DATE: October 26, 2016

ITEM # 1

TO: Bicycle/Pedestrian Advisory Commission and Planning/Transportation Commission

FROM: Cedric Novenario, Staff Liaison

SUBJECT: Enhanced Electronic Pedestrian Crossing Devices

RECOMMENDATION:

Review and provide comments on design and implementation of enhanced electronic pedestrian crossing devices

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BACKGROUND

During the development of the current five-year capital improvement budget, it was requested by the City Council, Planning and Transportation Commission, and the public to consider a design review of enhanced electronic pedestrian crossing devices.

Project TS-01031 Illuminated Crosswalk Replacement was originally intended to replace all existing in-roadway pavement crosswalk systems in Los Altos with Rectangular Rapid Flashing Beacons. However, the project was modified to replace existing In-Roadway Light systems at three locations: Almond Avenue by Almond Elementary, Springer Road at Rose, and Grant Road at Morton Road with an alternate In-Roadway Light system.

The California Manual on Uniform Traffic Control Devices (CA MUTCD) governs the implementation and use of enhanced electronic pedestrian crossing devices in California. The CA MUTCD is also consistent with the Federal Manual on Uniform Traffic Control Devices.

DISCUSSION

In-Roadway Light System

Los Altos currently operates 11 In-Roadway Light systems. The majority of the systems are manufactured by Silicon Constellations Systems. The other manufacturer was Spot Devices; however, that company has since gone out of business. See attached map for locations.

In-Roadway Lights are special types of highway traffic signals installed in the roadway surface that generally warn motorist they are approaching a condition that might require them to slow down and/or come to a stop. This includes situations warning of marked school crosswalks, marked midblock crosswalks, and marked crosswalks on uncontrolled

approaches. All of the In-Roadway Light systems in Los Altos are at marked-uncontrolled intersections or at school crosswalks. Note, however, In-Roadway Lights are not allowed at intersections where YIELD signs, STOP signs or traffic signals are present.

The length of the light flash period shall be long enough to allow the majority of pedestrians' to cross the street. The flash period is based on a walking speed of 3.5 feet per second and a crossing distance from the curb to the far side of the traveled way or median (situation dependent). A walking speed of 3.0 feet per second may be considered at locations where it is routinely expected for wheel chair access or the need for a longer flash period is required. With a longer flash period, it is expected vehicle traffic will be delayed.

Basic Evaluation Criteria

The CA MUTCD chapter 4N defines the criteria for In-Roadway Light implementation. The criteria are:

- At least 40 pedestrians regularly use the crossing during each of any two hours (not necessarily consecutive) during a 24-hour period.
- The vehicular volume through the crossing exceeds 200 vehicles per hour in urban areas or 140 vehicles per hour in rural areas during peak-hour pedestrian usage.
- The critical approach speed (85th percentile) is 45 mph or less.
- In-Roadway Warning Lights are visible to drivers at the minimum stopping sight distance for the posted speed limit.

Maintenance Experience

Based on staff experience, the need for maintenance occurs as early as two years after first construction. In-Roadway lights, although generally durable, may have a shorter life-span due to vehicles constantly traveling over the lights. The light pods are prone to rotating, dimming, and completely going dark. Maintenance of the light pods can be costly; the replacement cost of a light pod can vary between $500-$1000. Lastly, some In-Roadway Light systems become obsolete by virtue of new production models and a business decision by manufacturers' to no longer support slightly older systems. As a result, agencies are sometimes required to do an overhaul of an In-Roadway Light system (light pods, controllers, illuminated signs, etc) should numerous light pods go dark. This is the case for the current Silicon Constellations Systems in Los Altos.

Cost

It is estimated that an In-Roadway Light system costs approximately $30,000 - $45,000.

