Howard/Stein-Hudson Associates, Inc.
CREATIVE SOLUTIONS • EFFECTIVE PARTNERING

MEMORANDUM

To: Kathy Mullaney
Projects Administrator, Permanent Building Committee
Date: August 30, 2013

From: Robbie Burgess, P.E.
Elizabeth Peart
HSH Project No.: 2010190

Subject: Tolles-Parsons Center
Pedestrian Crossing Recommendations for Washington Street

The purpose of this memorandum is to discuss the methodology used to in the design development for the proposed pedestrian crosswalk for the Tolles-Parsons Center (Center).

The goal of the proposed crosswalk is to provide safe and convenient pedestrian crossing opportunities that will effectively serve all land uses within along the subject portion of Washington Street while minimizing the impact on vehicle movement and on-street parking.

Existing Conditions

HSH evaluated the section of Washington Street from Morton Street to Wellesley Avenue that includes two existing crosswalks; one at the Wellesley Police Department (WPD) Driveway and one serving the St. Paul Church. This area was examined because the development of the Center will generate additional pedestrian traffic as well as shift existing pedestrian trips to the proposed Center crosswalk. Other pertinent information is below.

- The existing on-street parking supply within the area studied is approximately 40 spaces;
- Automatic Traffic Recorder data indicate this area of Washington Street carries approximately 16,400 vehicles per day;
- The existing crosswalk near St. Paul's Church has a pedestrian actuated amber flashing beacon that acts as a warning to motorists;
- The existing crosswalk near the WPD has no warning signal; and
- The 85th Percentile speed on Washington Street eastbound is 32 mph and 33 mph westbound.

Methodology

Because the Center is expected to relocate existing pedestrian crossings and generate new pedestrian crossings the first step was to evaluate if the crossing will require a fully functional traffic signal—one that will remain in the green phase until a pedestrian actuates a push-button, then cycle from yellow to red and return to green after the pedestrian call has been satisfied. Other options such as a hybrid pedestrian beacon or improved static signage were also evaluated.

Traffic Signal Warrants

The Manual of Uniform Traffic Signal Control Devices (MUTCD) provides recommendations for the installation of traffic signals at intersections and other locations in the form of nine Warrants. If any of these are met, along with the application of engineering judgment, a traffic signal is recommended for installation. The warrants are as follows:

- Warrant 1—Eight Hour Vehicular Volume;
- Warrant 2—Four Hour Vehicular Volume;

- Warrant 3—Peak Hour Vehicular Volume;
- Warrant 4—Pedestrian Volume;
- Warrant 5—School Crossing;
- Warrant 6—Coordinated Signal System;
- Warrant 7—Crash Experience;
- Warrant 8—Roadway Network; and
- Warrant 9—Railroad Crossing.

Warrants 1through 4 are vehicular volume based warrants used for applications when side-street traffic is attempting enter a main street. These warrants do not apply.

Warrant 4, the Pedestrian Volume warrant was examined in detail. This warrant is satisfied when the volume of main street traffic is large enough and the demand to cross the main street is high enough that not enough gaps exist in the existing traffic to allow pedestrians to cross.

Warrant 4 is further aggregated to consider two conditions; a peak single hour with high traffic volumes combined with high pedestrian demand, and a four-hour period with lower traffic volume and lower but steady pedestrian demand.

- To satisfy the peak hour, approximately 1,500 vehicles per hour are required combined with at least 133 pedestrian crossings.

- To satisfy the four-hour condition 1,100 vehicles per hour are needed each hour for four hours along with 107 pedestrian crossings per hour for each hour.

HSH employed a conservative approach considering significant traffic growth and a combination coinciding pedestrian demands. Table 1 shows the estimated weekday pedestrian demand for the Center crosswalk, based on assumed new and relocated crossings as the crosswalk does not exist.

As the table indicates, the average per hour pedestrian crossings are approximately 33 per hour and the peak crossing is 49 per hour. These values are significantly below the requirements to meet the warrants.

The second component of the Pedestrian Volume warrant is the requirement for Washington Street traffic volumes to exceed 1,100 vehicles per hour for four hours or exceed 1,500 vehicles for a single hour. Existing volume date indicates that there are four hours that approach the volume threshold (over 1,000 vehicles per hour, but under 1,100 vehicles per hour) but do not satisfy it. Similarly, the existing peak hour volume at 1,265 vehicles per hour does not satisfy the requirement.

Analogous to the traffic study, existing traffic volume data was increased by 1% per year and re-evaluated. Although closer to satisfying the volume requirement, the increase of 5% still did not.

Warrant 5 does not apply as the existing crosswalk to service the school at St. Paul's will remain and Warrants 6-9 do not apply.

In summary, the Washington Street volume although near minimum thresholds does not meet the lowest required vehicle volumes to satisfy Traffic Signal Warrant 4. More importantly, the pedestrian volumes estimated for this location are well below the minimum requirements. HSH has concluded that a full traffic signal is not warranted given the conditions examined.

