Uniformity of Terminology for Circular Intersection Designs

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All aerial and street-level images in this presentation are from Google Maps, unless otherwise noted.

Roundabout Flavors

Intersection Terminology

- Mini Roundabout
- Diverging Conflict
- Gyrotory
- Modern Roundabout
- Traffic Circle
- Circulatory Roadway
- Merging Conflict
- Signalized Roundabout
- Turbo Roundabout

Why this paper?

- No globally-accepted set of terminology
- Circular intersection designs vary widely
  - Intersection Size
  - Traffic controls
  - Lane interactions / Conflict points
  - Expected driver behaviors
- Current definitions exclude, or fail to address, these many global differences.
GOALS

1. To develop a globally-acceptable set of terminology for circular intersection designs.

2. To develop an analysis method that can help to differentiate between various designs.

Intersection Flavors

Image Credit: Washington County, MN
Intersection Flavors
Intersection Flavors

Intersection Flavors
Intersection Flavors

Intersection Flavors
Intersection Flavors

Why is it important?

Proper driver behaviors are very different at these two configurations!

Crossing Design

Concentric Design

Crossing to Enter

Turning / Merging to Enter
Why is it important?
Proper driver behaviors are very different at these two configurations!

Crossing Design
Through Movement to Exit

Concentric Design
Right Turn To Exit

“Carriageway”

• The terms “highway” or “roadway” can be interpreted to apply jointly to both sides of a divided highway (note the singular form).
• “Carriageway”: A contiguous group of lanes which is spatially or physically separated from other contiguous lane groups, such as opposing lanes or channelized turn lanes.
• In lieu of the term “traffic streams”.

Washington County
Conflict Points

- **“Crossing Conflict”**: 2 inputs, 2 outputs
- **“Joining Conflict”**: 2 inputs, 1 output
- **“Separating Conflict”**: 1 input, 2 outputs

- “Joining”, not “Merging”. “Merging” is a particular driving maneuver that involves matching speeds and changing lanes within the same carriageway.
- Crash severity isn’t necessarily tied to these. Crash severity is a function of velocity differential.
The Line-and-Island Model

- An analysis method that can be applied to existing roundabouts or to proposed designs.
- Clarifies the nature of traffic interactions between various carriageways at the roundabout.
- These interactions can then be readily explained by ordinary traffic laws and behaviors.

The Line-and-Island Model

- **Step 1:** Identify the through carriageways.
- **Step 2:** Identify each intersecting point with the proper conflict type.
- **Step 3:** Create a simplified framework model by eliminating line curvature, except that a circle may be used for circular carriageways.
- **Result:** A functional lane layout, readily explained by ordinary traffic laws.
The Line-and-Island Model

**Step 1:** Identify the through carriageways. Turning movements from one carriageway to another can be ignored.

The Line-and-Island Model

**Step 2:** Identify each intersecting point with the proper conflict type. Turning movements from one carriageway to another can be ignored.

- Crossing Conflict
- Joining Conflict
- Separating Conflict
Step 3: Create a simplified framework model by eliminating curvature.

Crossing Design
The Line-and-Island Model

**Result:** A functional lane layout, readily explained by ordinary traffic laws.

**Step 1:** Identify the through carriageways.

Turning movements from one carriageway to another can be ignored.
The Line-and-Island Model

**Step 2:** Identify each intersecting point with the proper conflict type.

**Step 3:** Create a simplified framework model by eliminating curvature.
The Line-and-Island Model

**Step 1:** Identify the through carriageways. Turning movements from one carriageway to another can be ignored.

**Step 2:** Identify each intersecting point with the proper conflict type.

*Images show a roundabout with different types of conflict points marked.*
Step 3: Create a simplified framework model by eliminating curvature.

The Line-and-Island Model

Concentric Design
The Line-and-Island Model

Crossing Design

All arrows are optional

(Optional)

Crossing Conflict
Joining Conflict
Separating Conflict


Six-Legged Roundabout

Step 1: Identify the through carriageways.

Turning movements from one carriageway to another can be ignored.
Six-Legged Roundabout

**Step 2:** Identify each intersecting point with the proper conflict type.

**Step 3:** Create a simplified framework model by eliminating curvature.

Crossing Design
Six-Legged Roundabout

Entering through lanes ≠ Crossing Through Lanes

Right-Turn-Only lanes never count towards these calculations because right turns cannot (and do not) result in the two most common multi-lane RAB crash types.

Example: A driver making a right turn, who fails to yield to the left lane of cross traffic, does not crash.

Recommended Terminology

- **Conflict points**: A location at which two carriageways interact.

  - Crossing Conflict: 2 Inputs, 2 Outputs, Two Carriageways
  - Joining Conflict: 2 Inputs, 1 Output, Two Carriageways
  - Separating Conflict: 1 Input, 2 Outputs, Two Carriageways
  - Joining Conflict near Separating Conflict: Three Carriageways
Recommended Terminology

• **Roundabout**: A roadway intersection featuring a central island around which traffic progresses in only one direction.

• **Modern Roundabout**: A roundabout at which traffic entering the intersection must yield right-of-way to conflicting traffic at the entry point.

Recommended Terminology

• **Crossing Roundabout**: A junction between two intersecting roadways in which turns made across opposing traffic are completed by way of the far side of a central island.

• **Concentric Roundabout**: A junction formed by a series of three-legged “T” intersections with a continuous loop carriageway encircling a central island.
Recommended Terminology

• **Turbo Roundabout**: A roundabout design which utilizes added interior lanes along with physical channelization to force traffic to exit the intersection.

• **Rotary / Free-Flow Roundabout**: A roundabout design intended to operate without requiring vehicles to stop or yield at entry, relying instead on speed-matching and lane changes for drivers to enter the intersection.

Recommended Terminology

• **Circulatory Roadway**: A continuous through carriageway surrounding the central island of a Concentric Roundabout, intersected at various points by entry and exit carriageways.

NOTE: A *Crossing Roundabout* does not possess a *circulatory roadway* under this definition.
Recommended Terminology

- **Inscribed Roadway Area**: The area exterior to the central island and truck apron of a roundabout, but interior to the inscribed intersection area.

NOTE: At *Crossing Roundabouts*, this area includes portions of multiple through carriageways, but typically consists of unified geometric design elements, such as turning radii and cross slope from the central island.

Thank You


Or for more information contact me at:

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