1 | MARION WY & DUNFORD AV & NORMAN DR | Peterson |
| 2 | SANTA PAULA AV & AMADOR AV | San Miguel |

# Yield Controlled – Without Marked X-Walks

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|---|---|
| Improvements to Consider | **Install High Visibility Crosswalks, Advanced Yield Lines, Consider in-street signs** |
| Criteria | Yield controlled intersections, along a school route, with no crosswalks |
| Query | "Control" = 'yield' AND "Crosswalk" = ' ' AND "School" <> 'not school' |
| Result file name | yield_for_improvement.shp<br>32 intersections |
| Map Label and Symbol |  High Visiblity Crosswalks at Yield intersections |

| # | Yield Controlled with no X-Walks | School |
|---|---|---|
| 1 | MADRONE AV & W EAGLEWOOD AV | Bishop |
| 2 | E ARBOR AV & WORLEY AV | Bishop |
| 3 | W REMINGTON DR & ROBIN WY | Cherry Chase |
| 4 | POME AV & SHERATON DR | Cherry Chase |
| 5 | HOLBROOK PL & HAVERHILL DR | Cumberland |
| 6 | PYRUS WY & HAVERHILL DR | Cumberland |
| 7 | HAVERHILL DR & QUETTA CT & QUETTA AV | Cumberland |
| 8 | RUBIS DR & HARVARD AV | Cumberland |
| 9 | RESEDA DR & DANFORTH DR | Cumberland |
| 10 | SPINOSA DR & TEMPLETON CT & TEMPLETON DR | Cumberland |
| 11 | CEZANNE DR & BRAHMS WY | Ellis |
| 12 | BELLFLOWER AV & GRAND FIR AV | Ellis |
| 13 | GRAND FIR AV & BEGONIA WY | Ellis |
| 14 | ASTER CT & SEQUOIA DR & ASTER AV | Ellis |
| 15 | SOCORRO AV & FAIRWOOD AV | Fairwood |
| 16 | HAVENWOOD AV & TORRANCE AV & TUCSON AV | Fairwood |
| 17 | SOCORRO AV & HAVENWOOD AV | Fairwood |
| 18 | PLAZA DR & FULTON AV | Lakewood |
| 19 | YUKON DR & CHEYENNE DR | Nimitz |
| 20 | ELEANOR WY & RAMON DR | Peterson |
| 21 | ELIZABETH WY & NAVARRO DR | Peterson |
| 22 | ORIOLE AV & DUNFORD AV | Peterson |
| 23 | LOCHINVAR AV & SWIFT CT | Peterson |
| 24 | BENTON ST & LOCHINVAR AV & BENTON CT | Peterson |
| 25 | VIREO AV & LOCHINVAR AV | Peterson |
| 26 | WARBLER AV & LOCHINVAR AV & WARBLER WY | Peterson |
| 27 | LOCHINVAR AV & WAXWING AV | Peterson |
| 28 | HARWICK WY & ALBATROSS DR | Stocklmeir |
| 29 | HERON AV & FIFE WY | Stocklmeir |
| 30 | BEDFORD AV & THE DALLES | West Valley |
| 31 | FRANCHERE PL & CASCADE DR | West Valley |
| 32 | ALLISON WY & NELSON WY | West Valley |

# Uncontrolled – With Marked X-Walks

| | |
|---|---|
| Improvements to Consider | **Conduct Stop Warrant Studies**<br>**Install advanced Yield Lines and Yield Signs, and In-Street Signs** |
| Criteria | **Option 1**<br>**Uncontrolled marked crosswalks, on a school route** |
| Query | "Control" = ' ' AND ( "Crosswalk" = ' Yes' OR "Crosswalk" = 'yes' ) AND "School" <> 'not school' |
| Result file name | Stop_WarrantOption1.shp<br>51 intersections |
| Map Label and Symbol |  |

