



SPR RESEARCH PROGRAM

SECOND-STAGE PROBLEM STATEMENT

FY 2017

ODOT Research Unit
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I. PROBLEM NUMBER AND TITLE

17-019_TSHF Best Practices for Installation of Rectangular Rapid Flash Beacons (RRFB) with and without Median Refuge Islands

II. RESEARCH PROBLEM STATEMENT

Over the last decade, Oregon jurisdictions have systematically installed pedestrian crossing enhancements (PCEs) at crosswalks such as continental markings, median refuge islands, curb bulb outs, pedestrian activated flashing beacons, overhead signs, advanced stop bars and more recently Rectangular Rapid Flash Beacons (RRFB). RRFBs are proving to be a cost-effective way to improve driver yielding and hopefully safety. Oregon practitioners, however, desire guidance as to the value of pedestrian refuge islands and the placement of the RRFB beacons on highways with two-way left turn lanes (median vs. far side). The median island can lead to access management issues in urban and suburban areas. In



some cases, installing median mounted beacons on three lane roadways (one lane in each direction with a two-way left turn lane) can lead to conflicts with over-dimensional freight (oversize loads on state highways may need 25 feet of clearance). Beacons are typically installed on median islands but it is not clear if they are needed, since left-side beacons can be seen by oncoming traffic unless occluded by large vehicles. It is also desirable to identify situations where there is a significant benefit to installing both treatments.

A current ODOT research project (SPR 778) has collected data on many different types of PCEs on state and non-state highways in Oregon with an objective to establish the safety effectiveness of these improvements. The SPR 778 research data set includes 39 and 29 RRFB locations with and without a pedestrian refuge island, respectively (15 locations are on three-lane roadways). The data set includes detailed information about the installations. Preliminary analysis of crash data is underway. However, due to the recent installation dates and the lack of pedestrian volume counts, SPR 778 will likely not produce a definitive answer on the safety effectiveness of RRFBs. Pedestrian volume counts are necessary to accurately estimate the safety effectiveness of RRFB locations and take SPR 778 results to the next level.

III. RESEARCH OBJECTIVES

This research will seek to produce the guidance that practitioners need about the placement of RRFB beacons in combination with median refuges on three lane roadways. This research will provide empirical evidence about the effect of refuge medians on driver yielding and pedestrian crossing behavior. The research will also compare the effect of median-mounted RRFB displays versus far side-mounted RRFB displays with respect to these same performance measures. Finally, this project will enhance and reanalyze the SPR 778 RRFB data to produce more robust estimates of the safety effectiveness. With these measures well-quantified, ODOT will be able to improve the guidance for pedestrian crossing enhancements.

IV. WORK TASKS, COST ESTIMATE AND DURATION

The specific tasks to be undertaken by the researchers for the study are as follows (tasks overlap in duration):

Task 1: Review Policies and Procedures for RRFB Installation (3 months)

Review and synthesize policies and procedures from other agencies in Oregon and other states. The review will include NCHRP 562 and other documents that have guidance on placement of RRFBs.

Task 2: Identify Additional RRFB Installations (4 months)

Identify additional RRFBs in Oregon (and possibly in Washington) on three lane roadways with and without median. Replicate the SPR778 data collection methodology on these new locations.

Task 3: Develop Observational Video Collection Plan (3 months)

After the Task 2 data are collected and summarized, the research team will develop a robust data collection plan. The locations for video data collection will be balanced with respect to variables of interest including the duration of installation (i.e. how long has the RRFB been in place), geometry, traffic and pedestrian volumes, geography, presence of median refuge, and placement of beacons. The research team will determine the appropriate duration and number of locations to answer the research question. The budget is scoped for up to 20 locations.

Task 4: Conduct Video Data Collection (6 months)

Deploy passive video data collection devices at pedestrian crossing locations with field of views sufficient to capture driver yielding and pedestrian crossing behavior. Data collection will take place in April-August.

Task 5: Analyze Video for Yielding Behaviors and Pedestrian Volumes (5 months)

The collected video will be analyzed to determine the yielding behavior of motorists at locations using methods previously developed by the research team. The yielding behavior will be examined to understand the relationships between the design elements of the installation and yielding behavior, including risk factors. At crossings near driveways or minor roads, the behavior of left-turning vehicles will be examined. The analysis will also study pedestrian behavior with and without median refuge islands. Pedestrian volumes will also be extracted from the video. Methods to estimate pedestrian volumes from these data to enhance the safety analysis will be explored.

Task 6: Update Safety Effectiveness Evaluation from SPR 778 (3 months)

The enhanced data set, including the additional RRFB locations and newer crash data will be reanalyzed for safety effectiveness. We anticipate 1-2 years of new crash data at the SPR 778 locations, pending ODOT crash analysis processing schedules. If the pedestrian volume estimating methods prove robust, the research team will use this to enhance the safety effectiveness analysis.

Task 7: Final Report (4 months)

Prepare and submit a final report which describes the research study, conclusions, and recommendations.

Total project time: 18 months

Total project budget (includes research administration): \$185,000

V. IMPLEMENTATION

The results of this will update ODOT’s guidance on uncontrolled crossings in the Traffic Manual. The results of the research will be used by traffic operation and safety professionals in selecting the appropriate treatments for enhancing these cross walks.

VI. POTENTIAL BENEFITS

The research will identify the circumstances when it is best practice to provide a median island with an RRFB, with a focus on three lane roadway cross-sections. If the research can identify situations where an island is not needed, it will simplify and reduce the cost of installing RRFBs. This will allow ODOT and other agencies to install more of these pedestrian safety devices. Conversely, this research may provide the documentation that will help justify installing median islands where they are required for pedestrian safety.

VII. SUBMITTED BY

<i>Stage 1 Submitter</i>	<i>Stage 2 Submitters</i>	<i>ODOT champions</i>
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