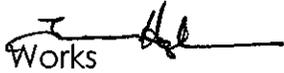


**CITY OF HUNTINGTON BEACH
PUBLIC WORKS COMMISSION
REQUEST FOR ACTION**

Item No. PW10-02

SUBMITTED TO: Chairman McGovern and Members of the Commission

SUBMITTED BY: Travis K. Hopkins, PE, Director of Public Works 

DATE: January 20, 2010

SUBJECT: Bushard/Yellowstone In-Roadway Lighted Crosswalk Follow-up Evaluation

Statement of Issue: A 12-month review of the effectiveness of the flashing crosswalk installation on Bushard Street at Yellowstone Drive was directed in the City Council Pilot Project authorization.

Funding Source: The recommended action does not require the expenditure of funds. However, future project consideration will require a review of potential funding sources as part of the capital improvement process.

Impact on Future Maintenance Costs: The authorization of future installations would result in incremental maintenance cost increases within the Signal and Lighting Maintenance section of the Transportation Division.

Recommended Action: Motion to recommend to the City Council, to consider in-road flashing crosswalk installations as a potential treatment for uncontrolled pedestrian crossing locations following the guidelines recommended in the attached report.

Alternative Action(s): Recommend against future consideration of flashing crosswalk installations at any location.

Analysis: In response to concerns raised by area residents, the City Council approved the installation of an in-road flashing crosswalk system at the intersection of Bushard Street and Yellowstone Drive in December 2007. The flashing crosswalk was intended to warn motorists of specific pedestrian activity and encourage pedestrian use to and from Hawes Elementary School and Sowers Junior High School. The Public Works Commission approved the project in March 2008 and the City Council awarded the construction contract in June 2008. The work was completed in early November 2008. Part of the approval of

the pilot project was the direction to provide a follow-up review of the effectiveness of the installation.

The new lighted crosswalk was installed across the south leg of the intersection of Bushard Street at Yellowstone Drive. The crosswalk was installed with a passive detection system that activates the in-roadway lights by pedestrians passing between two bollards placed on the sidewalk at the curb ramp locations. New flashing warning beacons and advance warning signage supplement the in-roadway flashing crosswalk lights.

The complete flashing crosswalk evaluation is provided in Attachment 2. Details regarding the methodology used in the analysis are included in the report.

Based on the field studies the following summarizes conclusions regarding the in-roadway lighted crosswalk installation:

- In-roadway flashers were effective in reducing approaching vehicle speeds and stopping vehicles for pedestrians when activated.
- In-roadway lighted crosswalk installation costs are approximately 35% of a typical traffic signal installation.
- Passive detection appears to encourage appropriate caution in pedestrians crossing the street.
- The addition of the marked crosswalk and in-roadway flashers in this location was not effective in encouraging additional pedestrian activity, especially related to the nearby schools as originally contended by residents (fewer than 20 pedestrians per day appear to use the crosswalk)
- Contractor experience is important to reducing initial operational problems.
- The in-roadway lighted crosswalk system has operated properly with no reported accidents or complaints relating to the operation following initial corrections.
- The in-roadway flashers did not appear to reduce the attention given to approaching traffic by pedestrians when attempting to cross.

Under the right circumstances, consideration of additional flashing crosswalk installations is warranted. Recommendations for future consideration are based on current experience and existing national guidelines:

- Installation should only be considered at an uncontrolled location greater than 600 feet from an existing controlled crossing where typical markings appear to be inadequate.
- Passive activation is preferred over push button activation to avoid unwarranted pedestrian confidence.
- Incorporation of overhead flashing beacons should be considered on arterials for greater visibility.

G-1²

- The location should have an identified associated pedestrian safety problem (pedestrian accidents, insufficient visibility, etc.)
- The in-roadway lighted crosswalk should be used at uncontrolled locations and be marked.
- The use of an in-roadway lighted crosswalk should be used at locations with at least a moderate amount of pedestrian activity (minimum of 50 pedestrians per day).
- No controlled crosswalks or traffic control devices should exist within 600 feet of a proposed installation location.
- The average daily traffic (ADT) on the street should be a minimum of 5,000 vehicles per day.

