



## Memorandum

To: Habib Motlagh, City of Perris  
Nathan Perez, City of Perris

From: Dilesh Sheth, P.E., T.E. *Dilesh Sheth*

Date: March 22, 2016

Re: TTM36647 and TTM36648 Safety and Roadway Improvements along Evans Road



The purpose of this memo is to provide recommendations for roadway and safety improvements for Evans Road for Stratford Ranch Residential (TTM36647 and TTM36648). Phase 1 of development of Stratford Ranch is the proposed TTM36648. Phase 2 is TTM36647. The recommendations are based on the Traffic Impact Analysis conducted for TTM36647 and TTM36648 along with an analysis of the current safety conditions of Evans Road, particularly in regards to pedestrians.

### Existing Conditions

#### Evans Road

Currently, Evans Road is a 2 to 3 lane in each direction primary arterial with a 14' raised median. It connects north with Lasselle Street in the City of Moreno Valley, a 2 lane in each direction arterial with an 18' raised median. According to the Stratford Ranch (TTM36648) Traffic Impact Analysis, Evans Road, near the location of Rancho Verde High School, currently carries approximately on average 21,000 vehicles daily. The current speed limit is 55 MPH on Evans Road in the City of Perris between Ramona Expressway and the City limit and 50 MPH north of Rancho Verde High School in the City of Moreno Valley. The City of Perris has adopted a master bike plan for the City of Perris, which includes implementing bike lanes along Evans Road. The City of Moreno Valley has designated between the City limit and Via De Anza as a bike route. There are currently no bike lanes along Evans Road between Ramona Expressway and Via De Anza. The primary land use or zoned land use along Evans Road is residential, except at the intersection with Ramona Expressway, where there is a future commercial development planned.

#### Rancho Verde High School & Pedestrians

RK Engineering performed the Rancho Verde High School Traffic/Circulation Review in October 2009. The school was originally designed for a student population of approximately 2,400 students but in 2009, the student population was approximately 3,300 students with a staff of approximately 250 employees. The school built new facilities to accommodate students but the amount of parking has only decreased over the years. The review pointed to the inadequacy of the on-site circulation with only one fully functioning access point from Lasselle Street. The review also observes mid-block "jaywalking" as a major safety concern because "parents park on the west side of Lasselle Street in a southbound direction."

PM counts, 25 pedestrians were observed jumping the fence at the school's southern driveway and 74 pedestrians were observed jaywalking just south of where the fence ends at Camino Delrey. Attached to this memo are the counts collected.

