

INTRODUCTION

Pedestrians and bicycles are a very important component in the design of any traffic control system and this is no different for roundabouts. Of all the user groups on public streets and highways, pedestrians are among the most vulnerable, particularly in terms of fatalities and serious injuries (1).

Substantial international and U.S. studies and research have concluded roundabouts reduce the severity, and number of accidents for pedestrians.

FOUNDATIONAL DESIGN ATTRIBUTES THAT PROMOTE PEDESTRIAN SAFETY

- 1) The geometric design provides slow vehicle speeds at pedestrian crossings.
- 2) Crosswalks pass through the splitter islands, creating a two-stage crossing for pedestrians, allowing pedestrians to cross one direction of traffic at a time.
- 3) The geometric design provides good sight lines from ped to driver and vice versa.
- 4) Crosswalks are set back from the yield line by one or more car lengths where vehicle speeds are slow, which promotes yielding of motorists to non-motorized users.

PUBLIC RIGHT OF WAY ACCESSIBILITY GUIDELINES (PROWAG)

All roundabouts must address the current ADA requirements and be cognizant of proposed ADA requirements for pedestrians with vision or hearing impairment (*Public Right of Way Accessibility Guidelines/ PROWAG*). Higher flow multi-lane roundabouts may in some situations require additional visual and audible cues to better accommodate pedestrian traffic, and specifically pedestrians with disabilities. The proposed ADA ruling (PROWAG) regarding the accessibility of multi-lanes indicates additional requirements are necessary to include accessible pedestrian signals (APS) or equivalent facilitations to meet the accessibility needs of visually impaired pedestrians. Recent research into this area is included in NCHRP 834 Report – *Crossing Solutions at Roundabouts and Channelized Turn Lanes for Pedestrians with Vision Disabilities: A Guidebook*.

Ref. (1): "Safer Vulnerable Road Users: Pedestrians, Bicyclists, Motorcyclists, and Older Users" by C. Zegeer and W. Hunter

Fig. 1 HAWK (High-Intensity Activated Crosswalk Beacon) signal at crosswalk



NCHRP 834 REPORT

This guide provides an accessibility assessment framework and a methodology for evaluating treatment alternatives for proposed crossings and wayfinding accommodations.

Of particular focus the 834 Report contains guidance on what may constitute "equivalent facilitation" to pedestrians with vision disabilities.

The 834 Report states that the research is based on the premise that other treatments exist besides an APS-equipped signal that can meet the accessibility goals of the PROWAG for pedestrians with vision disabilities, and states:

"This report provides a firm conceptual measurement driven approach to the study of the effect of such treatments, but it is clear that more field research is needed to explore and substantiate treatment effects..."

The PROWAG guidelines place a strong emphasis on "speed control" and "wayfinding."

WAYFINDING FEATURES

Wayfinding principles to optimize wayfinding information for people who rely on nonvisual information include:

- Provide positive wayfinding guidance to the crosswalk.
- Landscaping, fences, or other features should restrict the ability of pedestrians to cross at locations other than crosswalks and provide guidance to the crosswalk location.
- The crosswalk should be located conveniently close to the roundabout to minimize out-of-direction travel for pedestrians.
- The crosswalk should be located such that approaching drivers have time to see a pedestrian in it, react and apply their brakes, and stop their vehicles before reaching the crosswalk.

RAISED CROSSINGS AND RECTANGULAR RAPID FLASHING BEACONS (RRFBs)

Raised crossings and rectangular rapid flashing beacons (RRFBs) with accessibility features are featured in NCHRP 834 as means to address accessibility.

RRFB

The project pictured in Figs. 2 and 3 includes Rectangular Rapid Flashing Beacons (RRFB) to meet this challenge by providing an improved pedestrian environment. The RRFBs contain LEDs that flash at a rapid rate to facilitate driver recognition and awareness of pedestrians at or near a crosswalk.

RRFBs are placed closer to driver eye-level at entry and exit points where pedestrians traditionally wait to cross an intersection. This brings the driver's attention to the roadside, making pedestrians more visible than overhead pedestrian signal alternatives. The RRFB devices have shown significant improvements to yielding rates and safety due to greater visibility of pedestrians in crosswalks for multiple lane crossings (*City of St. Petersburg, FL RRFB Study, 2009*).

RAISED CROSSWALKS

Non-signalized treatments can be considered to improve the accessibility of crosswalks at roundabouts. Treatments that provide vertical deflection and thus reduce speeds, such as raised crosswalks (Fig. 4), may improve the likelihood of drivers yielding to pedestrians. Testing of a raised crosswalk at a multilane roundabout is reported in NCHRP Report 674 and showed beneficial results in terms of the pedestrian level of risk and driver yielding. Evaluations in NCHRP Project 03-78B further found that raised crosswalks can help reduce vehicle speeds, increase driver yielding, and reduce pedestrian risk and delay. The potential impact of a raised crosswalk at roundabouts on the slowing down of vehicles needs to be considered before installation. Further testing is needed to understand the range of conditions under which a raised crosswalk may be effective.

It is further possible to combine a flashing beacon or RRFB with a raised crosswalk. The beacons are primarily intended to increase driver awareness of the crosswalk, alert them of the presence of a pedestrian, and encourage drivers to yield. A raised crosswalk can be effective in supplementing these treatments, by reducing vehicle speeds at the crosswalk, which can help reduce sight distance requirements, improve yielding, and reduce risk.

