Washington State's Roundabout Program

TRB National Roundabout Conference

May 25, 2005

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Washington State Department of Transportation

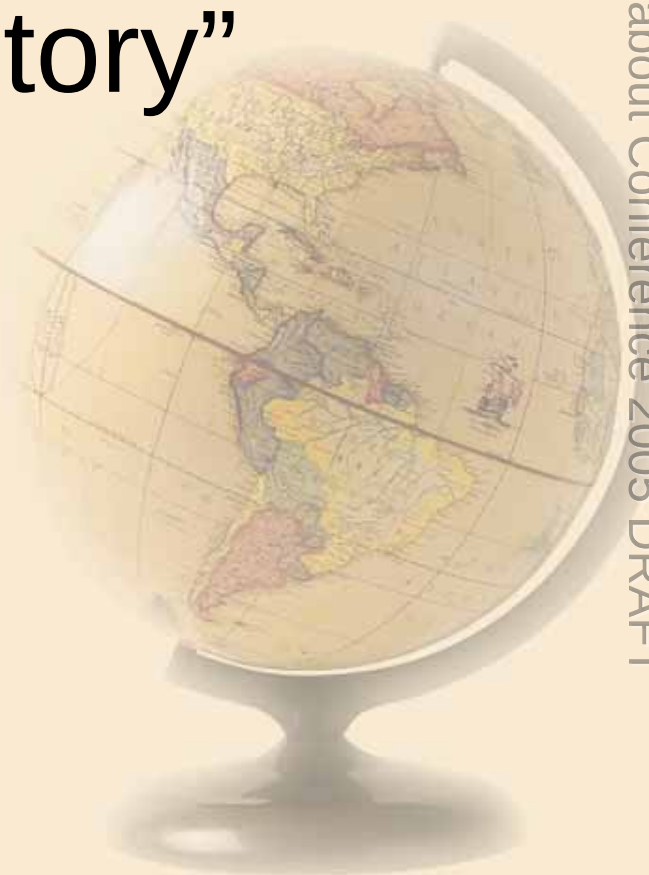
An alternative title could have been

“Myth Busters”

Fighting the perception…..
(Simpson Video)

Policy Development

“The Short Story”



Roundabout Task Force

Design Manual Chapter

Chapter 915 Roundabouts

915.01 General

Modern roundabouts are circular intersections at grade. They can be an effective intersection

Old rotaries and traffic circles are characterized by a large diameter, often in excess of 300 ft. This large diameter typically results in travel speeds within the circulating roadway that exceed 30 mph. They typically provide little or no horizontal deflection of the paths of through traffic. These large diameters also create weaving areas that increase accidents in the circulating roadway. At times, traffic control was imposed on the circulating traffic, such as yield or stop signs that required circulating traffic to yield to entering traffic. In some cases, each entry was controlled with a traffic signal. Circular intersections with any of these features are not an approved intersection type.

(1) Locations Recommended for Roundabouts

910.01 General

Intersections are a critical part of highway design because of increased conflict potential. Traffic and driver characteristics, bicycle and pedestrian needs, physical features, and economics are considered during the design stage to develop channelization and traffic control to enhance safe and efficient multimodal traffic flow through intersections.

This chapter provides guidance for designing

WAC 468-52, "Highway access management—Access control classification system and standards"

Local Agency Guidelines (LAG), M 36-63, WSDOT

Manual on Uniform Traffic Control Devices for Streets and Highways, USDOT, FHWA; including the *Washington State Modifications to the MUTCD*, M 24-01, WSDOT (MUTCD)

Standard Plans for Road, Bridge, and Municipal Construction (Standard Plans), M 21-01, WSDOT

Roundabouts: An Informational Guide, FHWA-RD-00-067, USDOT, FHWA

Guidelines and Recommendations to Accommodate Older Drivers and Pedestrians, FHWA-RD-01-051, USDOT, FHWA, May 2001

A Policy on Geometric Design of Highways and Streets (Green Book), 2001, AASHTO

Highway Capacity Manual (HCM), Special Report 209, Transportation Research Board, National Research Council