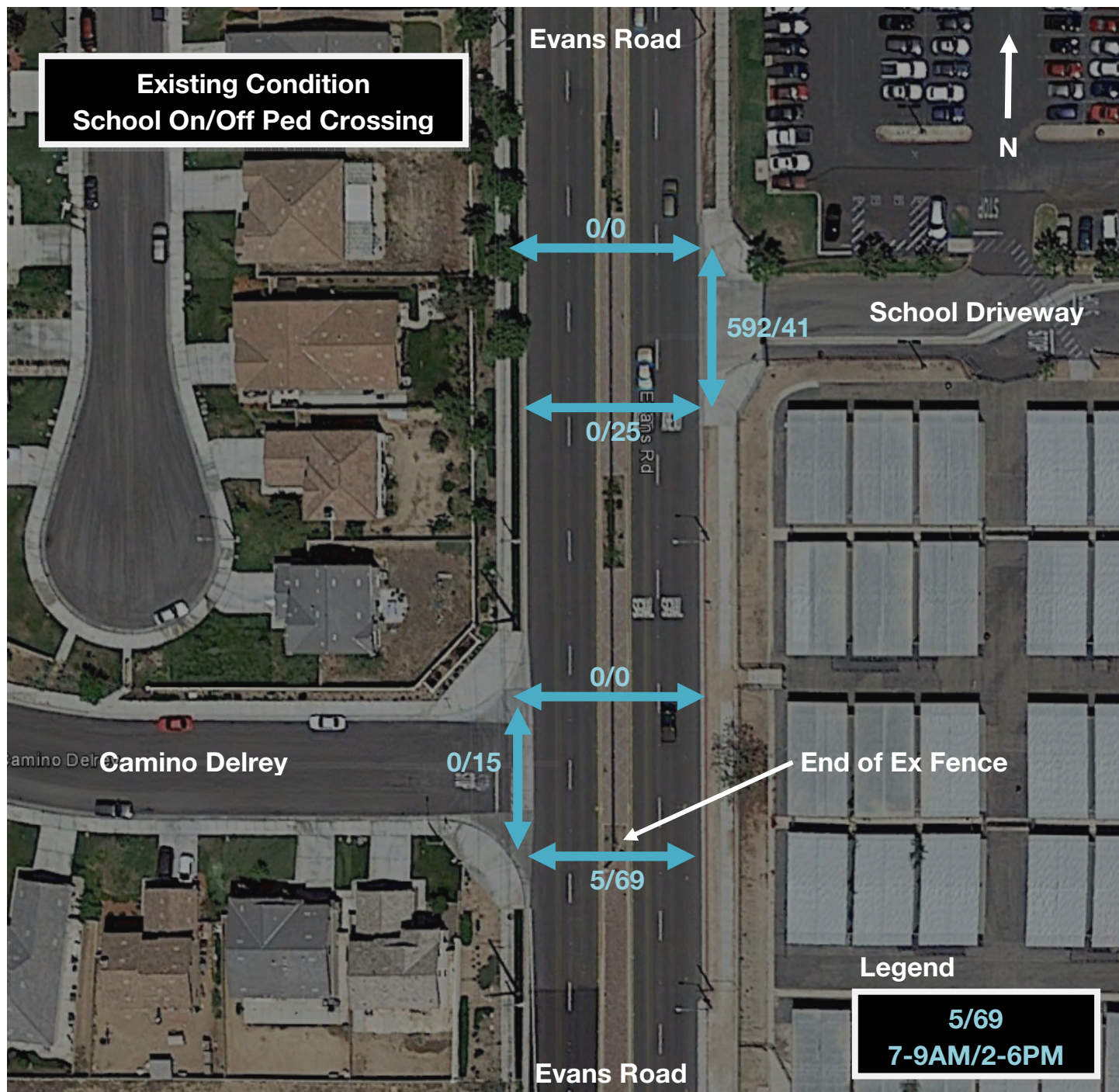


Figure 1: Existing Pedestrian Counts during School On & Off periods at Camino Delrey and School Driveway

### Project and Future Conditions

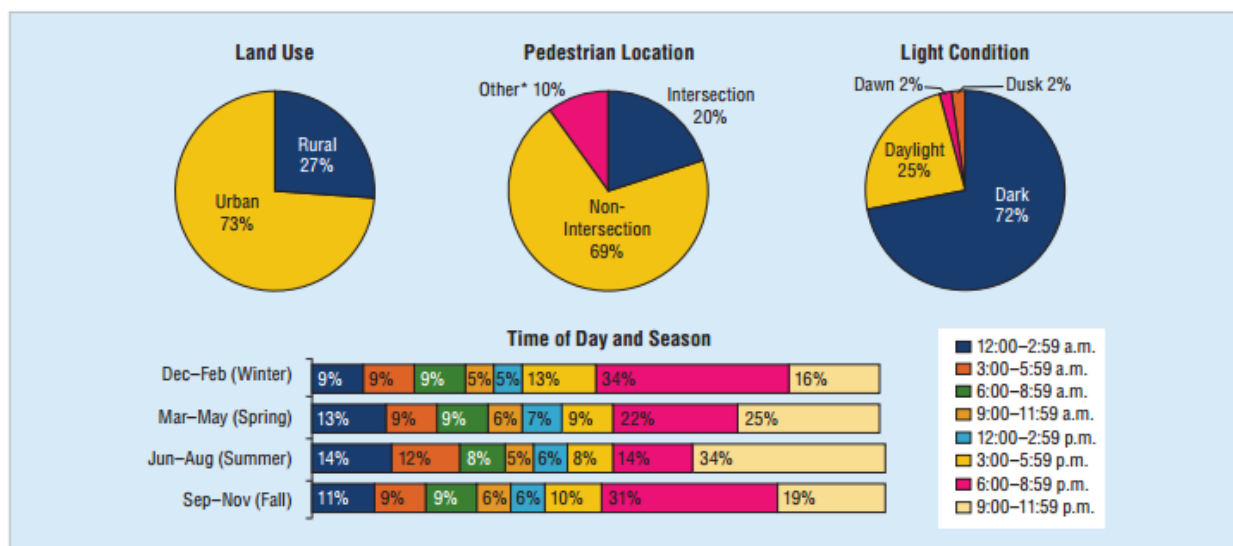
With the addition of the proposed Stratford Ranch (TTM36648) and other cumulative projects in the area, Evans Road is predicted to operate on average 26,500 vehicles a day.