DATE: October 26, 2016

ITEM # 1

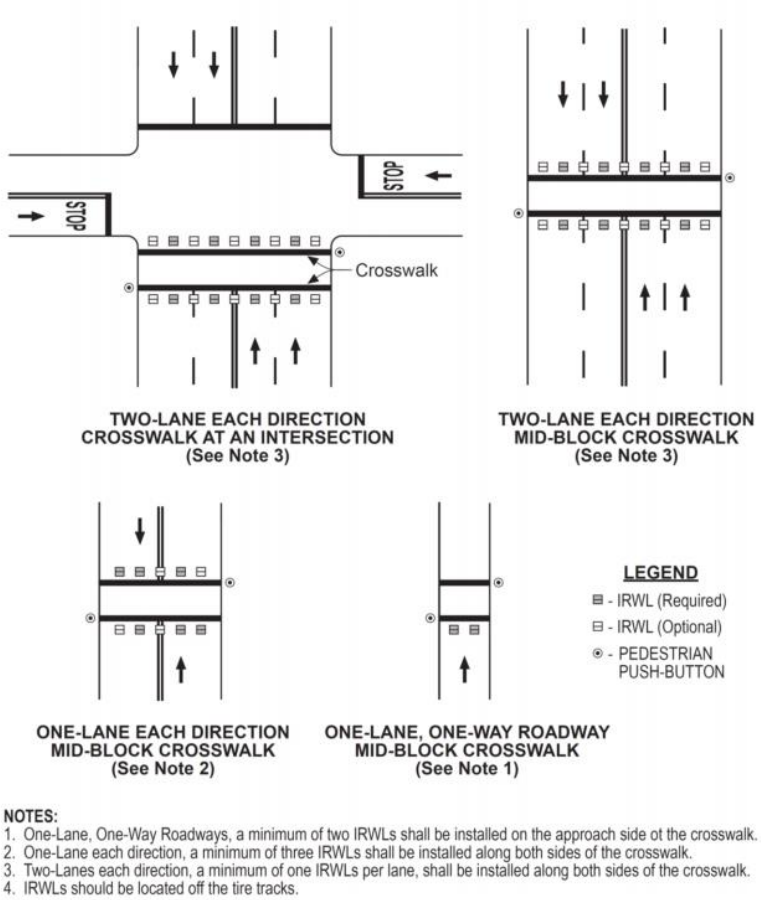

Image: Typical In-Roadway Light Configuration

Current In-Roadway Light locations:

- San Antonio Road & Pepper Drive
- San Antonio Road & Hawthorne Avenue
- San Antonio Road & Mt. Hamilton Avenue
- San Antonio Road & Pine Lane
- San Antonio Road & Loucks Avenue
- San Antonio Road & Lyell Street
- Almond Avenue & Gordon Way
- Almond Avenue & North Clarke Avenue
- Springer Road & Rosita Avenue
- Grant Avenue & Morton Avenue

Pedestrian Hybrid Beacons

Also known as, **H**igh Intensity **A**ctivated Cross**w**al**k**s (HAWK), look very similar to a traffic signal with a standard signal face displaying green, yellow, or red. There are no HAWK systems in Los Altos. An older version of a HAWK system exists in the Mountain View portion of Cuesta Road, at the rear entrance of Springer Elementary School. A HAWK 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. A HAWK can be installed at intersections or mid-block locations.

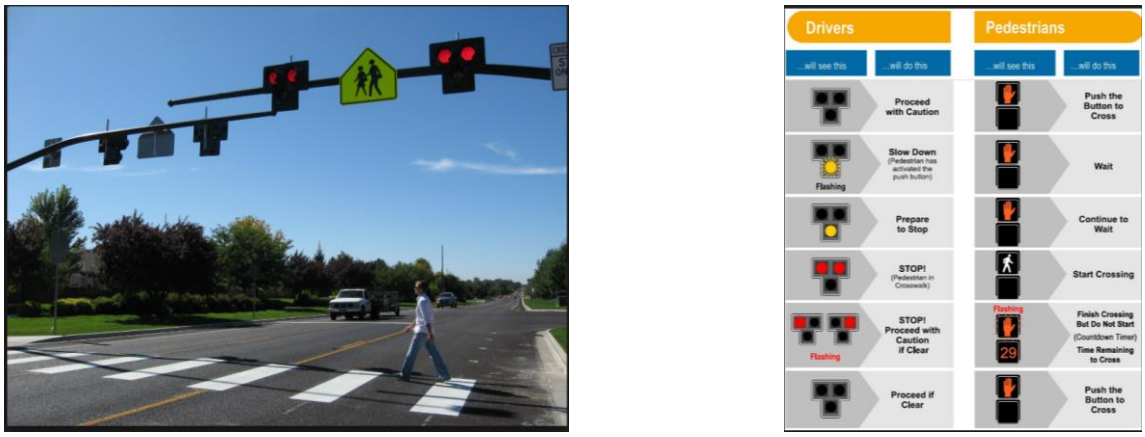

Image: HAWK system and HAWK flashing pattern

Evaluation/Implementation Criteria

The CA MUTCD chapter 4F defines the criteria for In-Roadway Light implementation. The criteria are:

