



Research Need Statement 531

Date:	6-29-2018
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Idea Originated from:	IdeaScale

Select Program:

MnDOT OR Local Road Research Board (LRRB)

Research OR Implementation

Need Statement Title:

Driver encounters with non-traditional traffic treatments: how to maximize operational and safety benefits while reducing time to secure stakeholder consent.

Need Statement: Describe the problem or the opportunity. Include background and objective.

Non-traditional traffic treatments (e.g.: roundabouts, Restricted Crossing U-turns, Diverging Diamond Interchanges, Back-In Angle Parking) improve traffic operations and safety, yet have a steep learning curve and stakeholder apprehension toward newer treatments. Better understanding of where users' attention is focused (i.e.: at what and where are users looking) is needed in order to maximize the operational and safety benefits provided by non-traditional traffic treatments. Also, a better understanding of the effectiveness of pre-construction education tools (e.g.: videos, animations, written materials, golf-cart demonstrations) is needed to help overcome stakeholder apprehension, in order to increase the deployment of these treatments.

Provide a summary of the potential benefits:

- Improve operational and safety performance of non-traditional traffic treatments (i.e.: reduce the learning curve) with a better understanding of on what and where users are focusing their attention.
- Reduce assets (e.g.: signs & pavement markings). Non-traditional traffic treatments typically have more signs and markings which may not be necessary, and could potentially cause user confusion.
- Reduce pre-construction efforts required to obtain the informed consent of stakeholders for these treatments.



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How does this project build upon previous research (include title or reference to a completed research effort)?

Traffic crashes are mainly caused by a diminished driver vigilance level and gaze distraction from the road (National Highway Traffic Safety Administration's National Center for Statistics and Analysis, 2016). Unfamiliar or non-traditional traffic treatments can be a significant source of gaze distraction, as a driver may not see sign and pavement line cues properly.

Kapitaniak, et al (2015), in a review of current research on driver effectiveness, indicates that the method of tracking eye movements is currently the method of choice for the study of driver cognitive strategies, in particular visual strategy, applying to whether something is perceived (noted) or missed during vehicle control, situation evaluation and navigation. Naviq, et al (2018) has shown great promise using near-infrared gaze tracking systems (Google Glass eyewear) for driver gaze documentation.

van Leeuwen, et al (2017) describes driver gaze differences based on experience level, with experienced drivers exhibiting greater anticipation, focusing less on the roadway center and more on the periphery, and looking farther ahead and with greater variation than less experienced drivers.

Winter, et al (2017) characterizes the differences in driver gaze between daytime and nighttime, and between highway and residential street settings.

Grippenkoven and Dietsch (2016), in an evaluation of gaze direction and driving behavior of drivers at railroad level crossings, identify driver age and experience level as significant controlling factors to decision made for safe crossings.

No prior research pertaining to pre-construction driver education for non-traditional intersection treatments was found.

Provide names to consider for a technical advisory panel:

Derek Leuer, MnDOT Office of Traffic Engineering
Josie Tayse, MnDOT Office of Traffic Engineering
Brett Paasch, MnDOT District 7 Acting Traffic Engineer
Chris Chromy, Bolton & Menk, Inc.