

# Roundabout Design Training for Alaska's Engineers

## **FINAL PROJECT REPORT**

by

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<b>16. Abstract</b> Roundabout are an emerging type of intersection design, are a relatively new addition to the transportation system in the United States. As a result, guidelines for roundabout design and construction are very broad and leave much room for subjectivity. This can result in roundabout designs with performance and safety well below the level that was anticipated. Further, the application and design of roundabouts is still evolving. As such, it is critically important that planners and engineers are kept up-to-date with the "state-of-the-art" and "best practices" for roundabout design so that these intersections will positively contribute to the transportation system. Education and outreach materials were developed and offered to designers and planners through a six-part webinar series that covered best-practices for planning, design, analysis, construction, and post-implementation techniques that can be applied to roundabouts in Alaska.			
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## List of Abbreviations

AKDOT: Alaska Department of Transportation  
PacTrans: Pacific Northwest Transportation Consortium  
UAF: University of Alaska Fairbanks  
AUTC: Alaska University Transportation Center

## **Acknowledgments**

The author would like to thank Mark Lenters of GHD Inc. for his involvement in the development and presentation of materials for this education and outreach effort. Mr. Lenters is one of the foremost experts on roundabout planning and design and this project would not have been a success without him.

## **Executive Summary**

Roundabout are an emerging type of intersection design, are a relatively new addition to the transportation system in the United States, particularly in Alaska. As a result, guidelines for roundabout design and construction are very broad and leave much room for subjectivity. This can result in roundabout designs with performance and safety well below the level that was anticipated. Education and outreach materials will be developed and targeted at planners and engineers within Alaska in order to promote best-practices for planning, design, analysis, construction, and post-implementation of roundabouts.

The goals of this project were threefold. First, promote the appropriate application and design of roundabouts and ensure consistency in practices and procedures across the State of Alaska through training materials and exercises. Second, inform participants about the need for and state-of-practice for the peer review process of roundabout designs. Third, contribute to information sharing and knowledge exchange through broader outreach efforts by UAF and PacTrans.

A series of webinars consisting of six two-hour long sessions were held over the course of one month in November 2014. Participants included individuals representing the private and public sector as well as student attendees from UAF. These webinars were recorded and the video files and presentation files are now hosted online and available for public viewing.





## Chapter 1 Introduction

The modern roundabout is a self-regulating intersection design, which promotes a higher level of driver responsibility. Compared to other conventional intersection types, roundabouts are fairly recent additions to the American transportation system with the first being built in the northeast region in 1995. There are roughly 2,000 roundabouts currently in the United States (Kittleson and Associates, 2013), yet the United Kingdom and Australia have approximately five and eight times as many roundabouts, respectively (Ahn, Kronprasert, & Rakha, 2009). Local media, informational brochures and public meetings are methods being employed as a means of informing citizens about roundabouts (TAC, 2008). This helps with the opposition which has historically accompanied newly proposed roundabout projects.

In addition, engineering and planning of roundabouts is still going through a significant learning phase as design aspects which address safety and efficiency for multiple user types are still being researched and tested. This has led to many roundabout designs which have not performed adequately once opened to the public. This is of particular concern in Alaska having a dark and cold climate for many months of the year can exacerbate many of the issues experienced in other regions of the United States. Further, roundabouts are a more recent addition to the road system when compared to these other regions resulting in design and planning best practices for Alaska that have not been as well developed.

Knowledge transfer and education for is key to the successful promotion and implementation of roundabouts. Addressing both the concerns and hesitations of adoption by the public as well as ensuring that engineers and planners are utilizing the most up-to-date design practices is critical. Sharing the experiences and knowledge of other states with higher

implementation rates is of great benefit in advancing the use of roundabouts as a traffic control mechanism in Alaska.

A six-part webinar series was hosted in November 2014 by UAF to cover topics related to the history behind, planning, proposing, designing, and maintaining roundabouts. Participants included several people from AKDOT, private engineering firms, and students from UAF. Each webinar was recorded and is now hosted online for documentation and public viewing.

## Chapter 2 Method

### 4.1 Training Planning and Execution

Preliminary meetings were held with Mark Lenters (webinar presenter) of GHD Inc., AUTC, and AKDOT to determine which topics were most appropriate and of most concern to be covered in these training efforts. In these meetings, it was also concluded that in order to address the access issue associated with the long distances and travel costs for potential participants joining from remote and isolated locations in Alaska, the most appropriate way to offer these training sessions would be an online webinar where attendees could participate from each of their respective locations. The webinar format was also be beneficial for ease of recording and hosting the videos online to be accessed later.

The final agenda and webinar topics selected were as follows:

**Part 1:** Site selection and intersection control studies (November 5<sup>th</sup>)

**Part 2:** Design principals of speed control, trucks and rural design (November 7<sup>th</sup>)

**Part 3:** User considerations (pedestrians and bicyclists), system considerations, design trade-offs and evaluating design decisions (November 12<sup>th</sup>)

**Part 4:** Implementation, public outreach and policy discussion session (November 14<sup>th</sup>)

**Part 5:** Review of capacity models (analytical, simulation, and empirical); examine historical methods; capacity and basic sizing techniques (November 19<sup>th</sup>)

**Part 6:** Demonstration and design exploration with ARCADY and HCM capacity procedures (November 21<sup>st</sup>)

The roundabout training webinar was advertised through UAF and AUTC partners and affiliates, the AKDOT training and professional development email list, and local contacts. The webinar was hosted on the UAF campus where some attendees participated in person while others in more remote or distant locations attended online. Presentation and webinar activities included both lecture-style and hands-on type exercises. Those participating from AKDOT and the private sector all had active roundabout projects on which they were working to the training and activities were timely in that regard. In total, approximately 30 individuals participated in the webinar series. A formal survey was not conducted but the general feedback from the participants after the webinar was positive and the topics were immediately applicable to current projects.

