

Roundabout Implementation Analyses Based on Traffic Microsimulation Model

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Abstract : Roundabouts are a common choice in the case of reconstruction of an intersection, whether it is to improve the capacity of the intersection or traffic safety, especially in urban conditions. The regulation for the design of roundabouts is often related to driving culture, the tradition of using this type of intersection, etc. Individual values in the regulation are usually recommended in a wide range (this is the case in Croatian regulation), and the final design of a roundabout largely depends on the designer's experience and his/her choice of design elements. Therefore, before-after analyses are a good way to monitor the performance of roundabouts and possibly improve the recommendations of the regulation. This paper presents a comprehensive before-after analysis of a roundabout on the country road network near Rijeka, Croatia. The analysis is based on a thorough collection of traffic data (operating speeds and traffic load) and design elements data, both before and after the reconstruction into a roundabout. At the chosen location, the roundabout solution aimed to improve capacity and traffic safety. Therefore, the paper analyzed the collected data to see if the roundabout achieved the expected effect. A traffic microsimulation model (VISSIM) of the roundabout was created based on the real collected data, and the influence of the increase of traffic load and different traffic structures, as well as of the selected design elements on the capacity of the roundabout, were analyzed. Also, through the analysis of operating speeds and potential conflicts by application of the Surrogate Safety Assessment Model (SSAM), the traffic safety effect of the roundabout was analyzed. The results of this research show the practical value of before-after analysis as an indicator of roundabout effectiveness at a specific location. The application of a microsimulation model provides a practical method for analyzing intersection functionality from a capacity and safety perspective in present and changed traffic and design conditions.

Keywords : before-after analysis, operating speed, capacity, design.

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