Fig. 2 Rectangular Rapid Flashing Beacon (RRFB) at Crossing Martin Luther King Roundabout, Springfield, OR



Photo courtesy City of Springfield, OR

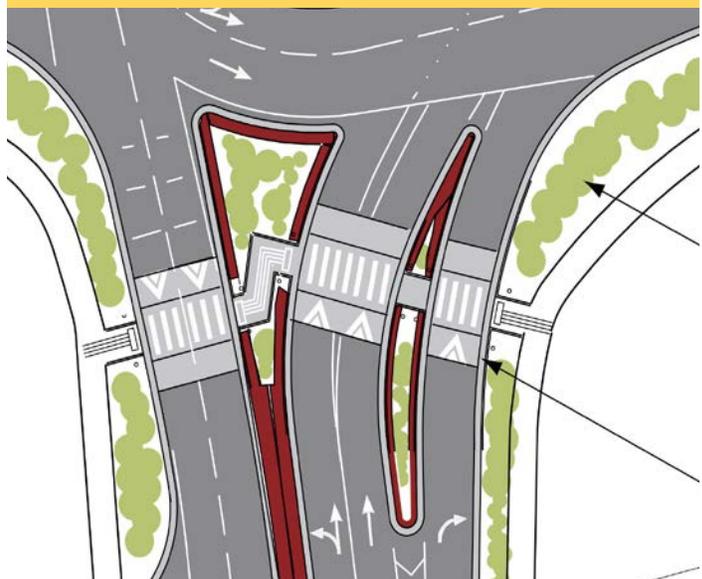
Fig. 3 Rectangular Rapid Flashing Beacon (RRFB) at Crossing Martin Luther King Roundabout, Springfield, OR

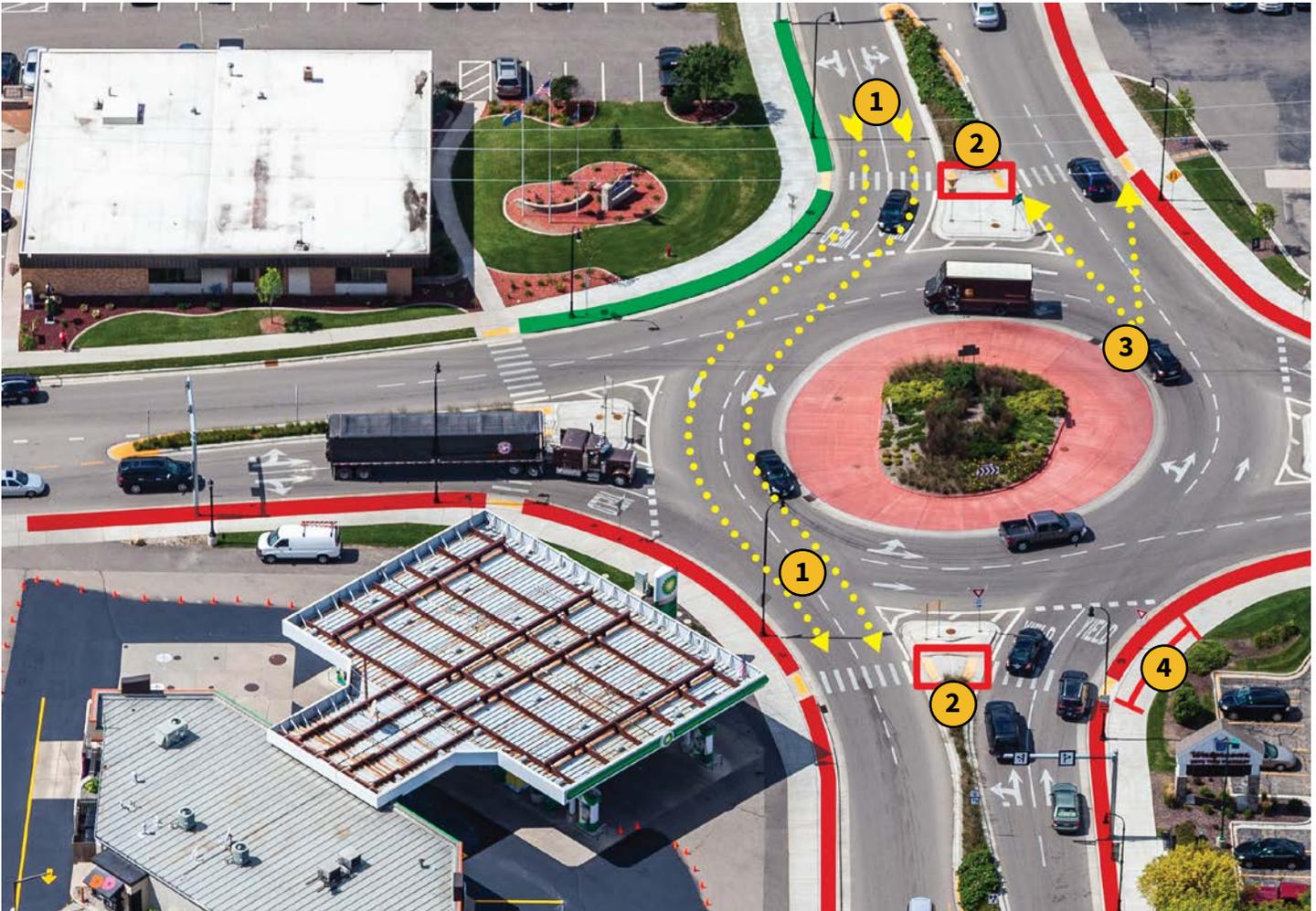


Video courtesy City of Springfield, OR

[See video of pedestrian crossing here](#)

Fig. 4 Raised Crosswalks





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