




*ITE San Diego
April 25, 2024*

***Something Old & Something New:
An update on new national Roundabout Guidance.
Overview of NCHRP Research Report 1043: Guide for Roundabouts***

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Agenda

- **Project Overview**
- What's new?
- Roundabout Design Process
- Guide Organization
- Discussion

NCHRP Research Report 1043: Guide for Roundabouts



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NCHRP Research Project 03-130 Research Team

- Kittelson & Associates, Inc. (Prime Contractor)
- Sunrise Transportation Strategies, LLC.
- Texas A&M University (TTI)
- Kimley-Horn Associates, Inc.
- Accessible Design for the Blind, LLC

NCHRP Research Report 1043: Guide for Roundabouts
Project Overview



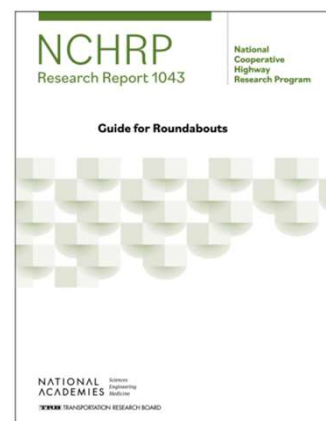
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NCHRP Research Project 03-130

NCHRP Research Report 1043
Guide for Roundabouts

- *You can get NCHRP Documents for free in .pdf !*
- *Just search the report title!*

[Guide for Roundabouts](#) | [Blurbs New](#) | [Blurbs](#) | [Publications \(trb.org\)](#)



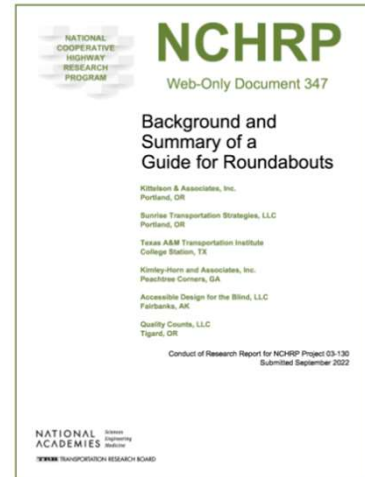
NCHRP Research Report 1043: Guide for Roundabouts
Project Overview



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NCHRP Web-Only Document 347

- Research Report supplementing Research Report 1043 *Guide for Roundabouts*
- Highlights:
 - User feedback summaries
 - Guide bibliography
 - Truck and bicycle research summaries
 - Synthesis summaries
 - Future research



NCHRP Research Report 1043: Guide for Roundabouts
Project Overview



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NCHRP Research Report 1043 – Guide for Roundabouts

- This new Roundabout Guide:
 - Has parts and chapters reflecting project development stages
 - Emphasizes planning and design in context:
 - Project Type
 - Built and natural environment
 - Context Classification
 - User-focused
 - Supports a design continuum versus roundabout “types”

Performance driven to support roundabout implementation!

NCHRP Research Report 1043: Guide for Roundabouts
Project Overview



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NCHRP Research Report 1043 – Guide for Roundabouts

- The Guide includes research and synthesis findings conducted as part of NCHRP Research Project 03-130
 - Designing for Trucks
 - Designing for Bicycles
 - Synthesized information on roundabout design and implementation
 - Intersection Control Evaluation practices

*...also integrating lessons from practice since
NCHRP Report 672 was published in 2010...*

NCHRP Research Report 1043: Guide for Roundabouts
Project Overview



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Guide Philosophy: Emphasis on Principles

- Continued emphasis on principles
 - Consider performance needs and not the roundabout category
- Continued emphasis on performance-based design
 - Operational and safety performance for all users
 - Iterative process to optimize configurations

...focus on benefits of the roundabout not what's missing for perfection...

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Research and Syntheses—What's new?



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NCHRP Research Project 03-130 Research

- Designing for Trucks
- Designing for Bicycles

...reflecting the evolution of roundabout practice...



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NCHRP Research Report 1043: Guide for Roundabouts
Research and Syntheses—What's new?



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Designing for Trucks

- A lack of understanding and compliance for keeping trucks in lanes partially (Case 2) or completely (Case 3) compared to straddle lanes (Case 1).
 - Many truck drivers operate Case 2 and Case 3 roundabouts as Case 1 (i.e., straddling lane lines).
- Case 2 and Case 3 increase roundabout dimensions
 - Potentially faster passenger car speeds, longer pedestrian crossings, increased construction cost, and larger right-of-way impacts.

