

## Roundabouts - the safer intersection solution

by **Lutz Pfeiffer**  
Road Safety Audit Expert

Consortium:  
WYG Engineering as Leading Partner  
TRADEMCO S.A.  
VIENNA CONSULT  
TRL Ltd

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## Overview about the presentation

- Types of roundabouts
- Traffic dimensioning of roundabouts
- Road safety aspects of roundabouts
- Effects on pedestrian and cycle traffic
- Example for multilane roundabout

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### 1. Types of roundabouts

Roundabouts are the most safety intersection type. Pre-conditions are a correct planning and building construction including the road marking and signage.



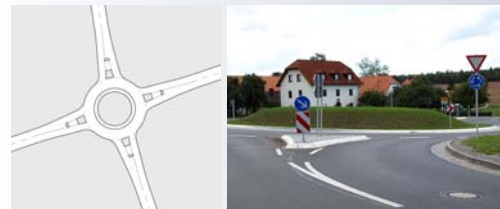
Example for a  
2-Lane-Roundabout

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### 1. Types of roundabouts

**Small Roundabout:**  
**Single-Lane-Circle (35 – 45 m diameter)**



Source: Merkblatt Kreisverkehr – Germany FGSV 2006

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### 1. Types of roundabouts

**Mini Roundabout:**  
**Single-Lane-Circle (13 – 22 m diameter)**



Source: Merkblatt Kreisverkehr – Germany FGSV 2006

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### 1. Types of roundabouts

**Roundabout:**  
**Two-Lane-Traffic ability (40 – 60 m diameter)**



Source: Merkblatt Kreisverkehr – Germany FGSV 2006

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# 1. Types of roundabouts

**Large Roundabout:**  
**Multi-Lane-Circle (more than 60 m diameter)**



Source: Merkblatt Kreisverkehr – Germany FGSV 2006

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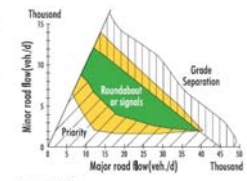
# 2. Traffic dimensioning of roundabouts

Table 1-1 Capacity based on intersection type

INTERSECTION TYPE	CAPACITY (pcph)
Right-hand priority	1,000 – 1,500
Fixed-priority	5,000 – 12,000
Single-lane roundabout	20,000 – 28,000
Multi-lane roundabout	35,000 – 7*
Signalized intersection	20,000 – 80,000*

\* Variable between countries.  
 \* Depending on the lane assignment.

Figure 1-1 Type of intersection based on traffic flows



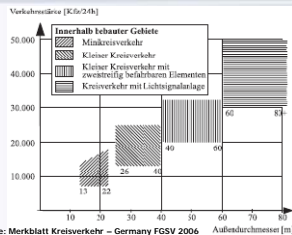
Source: IHT, 1987

Choice of the intersection type according to capacity

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# 2. Traffic dimensioning of roundabouts



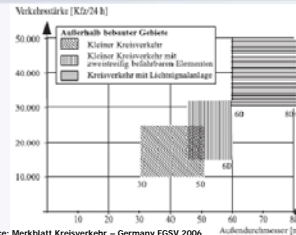
Source: Merkblatt Kreisverkehr – Germany FGSV 2006

Choice of the roundabout type according to capacity inside inhabited areas

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# 2. Traffic dimensioning of roundabouts



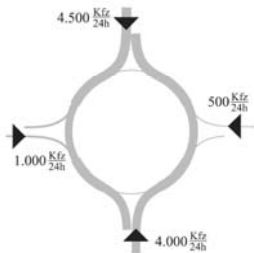
Source: Merkblatt Kreisverkehr – Germany FGSV 2006

Choice of the roundabout type according to capacity outside inhabited areas

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# 2. Traffic dimensioning of roundabouts



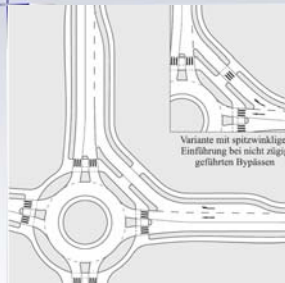
Source: Merkblatt Kreisverkehr – Germany FGSV 2006

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Example for acceptable limit of unbalanced distribution of traffic intensity

# 2. Traffic dimensioning of roundabouts



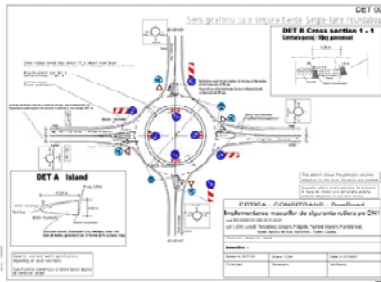
Source: Merkblatt Kreisverkehr – Germany FGSV 2006