| # | Uncontrolled with X-Walks Option 1 | School |
|---|---|---|
| 1 | BORREGAS AV & W MAUDE AV | Bishop |
| 2 | N BAYVIEW AV & HAZELTON AV | Bishop |
| 3 | GAIL AV & GLADIOLA DR | Braly |
| 4 | GAIL AV & CALLA DR | Braly |
| 5 | JAMESTOWN DR & GRAPE AV | Cherry Chase |
| 6 | ANDOVER DR & GRAPE AV | Cherry Chase |
| 7 | CUMBERLAND DR & PIPER AV | Cumberland |
| 8 | ELMIRA DR & QUETTA AV | Cumberland |
| 9 | W MC KINLEY AV & S TAAFFE ST | Ellis |
| 10 | E MC KINLEY AV & SATURN TE | Ellis |
| 11 | E OLIVE AV & KENMORE AV | Ellis |
| 12 | OLD SAN FRANCISCO RD & BLACKWOOD TE | Ellis |
| 13 | KIFER RD & SAN ZENO WY | Ellis |
| 14 | KIFER RD & LAWRENCE STATION RD | Ellis |
| 15 | KIFER RD & GORDON AV | Ellis |
| 16 | BLAZINGWOOD DR & PECOS WY | Fairwood |
| 17 | BLAZINGWOOD DR & FAIRWOOD AV | Fairwood |
| 18 | FAIRWOOD AV & HH | Fairwood |
| 19 | HH & MANZANO WY | Fairwood |
| 20 | PED XING OVER CALABAZAS & MANZANO WY | Fairwood |
| 21 | DUNCAN AV & GARNER DR | Lakewood |
| 22 | BORREGAS AV & W WEDDELL DR | Lakewood |
| 23 | MORSE AV & PLENTY TE | Lakewood |
| 24 | MONTEGO TE & LE MANS TE | Lakewood |
| 25 | E JAVA DR & CROSSMAN AV | Lakewood |
| 26 | FAIR OAKS WY & N FAIR OAKS AV | Lakewood |
| 27 | ELDORADO MHP | Lakewood |
| 28 | HIDDENLAKE DR & HH | Lakewood |
| 29 | MEADOWLAKE DR & LAKEFAIR DR | Lakewood |
| 30 | HH & MEADOWLAKE DR | Lakewood |
| 31 | LAKEHAVEN DR & VELVET LAKE DR | Lakewood |
| 32 | OWEN SOUND DR & CHEYENNE DR | Nimitz |
| 33 | CHEYENNE DR & REVELSTOKE WY | Nimitz |
| 34 | CHEYENNE DR & SASKATCHEWAN DR | Nimitz |
| 35 | CASCADE DR & SELO DR | Nimitz |
| 36 | POPLAR AV & ROSALIA AV | Peterson |
| 37 | N TANTAU AV & HOMESTEAD RD | Peterson |
| 38 | DUNFORD WY & LOCHINVAR AV | Peterson |
| 39 | DUNFORD WY & THUNDERBIRD AV | Peterson |
| 40 | PONDEROSA AV & LANTANA DR | Ponderosa |
| 41 | N WOLFE RD & STEWART DR | San Miguel |
| 42 | SAN JUAN DR & BLYTHE AV | San Miguel |
| 43 | SAN JUNIPERO DR & ALVARADO AV | San Miguel |
| 44 | MIRALOMA WY & LAWRENCE EX | San Miguel |
| 45 | CHICKADEE CT & DUNHOLME WY | Stocklmeir |
| 46 | DUBLIN WY & FLOYD AV | Stocklmeir |
| 47 | CONDOR WY & DUNHOLME WY | Stocklmeir |
| 48 | RAMP FREMONT S85 & W FREMONT AV | West Valley |
| 49 | BELLEVILLE WY | West Valley |
| 50 | RAMP N85 & FREMONT AV | West Valley |
| 51 | CORONACH AV & HELENA DR | West Valley |

| | |
|---|---|
| Criteria | **Option 2**<br>**Uncontrolled marked crosswalks, within ½ mile of the school, classified as a collector street, or with over 2000 AWDT volumes** |
| Query | "Control" = ' ' AND "Crosswalk" = 'yes' AND "In_half_mi" = 'yes' AND( "ADT_EW" > 2000 OR "ADT_NS" > 2000 OR "Collector" = 'yes' OR "Arterial" = 'yes' ) |
| Result file name | Stop_WarrantOption2.shp<br>12 intersections |
| Map Label and Symbol |  |