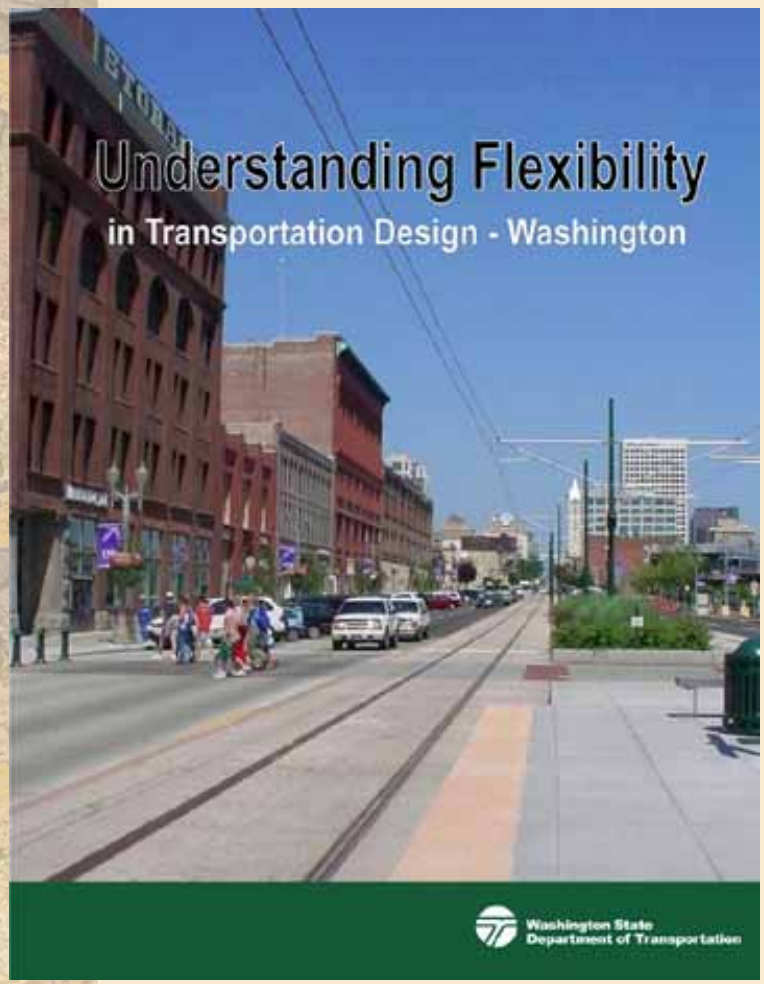
NCHRP 279

	Design Element	Mini [1]	Urban [2] Compact	Urban Single-Lane	Urban Double-Lane	Rural Single-Lane	Rural Double-Lane
General	Number of Lanes	1	1	1	2	1	2
	Typical max. [3] ADT	12,000	15,000	20,000	40,000	20,000	40,000
	Splitter Island Treatment	Painted, raised if possible	Raised	Raised	Raised	Raised extended	Raised extended
	Max. Design[4] Vehicle	SU	SU/BUS	WB-50	WB-50	WB-67	WB-67
Circulating	Inscribed Circle Diameter	45'-80'	80'-100'[5]	100'-130'[6]	150'-180'	115'-130'[6]	180'-200'
	Circulating Roadway Design Speed	15-18 mph	16-20 mph	20-25 mph	22-28 mph	22-27 mph	25-30 mph
	Circulating Roadway Width	14'-19'	14'-19'	14'-19'	29'-32'	14'-19'	29'-32'
Entry	Max. Entry Design Speed	15 mph	15 mph	20 mph	25 mph	25 mph	30 mph
	Entry Radius	25'-45'	25'[7]-100'	35'[7]-100'	100'-200'	40'[7]-120'	130'-260'
	Entry Lane Widths	14'-16'	14'-16'	14'-16'	25'-28'	14'-16'	25'-28'

(1) Mini roundabouts are not suitable for use on a

(5) Use 100 ft minimum on state routes.

Flexibility Document



http://www.wsdot.wa.gov/eesc/design/Urban/Default.htm

Examples

largest vehicle to occasionally use the facility, means allowing for turning movements without leaving the paved shoulders or encroaching on sidewalks.