#### 4.2 Webinar Recordings

Each webinar was recorded live in video format using the GoToWebinar application. These videos were stored locally and then uploaded to a free YouTube account and can be accessed through the following web link: <https://sites.google.com/a/alaska.edu/npbelz/education-outreach/2015-roundabout-design-training>

### **Chapter 3 Conclusions and Recommendations**

The webinar format used for this roundabout training education efforts was found to be very useful for Alaska where travel distances and cost can be of concern, particularly with recent budget cuts which have prompted many travel restrictions for those in the public sector. However, some of the activities such as the software demonstration and exercises were difficult to execute solely due to the difference in attention required by each participant when walking software-based exercises. In the future, either 1) more careful planning of such activities should be done to ensure that each participant is afforded equal time and depth in their instruction; or 2) the types of activities included in the webinar are limited to only those suited for online instruction and dialogue.

## References

- Ahn, K., Kronprasert, N., & Rakha, H. (2009). Energy and Environmental Assessment of High Speed Roundabouts. *Transportation Research Record, Journal of the Transportation Research Board of the National Academies*, 54-65.
- Kittleson and Associates. (2013). *Roundabout/Traffic Circle Inventory Database*. Retrieved June 13, 2013, from <http://roundabout.kittelson.com/Roundabouts/Search>
- TAC. (2008). *Synthesis of North American Roundabout Practice*. Ottawa, ON: Transportation Association of Canada.

## **Appendix A Training Flyer**

# Roundabout Design & Software Webinar Series

November 5<sup>th</sup> through 21<sup>st</sup>, 2014

Wednesdays and Fridays | 9:00am – 11:00am (AKST)

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*Funding for the workshop is provided through the Pacific Northwest Transportation Consortium (PacTrans), the Alaska University Transportation Center (AUTC), and the UAF Institute of Northern Engineering (INE)*

**Location |** Online and hosted in Room 535 Duckering Hall, University of Alaska Fairbanks  
(Webinar link for remote attendees provided below)

This six part webinar series will present lessons learned, best practices and case studies to gain and strengthen knowledge in the following areas: roundabout policy and implementation, design composition, capacity and sizing techniques, software and capacity analysis procedures.

**November 5<sup>th</sup>, 9:00 am - 11:00 am\***

**Part 1: Site selection and intersection control studies**

GoToWebinar Registration URL: <https://attendee.gotowebinar.com/rt/4739555184943414785>

**November 7<sup>th</sup>, 9:00 am - 11:00 am\***

**Part 2: Design principals of speed control, space for trucks and rural design**

GoToWebinar Registration URL: <https://attendee.gotowebinar.com/rt/5866247839670054146>

**November 12<sup>th</sup>, 9:00 am - 11:00 am\***

**Part 3: User considerations (pedestrians and bicyclists), system considerations, design trade-offs and evaluating design decisions**

GoToWebinar Registration URL: <https://attendee.gotowebinar.com/rt/3327422714577154050>

**November 14<sup>th</sup>, 9:00 am - 11:00 am\***

**Part 4: Implementation, public outreach and policy discussion session**

GoToWebinar Registration URL: <https://attendee.gotowebinar.com/rt/3349087491690865410>

**November 19<sup>th</sup>, 9:00 am - 11:00 am\***

**Part 5: Review types of capacity models (analytical, simulation, and empirical); examine capacity data and historical methods; capacity and basic sizing techniques**

GoToWebinar Registration URL: <https://attendee.gotowebinar.com/rt/8122363236494366210>

**November 21<sup>st</sup>, 9:00 am - 11:00 am\***

**Part 6: Demonstration and design exploration with ARCADY and HCM capacity procedures**

*(demo software installations will be made available through a download link)*

GoToWebinar Registration URL: <https://attendee.gotowebinar.com/rt/7387503540558673666>

\* Coffee and light refreshments will be provided starting at 8:30am for those attending the webinar in person on the University of Alaska Fairbanks campus.



## **Mark S. Lenters, P.E. | Workshop Presenter**

*Principal, GHD Inc. (formerly Ourston Roundabout Engineering)*



Mark Lenters is the Service Group Manager for GHD Inc. For the past 14 years Mr. Lenters has focused his professional engineering practice on modern roundabouts, following 14 years of practice in intersection design and safety reviews. He is a leading engineer in this era of the expanding use of roundabouts in North America. His work covers all aspects of policy, planning, design, public outreach, and research in roundabouts. He provides on-call design review and standards for numerous DOT's and local agencies. He served on the review panel for the 2010 FHWA Roundabout Guide; is a vice chair of the ITE Roundabouts Committee and a member of the TRB Roundabout Committee. In addition to his technical expertise, Mr. Lenters is a highly rated instructor, having conducted roundabout design and software- based design courses since 2002.

## **Dr. Nathan P. Belz | Workshop Coordinator**

*Assistant Professor, University of Alaska Fairbanks*



Dr. Belz joined the University of Alaska Fairbanks in August 2013. He holds an M.S. degree in Civil Engineering from the University of Maine and Ph.D. in Civil Engineering from the University of Vermont. His general research interests include: the overlapping area between driver behavior and traffic operations with a focus on system safety, capacity, and efficiency; transportation applications of Geographic Information Systems (GIS); and transportation issues unique to rural and cold climate areas. Dr. Belz's research has been focused on roundabouts and over the past seven years has studied public opposition to roundabouts, driver behavior at roundabout entries that are inconsistent with existing traffic theories, and the development of a new microsimulation model to account for non-compliant driver behavior. Dr. Belz is also an active member of the TRB Roundabout Committee.