The Stratford Ranch residential project proposes providing the existing ultimate right-of-way for Evans Road as designated in the General Plan and providing 2 through lanes in each direction, bike lanes, and a right turn lane. The right turn lane is proposed to be designed so that in the future, the City can decide if necessary to restripe the right turn lane into a through lane and would not have to perform any additional street improvements. This is in contrast with the City’s request for 3 through lanes in the southbound direction, bikes lanes and a right turn lane.

## Pedestrian Safety

### Collisions with Pedestrians

According to the Federal Analysis Reporting System, a data resource website for the National Highway Traffic Safety Administration, 69% of pedestrian fatalities are at non-intersection locations. These are the locations where pedestrians are not expected and cars travelling at full speed can cause fatalities.<sup>1</sup>



Source: FARS 2013 ARF.

Note: Unknown values were removed before calculating percentages.

\*Other includes parking lane/zone, bicycle lane, shoulder/roadside, sidewalk, median/crossing island, driveway access, shared-use path/trail, non-trafficway area, and other.

Figure 2: Percentage of Pedestrian Fatalities in Relation to Land Use, Pedestrian Location, Light Condition, and Time of Day and Season. Source FARS 2013.

There’s a high correlation with pedestrian fatalities and the speed of the motor vehicle. Figure 3 from the Traffic Advisory Unit analyzes the probability for fatal, injury-causing, or with no injury accidents, dependant on vehicle speed. The probability for fatality dramatically decreases from approximately 85% with 40 MPH to approximately 5% with 20 MPH. In San Francisco, between 2005 and 2011, 90% of pedestrian fatal collisions were with vehicles traveling at 55 MPH.<sup>2</sup>

<sup>1</sup> National Highway Traffic Safety Administration. FARS 2013 ARF Pedestrian Collisions Data.

<sup>2</sup> San Francisco Planning Department. “WalkFirst: Making San Francisco safer one step at a time.” Accessed March 27, 2015. <<http://walkfirst.sfplanning.org/index.php/>>



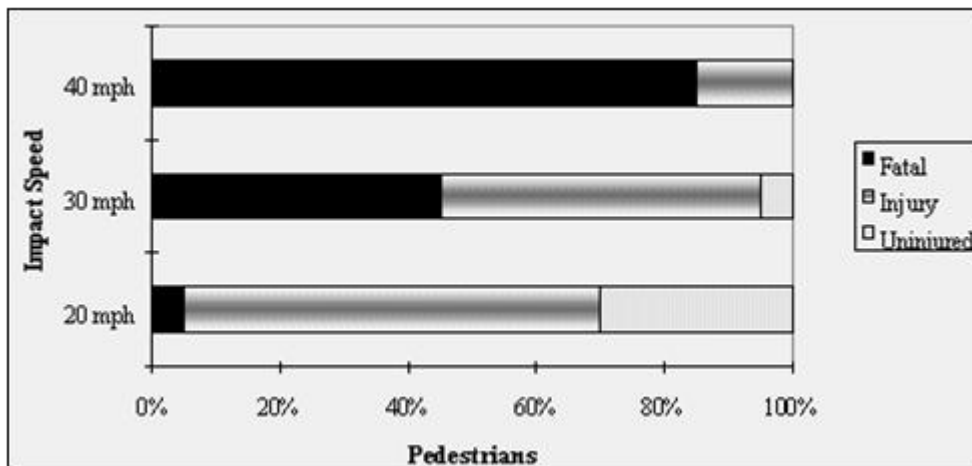


Figure 3: Pedestrian Injury Severity Based on Vehicle Speed. Source: Traffic Advisory Unit, 1993.

