



Research Project Statement 20-281 FY 2019 Annual Program

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| Title: | Use of Roundabouts and Innovative Intersection Designs at High-Speed Intersections in Texas |
| The Problem: | <p>TxDOT operates thousands of centerline-miles of high-speed roadways, speeds at which access might traditionally have been restricted. As posted speed limits have increased with the repeal of the national speed limit and subsequent legislative acts, there are an increasing number of high-speed roadways that have at-grade access points, both intersections with other roads and driveways connecting to adjacent land uses. Innovative intersection designs (j-turns, median u-turns) have been used to remove conflict points and redistribute turning traffic from traditional intersections, and their success has been documented at locations across the country. However, guidance on use of innovative intersection designs and how to choose the most appropriate design from multiple alternatives is still not fully developed. Additional research would provide design guidelines based on Texas conditions for designers to make more informed decisions about the intersection design features most appropriate for a given location.</p> <p>Similarly, roundabouts have documented benefits in improved operations and crash reduction in a variety of conditions nationwide. While typically used in urban and suburban environments with lower speeds, they can also be used in rural, high-speed environments as well when properly designed. What is less well-known is how well they perform at intersections that serve large volumes of oversize and overweight (OSOW) vehicles. The characteristics of roundabouts that facilitate the slower speeds on approach and within the intersection also can make it more challenging to navigate for a vehicle with a permit load. They have been used in other states, such as Minnesota, North Dakota, and Kansas to process traffic for distribution centers, windmill farms, and oilfield development. Roundabouts may be a useful tool in Texas to provide intersection alternatives for rural intersections that have high volumes of trucks, but additional research is needed to quantify those benefits in Texas locations.</p> |
| Technical Objectives: | <p>This project will have a two-pronged approach. Following a review of relevant literature and findings from studies on existing intersections in other states, the project will have separate efforts on innovative intersection designs that provide access at high-speed locations and on roundabouts that accommodate OSOW vehicles in rural areas.</p> <p>For the roundabouts effort, researchers will use existing rural intersections with high-volumes of OSOW vehicles to collect operational data for baseline conditions, then simulate a set of roundabout alternatives. The alternatives will include adjustments to the approach and departure legs of the roundabout to facilitate appropriate speed transitions, circulating roadway radii values to provide a balance between lower speeds and OSOW operational limitations, and treatments at each entry and exit to provide sufficient space for OSOW vehicles to maneuver. The project will also include a study of existing rural roundabouts in Texas to gain additional insight into performance characteristics. Researchers will use the conclusions drawn from the simulation and field study analysis to develop a set of preliminary design guidelines, which would subsequently be used to install a roundabout at one or more existing intersections to determine the real-world benefits of the concept.</p> <p>For the innovative intersections effort, researchers will conduct a search to identify existing locations within Texas that have innovative intersection design features. Researchers will then obtain crash data on Texas locations to conduct a safety study and identify crash patterns and trends associated with those features. Researchers will also collect field data to conduct an operational study of relevant intersections at high-speed locations. Findings from the safety and operational studies will support the development of suggestions for design guidelines for implementing innovative intersection features in Texas, along with corresponding suggestions for appropriate signing and marking treatments.</p> <p>The expectation of this project is that the end product will obtain a TRL level 8.</p> |



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| Desired Deliverables: | <ol style="list-style-type: none">1. Technical memorandum for each task completed.2. Monthly progress reports.3. Value of Research (VoR) that includes both qualitative and economic benefits, to be included in the final research report.4. Research report documenting the findings of the research, including potential revisions to the TxDOT Roadway Design Manual.5. Project Summary Report. |
| Proposal Requirements: | <ol style="list-style-type: none">1. Utilize the "Proj/Agre" and "PA_Form" templates located at the TxDOT RTI website.2. Proposals will be considered non-responsive and will not be accepted for technical evaluation if they are not received by the deadline or do not meet the requirements stated in RTI's University Handbook, which is also located at the RTI website.3. Proposals should be submitted in PDF format, 1 PDF file per proposal. File name should include project name and university abbreviation.4. This project will be tracked during the life of the project using a Technology Readiness Level (TRL) scale. For more information about the use of a TRL, click. |