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Tech Brief

Operational Improvements at Traffic Circles: Safety Analysis

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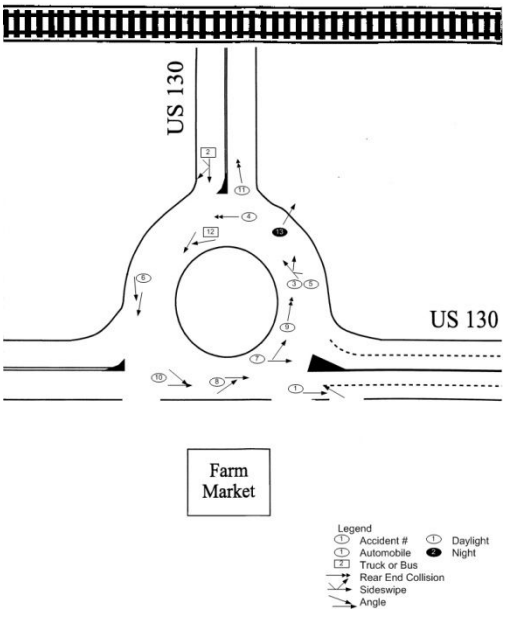
BACKGROUND

- The purpose of this project is to improve the safety and operation of three traffic circles in New Jersey. These circles are Colingwood Circle, Brooklawn Circle and Asbury Park Circle.
- Data were collected at the traffic circles to allow researchers to model the circles using the PARAMICS software simulation package.
- The PARAMICS model was then utilized to evaluate the affects of various operational and geometric changes on safety of these traffic circles.

DATA COLLECTION

Observing a facility is one of the most important steps to reaching a clear understanding of how the geometrics, signage, and markings control and affect operations as well as driver behavior.



Therefore, to conduct safety assessments at the study traffic circles, both accident data and traffic data were collected. The accident data were used to:

- Pinpoint crash locations within and near the traffic circles,
- Determine which crash locations are most frequented,
- Recommend treatments based on the specifics of the facility design and crashes (type, time of day, pavement conditions).

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Additionally, traffic data were employed to:

- Characterize speed-flow-density relationships,
- Determine which crash locations potentially impact circle operations heavily due to high speeds, flows, or densities at said locations,
- Analyze existing conditions and proposed treatments with the aid of a simulation program, PARAMICS.

ANALYTICAL MODELS

- The research team sought out empirical and analytical models in the transportation literature that could relate traffic circle geometry, operations, and traffic conditions to the safety of a facility.

- The primary models of interest were safety models designed for assessing roundabouts.

- The most detailed are the level 3 models that examine each approach of a roundabout individually. These models provide ample insight for our analysis. Two of the single vehicle accident models that were identified include UK Model and Australian Model.

FINDINGS

- The safety treatment options for each of the traffic circles were modeled using the PARAMICS computer software package.

- PARAMICS has many limitations when it comes to modeling the effects of certain geometric parameters. For example, the roadway width may be altered or super-elevation imposed on the circulating roadway in the traffic circle. In the real world environment, these treatments would both have a significant impact on speeds in the facility.

- However, PARAMICS is unable to model these effects as a direct result of changing the geometry. What PARAMICS does allow the user to do is input a given percent speed reduction that would be anticipated due to the presence of a curve.

- Therefore, when modeling the treatments, a percent speed reduction must be entered to reflect the impacts of making such a change.

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