Figure 4 from the Transportation Authority of Marin and republished by Safe Routes to School, shows the increasing distance of number of feet motorists will need in order to stop a car. As the speed increases, the distance needed increases.<sup>3</sup>

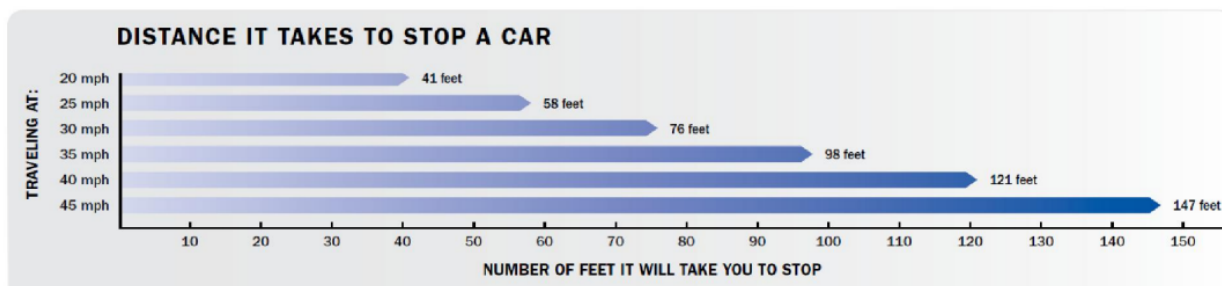


Figure 4: Travel Speed vs. Reaction and Braking. Source: Street Smarts Marin, Transportation Authority of Marin

ITE advises that physical changes to roadways to achieve traffic calming are generally more self-enforcing than traditional education and enforcement efforts and offer long-term benefits and do not require continued intervention. Physical changes to roadways suggested include curb extensions, chicanes, lateral shifts, and chokers, speed humps, speed tables and raised crosswalks, raised intersections, neighborhood traffic circles/mini-traffic circles, half-street closures, median islands, and forced-turn islands. In particular with curb extensions, the publication cites reducing roadway width from curb to curb as one way to shorten crossing distance for pedestrians and make it easier for motorists to see pedestrians, which both improve pedestrian crossing safety.<sup>4</sup>

## Possible Recommendations for Improving Pedestrian Safety

### Proposals based on Rancho Verde High School Traffic Review

RK Engineering in the Rancho Verde High School Traffic Review made many recommendations to improve the on-site and off-site circulation. On and off-site circulation improvements would improve pedestrian safety

<sup>3</sup> Institute of Transportation Engineers. "Safe Routes to School Briefing Sheets: The Use of Traffic Calming Near Schools."

<sup>4</sup> Institute of Transportation Engineers. "Safe Routes to School Briefing Sheets: The Use of Traffic Calming Near Schools."

for Evans Road. On-site improvements would encourage parents to turn into the school and use the on-site drop off locations instead of choosing to drop kids off on the street. One such recommendation is the connection with Lake Perris Drive to encourage use of the secondary right-in-right-out driveway south of the main driveway.

An off-site recommendation made for Evans Road is to extend the existing median fence south of the existing fence as far as possible to prohibit pedestrians from crossing Lasselle Street.<sup>5</sup> The fence currently ends just south of the Camino Del Rey intersection with Evans, by the border of the City of Perris and the City of Moreno Valley. Pedestrian counts at the Camino Del Rey intersection show 69 people crossing at that location during the afternoon hours.

### **Proposal based on TTM36648**

Based on the above review of pedestrian safety, three lanes would be safer for pedestrians than four lanes. In addition, the California Manual on Uniform Traffic Control Devices (MUTCD) has designated the pedestrian walking speed to be 3.5 feet per second. Therefore on a 94' wide roadway (as proposed by TTM36648), pedestrians would take 27 seconds to cross the road. Adding an additional lane, as proposed by the City, would require an 106' wide roadway and 30 seconds to cross the road.

If lanes were reduced to be 11' through lanes, motorists are likely to drive slower and there would be space for other potential pedestrian or bicycle improvements. Furthermore, according to the FHWA, a reduction in vehicle interactions resulting from a road diet can decrease the number and severity of crashes.<sup>6</sup> According to San Francisco's WalkFirst program, a program that seeks to reduce serious and fatal injuries in San Francisco, lists road diets as one of their safety tools to encourage drivers to reduce vehicle speeds. Road diets eliminate a lane or more of travel.<sup>7</sup>

Figure 5: Median Island Pedestrian Refuge Crossing. Source: FHWA



### **Proposals based on Literature Review**

#### **Median Islands – Median Refuge**

Median islands can be used as a median refuge for pedestrians crossing wide roads. "The Federal Highway Administration (FHWA) strongly encourages the use of raise medians (or refuge areas) in curbed sections of multi-lane roadways in urban and suburban areas, particularly in areas where there are mixtures of a significant number of pedestrians, high volumes of traffic (more than 12,000) vehicles per day and intermediate or high travel speeds."<sup>8</sup>

<sup>5</sup> RK Engineering. "Rancho Verde High School Traffic Review." October 7, 2009.