| # | Uncontrolled with X-Walks Option 2 | School |
|---|---|---|
| 1 | BORREGAS AV & W MAUDE AV | Bishop |
| 2 | GAIL AV & GLADIOLA DR | Braly |
| 3 | GAIL AV & CALLA DR | Braly |
| 4 | E MC KINLEY AV & SATURN TE | Ellis |
| 5 | E OLIVE AV & KENMORE AV | Ellis |
| 6 | OLD SAN FRANCISCO RD & BLACKWOOD TE | Ellis |
| 7 | BORREGAS AV & W WEDDELL DR | Lakewood |
| 8 | LAKEHAVEN DR & VELVET LAKE DR | Lakewood |
| 9 | CASCADE DR & SELO DR | Nimitz |
| 10 | DUNFORD WY & LOCHINVAR AV | Peterson |
| 11 | DUNFORD WY & THUNDERBIRD AV | Peterson |
| 12 | BELLEVILLE WY | West Valley |

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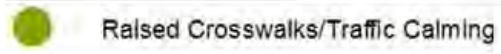
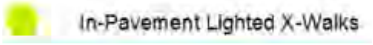
|---|---|
| Improvements to Consider | **Raised Crosswalk or other Traffic Calming** |
| Criteria | All marked crosswalks, within ½ mile of a school, on a residential street, with volume higher than 1000 AWDT, without a traffic signal. |
| Query | "Crosswalk" = 'yes' AND "School" <> 'not school' AND "In_half_mi" = 'yes' AND "Collector" = ' ' AND "Arterial" = ' ' AND "Control" <> 'signalized' AND "Expressway" = ' ' AND( "ADT_EW" > 1000 OR "ADT_NS" > 1000) |
| Result file name | raised_crosswalks_potential.shp<br>16 intersections |
| Map Label and Symbol |  |

| # | Uncontrolled with X-Walks – Raised X-walk/Traffic Calming | School |
|---|---|---|
| 1 | MORSE AV & E ARQUES AV | Bishop |
| 2 | JAMESTOWN DR & GRAPE AV | Cherry Chase |
| 3 | HEATHERSTONE AV & HEATHERSTONE WY & GRAPE AV | Cherry Chase |
| 4 | TICONDEROGA DR & LIME DR | Cherry Chase |
| 5 | ANDOVER DR & GRAPE AV | Cherry Chase |
| 6 | BLAIR AV & GRAPE AV | Cherry Chase |
| 7 | PEACH AV & BLAIR AV | Cumberland |
| 8 | ALL AMERICA WY & W OLIVE AV | Cumberland |
| 9 | CHARLES ST & W OLIVE AV | Cumberland |
| 10 | E WASHINGTON AV & S BAYVIEW AV | Ellis |
| 11 | HENDERSON AV & BRYANT WY | Peterson |
| 12 | THUNDERBIRD AV & LILLICK DR | Peterson |
| 13 | BITTERN DR & DUNHOLME WY | Stocklmeir |
| 14 | BITTERN DR & CONNEMARA WY | Stocklmeir |
| 15 | BITTERN DR & CARLISLE WY | Stocklmeir |
| 16 | WRIGHT AV & HELENA DR | West Valley |

| | |
|---|---|
| Improvements to Consider | **Rectangular Rapid Flashing Beacons** |
| Criteria | All uncontrolled intersections, within ½ of a school, with marked crosswalks, on a school route, on a collector street, [criteria says 85th % speed over 35mph and over 2000 ADT and 300 ft. distance from controlled crossing but data no or available in GIS. Distance from a controlled intersection was manually removed] |
| Query | "Control" = ' ' AND "In_half_mi" = 'yes' AND "School" <> 'not school' AND "Collector" = 'yes' AND "Crosswalk" = 'yes' |
| Result file name | RRFB.shp<br>8 intersections |
| Map Label and Symbol |  |

| # | Uncontrolled with X-Walks – RRFB | School |
|---|---|---|
| 1 | GAIL AV & GLADIOLA DR | Braly |
| 2 | GAIL AV & CALLA DR | Braly |
| 3 | E OLIVE AV & KENMORE AV | Ellis |
| 4 | BORREGAS AV & W WEDDELL DR | Lakewood |
| 5 | CASCADE DR & SELO DR | Nimitz |
| 6 | DUNFORD WY & LOCHINVAR AV | Peterson |
| 7 | DUNFORD WY & THUNDERBIRD AV | Peterson |
| 8 | BELLEVILLE WY | West Valley |