...a good lesson to be sure users know what our intent really is...

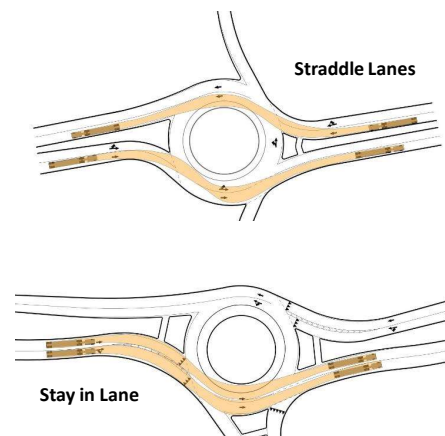
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Research and Syntheses—What's new?



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Designing for Trucks

- Simplified to two cases for multilane design for trucks:
 - Straddling lanes
 - Staying in a lane
- Straddle-lane design as the default based on how truck drivers use roundabouts.
- Turbo roundabout features can be used with stay-in-lane designs.



...implementing a roundabout is more important than achieving a Case 2 or 3 configuration...

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Research and Syntheses—What's new?



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Designing for Bicycles

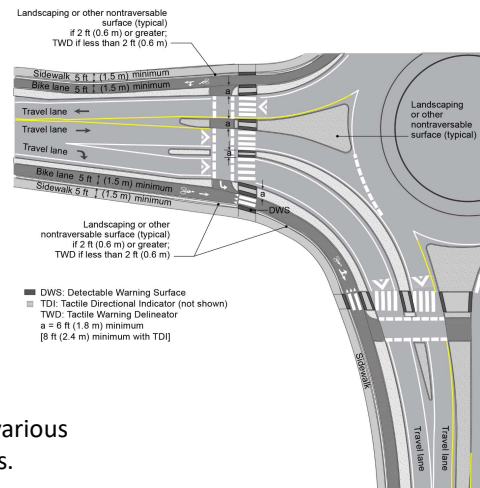
- Bicycle design principles and techniques have evolved since the 2010 NCHRP Report 672.
- There is an emerging standard typology of bicyclists based on levels of comfort.
 - “interested but concerned” category emerging as the design bicyclist
- Bicycle treatment concepts illustrate a range of treatments for a variety of roundabout configurations.

...emphasize principles to allow flexible decision making...

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Research and Syntheses—What’s new?

Designing for Bicycles (Peds too!)

- Emphasize principles:
 - Reduce speeds at conflict points;
 - Separate modes;
 - Clearly communicate right-of-way priority;
 - Provide predictable, simple, direct alignments; and
 - Provide comfortable spaces for waiting and decision making.
- New Guide information and exhibits:
 - Material on tactile walking surface indicators for pedestrians who are blind or have low vision.
 - Exhibits on pedestrian and bicycle treatments, including various combinations of on-street, separated, and shared facilities.



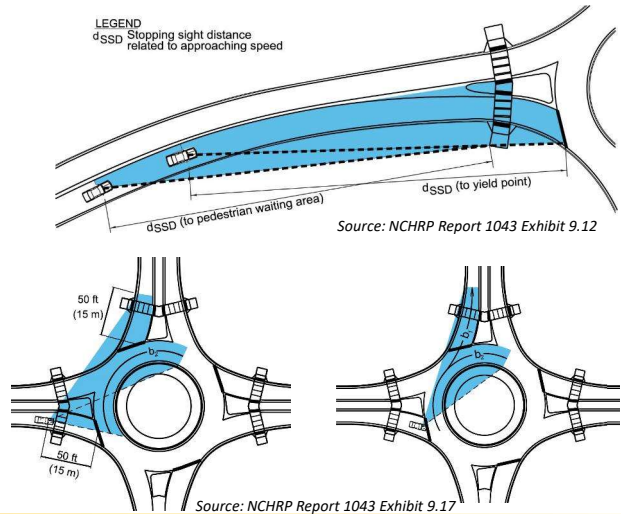
Source: NCHRP Report 1043 Exhibit 10.84

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Research and Syntheses—What’s new?

Designing for Bicycles (Peds, too!)

- Refined/expanded performance checks
 - Updated stopping sight distance and intersection sight distance.
 - Added bicyclist and pedestrian design flags from NCHRP Research Report 948.
 - Added pedestrian wayfinding and crossing assessments.

...concepts applicable to other intersection forms



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Research and Syntheses—What's new?

