



# Project Summary

Texas Department of Transportation

## 0-6414: Development of Guidelines for Implementation of Roundabouts in Texas

### *Background*

Circular intersection forms have been part of the transportation system in the United States since at least 1905. Their widespread usage decreased after the mid-1950s, due to high crash rates and problems with congestion. Therefore, the modern roundabout was developed to improve the safety and operations of the early circular intersection forms. Roundabout characteristics and design features include:

- Yield control on entering traffic to circulating traffic;
- Counterclockwise circulation of traffic around a central island; and
- Appropriate geometric curvature to induce slow and consistent speeds through the intersection.

Roundabouts are categorized according to size and number of lanes to facilitate discussion of specific performance or design issues. The categories include mini roundabouts, single-lane roundabouts, and multilane roundabouts.

Despite the fact that the U.S. had very few roundabouts at the time, a national set of guidelines was published in 2000. During the last ten years, data regarding U.S. roundabouts has become sufficient to enable roundabout research specific to the U.S. and a series of subsequent guidelines for analyzing, designing, and implementing roundabouts have been disseminated.

Although roundabouts have now been implemented in many parts of the U.S., very few have been built in Texas. Therefore, this research effort was designed to develop guidelines for implementing them in Texas. The desired guidelines were to suggest best practices for choosing appropriate locations and design concepts for Texas roundabouts.

### *What the Researchers Did*

This research effort is comprised of the following components: synthesis, methodological development, validation and enhancement, implementation support, and knowledge transfer. The synthesis involved conducting a thorough, systematic review of previous guidance documents, current practices, and recent research findings to form a foundation for roundabout safety and operations methodologies and geometric design principles. The methodological development component involved developing an initial set of methodologies and guidance for assessing roundabout safety, evaluating roundabout operations, and designing roundabouts that build on the existing guidance.

### *Research Performed by:*

Center for Transportation Research (CTR)  
The University of Texas at Austin  
Texas A&M University – Kingsville (TAMUK)

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**Project Completed:** 8-31-11

In the validation and enhancement stage, researchers applied microsimulation techniques to validate and, as necessary, refine the initial methodologies to reasonably reflect conditions specific to Texas. The research conducted up to this point was then implemented via a spreadsheet tool that provided a consistent means to strategically identify and evaluate candidate roundabout locations, and compare the roundabout with other intersection alternatives. The main knowledge transfer component of this project was a pilot workshop that was held for TxDOT planners and engineers.

## What They Found

Data was collected at several Texas roundabouts for use in the validation and enhancement phase of this research. Information regarding speed, traffic volumes, turning movements, geometric design, and crash statistics were recorded on- and off-site. This information was used to simulate two roundabouts in VISSIM: one in Southlake, TX and one in San Antonio, TX. Entry lane capacity results from VISSIM, SIDRA, and the Highway Capacity Manual were compared. The effects of exiting vehicles, distribution of the origin of traffic, and mean speed were examined.

The elements of geometric design, safety, traffic operations, and traffic design were combined into a uniform planning process through a spreadsheet evaluation tool. The process allows the user to consistently and strategically identify and evaluate candidate roundabout locations. The result is a consistent and systematic screening procedure for determining the potential success of a roundabout in existing and planned intersections. The spreadsheet evaluation tool also compares the performance of a roundabout with traditional intersection forms. This will allow TxDOT to identify intersections where roundabouts provide superior service to motorized and non-motorized modes. The spreadsheet is based on methods outlined in NCHRP Report 672: *Roundabouts: An Informational Guide, Second Edition*.

## What This Means

The research conducted for this project indicates that roundabouts can be appropriately implemented in Texas. The effectiveness of roundabouts from both safety and operational viewpoints are dependent upon a number of very important design concepts. If designers fully understand and use these concepts the resulting intersections will become excellent examples upon which future designs can grow. Since Texas currently has very little experience with modern roundabout concepts and many misleading examples exist in other states, the best implementation path would include initial implementation at non-urban, lower traffic volume locations. Such locations would be less sensitive to problematic site-specific compromises and would provide an opportunity to grow Texas' operational experience before attempting implementation at locations with significant right-of-way restrictions or high traffic demands. Additional workshops on roundabout guidelines are also recommended to familiarize engineers and planners with the implementation of roundabouts in Texas.

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