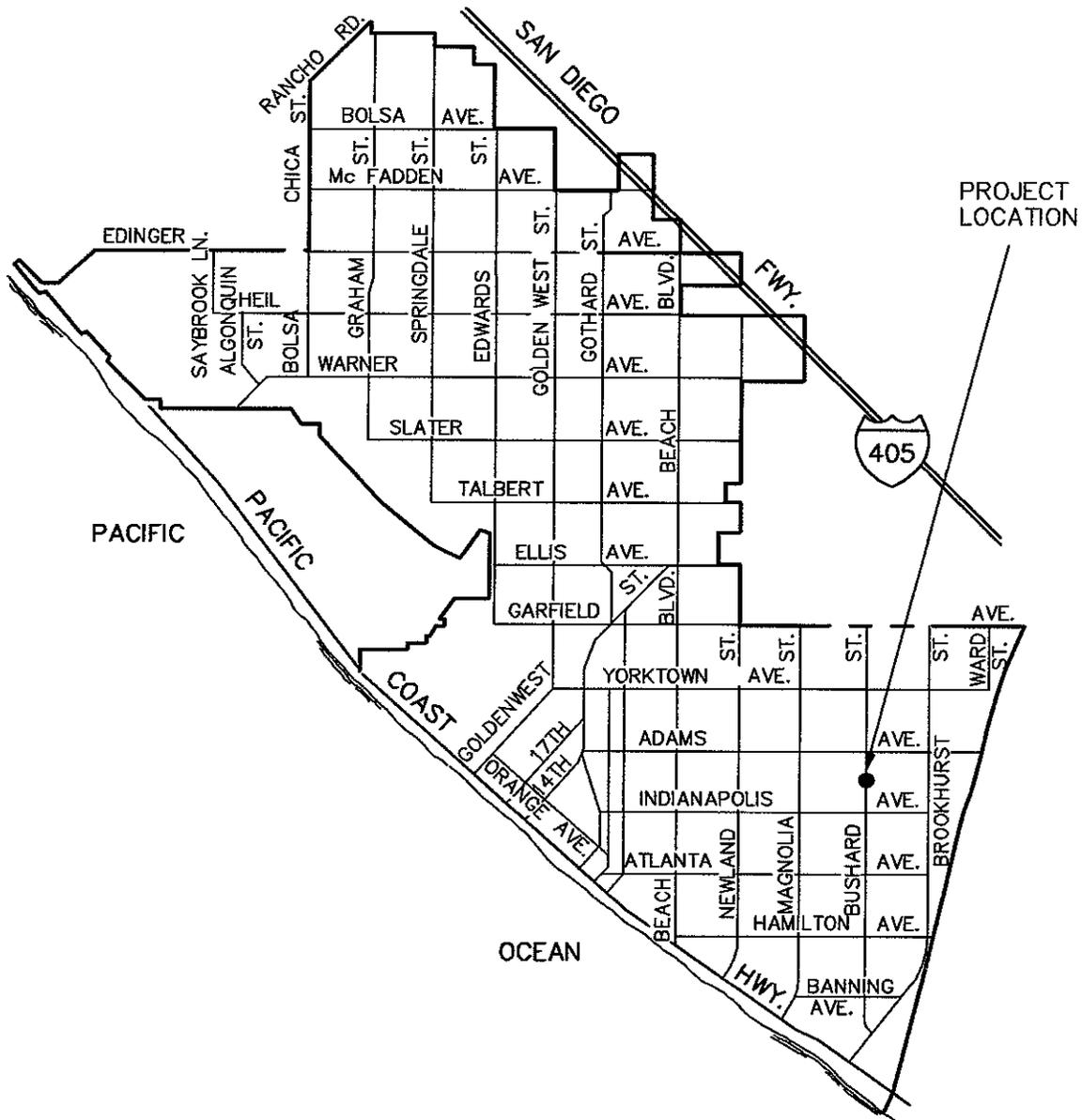
Attachments:

1. Project Location Map
2. Bushard Street at Yellowstone Drive Follow-up Evaluation Report

G-1³

G-1⁴

ATTACHMENT #1



PROJECT LOCATION



LOCATION MAP

N.T.S.

G-1⁵

CITY OF HUNTINGTON BEACH * PUBLIC WORKS * TRAFFIC ENGINEERING



PROJECT LOCATION
 BUSHARD ST AT YELLOWSTONE DR

ATTACHMENT

1

G-16

ATTACHMENT #2



Bushard Street at Yellowstone In-Roadway Lighted Crosswalk Follow-up Evaluation

Background:

This document evaluates the installed in-roadway lighted crosswalk at the intersection of Bushard Street and Yellowstone Drive. Transportation staff conducted field observations of pedestrians and vehicles, and interviewed pedestrian users of the crosswalk. The construction and maintenance issues concerning the lighted crosswalk system are also discussed. Figure 1 shows the in-roadway lighted crosswalk that was placed in service on November 2008 (CC-1329). The crosswalk consists of flashing lights installed in the street pavement that are activated when pedestrians cross between two bollards, interrupting a beam of light. The flashing lights warn motorists they are approaching a condition on the road that requires them to slow down and/or come to a stop. The flashing crosswalk lights are supplemented by a flashing warning beacon and advance warning signage.



G-17

Figure 1. In-Roadway Lighted Crosswalk on Bushard Street at Yellowstone Drive.