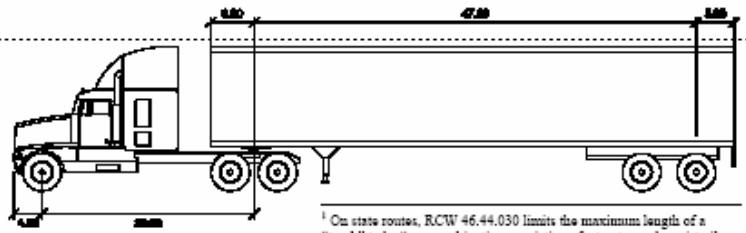
When selecting design vehicles for intersections, independent decisions should be made for each leg of the intersection. This frequently results in different design vehicles for different legs of the intersection. Design vehicle decisions for intersections influence elements such as roadway width, throat width, turning roadway design, and corner radii. Vehicle routing and the size of vehicles necessary to serve businesses along the corridor should be considered when selecting a design vehicle for intersections. Alternative routes that might be available for larger vehicles (as well as local pedestrian activity, bicycle usage, traffic volume, the percentage of trucks, and the speed of the facility) should also be considered.

Exhibit III-4.3 – Truck at a Suburban Roundabout (Location: SR 510, Lacey, WA)

Proper design vehicle consideration results in efficient traffic flow with the typical traffic mix of vehicles and non-motorized traffic. If too small a design vehicle is used in the design parameters, traffic disruptions can result when larger vehicles pass through. If too large a design vehicle is used, the pedestrian crossing distances and impervious surface area are needlessly increased, with no overall benefit.

The WB-67 is the largest legal vehicle on state routes, and it has frequently been used as the largest vehicle expected on a facility. The WB-67 is not the most prevalent large truck on our highway system and designs to accommodate these vehicles in the urban setting are frequently used, though the use of the WB-67 is often considered excessive. The somewhat smaller WB-50 truck is the most common vehicle used to transport products and goods. Because of its shorter wheelbase, it does not exhibit the extreme trailer off-tracking as the WB-67, though the off-tracking is still pronounced. There is also a smaller tractor and trailer truck, the WB-40, which can impact facility design. This older vehicle (WB-40), with its smaller enclosed trailer, is losing favor with the trucking industry because of its limited hauling capacity.[1]

Exhibit III-4.4 – Illustration of the WB-67 (Source: WSDOT)



[1] On state routes, RCW 46.44.030 limits the maximum length of a "truck" to be "any combination consisting of a tractor and semi-trailer that has a semi-trailer length (not) in excess of fifty-three feet." The WB-67 has a semi-trailer length of 53 feet. The "WB" refers to the wheelbase, and the "67" is the distance, in feet, of that wheelbase. The overall length of this vehicle is 74 feet, including the chassis and body extensions beyond the wheels. By comparison, the passenger car design vehicle is only 19 feet long.

Exhibit III-1.21 – Essential elements to consider when providing pedestrian facilities at intersections

- Consider safety by evaluating the separation of potential conflicts in space and/or time
- Optimize pedestrian visibility
- Evaluate pedestrian route continuity
- Consider the mobility, comfort, and convenience of all users
- Consider appropriate pedestrian features consistent with the design context
- Identify the time and distance required for a pedestrian to cross at the intersection
- Reduce vehicular speed at the intersection
- Accessibility

Exhibit III-1.22 – Pedestrian Facilities Approaching and at a Roundabout, Including Sidewalks and Crosswalks. (Note the pedestrian barrier provided to prevent undesirable pedestrian crossing and how route continuity was maintained through the intersection.) (Location: Port Orchard, WA)

Balancing the needs of vehicles and pedestrians can be particularly challenging where limited space exists (often found in urban environments). Typical features to consider when planning for pedestrian needs include: curb extensions, curb radius reductions, and traffic control features.

Separate conflicts – At signalized intersections, pedestrian conflicts can be separated in time by providing a pedestrian phase or an exclusive pedestrian phase.

Pedestrian visibility – Features at an intersection and limited sight distance can obscure pedestrians and reduce driver expectancy. Pedestrian visibility can be improved by restricting parking within the influence area of the intersection and moving or removing features that restrict sight distance (vegetation, newspaper stands, utilities, etc.). The visibility of the pedestrian crossing at the intersection in Exhibit III-1.20 is improved by using a fluorescent pedestrian crossing sign and the pavement treatment, as shown.

Pedestrian route continuity – If sidewalks exist on the approaches to the intersection, tie them into the intersection features. This will facilitate route continuity and minimize barriers to mobility and accessibility.