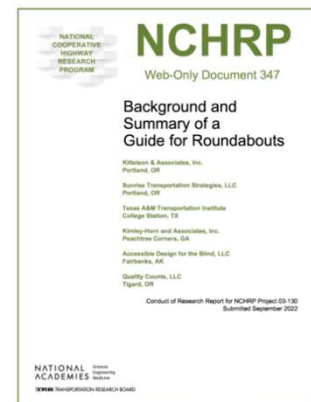


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NCHRP Research Project 03-130 Syntheses

- Synthesis Topics
 - Designing for Oversize/Overweight Trucks
 - In-service assessment and retrofit
 - Mini-roundabouts
 - Economic Impact of Roundabouts
 - Traffic Control Devices--Metering
 - Traffic Control Devices – Pedestrian crossings
 - Traffic Control Devices – Railroad crossings
 - Illumination

...understanding practices in various topic areas...



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Research and Syntheses—What's new?



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Synthesis Topics—Findings Highlights

- **Oversize/Overweight (OSOW)Trucks**
 - State practices for OSOW trucks are typically performed on a case-by-case basis.
- **In-Service Assessment and Retrofit**
 - Providing real-world examples in the Guide can help illustrate applications of design principles.
- **Mini-Roundabouts and Compact Roundabouts**
 - De-emphasize the “name.” A traversable central island has defining implications for many aspects of the Guide.
- **Economic Impacts**
 - There are no quantitative data that provides a means of measuring the economic impacts of roundabouts.

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Research and Syntheses—What’s new?



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Synthesis Topics—Findings Highlights

- **Traffic Control Device (TCD): Metering**
 - Metering has been successful but is still limited – typically a single approach to mitigate queuing on a downstream entry.
- **TCD: Railroad Crossings**
 - Railroads and highway agencies’ experiences vary widely with roundabouts at or near at-grade rail crossings. Many considerations are documented.
- **TCD: Pedestrian Crossings**
 - Current research identified treatments that show effectiveness for improving accessibility.
- **Illumination**
 - Practice varies widely, and the Guide includes updated national lighting guidelines and include design flexibility.

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Research and Syntheses—What’s new?



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In-Service Assessment and Retrofit

- Emphasize principles:
 - Retrofitting existing roundabouts or circular intersections is often more difficult than new construction.
 - Follow performance checks to identify contributing issues; and
 - Design choices should be based on benefit gained over existing condition.
- New Guide information and exhibits:
 - Example performance check and typical modifications.
 - Pedestrian wayfinding assessments.
 - Pedestrian crossing assessment.



Source: NCHRP Report 1043 Exhibit 9.31

Performance Check	Contributing Factors to Undesirable Performance	Possible Modifications to Address Issue
Geometric speed	<ul style="list-style-type: none"> • Skew • Inadequate deflection (combination of size, placement, or approach alignment) • Wide lanes • Excessively large entry curb radii 	<ul style="list-style-type: none"> • Add raised crosswalks to enhance entry and exit speed control. • Modify the entry horizontal geometry to increase deflection. • Alter the approach alignment to the left to lengthen entry arcs and increase deflection. • Reduce the number of lanes. • Reduce lane widths. • Include or increase raised features, such as splitter islands and truck aprons.

Source: NCHRP Report 1043 Exhibit 9.31

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Research and Syntheses—What's new?



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Mini-Roundabouts and Compact Roundabouts

- Emphasize principles:
 - Consider performance needs and not the roundabout name;
 - Traversable elements support design and implementation; and
 - A fully traversable central island influences signing decisions.
- New Guide information and exhibits:
 - Flexibility in terminology.
 - Promotes a wide range of applications.
 - Recognizes value in constrained locations



Source: NCHRP Report 1043 Exhibit 10.4

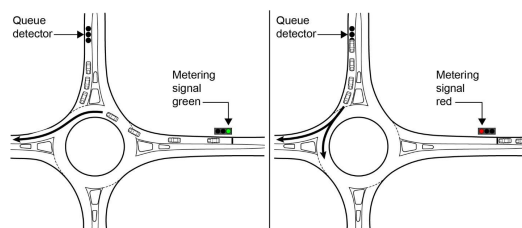
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Research and Syntheses—What's new?



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Traffic Control Devices--Metering

- Emphasize principles:
 - Entry metering signals could support single lane (versus multilane roundabouts) approaches in some contexts;
 - Entry metering could influence new or retrofit design decisions;
 - Metering can be short duration as needed or during the same peak period; and
 - Reserve Pedestrian Hybrid Beacon applications for crossing applications.
- New Guide information and exhibits:
 - Material on metering system components and considerations.
 - Exhibit on metering conceptual metering signal operation.