- Can be considered for installation to facilitate pedestrian crossings at a location that does not meet traffic signal warrants, or
- At a location that meets traffic signal warrants but a decision is made to not install a traffic control signal.
- The need for a pedestrian hybrid beacon should be considered on the basis of an engineering study that considers major-street volumes, speeds, widths, and gaps in conjunction with pedestrian volumes, walking speeds, and delay
    - Pedestrian delay is excessive

- For a major street where the posted or the 85th-percentile speed is 35 mph or less, the need for a pedestrian hybrid beacon should be considered if the engineering study finds that the plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding total of all pedestrians crossing the major street for 1 hour (any four consecutive 15-minute periods) of an average day falls above the applicable curve in Figure 4F-1 for the length of the crosswalk.

- For a major street where the posted or the 85th-percentile speed exceeds 35 mph, the need for a pedestrian hybrid beacon should be considered if the engineering study finds that the plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding total of all pedestrians crossing the major street for 1 hour (any four consecutive 15-minute periods) of an average day falls above the applicable curve in Figure 4F-2 for the length of the crosswalk

- The pedestrian hybrid beacon should be installed at least 100 feet from side streets or driveways that are controlled by STOP or YIELD signs
- Parking and other sight obstructions should be prohibited for at least 100 feet in advance of and at least 20 feet beyond the marked crosswalk, or site accommodations should be made through curb extensions or other techniques to provide adequate sight distance