Mobility, comfort, and convenience of all users – The road environment is shared by a multitude of different users. In the design of an intersection, the goal is to balance the needs of all users, rather than giving any one mode or movement preference or excluding certain users.

Appropriate pedestrian features – The type of pedestrian features provided will depend on the design context, pedestrian volumes, the volumes and types of vehicles using the intersection, existing intersection design, and site-specific features.

Time and distance needed to cross – Wide roads increase the pedestrian exposure times to vehicles. If feasible, the use of curb extensions and the reduction of curb radii can shorten the crossing distance and exposure time. Median refuges are also effective in shortening crossing distance. Crossing time and distance also affect decisions about pedestrian phases at traffic signals.

Accessibility – The ADA requires that all new or altered intersections be accessible.

Roadway Design

The design features of the roadway are primarily determined by the design context of the project. In urban environments with high pedestrian volumes, it is particularly important to slow vehicular traffic, provide sight distance to pedestrians, and channelize pedestrian flows to desirable crossing locations. On urban collectors and arterials, raised medians can be beneficial, as they provide refuge for pedestrians. However, they might also increase speeds due to reduced vehicle conflict. Where marked crossings are provided, warning signs are often used. In suburban and residential areas, traffic calming might be

Leading Roundabout Cities

- Kennewick (11)
- Lacey (8)
- University Place (7)

For More Information:

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Washington State Department of Transportation – Highways and Local Programs Service Center
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Fax: (360) 705-6822

This video was developed in partnership with the City of Lacey, City of Olympia and the Washington State Department of Transportation.

Driving Modern Roundabouts

VHS

Driving Modern Roundabouts

Back

Fold Lines

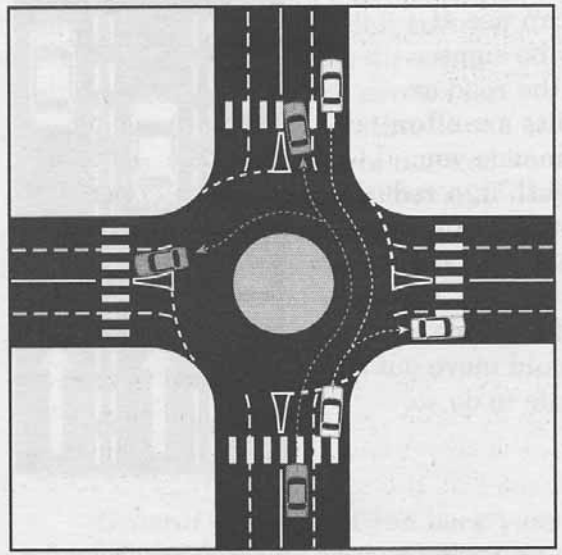
Front

Excerpt from “Modern Roundabout Driving” Video

Driver's Manual

Roundabouts

A roundabout is an intersection control device with traffic circulating around an island. Approaching vehicles must yield to the traffic in the circle. Always yield to pedestrians and bicyclists who are legally crossing the road. Inside the circle, always drive around the circle to the right.



How to drive in a roundabout:

1. **Slow down as you approach the intersection; roundabouts are designed for speeds of 15-20 mph.**
2. **Enter the roundabout when there is a gap in traffic. Once inside, do not stop.**
3. **You may exit at any street or continue around if you miss your exit.**

Low Tech Tools

HO Scale Model Trucks

Truck Accomodation

Open House Use

Our first roundabout(s)


National Roundabout Conference 2005 DRAFT

West Lake Sammamish Parkway

Operations

Unique Issues

SR 203 during first month – Video footage

“Ideal” Central Island

Conforms with Aesthetics

“Preferred” use of Central Island

A State DOT's "preferred" way

Innovative way to use the Central Island !

“Plumbing Optional”

Kittitas County

Washington State Law regarding fault in roundabout crashes

Striping

State Route 203

Design Visualization

Outreach

National Roundabout Conference 2005 DRAFT

Peds on Central Island?

Washington State Roundabout Status

- 67 “bonafide” roundabouts as of Dec 2004
- A good mix of WSDOT, city and county
- Construction will add 10 – 15 roundabouts in 2005
- More than 50 in design
- How many don’t we know about?

Questions/Comments?