

Adjustment of Driver Behavior to an Urban Multilane Roundabout

In June of 2006, the City of Springfield, Oregon began construction of the first multi-lane urban roundabout in Oregon (Figure 1). The five-legged roundabout replaced an existing 'T' intersection that was controlled by a traffic light. A study was conducted to evaluate how drivers adjusted to the traffic change.

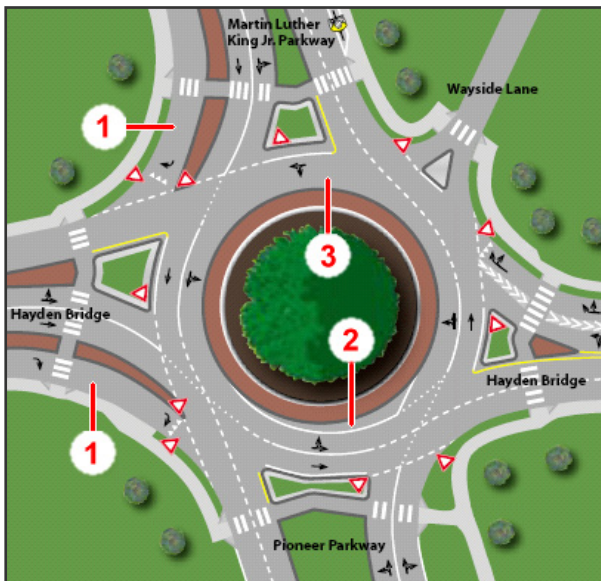


Figure 1: Diagram of the Springfield roundabout

It was hypothesized that after installation, speed variability on approaches to the intersection would decrease from the values with the previous signalized intersection. It was also hypothesized that the initially observed high incidence of driving errors associated with specific areas of the roundabout would decrease over time.

Motorist speed variability was examined on two legs of the intersection before and after the traffic change. Following construction of the roundabout, two distinct areas were chosen to test driver error and adaptability over a six month period. The areas selected were locations where numerous driver errors were initially observed.

Standard road-tube speed measuring instruments were used to measure variability of speed at a single lane on Hayden Bridge West and two lanes on northbound Pioneer Parkway. The mean speed of traffic increased in all three tested locations at an average of 4.5% (Figure 2).

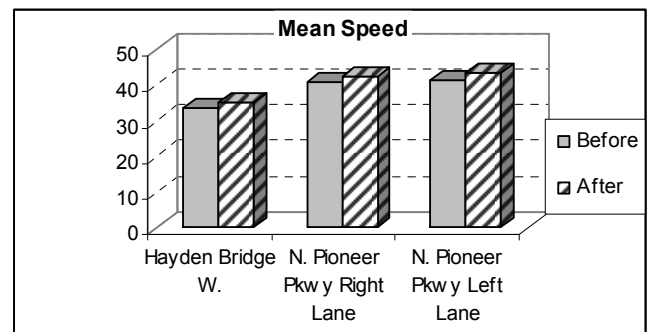


Figure 2: Chart showing the mean traffic speeds before and after the construction of the roundabout

The road-tube instruments also measured the variability of speeds at the same locations. Of three approach lanes monitored, one decreased in variability, one increased in variability, and the third was inconclusive (Figure 3).

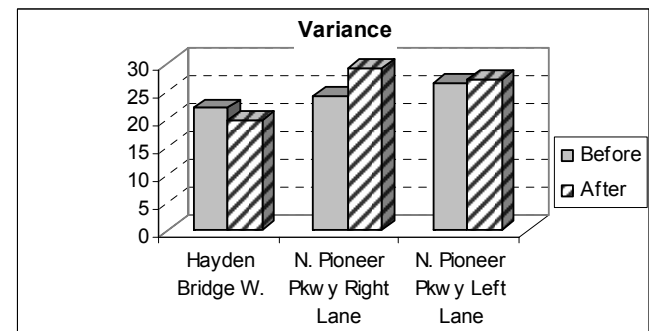


Figure 3: Chart showing the variance in traffic speeds before and after the construction of the roundabout

Observations of the approaches and functioning of the roundabout during the first week of operation identified two easily quantifiable areas where drivers showed confusion or indecision in navigating the intersection (Figure 4).

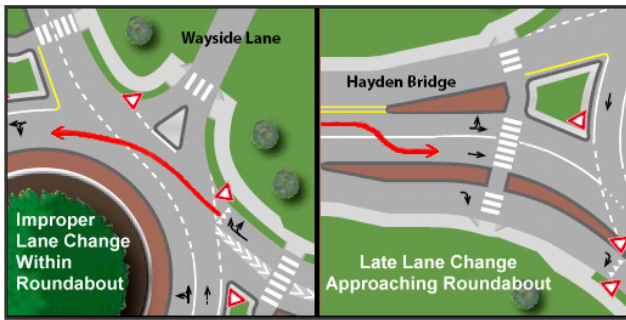


Figure 4: Maps showing the locations of the two areas examined where drivers showed confusion

One area of confusion was where drivers entered the roundabout from westbound Hayden Bridge road in the right lane. Westbound traffic entering the roundabout in the right lane from Hayden Bridge road must either exit on Wayside Lane or Martin Luther King Jr. Boulevard. Many of these vehicles were, however, observed making an abrupt lane change within the roundabout in order to continue circulating and avoid exiting onto Martin Luther King Jr. Parkway

The other identified area of confusion was eastbound Hayden Bridge Road approaching the roundabout. Several vehicles approaching the roundabout in the left-hand lane of Hayden Bridge Road eastbound were observed making a late merge from the left hand lane across a solid white line into the right hand lane.

Initial observations of traffic entering the roundabout from the right lane of Hayden Bridge road showed that as many as 40% of all vehicles using this lane did not exit as required and performed an abrupt lane change within the

roundabout in order to continue around to other exits. A steady decrease in the percentage of improper lane changes was observed from eight on-site observation sessions. Six months following the opening of the roundabout, the percentage of vehicles incorrectly using the right-hand entry lane had dropped to 3.3%.

The impact of the new Springfield, Oregon roundabout intersection on the speed variability of approaching traffic was small and mixed. The hypothesized smoothing effect of the roundabout on the speed of approaching road traffic was not consistently supported by the study findings. Other variables related to traffic flow may have played a role, such as the predominance of left-turning traffic at the intersection and the need for drivers to plan for which lane they should be in.

The high incidence of driving errors observed in the opening weeks of the new intersection are assumed to stem from the lack of familiarity of local drivers with multi-lane roundabouts. Overall, the errors of drivers in the roundabout steadily decreased. The decrease can be correlated to a logarithmic learning curve.

Roundabouts are known to be a valuable tool in effectively managing traffic flow in a safe and aesthetic manner. Although careful design is recognized as crucial to long-term efficient function, drivers can rapidly learn and adjust to situations that may initially cause confusion in navigating the roundabout.

For more information, contact Mark Joerger at 503-986-3464,
or via e-mail at Mark.D.Joerger@odot.state.or.us

The full report for this project is available on the Research Unit web page:
http://www.oregon.gov/ODOT/TD/TP_RES/ResearchReports.shtml



Oregon Department of Transportation

Research Unit

200 Hawthorne Ave. SE, Suite B-240
Salem, OR 97301-5192

Telephone: 503-986-2700
FAX: 503-986-2844

For more information on ODOT's Research Program and Projects, check our website at
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