<sup>6</sup> FHWA. "Public Roads: Going on a Road Diet." Accessed March 26, 2015.

<[www.fhwa.dot.gov/publications/publicroads/11septoct/05.cfm](http://www.fhwa.dot.gov/publications/publicroads/11septoct/05.cfm)>

<sup>7</sup> San Francisco Planning Department. "WalkFirst: Making San Francisco safer one step at a time." Accessed March 27, 2015.

<<http://walkfirst.sfplanning.org/index.php/>>

<sup>8</sup> FHWA. "Safety Benefits of Raised Medians and Pedestrian Refuge Areas." February 2013.

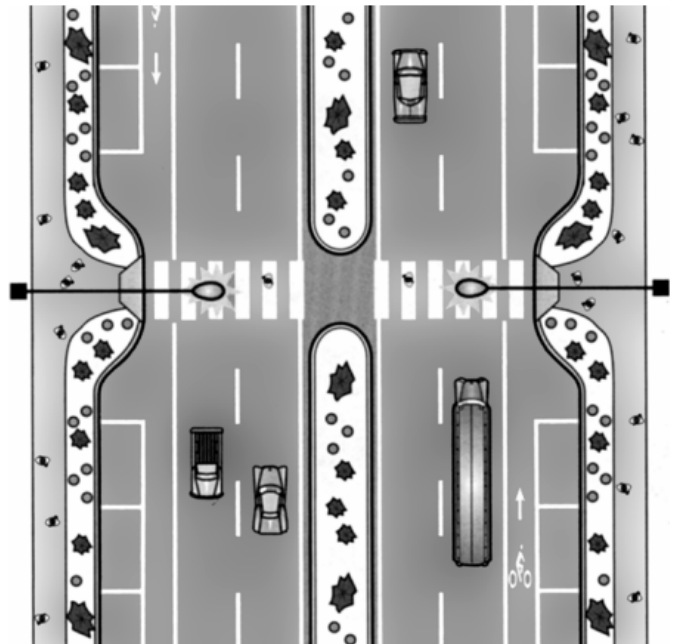
### Mid-block Crossing

According to the NACTO Urban Street Design Guide, “midblock crosswalks facilitate crossings to places that people want to go but that are not well served by the existing traffic network. These pedestrian crossings, which commonly occur at schools, parks, museums, waterfronts and other destinations, have historically been overlooked or difficult to access, creating unsafe or unpredictable situations for both pedestrians and vehicles.”<sup>9</sup> A mid-block crossing has the potential of addressing the pedestrian crossing demand and focusing them at a central location. They are incentivized to cross at this location because pedestrians feel safer in a marked crosswalk. Mid-block crossings should be designed with some of the following proposals to improve the safety.

### Curb Extension

A curb extension can also be coupled with a crosswalk to reduce the pedestrian crossing distance, increase pedestrian and driver visibility. The longer the pedestrian crossing distance, the longer pedestrians are in the street, the longer the delay on vehicular traffic and the greater the probability for accidents.

Figure 6: Midblock crossing curb extensions provide better visibility for motorists and pedestrians. Source: FHWA



### Pedestrian Beacon/Signals

A pedestrian crossing without a traffic signal can also be signalized with flashing beacons, a hybrid beacon, a conventional traffic signal and/or a pedestrian actuated signal device with a locator tone for pedestrians with vision impairments.<sup>10</sup> According to the FHWA, the installation of pedestrian hybrid beacons reduced pedestrian crashes by 69 percent. Their study suggests a 19 percent reduction in total crashes and severe crashes was reduced by 15 percent.<sup>11</sup>

### Raised Crosswalk

An additional option is to vertically raise the crosswalk. The raised crosswalk would provide level street crossing and also make pedestrians more visible to approaching motorists. For vehicles the raised crosswalk would also operate as a speed table to slow drivers down for the 25 MPH reduce speed limit zone. According to Fehr & Peers, speed tables on average see a 45% decrease in accidents.<sup>12</sup> The raised crosswalk would be coupled with signs to warn drivers.