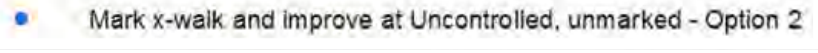
| | |
|---|---|
| Improvements to Consider | **In-Pavement Lighted Crosswalks** |
| Criteria | All uncontrolled intersections, with speed limit under 40mph, AWDT is over 10,000, on a school route, with in ½ mile of the a school, not on an arterial street. |
| Query | "Control" = ' ' AND "In_half_mi" = 'yes' AND "School" <> 'not school' AND "SPEED" <40 AND( "ADT_EW" > 10000 OR "ADT_NS" > 10000) AND "Arterial" <> 'yes' |
| Result file name | Inpavement_Lighted_Crosswalks_potential.shp<br>14 Intersections |
| Map Label and Symbol |  |

| # | Uncontrolled with X-Walks – In-Pavement Lighted Xwalks | School |
|---|---|---|
| 1 | BORREGAS AV & W MAUDE AV | Bishop |
| 2 | WINDSOR TE & HOLLENBECK AV | Cumberland |
| 3 | HOLLENBECK AV & YELLOWSTONE TE | Cumberland |
| 4 | OLD SAN FRANCISCO RD & BLACKWOOD TE | Ellis |
| 5 | OLD SAN FRANCISCO RD & IRONWOOD TE | Ellis |
| 6 | REED AV & BOUGAINVILLEA TE | Ponderosa |
| 7 | E HOMESTEAD RD & CUPERTINO SV BORDER | Stocklmeir |
| 8 | NORTHSKY SQ & HOMESTEAD RD | Stocklmeir |
| 9 | NORTHPOINT WY & HOMESTEAD RD | Stocklmeir |
| 10 | NORTHWIND SQ & HOMESTEAD RD | Stocklmeir |
| 11 | S BERNARDO AV & EATON TE | Vargas |
| 12 | W HOMESTEAD RD & STEVENS CREEK | West Valley |
| 13 | BEND DR & HOLLENBECK AV | West Valley |

# Uncontrolled – Without Marked X-Walks

| | |
|---|---|
| Improvements to Consider | **Install High Visibility Crosswalks, Advanced Yield Lines and In Street Signs, Conduct Stop Warrant Analysis** |
| Criteria | **Option 1**<br>**All uncontrolled intersections, with no crosswalks, with speed limit under 40mph, AWDT is over 2,000, under 12,0000, on a school route, with in ½ mile of a school.** |
| Query | "Control" = ' ' AND "Crosswalk" = ' ' AND "SPEED" < 40 AND "School" <> 'not school' AND "In_half_mi" = 'yes' AND (("ADT_EW" >2000 AND "ADT_EW" < 12000) OR ("ADT_NS" > 2000 AND "ADT_NS" < 12000) ) |
| Result file name | Uncontrolled_Unmarked_crosswalks.shp<br>85 intersections |
| Map Label and Symbol |  |