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Example for roundabout with bypass to increase the capacity for one direction

## 2. Traffic dimensioning of roundabouts



Example for roundabout for normal capacity

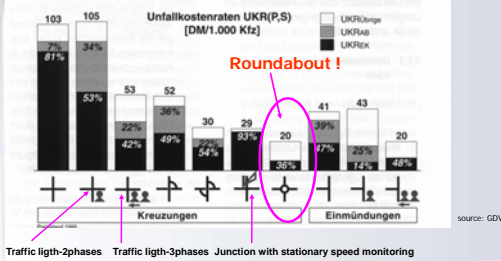
## 3. Road safety aspects of roundabouts

Rule No. 1: The circle traffic has the right of way!



## 3. Road safety aspects of roundabouts

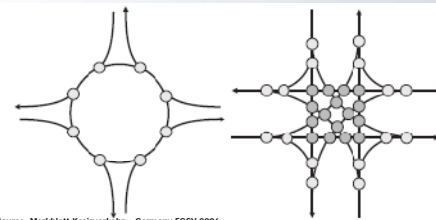
Safe junctions – comparison of junction-geometries on interurban roads - German statistics about the „accident – cost – rates“



Traffic light 2-phases Traffic light 3-phases Junction with stationary speed monitoring

source: GDV

## 3. Road safety aspects of roundabouts



Source: Merkblatt Kreisverkehr – Germany FGSV 2006

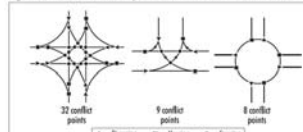
Conflicts on a roundabout (8) in comparison to an intersection (32)

## 3. Road safety aspects of roundabouts

Roundabout has a low number of conflict points:

- > in particular no multiple conflicts
- > in particular no crossing conflicts
- > in particular no left-turning conflicts

Figure 1-2 Number of conflict points at intersections and roundabouts



Source: PIARC

## 3. Road safety aspects of roundabouts

Roundabout is good readily identifiable:



Source: Kreisverkehrsline Kanton Zürich

Source: GDV

### 3. Road safety aspects of roundabouts



Accidents at roundabouts

Source: ADAC

### 3. Road safety aspects of roundabouts

Roundabout is good understandable:

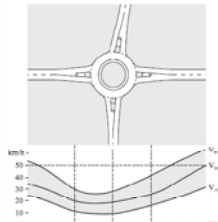


- only easy decision making for drivers
- good visibility conditions for road users

Source: Merkblatt Kreisverkehr – Germany FGSV 2006

### 3. Road safety aspects of roundabouts

Roundabout reduce the accident severity:

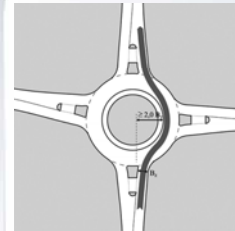


- low level of speed of vehicles
- low difference of speed level between all road users

Typical run of speed in area of a roundabout (Source: Merkblatt Kreisverkehr – Germany FGSV 2006)

### 3. Road safety aspects of roundabouts

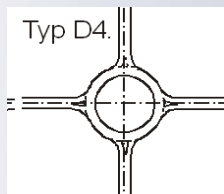
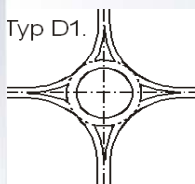
Roundabout reduce the accident severity:



- low level of speed of vehicles, because the deflection of straight ahead traffic is double width of lane at min.

Deviation of straight ahead traffic due to roundabout island (Source: Merkblatt Kreisverkehr – Germany FGSV 2006)

### 3. Road safety aspects of roundabouts



Design principles: dynamic roundabout vs. German solution

### 3. Road safety aspects of roundabouts

Roundabout reduce the accident severity:

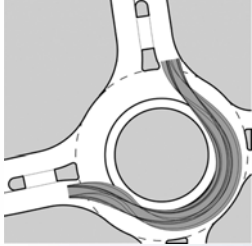
- proposed radii for in- and outgoing traffic

