City of Arts & Innovation

City Council Memorandum

TO: **HONORABLE MAYOR AND CITY COUNCIL** **DATE: MARCH 20, 2018**

FROM: **PUBLIC WORKS DEPARTMENT** **WARD: 1**

SUBJECT: **DIAGONAL CROSSWALK IMPROVEMENTS – MISSION INN AND UNIVERSITY AVENUES AT MARKET STREET**

ISSUE:

Upgrade of the existing standard crosswalks at the intersections of Mission Inn Avenue at Market Street and University Avenue at Market Street to permanent diagonal crosswalks.

RECOMMENDATION:

That the City Council approve:

1. Installation of permanent diagonal crosswalks at the intersection of Mission Inn Avenue at Market Street; and

2. Installation of permanent diagonal crosswalks at the intersection of University Avenue at Market Street.

COMMITTEE RECOMMENDATIONS:

On May 11, 2017, the Transportation Committee (Committee) reviewed information regarding the upcoming Public Works Department collaborative pilot project with Southern California Association of Governments (SCAG) which would install temporary diagonal crosswalks at three intersections in the Downtown area. This pilot project would occur in conjunction with the "Go Human" and Riverside Arts Walk events scheduled for June 1, 2017. The project called for removal of the diagonal crosswalks at the two smaller intersections following the scheduled events and retention of the diagonal crosswalk at Mission Inn Avenue at Market Street for a minimum of two-weeks to allow for assessment. The SCAG funded pilot project would enable the City to test use of diagonal crosswalks at a high pedestrian and vehicular volume intersection allowing for the collection of important data to aid in the evaluation of overall operations and impacts to pedestrian and vehicle movements. The Committee requested that the Public Works Department return with an update following conclusion of the pilot project.

On November 9, 2017, the Committee received updated information regarding the completed pilot project which installed temporary diagonal crosswalks at the intersections of Mission Inn Avenue at Market Street and Mission Inn Avenue at Lemon Street. Pilot project data including pedestrian volume and motorist delay information as well as resident feedback were presented for review.

Based upon the pilot project outcome permanent diagonal crossing improvements were proposed at both the intersection of Mission Inn and University Avenues at Market Street. The Committee unanimously recommended that the City Council approve installation of permanent diagonal crosswalks at both proposed intersections.

BACKGROUND:

The Public Works Department and SCAG worked together to successfully implement temporary diagonal crosswalk improvements at the intersections of Mission Inn Avenue and Market Street and Mission Inn Avenue at Lemon Street prior to the Downtown June 1, 2017 “Go Human” and Riverside Arts Walk events as part of an approved pilot project. The SCAG grant funded pilot project allowed the City to test operations of this uniquely designed crossing which allows pedestrians to cross directly from one corner of the intersection to any other corner during a single pedestrian phase at an intersection by crossing directly through the center of the intersection at a location which experiences both high pedestrian and vehicular volumes.

The diagonal crosswalk configuration is an approved California Manual of Uniform Traffic Control Devices device and is recommended by transportation professionals to enhance both pedestrian visibility and safety at high activity signalized intersections. Utilization of diagonal crossings allows for a single, longer pedestrians phase to service the diagonal crossing during which all vehicular movement is prohibited in lieu of several separate pedestrian phases. National research has shown demonstrated benefits to pedestrian safety with diagonal crosswalk improvements.

The City of Riverside currently has one operational diagonal crosswalk at the intersection of Canyon Crest Boulevard and Linden Avenue that serves students at University of California Riverside. The new pilot project location at Mission Inn Avenue and Market Street offered the opportunity to study the impacts of diagonal crosswalk improvements at a heavier vehicular setting.

DISCUSSION:

The intersection of Mission Inn Avenue at Market Street was selected for the diagonal crosswalk pilot project due to its unique position in the Downtown area providing access to key Downtown destinations including the Fox Theater, Main Street pedestrian mall, RCC Culinary Academy, the Mission Inn, as well as area residential properties, businesses, and restaurants. Additionally, high vehicular volumes at the intersection allowed the gathering of crucial information regarding the impacts of diagonal crosswalk improvements on traffic progression and delays.

Once temporary diagonal crosswalk improvements were in place at the intersection, the Public Works Department proceeded to conduct pedestrian counts at the intersection during the test period and study resulting vehicular delays. Pedestrian counts (shown in Table 1 below) determined that 30% of pedestrians crossing at Mission Inn Avenue and Market Street crossed diagonally and on the peak operating day 1,293 out of 4,306 pedestrians crossed diagonally, with over 200 of these crossings taking place during a single 15 minute interval. The volume counts indicate the intersection experienced an increase in pedestrian use while the diagonal crosswalks were in place. The spike in pedestrian volumes which occurred at the intersection on Saturday on Saturday was the result of an event hosted at the Fox Theater.

Table 1: Mission Inn Avenue at Market Street

Scenario	Total Pedestrian Crossings Per Day		
	Thursday	Friday	Saturday
Regular Crossing	3527	1360	1140
With Diagonal Crossing	4306	1375	3710*
	+22%	+1%	+325%*

*NPC West Coast Classic Event at Fox Theater on Sunday

Pedestrian traffic in the Downtown area varies based on a number of factors, however, count data suggests that even on non-event days the diagonal crosswalk configuration attracted a higher number of pedestrians to cross at the intersection. Data also suggests that the diagonal crosswalk allows the intersection to accommodate more pedestrians than a standard crosswalk design.