| N | Uncontrolled no X-Walks Option 1 | School |
|---|---|---|
| 1 | PINE AV & W DUANE AV | Bishop |
| 2 | MADRONE AV & W DUANE AV | Bishop |
| 3 | MANZANITA AV & W DUANE AV | Bishop |
| 4 | WAITE & E DUANE AV & AV | Bishop |
| 5 | KIRK AV & E DUANE AV | Bishop |
| 6 | E DUANE AV & MAPLE AV | Bishop |
| 7 | FAIR OAKS MOBILE LODGE & E AHWANEE AV | Bishop |
| 8 | PIERINO AV & IRIS AV | Braly |
| 9 | IRIS AV & HENRIETTA AV | Braly |
| 10 | GAIL AV & LINDEN AV | Braly |
| 11 | ANSHEN CT & GAIL AV | Braly |
| 12 | GAVELLO AV & GAIL AV | Braly |
| 13 | GAIL AV & DUFF CT | Braly |
| 14 | GAIL AV & GOLDENROD CT | Braly |
| 15 | KATON CT & IRIS AV | Braly |
| 16 | GAIL AV & CALICO CT | Braly |
| 17 | BLUE SAGE DR & GAIL AV | Braly |
| 18 | KOA CT & IRIS AV | Braly |
| 19 | WINDSOR TE & HOLLENBECK AV | Cumberland |
| 20 | HOLLENBECK AV & YELLOWSTONE TE | Cumberland |
| 21 | PESCADERO TE & W MC KINLEY AV | Cumberland |
| 22 | E IOWA AV & FLORA VISTA AV | Ellis |
| 23 | E MC KINLEY AV & FLORA VISTA AV | Ellis |
| 24 | MAXINE AV & E OLIVE AV & MAXINE AVE OLIVE AV | Ellis |
| 25 | E OLIVE AV & CARLYN CT | Ellis |
| 26 | E OLIVE AV & WILSON AV | Ellis |
| 27 | FOXTAIL DR & IRIS AV | Ellis |
| 28 | GOLDEN OAK DR & IRIS AV | Ellis |
| 29 | JACKPINE CT & IRIS AV | Ellis |
| 30 | E HENDY AV & N FAIR OAKS AV | Ellis |
| 31 | OLD SAN FRANCISCO RD & IRONWOOD TE | Ellis |
| 32 | E EVELYN AV & HOLLY TE | Ellis |
| 33 | E EVELYN AV & HOLLY TE | Ellis |
| 34 | E EVELYN AV & BRISTOL COMMONS APTS | Ellis |
| 35 | ADOBE WELLS MHP & TASMAN DR | Fairwood |
| 36 | OAK CREEK WY & SANDIA AV | Fairwood |
| 37 | HH & MORSE AV | Lakewood |
| 38 | TIMOR TE & MORSE AV | Lakewood |
| 39 | E WEDDELL DR | Lakewood |
| 40 | JENA TE & E WEDDELL DR | Lakewood |
| 41 | JENA TE & E WEDDELL DR | Lakewood |
| 42 | LAKEHAVEN TE & LAKEHAVEN DR | Lakewood |
| 43 | TASMAN DR & TASMAN CT | Lakewood |
| 44 | LAKEHAVEN DR & JADELAKE CT | Lakewood |
| 45 | LAKEMUIR DR & LAKEHAVEN DR | Lakewood |
| 46 | LAKEHAVEN DR & TWINLAKE DR | Lakewood |
| 47 | ALBERTA AV & OAK POINT TE | Nimitz |
| 48 | PINE PASS TE & ALBERTA AV | Nimitz |
| 49 | ALBERTA AV & RESTON TE | Nimitz |
| 50 | ALBERTA AV & RIORDEN TE | Nimitz |
| 51 | MARION WY & HAMPTON DR | Peterson |
| 52 | RAMON DR & MARION WY | Peterson |
| 53 | NAVARRO DR & MARION WY | Peterson |
| 54 | DUNFORD WY & SANDPIPER CT | Peterson |
| 55 | LOCHINVAR AV & DURHAM CT | Peterson |
| 56 | FIRTH CT & LOCHINVAR AV | Peterson |
| 57 | MAHOGANY LN & IRIS AV | Ponderosa |
| 58 | MESQUITE & PL & IRIS AV | Ponderosa |
| 59 | IRIS AV & LADIS CT | Ponderosa |
| 60 | SHASTA FIR WY & SEQUOIA DR | Ponderosa |
| 61 | ERICA DR & SEQUOIA DR | Ponderosa |
| 62 | HENDERSON AV & THUNDERBIRD MHP | Ponderosa |
| 63 | HENDERSON AV | Ponderosa |
| 64 | HENDERSON AV & GARDENIA WY | Ponderosa |
| 65 | REED AV & BOUGAINVILLEA TE | Ponderosa |
| 66 | E DUANE AV & N BRITTON AV | San Miguel |
| 67 | SANTA ROSALIA TE & E DUANE AV | San Miguel |
| 68 | KIRBYHILL WY & BITTERN DR | Stocklmeir |
| 69 | DUBLIN WY & BITTERN DR | Stocklmeir |
| 70 | CROMART CT & BITTERN DR | Stocklmeir |
| 71 | BITTERN DR & CARLOW CT | Stocklmeir |
| 72 | BITTERN DR & BERWICK WY | Stocklmeir |
| 73 | S BERNARDO AV & EATON TE | Vargas |
| 74 | S BERNARDO AV & DURAN TE | Vargas |
| 75 | W CALIFORNIA AV & LA MESA TE | Vargas |
| 76 | BELMONT TE & LA MESA TE & W CALIFORNIA AV | Vargas |
| 77 | BELLEVILLE WY & BELLINGHAM WY | West Valley |
| 78 | BELLEVILLE WY & BELLEVILLE CT | West Valley |
| 79 | BELLEVILLE WY & BELLEVILLE PL | West Valley |
| 80 | BELLEVILLE LN & BELLEVILLE WY | West Valley |
| 81 | BELLEVILLE WY | West Valley |
| 82 | ENDERBY WY & THE DALLES | West Valley |
| 83 | CORONACH AV & THE DALLES | West Valley |
| 84 | DOMINION AV & THE DALLES | West Valley |
| 85 | THE DALLES & NEWFOUNDLAND DR | West Valley |