Field Observations:

Field observations were conducted in the morning (before the beginning of nearby schools Hawes Elementary and Sowers Middle), mid-day between 10:00 AM and 1:00 PM, and during the afternoon at the end of the school day. Field observations were also conducted during the afternoon on the shortened “planning” day for the schools. All observations were taken after the in-roadway crosswalk had been in service for more than 10 months. Additional field studies using a staged pedestrian attempting to cross were done to observe the behavior of motorists approaching the lighted crosswalk.

During the morning period a total of six pedestrian crossings were observed. Most responded to interview questions regarding the lighted crosswalk and their responses were noted. Data for the morning observation period is shown in Table 1. During the mid-day a total of two crossings were observed by an individual pedestrian who declined to respond to interview questions. Data for the mid-day period is shown in Table 2. The afternoon time had a total of three pedestrian crossings with one pedestrian responding to interview questions. Table 4 shows the afternoon observation data. On the shortened “planning” school day three pedestrian crossings occurred with one pedestrian responding to interview questions. The interview questions and responses are in Appendix A. Table 5 show results of motorist behavior when a staged pedestrian was used.

Observation Period	No. of Crossing Pedestrians	Crossing Direction	Pedestrian Interview Response
Morning	3 students	westbound	Appendix A, response #1
	1 adult	eastbound	Appendix A, response #2
	1 student	eastbound	-
	1 adult	westbound	Appendix A, response #3
Total	6		

Table 1. Morning Pedestrian Observations at Bushard Street and Yellowstone Drive.

Observation Period	No. of Crossing Pedestrians	Crossing Direction	Pedestrian Interview Response
Mid-day	1 adult	eastbound	-
	1 adult	westbound	-
Total	2		

Table 2. Mid-day Pedestrian Observations at Bushard Street and Yellowstone Drive.

5-18

Observation Period	No. of Crossing Pedestrians	Crossing Direction	Pedestrian Interview Response
Afternoon	1 adult	westbound	Appendix A, response #4
	1 adult	eastbound	-
	1 student	westbound	-
Total	3		

Table 3. Afternoon Pedestrian Observations at Bushard Street and Yellowstone Drive.

Observation Period	No. of Crossing Pedestrians	Crossing Direction	Pedestrian Interviewed Response
Afternoon ("Planning" day)	1 adult	eastbound	Appendix A, response #5
	1 adult	westbound	-
	1 student	westbound	Appendix A, response #6
Total	3		

Table 4. Afternoon Pedestrian Observations at Bushard Street and Yellowstone Drive on school "Planning" day.

Of the four adults that responded to interview questions one had favorable opinions of the in-roadway lighted crosswalk, one responded that conditions at that location has improved, and two did not feel safe crossing. Based on the interviewed students responses and their behavior when crossing it appeared they felt safe using the crosswalk.

During the morning observation period, motorists stopped for both the three students and the adult accompanying a student using the crosswalk. When attempting to cross the street the adult waited for a gap in traffic and proceeded cautiously. The three students activated the lights and waited for vehicles to stop before crossing. During the mid-day, afternoon, and "planning day" observation periods all crossings occurred during gaps in traffic which allowed the pedestrians to complete the crossing without interfering with traffic.

Recognizing that the existing pedestrian use is rather low and doesn't provide much data on which to draw conclusions, Public Works personnel were used to "stage" pedestrian crossings to supplement the observations. When a staged pedestrian was used 30 percent of the motorists stopped, 45 percent reduced speed so that the pedestrian could clear the

G-19

travel lane, and 25 percent did not stop or reduce speed. Observation of approaching vehicles when the crosswalk system was activated showed a high percentage of vehicles reducing speed several hundred feet from the crosswalk. The recorded percentage of vehicles that reduced speed or stopped with the staged pedestrian was 75 percent. The 25 percent of motorists that did not reduce speed or stop generally were traveling on the opposite side of the street as the pedestrian and the pedestrian had not begun to cross. The staged pedestrian activated the crosswalk lights and proceeded to cross only if vehicles stopped or reduced speed enough for the pedestrian to walk clear of the travel lane.

Based on the field data collected before and after installation, it appears the in-roadway lighted crosswalk was not effective in encouraging additional pedestrian use at this location. The number of pedestrians using the lighted crosswalk did not substantially change. Before the lighted crosswalk was installed, four pedestrians crossed during the morning period and three during the afternoon. After installation, six pedestrians crossed during the morning period and three pedestrians during the afternoon.

Motorist Action	Percent Observed	# Observed
Did not Reduce Speed or Stop	25	28
Reduced Speed	45	52
Stopped	30	35
Total	100	115

Table 5. Motorist Action Observed to a Staged Pedestrian Attempting to Cross.