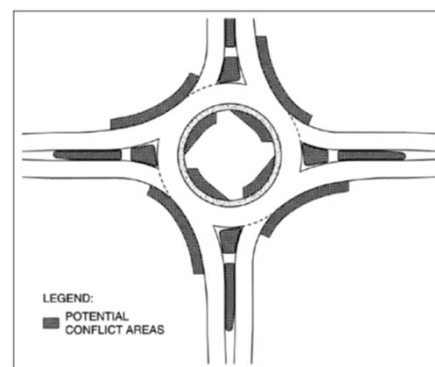


Source: NCHRP Report 1043 Exhibit 12.31

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Research and Syntheses—What's new?

Illumination

- Emphasize principles:
 - Illumination based on roundabout-specific characteristics versus traditional intersection forms;
 - Delineation helps drivers recognize roundabouts and mimic design features;
 - Roundabout-specific lighting policy allows flexibility; and
 - Applying Dark Sky principles can guide lighting decisions.
- New Guide information and exhibits:
 - Illuminance criteria for streets with continuous lighting based on asphalt or portland cement concrete.
 - Illumination criteria for isolated roundabouts.
 - Guidance for crosswalks and transition lighting.




Source: NCHRP Report 1043 Exhibit 14.7

NCHRP Research Report 1043: Guide for Roundabouts
Research and Syntheses—What's new?

Agenda

- Project Overview
- What's new?
- **Roundabout Design Process**
- Guide Organization
- Discussion

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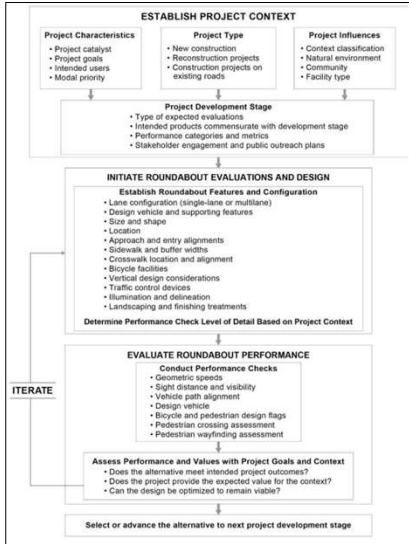
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Roundabout Design Process


- Performance-based approach to get to an “optimal” design
- Process works at early concepts through final design decisions
- Integrates concepts from AASHTO Green Book 7th Edition and looks toward future Green Book 8th Edition
- Evaluates “performance” for the roundabout and other broader project goals

...emphasizing design flexibility in a project's context...



Source: NCHRP Report 1043 Exhibit 9.1

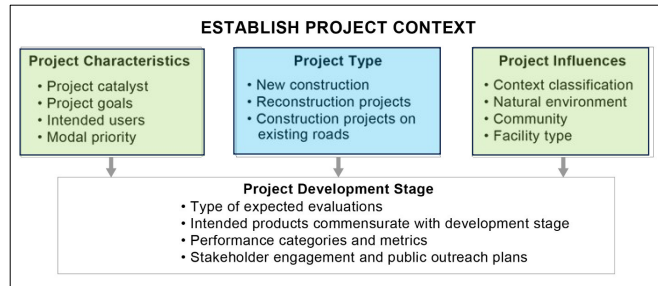
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Roundabout Design Process



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Guide Philosophy: Alignment with Context

- Outcomes beyond roundabout design
- Allows community, culture, and equity elements
- Scalable to project development stage
- Encourages flexible and adaptable planning and design



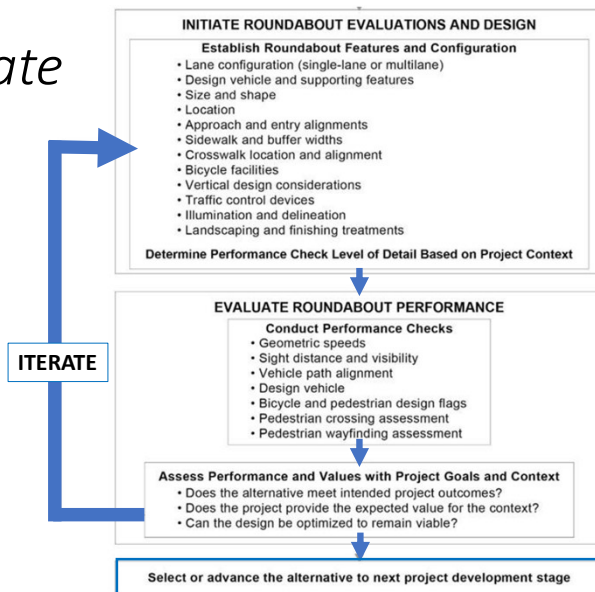
Source: NCHRP Research Report 1043 Exhibit 9.1

...project context is the foundation to adaptable implementation...