| | |
|---|---|
| Improvements to Consider | **Install High Visibility Crosswalks, Advanced Yield Lines and In Street Signs, Conduct Stop Warrant Analysis** |
| Criteria | **Option 2**<br>**All uncontrolled intersections, with no crosswalks, with speed limit under 40mph, AWDT is over 2,000, under 12,0000, on a school route, with in ½ mile of a school, with 3 collisions in 1 year or 5 collisions in 2 years.** |
| Query | "Control" = ' ' AND "Crosswalk" = ' ' AND "SPEED" < 40 AND "School" <> 'not school' AND( "Crash1yr" = 3 OR "Crash2yr" = 5 )AND "In_half_mi" = 'yes' AND (("ADT_EW" >2000 AND "ADT_EW" < 12000) OR ("ADT_NS" > 2000 AND "ADT_NS" < 12000) ) |
| Result file name | Uncontrolled_Unmarked_crosswalks_Option2.shp<br>1 intersection |
| Map Label and Symbol |  |

| # | Uncontrolled no X-Walks Option 2 | School |
|---|---|---|
| 1 | SANTA ROSALIA TE & E DUANE AV | San Miguel |

| | |
|---|---|
| Improvements to Consider | **Install High Visibility Crosswalks, Advanced Yield Lines and In Street Signs, Conduct Stop Warrant Analysis** |
| Criteria | **All 1-way or 2-way stops , with speed limit under 40mph, on a school route, not on an arterial, with in ½ mile of a school, with 3 collisions in 1 year or 5 collisions in 2 years.** |
| Query | ( "Stop_Type" = '1-way' OR "Stop_Type" = '2-way' ) AND "SPEED" < 40 AND "School" <> 'not school' AND "In_half_mi" = 'yes' AND( "Crash1yr" = 3 OR "Crash2yr" = 5 ) AND "Arterial" <> 'yes' |
| Result file name | Uncontrolled_Unmarked_crosswalks_Option3.shp<br>9 intersections |
| Map Label and Symbol |  |

| # | Uncontrolled no X-Walks Option 3 | School |
|---|---|---|
| 1 | W MAUDE AV & N MURPHY AV | Bishop |
| 2 | ROOSEVELT AV & E MAUDE AV | Bishop |
| 3 | WORLEY AV & E MAUDE AV | Bishop |
| 4 | HARVARD AV & HOLLENBECK AV | Cumberland |
| 5 | LAWRENCE EX & LAKEWOOD DR & BRIDGEWOOD WY | Fairwood |
| 6 | E DUANE AV & SAN LUISITO WY | San Miguel |
| 7 | SANTA PAULA AV & E DUANE AV | San Miguel |
| 8 | E DUANE AV & SAN RAFAEL ST | San Miguel |
| 9 | GRAND COULEE AV & HOLLENBECK AV | West Valley |