Construction and Maintenance:

During construction, uncertainty existed regarding the position of the detector bollards with respect to the curb face. The plans indicated the setback for the bollards was to be determined by the engineer in the field. The contractor installed them approximately 2.5 feet back of curb face on a 7 foot sidewalk without consultation with the engineer. Several pedestrians were observed walking around the bollards and not activating the flashing lights. The bollards were subsequently moved closer to the curb. Issues also existed with the detection system when the bollards were first installed. The detectors either placed false calls or missed calls. A control board was found to be defective and was replaced. Issues involving shorting out the system also occurred during installation. This was due to contractor error and unfamiliarity with installing in-roadway lighted crosswalk systems. No other problems have occurred since the in-roadway lighted crosswalk became fully operational.

G-1¹⁰

Conclusions:

Based on the field studies the following summarize staff conclusions regarding the in-roadway lighted crosswalk installation:

- In-roadway flashers were effective in reducing approaching vehicle speeds and stopping vehicles for pedestrians when activated
- In-roadway lighted crosswalk installation costs are approximately 35% of a typical traffic signal installation
- Passive detection appears to encourage appropriate caution in pedestrians crossing the street
- The addition of the marked crosswalk and in-roadway flashers in this location was not effective in encouraging additional pedestrian activity, especially related to the nearby schools as originally contended by residents
- Contractor experience is important to ensuring reliable operation of these installations
- The in-roadway lighted crosswalk system has operated properly with no reported accidents or complaints relating to the operation following initial corrections
- The in-roadway flashers did not appear to reduce the attention given to approaching traffic by pedestrians when attempting to cross

Recommendations:

Based on field observations on Bushard Street the concept of the in-roadway lighted crosswalk has shown a positive effect in enhancing driver awareness of and reaction to crosswalk activity. Future consideration of this treatment is recommended as an effective option to lower level warning signs or higher level signal control. Typically, this treatment should only be considered at uncontrolled crosswalk locations where a typical warning sign and marking treatment appears inadequate and additional warning to drivers is necessary.

Automatic detection is the recommended activation system for the in-roadway lighted crosswalk rather than by push button. Pedestrians may interpret activating a push button gives them the right of way. Push buttons are usually installed at standard traffic signals with pedestrian signal heads that pedestrians are familiar and understand. A push button activation system at an in-roadway lighted crosswalk without the accompanying signal head may not be understood. Since the in-roadway lighted crosswalk is a traffic warning device no visual indication should be given, encouraging the pedestrian to cross with caution and at their own discretion as they would at any other uncontrolled crossing.

Installation of flashing warning beacons at in-roadway lighted crosswalk locations is recommended on arterials due to the higher vehicular speeds. The higher speed streets require longer stopping distances where drivers can be warned more in advance of a potential stopping condition. An uncontrolled crosswalk location is a typical installation location for flashing warning beacons to emphasize its presence and warn drivers they may need to stop or reduce speed and proceed with caution.

G-1''

Additional recommendations to consider for future applications are listed below, many of which are duplicated from the California Manual of Traffic Control Devices:

- The location should have an identified associated pedestrian safety problem (pedestrian accidents, insufficient visibility, etc.)
- The in-roadway lighted crosswalk should be used at uncontrolled locations and be marked
- The use of an in-roadway lighted crosswalk should be used at locations with at least a moderate amount of pedestrian activity (minimum of 50 pedestrians per day)
- No controlled crosswalks or traffic control devices should exist within 600 feet of a proposed installation location
- The average daily traffic (ADT) on the street should be a minimum of 5,000 vehicles per day

G-1^R

Appendix A

Response #	Question	Response
1	How often do you cross at this location?	<i>"Every school day"</i>
	Do you feel safe crossing here?	<i>"Yes"</i>
2	How often do you cross at this location?	<i>"Six times a day"</i>
	Do you feel safe crossing here?	<i>"Yes"</i>
	Would you let your child cross here alone?	<i>"No"</i>
	Would you cross without the lighted crosswalk?	<i>"Yes"</i>
	What is your overall opinion of the lighted crosswalk?	<i>"The crosswalk is great"</i>
3	How often do you cross at this location?	<i>"Every school day in the morning"</i>
	Do you feel safe crossing here?	<i>"No, but it is better than before"</i>
	Would you let your child cross here alone?	<i>"No"</i>
4	How often do you cross at this location?	<i>"Three to four times a week"</i>
	Do you feel safe crossing here?	<i>"No"</i>
	Would you let your child cross here alone?	<i>"No"</i>
	Would you cross without the lighted crosswalk?	<i>"No"</i>
	What is your overall opinion of the lighted crosswalk?	<i>"Drivers do not pay attention to the crosswalk"</i>
5	How often do you cross at this location?	<i>"Every school day"</i>
	Do you feel safe crossing here?	<i>"No"</i>
	Would you let your child cross here alone?	<i>"No"</i>
6	How often do you cross at this location?	<i>"Once or twice a week"</i>
	Do you feel safe crossing here?	<i>"Yes"</i>

G-1¹³