### High-Visibility Crosswalks

The visibility of crosswalks can be enhanced through striping. Figure 5 shows various crosswalk treatments including the high-visibility crosswalk treatments. Crosswalk treatments are inexpensive and provide a better

<sup>9</sup> NACTO. “Urban Street Design Guide.” Accessed March 26, 2015. <nacto.org>

<sup>10</sup> FHWA. “Designing Sidewalks and Trails for Access: Best Practices Design Guide.” Accessed March 26, 2015. <www.fhwa.dot.gov/environment/bicycle\_pedestrian/publications/sidewalk2/sidewalks208.cfm>

<sup>11</sup> FHWA. “Pedestrian Hybrid Beacon Guide – Recommendations and Case Study.” March 2014.

<sup>12</sup> Traffic Calming.org. Accessed March 26, 2015. <trafficcalming.org>

visual queue of where pedestrians could be crossing. The continental crosswalk can be designed to avoid wheel paths and reduce long-term maintenance needs.<sup>13</sup>

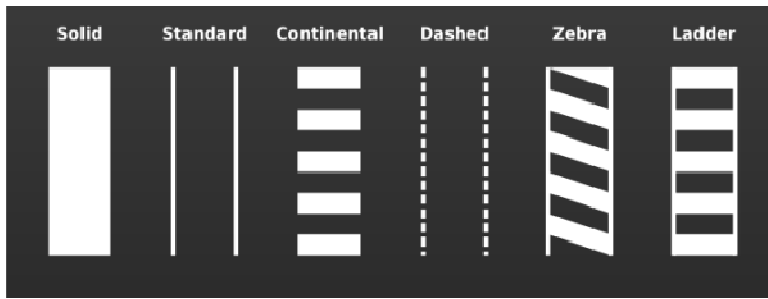


Figure 7: High-Visibility Crosswalk Treatments.  
Source: Sfbetterstreets.org

### Pedestrian Lighting

Lighting for crosswalks and for pedestrian walkways improve the safety and security for both traffic and for pedestrians crossing sidewalks. According to FARS 2013, 72% of collisions happen at night.<sup>14</sup> Therefore lighting crosswalks and mid-block crosswalks can greatly reduce the probability of collisions.

### Reduced Speed Limit Zone

Currently the speed limit zone starts at the City of Moreno Valley and City of Perris limit, but according to the suggested distance from the California MUTCD and ITE and SRTS Publication on Reduced School Area Speed Limits, the suggestion is 200 feet in advance of the school grounds.<sup>15</sup>

School Speed Limit (mph)	Distance to Crosswalk or First Driveway (ft.)
20	200
25	200
30	300
35	400

Figure 8: Suggested beginning of school speed limit zone. Source: Institute of Transportation Engineers (ITE)

## Application

### Improvements by Rancho Verde High School

This memo recommends that Rancho Verde High School implements the recommendations made by RK Engineering for improving school on-site circulation. Without improvements by the school, the current unsafe travel patterns are only going to continue or can grow worse. On-site circulation can be improved for example through a direct connection to Lake Perris Drive, as mentioned in the memo made by RK Engineering.

### Improvements by TTM36648

The following is a summary of the possible improvements listed above that have direct application and are recommended for improving pedestrian safety along Evans Road in connection with the Rancho Verde High School. Other improvements listed here that are not mentioned above are roadway improvements tied to the forecasted traffic from the development. Refer to the attached Evans Road exhibit for details.

<sup>13</sup> SFBetterStreets.org. "A guide to making street improvements in San Francisco." Accessed March 27, 2015. <[www.sfbetterstreets.org/](http://www.sfbetterstreets.org/)>

<sup>14</sup> National Highway Traffic Safety Administration. FARS 2013 ARF Pedestrian Collisions Data.

<sup>15</sup> Institute of Transportation Engineers. "Safe Routes to School Briefing Sheets: The Use of Traffic Calming Near Schools."