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Roundabout Design Process

Design Process--Iterate

- Modify design and elements to best meet target performance
- Iterate as needed to optimize. Sometimes repeatedly
- Assess if the roundabout remains viable
- Always consider context and intended outcomes




Source: NCHRP Report 1043 Exhibit 9.1

NCHRP Research Report 1043: Guide for Roundabouts
Roundabout Design Process

Agenda

- Project Overview
- What's new
- Roundabout Design Process
- **Guide Organization**
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Guide Organization

PROJECT DEVELOPMENT PROCESS	Planning	<i>Part I: Introduction to Roundabouts</i>	Chapter 1: Introduction Chapter 2: Roundabout Characteristics and Applications Chapter 3: A Performance-Based Planning and Design Approach
	Identify and Evaluate Alternatives	<i>Part II: Planning and Stakeholder Considerations</i>	Chapter 4: User Considerations Chapter 5: Stakeholder Considerations Chapter 6: Intersection Control Evaluation
	Preliminary Design	<i>Part III: Roundabout Evaluation and Conceptual Design</i>	Chapter 7: Safety Performance Analysis Chapter 8: Operational Performance Analysis
	Final Design	<i>Part IV: Horizontal, Vertical, and Cross-Section Design</i>	Chapter 9: Geometric Design Process and Performance Checks Chapter 10: Horizontal Alignment and Design Chapter 11: Vertical Alignment and Cross Section Design
	Construction, Operations, and Maintenance	<i>Part V: Final Design and Implementation</i>	Chapter 12: Traffic Control Devices and Applications Chapter 13: Curb and Pavement Details Chapter 14: Illumination, Landscaping, and Artwork
	Supplemental Appendix		Chapter 15: Construction and Maintenance Appendix A: Design Performance Check Techniques

- Organized by Project Development process
- Five Parts
 - Chapter groupings to support each part
- 15 chapters supporting project development
- Appendix supporting performance checks techniques



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Performance-based approach

- NCHRP Research Report 1043
 - Chapter 3: A Performance-Based Planning and Design Approach
 - Chapter 9: Geometric Design Performance Checks
 - Appendix A: Design Performance Check Techniques

Source: NCHRP Research Report 1043

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Guide Organization

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Appendix: Design Performance Check Techniques

- Details a variety of design performance check techniques that can facilitate the check process
 - Complements and a companion to Chapter 9: Geometric Design Process and Performance Checks.
 - New multimodal checks: Bicycle and pedestrian design flags, and pedestrian crossing and wayfinding assessments.
- Techniques are representative but not exhaustive
 - Practitioners must sometimes modify performance check techniques to meet a specific configuration.

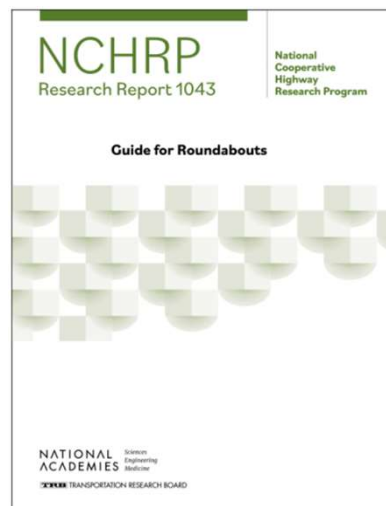
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Guide Organization

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Summary

- Like its predecessors, the *Guide for Roundabouts* is a step forward
- Its principles and design approach can be applied to all roadway and intersection applications



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Agenda

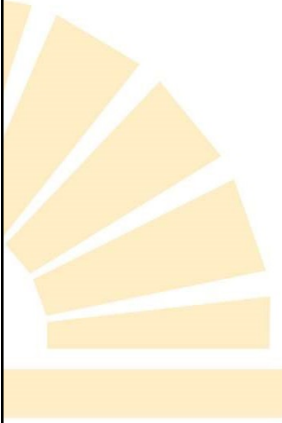
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Discussion



Questions?


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Thank you!



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