Kansas Department of Transportation

TECHNICAL SUMMARY

Accommodating Oversize/Overweight Vehicles at Roundabouts

Report Number: K-TRAN: KSU-10-1 ▪ Publication Date: February 2013

Eugene R. Russell, Sr., P.E., Ph.D.
Professor Emeritus

E. Dean Landman, P.E.
Adjunct Professor

Ranjit Godavarthy
GRA, Ph.D. Candidate

Kansas State University Transportation Center

Introduction

Safety and traffic operational benefits of roundabouts for the typical vehicle fleet (automobiles and small trucks) have been well documented. Although roundabouts have been in widespread use in other countries for many years, their general use in the United States began only in the recent past. 1990 is generally accepted as the year the first modern roundabouts were built in the United States (US), but their use is growing. Roundabouts can offer several advantages over signalized and stop-controlled intersection alternatives, including better overall safety performance, lower delays, shorter queues, better management of speed, and opportunities for community enhancement features. However, potential use of roundabouts with all their benefits may be greatly diminished if they cannot accommodate oversize/overweight vehicles (OSOW).

Wide Truck Apron in Arizona

Project Objectives

Accommodating OSOW at roundabouts is the central issue and the need for this research.

Note that the acronym OSOW has been used in this report as a universal term, generally understood to mean a permitted vehicle. OSOWs impact pavement structure, roadway geometrics, and traffic operations. These issues are discussed in the report. OSOWs are a reality for American industry and often critical for certain industries. A better understanding and sharing of current practices is essential for states that permit such movement, and the industry which must rely on state highways and a permit to deliver large loads. Thus, the main objectives of this report are to compile current practice and research by various states and countries related to the effects OSOW have on roundabout location, design, and accommodation. Second, the research will attempt to fill in information gaps with respect to roundabout design and operations for this class of vehicles.

Project Description

A literature review uncovered no published reports on OSOW accommodation per se; however, much information on the advantages of having designated truck and OSOW networks is analyzed and reported. The authors make an argument that states should consider conducting a study to develop a freight network, which includes segments where OSOW need to be accommodated, in accordance with state and federal commerce

laws and policies and the state's economy. The study should include determining all motor vehicles whose size and turning movements are critical to developing routes on which all segments will accommodate these vehicle. To obtain information on the state-of-the –art of OSOW accommodation, the authors turned to personal contacts, unpublished material, case studies and surveys. Examples of accommodating OSOW in general, and various turning movements, found in the literature, surveys, and personal contacts are provided in the report as examples of ideas and concepts that could be considered, and possibly adapted to the needs of a specific site. Several examples from England, France, and Germany, and other countries, were also found and are presented. Also, cutting edge research and a state's recent policy on accommodating low, ground clearance vehicles that could "hang up" are presented. Four surveys were developed, executed and analyzed: a general survey on permitted vehicles to the 50 states; a second survey to the 50 states on specific roundabout issues, a survey to regional managers of the Specialized Carriers and Rigging Association (SC&RA), and a survey developed and conducted in partnership with the American Transportation Research Institute (ATRI) and sent to their membership. The complete analysis and some actual answers are contained in the report and its appendices.

Project Results

From all surveys and contacts made during the course of this investigation, based on the most mentioned concern, the authors conclude that vertical ground clearance in general, and curbs in particular, are a major problem for large trucks and OSOW and definitely need to be mitigated whenever OSOW need to be accommodated. The authors conclude that ground clearance is an issue that has not been given as much attention as it deserves and must be addressed. The authors further conclude that three inches should be considered as a maximum height of splitter islands, truck aprons and curbs. Many other issues uncovered by the surveys are presented and discussed in the report.

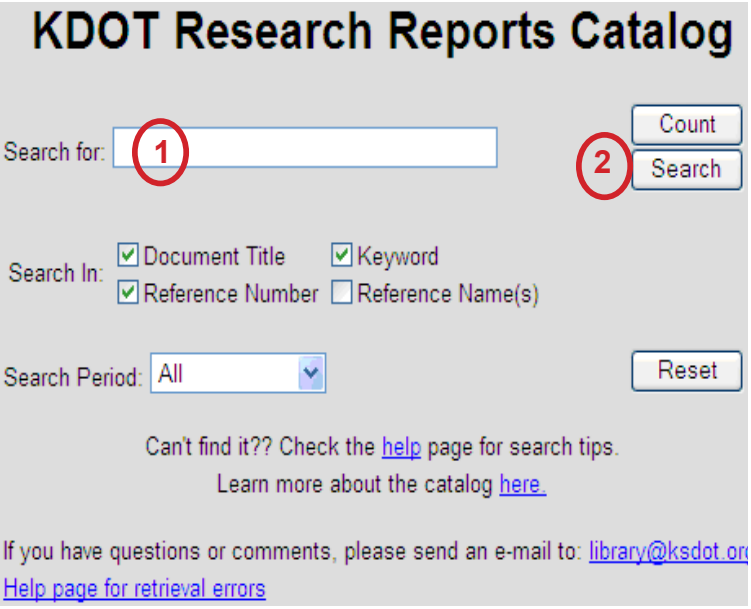
Numerous ideas are presented and design strategies are illustrated. Simulations of seven OSOW check vehicles, from a Wisconsin vehicle library, were run on many hypothetical, and some actual, roundabout scenarios. The authors emphasize that the ideas and concepts shown and illustrated are just that, i.e., ideas and concepts. No attempt has been made or was ever intended that this report should be a design guide; however, the authors believe it contains a wealth of ideas that designers and states should consider. The authors primary conclusion from conducting great numbers of vehicle path simulations is that, given the knowledge of what OSOW need to be accommodated, and their turning characteristics, any knowledgeable designer can do it, provided that right of way is available. It is up to the state to determine the economic benefits or dis-benefits of doing so.

A final section of the report presents guidelines developed by Wisconsin DOT to check and avoid low, ground clearance vehicles ("low boys") from scraping bottom while traversing roundabouts ("hang ups"), believed to be one of the first such studies in the USA. The authors present over three pages of other conclusions and recommendations, based on the literature reviewed, four surveys, examples of OSOW accommodation obtained from personal contacts, numerous OSOW simulations on various roundabout scenarios, the seven OSOW check vehicles used, and the low ground clearance concern that was the number one reported concern of the trucking industry.

Overall, both patterns currently installed in Kansas have provided crash reductions and are recommended. Shoulder width and traffic volume should be considered as crash predictors for enhancement of the benefits.

Project Information

For information on this report, please contact Dr. Eugene Russell at the Kansas State University Department of Civil Engineering; 2133 Fielder Hall; Manhattan, Kansas 66506; 785.532.1588; geno@ksu.edu.



Directions for Downloading the Full Report

To download the full report, visit http://www.ksdot.org/burmatrres/kdotlib2.asp and do the following:

1. Enter KSU-10-1 in the search box.
2. Click the Search button to the right of the search box.
3. You may have to scroll to find the specific report.
4. To download the report, click on the title of the report to open the PDF file and save it to your hard drive.

If you have any questions, please email us at library@ksdot.org.