INTRODUCTION

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TRB Roundabout Conference
Vail, Colorado, USA, May 2005
DEMO Objectives

- You are interested in **Roundabouts** – How can **aaSIDRA HELP** you?
- This brief **Introduction** first
- **aaSIDRA 2.1 HCM version with US Units**
- **QUICK examples** to demonstrate:
  - Input & Output
  - Various intersection types
  - Different GEOMETRIES
  - CALIBRATION
  - Sensitivity Analysis
  - Case Studies
Australia...

Roundabouts are very common

Images for US driving conditions
Australia...

Roundabouts are very common
akcelik & associates

Signalised & unsignalised Intersection Design and Research Aid
aaSIDRA Users

- USA: 717
- Australia: 422
- South Africa: 131
- New Zealand: 92
- Canada: 72
- Malaysia: 72
- Spain: 35
- Chile: 29
- Norway: 29
- Slovenia: 28
- Italy: 24
- Korea, South: 22
- Singapore: 20
- Other Asia and Africa: 105
- Other Europe: 77
- Other Latin America: 44

- First released in 1984
- Over 1900 sites in more than 80 countries

aaSIDRA most popular roundabout analysis software in the USA
US Highway Capacity Manual (HCM) version of aaSIDRA

- USA largest user group (over 700 sites)
- The HCM version of aaSIDRA offers options for US Customary and Metric units
- aaSIDRA is HCM compatible
  See: www.aattraffic.com/SIDRA/aaSIDRA_HCMversion.htm
What makes aaSIDRA different?

Total intersection analysis tool

Model CONSISTENCY in evaluating alternative intersection treatments
aaSIDRA areas of application
aaSIDRA is based on extensive research and development effort

Documentation

✓ aaSIDRA User Guide
✓ Research Reports
✓ Articles
✓ Our website
## What makes aaSIDRA different?

### Level of analysis detail

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<th>Individual vehicles</th>
<th>Drive cycles</th>
<th>Traffic flows</th>
<th>Speed-flow functions</th>
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<td>Most traffic analysis models e.g TRANSYT, HCS</td>
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<td>Most transport planning and economic analysis models</td>
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<td>Approaches Lane groups Individual LANES</td>
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- **Microsimulation models**: more detailed model of traffic stream
- **aaSIDRA**: more detailed model of road geometry

**Micro-analytical model**
What makes aaSIDRA different?

Lane-by-lane analysis

aaSIDRA is the ONLY major analytical software with lane-by-lane analysis

- Short lane analysis
  - Lane flows
  - Unequal lane use
  - De facto exclusive lanes
What makes aaSIDRA different?

Four-mode elemental model (drive cycles)

For modeling

- Geometric delay
- Operating COST
- Fuel consumption
- Emissions
What makes aaSIDRA different?

Total intersection analysis tool

Model CONSISTENCY in evaluating alternative intersection treatments
Roundabout Model

- Geometry
- Driver–Vehicle Characteristics

BOTH are included in aaSIDRA (not just Geometry)
Modeling of LANE USE at roundabouts is very important.
What makes aaSIDRA different?

Roundabout design

Important for roundabouts with **low demand**: aaSIDRA models negotiation radius, speed and distance allowing for path smoothing by drivers.
What makes aaSIDRA different?

Roundabout design

Important for roundabouts with high demand: aaSIDRA identifies congestion caused by heavy circulating flows especially with unbalanced flow patterns
aaSIDRA uses an empirical gap-acceptance method to model roundabout capacity and performance.

The model allows for the effects of both roundabout geometry and driver behaviour.

It incorporates effects of:

- priority reversal (low critical gaps at high circulating flows),
- priority emphasis (unbalanced O-D patterns), and
- unequal lane use (both approach and circulating lanes).

CAPACITY can be measured as a service rate for each traffic lane in undersaturated conditions according to the HCM definition of capacity to represent prevailing conditions.
What makes aaSIDRA different?

Roundabout model

aaSIDRA gap-acceptance parameters are *NOT fixed*, but vary with roundabout geometry and flow rates.
Dominant flows at roundabouts (effect of O-D demand pattern)
Effect of Exiting Flow can be included

- Exiting
- Default = 0 %

- Entering
- Circulating
Model Calibration for local conditions

Environment Factor

- Dominant lane of two-lane roundabout
- Inscribed diameter, $D_i = 50$ m
- Lane width = 4.0 m

- Environment Factor, $f_e$
  - 0.95
  - 1.00
  - 1.05

Adjustment for the Entry Flow / Circulation Flow Ratio

- Medium O-D pattern effect
- Dominant lane of two-lane roundabout
- Inscribed diameter, $D_i = 50$ m
- Lane width = 4.0 m

- $q_a / q_c$ ratio adjustment
  - High
  - Medium
  - Low
  - None
Model Calibration for local conditions

HCM single-lane roundabout example, WB approach:
inscribed diameter = 36 m (118 ft), entry lane width = 4.0 m (13 ft), approach half width = 3.5 m (11.5 ft), turn radius = 26 m (84 ft), flare length = 20 m (66 ft), entry angle = 30°

aaSIDRA model with default parameters:
Environment Factor = 1.0, Medium entry flow adjustment, Medium O-D pattern effect

aaSIDRA model calibrated to match the HCM lower capacity model:
Environment Factor = 1.15, Low entry flow adjustment, Medium O-D pattern effect
Information on roundabouts

Visit our web page for extensive information on roundabouts

www.aattraffic.com/SIDRA/roundabouts.htm
Paper presentations during the conference:
  – Session 4A, Monday – Metering Signals
  – Session 7B, Tuesday – Model Calibration

DENVER Workshop: 26-27 May

Exhibition:
  – Leaflet

DISCUSS any issues with us
Thank you ...