1. Install a traffic signal at the intersection of Belsera Gate and Evans Road with appropriate striping as early as possible, before TTM36648, to facilitate safe crossing at this location.
2. Extend the median fence to Belsera Gate to discourage pedestrians from crossing at non-crosswalk marked locations and cross instead at the signal to be installed.
3. Maintain Evans Road as 2 through lanes in each direction in front of the residential tracts per TTM36648's recommendations.
4. Reduce lane widths to 11' to reduce motorists' speed and allocate additional street space for bike lanes and an expanded bike lane buffer. Refer to the attached Evans Road exhibit for details.
5. A new crosswalk at the EMWD easement's future trail crossing, south of the Camino Delrey intersection, with:
  - a. An opening in the pedestrian fence for this crosswalk,
  - b. Median improvements to serve as a pedestrian refuge, and
  - c. Pedestrian signal or warning beacon to warn motorists of pedestrians.
6. Continental striping at all proposed and existing school crosswalks.
7. Pedestrian lighting improvements especially at crosswalks.
8. Modify the existing Marbella Gate intersection to right-in-right-out to reduce potential conflicting turning movements along Evans Road by extending the median through the intersection.
9. Extend school area reduced speed limit zones south into the City of Perris per the California MUTCD.
10. Interconnect traffic signals on Evans Road from Ramona Expressway to Via de Anza and synchronize the signals at 45 MPH.
11. Update the traffic signal at Anira Court and Evans Road to accommodate shifted lanes and bike lanes. The traffic signal at Ramona Expressway would also need to be updated along with the installation of a southbound overlapping right turn signal per the traffic impact analysis for TTM 36648.
12. Reconfigure Evans Road median to create left turn pockets as shown in the Evans Road exhibit attached.
13. Pay cash-in-lieu fair share for cumulative improvements as identified in the traffic impact analysis for TTM36647.

A second phase of improvements associated with the **TTM36647** (just south of TTM36648) are listed below.

1. Widen Evans Road to the ultimate cross section from the southerly line of Tract 32708 to the northerly DWR easement line. This improvement will require the relocation of 6 existing SCE power poles. Refer to the Evans Road exhibit for geometrics.
2. Restripe Evans Road from the southerly line of Tract 32708 to Ramona Expressway with bike lanes, buffer and reduced lane widths. Refer to the attached Evans Road exhibit for details.



3. Update traffic signal at Ramona Expressway and Evans Road as necessary to accommodate shifted lanes and bike lanes.
4. Construct full width median along Evans Road.
5. Pay cash-in-lieu fair share for cumulative improvements as identified in the traffic impact analysis for TTM36647.

**Improvements by City of Perris and City of Moreno Valley**

1. Implement no parking signs except residents in adjacent residential tracts.
2. To encourage safe behavior and discourage dangerous behavior for motorists and for pedestrians, increased police enforcement may be necessary. Police enforcement should enforce the following:
  - a. Pedestrians jaywalking across Evans. Guide them to the new and improved crosswalks,
  - b. Vehicles stopping along Evans Road, and
  - c. Speeding particularly within 200 feet of the school grounds during school hours.

## Citation

1. Dan Burden and Peter Lagerwey, *"Road Diets: Fixing the Big Roads,"* (Walkable Communities, Inc., 1999).
2. Erik Rosen and Ulrich Sander, *"Pedestrian Fatality Risk as a Function of Car Impact Speed."*
3. Fatality Analysis Reporting System (FARS) Encyclopedia, 2013.
4. FHWA. "Evaluation of Lane Reduction 'Road Diet' Measures and Their Effects on Crashes and Injuries" (Highway Safety Information System, 2010).
5. FHWA. "Designing Sidewalks and Trails for Access: Best Practices Design Guide." Accessed March 26, 2015.  
<[www.fhwa.dot.gov/environment/bicycle\\_pedestrian/publications/sidewalk2/sidewalks208.cfm](http://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/sidewalk2/sidewalks208.cfm)>
6. FHWA. "Public Roads: Going on a Road Diet." Accessed March 26, 2015.  
<[www.fhwa.dot.gov/publications/publicroads/11septoct/05.cfm](http://www.fhwa.dot.gov/publications/publicroads/11septoct/05.cfm)>
7. Institute of Transportation Engineers. "Safe Routes to School Briefing Sheets: The Use of Traffic Calming Near Schools."
8. NACTO. "Urban Street Design Guide." Accessed March 26, 2015. <[nacto.org](http://nacto.org)>
9. RK Engineering. "Rancho Verde High School Traffic Review." October 7, 2009.
10. Traffic Calming.org. Accessed March 26, 2015. <[trafficcalming.org](http://trafficcalming.org)>

## Appendix

1. Evans Road Intersection Exhibit
2. Counts from Counts Unlimited performed in May 2014