

Preliminary analyses of the optimal distance between a roundabout and signalized intersection

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Abstract

With increasing urban traffic flows and increased congestions, the question of design modifications and intersection reconstruction is a common problem for urban traffic designers. Roundabouts are often chosen when planning new intersections and reconstructing old ones, given numerous advantages in terms of traffic safety and lower maintenance costs. When planning roundabouts, in addition to micro-location, it is important to consider functional criteria and the influence of adjacent intersections [1]. Usually, roundabouts experience less queuing than signalized intersections. The queues for the signals will govern and, in the case of a more significant amount of traffic, have a negative impact on roundabout capacity. In the literature, it is emphasized that the positioning of a roundabout between two adjacent signalized intersections should be avoided [2], [3]. Still, in practice, it is not always possible to prevent this situation. There are no specific guidelines for the acceptable distance between signalized intersection and roundabout.

Traffic queues that extend into adjacent intersections need to be analyzed further. The design of the system generally follows the principles of isolated roundabout design, but modeling requires two steps. The first step is providing a model as an isolated intersection – deterministic models. The second, often overlooked, step is analyzing the model as a system – stochastic model [4].

The research utilized the well-known software package VISSIM to evaluate the performance of signalized intersections and roundabouts, respectively. Four-leg intersections at different distances were taken into account. A microsimulation analysis was performed to determine the minimum distance at which a nearby signalized intersection does not affect the traffic flow of the roundabout.

Keywords

delay, minimum distance, roundabout, signalized intersection, VISSIM

References

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