PROJECT SUMMARY

Variable Pedestrian Clearance Interval (VPCI)

Project Location:

TH-61 at 4th Street
White Bear Lake, MN

Start – Finish Date:

October 2016 – May 2018

Project Status:

Complete

Project Partners:

SRF Consulting
ISS
TCC
Egan Company

MnDOT Project Cost:

$225,000

Projects with Similar Characteristics:

Passive Pedestrian Detection Analysis

- Direct follow up from VPCI

Project Description:

The Variable Pedestrian Clearance Interval (VPCI) project consisted of deploying, testing, and analyzing the results of installing video at an intersection to extend the Flashing Don't Walk (FDW) interval as needed when pedestrians were still located within the crosswalk. To complete this project, the project team:

- Installed pedestrian detection equipment.
- Reviewed an initial round of testing data to find gaps in the system data.
- Determined a new path forward after identifying the data gaps.
- Tested additional pedestrian detection equipment.
- Utilized ATSPM data to verify the outcome of the pilot.

Project Objective:

The objective of the VPCI project was to use video detection to extend the FDW interval when needed to accommodate pedestrians who were still in the crosswalk and minimize the impact to vehicular efficiency. A secondary objective involved understanding the potential of utilizing the same methodology to shorten the FDW interval when the entire count was not required.

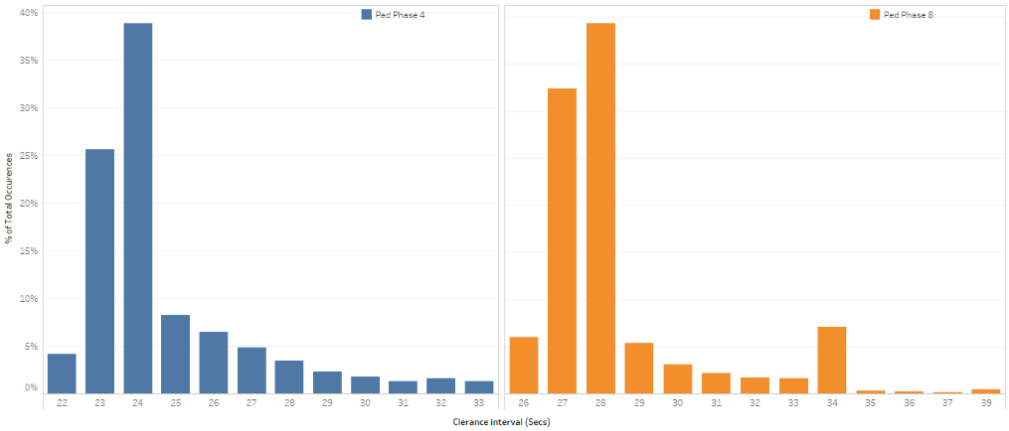

Figure 1: FDW Interval Duration Graph

Project Accomplishments:

- Determining that a variable pedestrian clearance interval system shows promise by providing on-demand enhanced safety while limiting the impact to vehicular travel efficiency.
- Determining that ATSPM is a valuable and reliable source of data when the MaxView data experienced gaps.
- Identifying detection accuracy differences while testing several detection systems.

Key Findings:

Camera Accuracy

The camera's "true positive rate" (the rate at which the system correctly identified a pedestrian in the crosswalk) was 77%. The camera's "false detection rate" (the rate at which the system identified a pedestrian in the crosswalk that was not present) was 35%. These rates were less than ideal with expectations being closer to 99% and 1% respectively.

An alternate camera was tested and saw a true rate of approximately 90% with a false rate of 7% which was a significant improvement from the first camera used in the project.

Vehicular Detection

The detection system and FDW interval extension worked as intended for pedestrians, but the detection system would occasionally pick up left-turning vehicles from the side street onto the mainline as pedestrians, which extended the FDW interval when it wasn't necessary.

Passive Pedestrian Detection System

The system operated as intended with a 97% true detection rate with the false alarms rate being less than 3%.

ATSPM Analysis

ATSPM results showed a value in providing a variable FDW interval. Where no FDW extension was provided, the amount of time in coordination was above 75%. Where frequent FDW extensions occurred, the time in coordination dropped as low as 30%. The variable pedestrian clearance interval system offered reduced delay and improved arrival on green performance as opposed to if the intersection had a longer fixed FDW interval.

Applicability

Due to limitations of video detection capabilities, VPCI was not yet ready for scale deployment.

Lessons Learned:

- Data gaps identified were likely due to how the MaxView system was polling the local signal controller.
- Detection accuracy is a key component of system functionality, so testing should be utilized to determine the most appropriate device.

Potential Next Steps for MnDOT:

- Continue to refresh / update "state of the art" pedestrian video detection and VPCI systems.
- Evaluate recommendations and lessons learned progress since project completion.
- Continue to evaluate and identify intersections that could benefit from the installation of a variable pedestrian clearance interval system.
- Continue to identify systems that can incorporate both vehicle detection and pedestrian detection to minimize the amount of technology needed at intersections.
- Explore detailed signal design recommendations in project summary report (many have already been accomplished through new equipment).
- Develop a pilot or demonstration V2X application project using pedestrian video detection.