Table 1 Trip Estimate for Center's Proposed Washington Street Pedestrian Crossing

Pedestrian Generator	Time of Day (weekday)									
	6 a.m. to 7 a.m.	7 a.m. to 8 a.m.	8 a.m. to 9 a.m.	9 a.m. to 10 a.m.	10a.m. to 11 a.m.	11a.m. to 12 p.m.	12 p.m. to 1 p.m.	1 p.m. to 2 p.m.	2 p.m. to 3 p.m.	3 p.m. to 4 p.m.
Center parkers at WPD lot walking to/from the Center				23	19	18	17	15	12	23
Morton Circle and Washington St. studio residents (senior housing) walking to/from the Center [1)]				13	11	10	9	8	7	13
Morton Park visitors walking to/from the park and locations on south side of Washington Street.					5	5	5	5	5	5
Public parkers along both sides Washington Street spaces walking to/from locations on opposite side of street [2)]		8	8	8	8	8	8	8	8	8
Total	0	8	8	43	43	41	39	36	32	49

1) In total, these two developments have 72 units of housing. Assume 36 residents visit the Center daily.
2) Walking trips in this row are not related to St. Paul or the Center. It is assumed that pedestrians destined to St. Paul Parish and School will use the Washington Street crosswalk directly in front of St. Paul's Parish.

Pedestrian Hybrid Beacon

The MUTCD provides other installations when the requirements for a full traffic signal are not met. A pedestrian hybrid beacon can be installed. The Hybrid Beacon can be post mounted similar to existing traffic signals or can be a HAWK (High-Intensity Activated CrossWalK Beacon) Similar to a full pedestrian signal, a hybrid beacon is activated by pedestrian push buttons and legally stops traffic for pedestrians.

> *A pedestrian hybrid beacon is a special type of hybrid beacon used to warn and control traffic…to assist pedestrians in crossing a street or highway at a marked crosswalk.*

The threshold for a Hybrid Beacon signal is 20 pedestrian crossings per hour and a two-way vehicle volume of approximately 1,625 vehicles per hour. The lower pedestrian volume requirement with a HAWK beacon indicates that such a beacon is generally installed at locations with lower pedestrian demand.

At the Center location on Washington Street, the pedestrian threshold is met for the Hybrid Beacon but similar to Traffic Signal Warrant 4, the traffic volume threshold is not. However, it is our opinion that engineering judgment applied to the parameters set forth in this memorandum support the installation of a Pedestrian Hybrid Beacon.

The Hybrid Beacon has several benefits for this application. First, it provides many of the same functions as full traffic signal. It is pedestrian actuated, provides a "red" indication to stop traffic, provides WALK/DON'T WALK and count down pedestrian timers. Also the Hybrid Beacon remains dark when not in use which adds to effectiveness as it will not become commonplace to drivers. A full traffic signal that indicates a "green" phase much of the time can become less effective as drivers become accustomed to the "green" signal.

Reccomendations

HSH recommends a series of measures be taken to effectively organize and delineate pedestrian crossings on Washington Street within the study area of the Tolles-Parsons Center:

1—Install Hybrid Pedestrian Beacon east of the Senior Center as shown on HSH's plan. This will be conveniently located for multiple land uses and will have minimal impact on residences. The hybrid beacon can be installed post mounted, or overhead on a mast arm. Existing trees may need to be pruned and street lights may need to be relocated.

2—Remove the crosswalk at the WPD. The extremely low demand that exists for this crosswalk can be relocated to the proposed crosswalk.

3—Retain the existing St. Paul crosswalk. The distance between the new hybrid beacon and the existing St. Paul crosswalk will be about 340 feet. This distance should be sufficient to safely allow for retaining the existing St. Paul crosswalk (with existing control) and installing the new hybrid beacon for the Center.

4—Inform the Public. If a Pedestrian Hybrid Beacon is installed, provide public outreach, education, and demonstrations to allow drivers and pedestrians to understand this newer signal type. Demonstrations can be done with traffic control assistance from the WPD to provide a safe environment for the demonstration.

5—Monitor results. After these improvements are made, the Town should monitor crosswalk operations to ensure that the new hybrid beacon and existing St. Paul crosswalk are providing safe and efficient movement of Washington Street pedestrians and vehicles.

Conclusions

A review of the available data indicates that the Washington Street traffic volumes, and projected pedestrian crossing demand, do not meet the requirement for full pedestrian signal However, there will be periodic times when pedestrians can benefit from alerting vehicles of their presence in the crosswalk., and legally stopping vehicles prior to the crosswalk.

It is our conclusion that, at this Washington Street location, a Pedestrian Hybrid Beacon can provide the necessary driver information and pedestrian information in the form of overhead or post mounted signals to alert drivers and WALK/DON'T WALK indications for pedestrians.

In the absence of traffic volume projections that will exceed those required for a full traffic signal, we recommend installation of a Pedestrian Hybrid Beacon as the most appropriate for this location.

Because this installation would be somewhat new to Wellesley, we also recommend a campaign to educate drivers prior to activating the beacon. This could include temporary signage, operational demonstration for the community, notices in the Town newspaper, and information on the Town government website.