	Typ	Minikreisverkehr	Kleiner Kreisverkehr	Kleiner Kreisverkehr mit zwei-streifigen Zufahrten
innerhalb bebauter Gebiete	Eckausrundung Zufahrt R <sub>1</sub>	8-10	10-14	12-16
	Eckausrundung Ausfahrt R <sub>2</sub>	8-10	12-16	12-16
außerhalb bebauter Gebiete	Eckausrundung Zufahrt R <sub>1</sub>	-	14-16	14-16
	Eckausrundung Ausfahrt R <sub>2</sub>	-	16-18	16-18

Source: Merkblatt Kreisverkehr – Germany FGSV 2006

### 3. Road safety aspects of roundabouts

Roundabout reduce the accident severity:



➤ Check of traffic ability by help of dynamic minimum turning curve

Check of traffic ability  
(Source: Merkblatt Kreisverkehr – Germany FGSV 2006)

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### 3. Road safety aspects of roundabouts

Roundabout reduce the accident severity:



➤ Safekeeping of traffic ability by pave areas (for example cobble) outside of carriageway

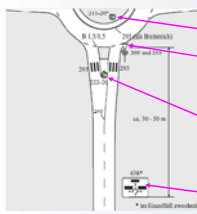
Safekeeping of traffic ability  
(Source: Merkblatt Kreisverkehr – Germany FGSV 2006)

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### 3. Road safety aspects of roundabouts

Signage for roundabouts inside inhabited areas:



Sign no. 211-20 (German Traffic Rules) "Here right" - shows in drive direction on the circle lane

Sign no. 205 (German Traffic Rules) "yield sign" and Sign no. 215 (German Traffic Rules) "roundabout"

Sign no. 222-20 (German Traffic Rules) "to keep to the right" - shows in drive direction on the right lane

Sign no. 438 (German Traffic Rules) pre-direction-sign shows the roundabout with the main directions

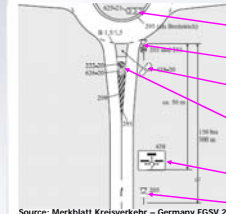
Source: Merkblatt Kreisverkehr – Germany FGSV 2006

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### 3. Road safety aspects of roundabouts

Signage for roundabouts outside inhabited areas:



Sign no. 625-21 (German Traffic Rules) "hatched signboard" - shows in drive direction on the circle lane

Sign no. 205 (German Traffic Rules) "yield sign" and Sign no. 215 (German Traffic Rules) "roundabout"

Sign no. 418-20 (German Traffic Rules) "arrowhead-direction-sign" shows the outgoing way with the main direction

Sign no. 222-20 (German Traffic Rules) "to keep to the right" - shows in drive direction on the right lane  
Sign no. 626-20 (German Traffic Rules) "hatched signboard"

Sign no. 438 (German Traffic Rules) pre-direction-sign shows the roundabout with the main directions

Sign no. 205 (German Traffic Rules) "yield sign" and Sign no. 307 (German Traffic Rules) "end of main road"

Source: Merkblatt Kreisverkehr – Germany FGSV 2006

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### 4. Effects on pedestrian and cycle traffic

Pedestrian and cycle way inside inhabited areas:



Example for give-way-line for pedestrians and separate cycle way

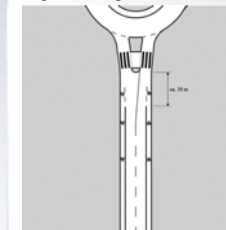
Source: Merkblatt Kreisverkehr – Germany FGSV 2006

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### 4. Effects on pedestrian and cycle traffic

Cycle way inside inhabited areas:



Example for cycle way on access road to roundabout

Source: Merkblatt Kreisverkehr – Germany FGSV 2006

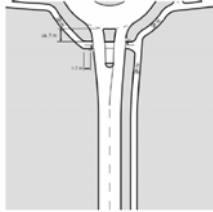
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## 4. Effects on pedestrian and cycle traffic

### Cycle way outside inhabited areas:



Example for cycle way in 2-way-line without right of way

Source: Merkblatt Kreisverkehr – Germany FGSV 2006



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## 4. Effects on pedestrian and cycle traffic

### Roundabout with bypass



Example for pedestrian and cycle way with right of way for all directions and for bypass

Example for pedestrian and cycle way with right of way for all directions, not for bypass

Source: Merkblatt Kreisverkehr – Germany FGSV 2006



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## Multilane roundabout

Source: PIARC

### Example for a multilane roundabout

See the yield sign on access lanes!

Usually are roundabouts with a diameter more than 30 m less safe!



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## Multilane roundabout

### Berlin – Germany

The so called „Great Star“, it works safe with additional traffic signals



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Thank you for your attention!

Any Questions?



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