As diagonal crosswalks require an exclusive pedestrian signal phase delays to traffic were anticipated. Traffic Division staff conducted travel time studies along Market Street between Tenth and First Streets both while standard crosswalks were in place and while diagonal crosswalks were in place at the intersection to enable comparisons and determine impacts to motorists. Collected data was used to create a Corridor Synchronization Performance Index (CSPI), which measures motorists' average speed, number of stops per mile, and the number of green lights received along a corridor. The CSPI score is translated to a traditional letter grade from A-F. Areas such as our Downtown which is characterized by closely spaced intersections, frequent emergency vehicle pre-emptions, high pedestrian crossing volumes, and lower speed limits typically have lower CSPI scores than major arterial corridors with intersections spaced at least 1500 feet apart and locations with scores of less than 70 warrant improvement. Based upon existing conditions, Traffic Division staff previously recognized the need to retime the traffic signals Downtown and sought and received grant funding under the Highway Safety Improvement Program Cycle VII to replace traffic signal controllers, install additional traffic cameras, and provide consultant services to retime the Downtown grid to optimize traffic flow in response to recent development and in consideration of future development. The grant funded project improvements will produce improved baseline condition as shown in Table 2 which demonstrates the change in corridor traffic progression following implementation of the diagonal crosswalks.

Table 2:

Market Street (10th – 1st) Corridor Synchronization Performance Index			
AM Peak Hour of Traffic			
	Average Speed	CSPI Score	CSPI Grade
Regular Crosswalk	27.3 MPH	81.4	B
Diagonal Crosswalk	25.0 MPH	61.0	D
PM Peak Hour of Traffic			
	Average Speed	CSPI Score	CSPI Grade
Regular Crosswalk	25.6 MPH	65.7	D
Diagonal Crosswalk	20.3 MPH	21.9	F

The travel time studies showed that traffic progression along corridor declined during both a.m. and p.m. peak hours with the most significant increase in delay along the northbound direction of travel during the p.m. commute hours. Left-turns from Mission Inn Avenue to north and southbound Market Street also experienced increased delays.

Another crucial component of the pilot project assessment was gauging resident feedback. As a result, SCAG staff conducted a survey of 152 individuals regarding the temporary diagonal crosswalk improvements. SCAG indicated that all comments received were positive and a

majority were in support of the proposed improvements noting that the diagonal crosswalk configuration saved them time and created a higher sense of safety as pedestrians crossed the intersection. City Traffic Division also received several service requests regarding signal progression performance during the pilot project and though staff made efforts to improve the signal coordination measured results indicate that progression continued to remain sub-optimal throughout the pilot. Additionally, SCAG conducted a more focused study survey with a smaller sample size of 17 individuals to gain more in-depth information regarding the improvements and found that 16 of the 17 supported diagonal crosswalk improvements as permanent changes in their community.

Overall findings showed that during the diagonal crosswalk pilot project period, pedestrians accounted for approximately 11% of the daily combined vehicular and pedestrian entering traffic at the intersection of Mission Inn Avenue and Market Street. Pedestrian use of the intersection is also extremely heavy during the annual Festival of Lights event which brings an estimated 500,000 visitors to the City during the holidays. Levels of pedestrian use at this location are only anticipated to increase as housing and business development in the Downtown continues and other upcoming land uses are constructed and the Food Lab is opened along Market Street. As a result of the study data, resident feedback, and current and forecasted pedestrian use at the intersection, the Public Works Department recommends upgrading the existing standard crosswalks at Mission Inn Avenue and Market Street to permanent diagonal crosswalks. The project will be deployed in phases due to the Stalder Building construction.

Increased vehicular travel delays experienced during the pilot program were assessed and are believed to be manageable through use of the following mitigation measures:

1. Installation of a second permanent diagonal crosswalk at Market Street and University Avenue. This second crossing will allow staff to keep the intersection at Mission Inn Avenue more closely in step with University Avenue and ensure vehicles proceeding northbound across University Avenue will clear Mission Inn Avenue during the PM peak hour of traffic;

2. Installation of a “no right turn” blank-out lighted sign to restrict right turns during the diagonal crossing movement. A portion of the delay at the intersection was caused by the “no right turn on red” signage that limited right turn movements at all times. Installation of the blank-out signs which are activated by the traffic signal will limit the restriction to pedestrian crossing times only; and

3. Installation of “accessible pedestrian signal” push-buttons which allow staff to program a faster walking rate into the traffic signal and reduce the amount of time the diagonal crosswalk is activated. The button can be depressed longer to allow for an extended crossing time and this information will be relayed via signage and an audio message at the push-button. The “accessible pedestrian signal” buttons are already funded through the Active Transportation Program Cycle 1 which has already been bid and the contract awarded.

These measures will help facilitate a more complete approach to pedestrian and motorist service along Market Street. Most importantly, as pedestrians are the most vulnerable of our roadway users and the Transportation Research Board has published findings that identify diagonal crosswalks as a viable pedestrian collision countermeasure, permanently converting the standard crosswalks at both Mission Inn and University Avenues at Market Street to diagonal crosswalks will provide a safer and more efficient crossing experience for the City’s residents and visitors to the vibrant and enchanting Downtown area.

FISCAL IMPACT:

Striping and signage for the diagonal crosswalks can be implemented by staff within the existing Public Works budget. The total cost to purchase 8 blank-out signs at the proposed intersections is approximately $20,000 and the cost for the additional 8 pedestrian signal indications is approximately $6,400. Estimated materials acquisition costs for the project of $26,400 are available in account #9586133-440313 Miscellaneous Signal Revisions.

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Attachment: Diagonal Crosswalk Sample Exhibit – Mission Inn Avenue at Market Street