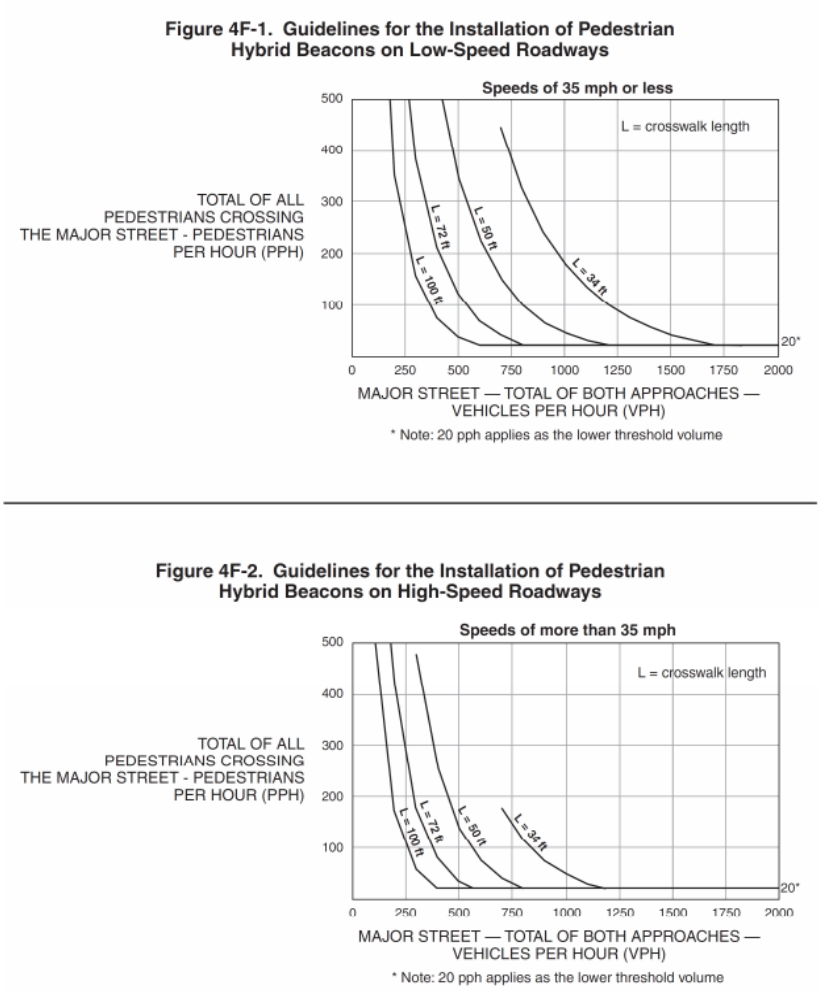

Image: Guidelines for HAWK installation based on vehicle speed

Maintenance Experience

Staff inquired with the City of Mountain View regardin their maintenance history with their version of a HAWK system. According to Mountain View staff, maintenance is minimal with primarily monthly routine maintenance checks. These checks consist of observing traffic control operations, testing the pedestrian push button for correct operation and observing the signal operation. Monthly routine maintenance checks are consistent with most mainteance checks of traffic signals.

Cost

It is estimated that a HAWK system is approximately $200,000.

Rectangular Rapid Flashinig Beacon

The Federal Highway Administration has granted interim approval across the nation for the use of Rectangular Rapid Flashing Beacons (RRFB). An RRFB system generally consists of amber LEDs that are activated by pedestrian push buttons or passive detection. The RRFBs supplement warning signs at unsignalized intersections or mid-block crosswalks and can't be used at controlled locations (YIELD, STOP, traffic signals). RRFBs use an irregular flash pattern that is similar to emergency flashers on police vehicles. The flash period is calculated in the same manner as the In-Roadway Light system.

DATE: October 26, 2016

ITEM # 1

Image: RRFB

Basic Evaluation/implementation Criteria

While the FHWA and CA MUTCD do not define implementation criteria, the California State Department of Transportation (CalTrans) notes that the use of RRFBs do not need to meet traffic signal warrants. Staff suggests following similar evaluation/implementation criteria of In-Roadway Lights for RRFBs.

Maintenance

The City operates one RRFB system at the intersection of Portland Avenue and Carmel Terrace; which is a pedestrian crossing to school. The RRFB system was installed in 2013 to replace a failed In-Roadway Light system. The RRFB has not required any maintenance since installation. It is expected that maintenance will be similar to HAWK systems.

Cost

It is estimated that an RRFB system is approximately $20,000 - $40,000.

Other pertinent information

- At the time Los Altos first installed In-Roadway Light systems (mid to late 2000s), they were one of two widely used types of enhanced electronic pedestrian crossing devices (the other was a HAWK).
- Yield rates for an In-Roadway Light system is approximately 50%-90%.
- The use of RRFBs has grown around the nation since the system received interim approval. Many agencies have switched to RRFBs when their In-Roadway Light systems have failed or require an overhaul. The primary reason for agencies to switch to RRFB is the lower long term maintenance costs. Additionally, according to evaluation studies, RRFBs yield up to a 96% motorists yield rate.
- The use of HAWKs in Los Altos may not be suitable or feasible in many Los Altos Roads because of the physical space needed for equipment. Larger streets like San Antonio Road or larger collector streets like Fremont Avenue may have the space required. Additionally, the City has received concerns from residents about traffic signal installation relating to City context, characteristic, and increased traffic, since HAWKs essentially are traffic signals, it is expected that this concern will remain.
- The City would eventually pursue replacing failed In-Roadway Light systems with RRFBs. However, the use of In-Roadway Lights in the future will still be considered based on installation location and context. For example, if a new enhanced electronic pedestrian crossing impacts adjacent residents, the least impactful between RRFBs or In-Roadway Lights will be selected.
- Additional information regarding In-Roadway Lights, HAWKs and RRFB can be located at the following links:
    - http://mutcd.fhwa.dot.gov/resources/interim_approval/ia11/fhwamemo.htm
    - http://safety.fhwa.dot.gov/intersection/conventional/unsignalized/tech_sum/fhwasa09009/
    - https://www.michigan.gov/documents/msp/Identifying_the_Riskiest_Situations_for_pedestrians-_Brewer_485674_7.pdf
    - http://www.dot.ca.gov/hq/tpp/offices/owd/academy_files/Oct_2012_Workshop/Wednesday/Bike_Ped_Presentation.pdf