

aaSIDRA for Roundabouts

INTRODUCTION

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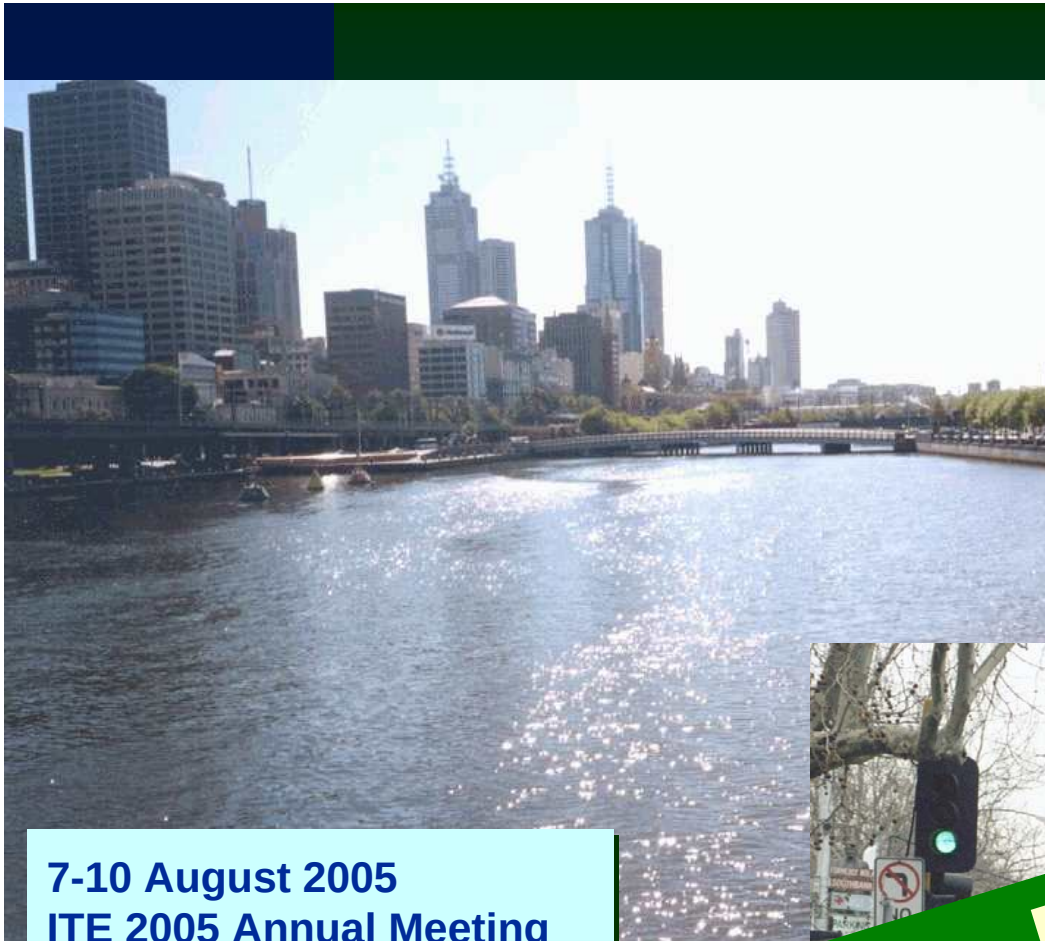
TRB Roundabout Conference
Vail, Colorado, USA, May 2005



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



7-10 August 2005
ITE 2005 Annual Meeting



Melbourne, Australia

Australia...



Roundabouts are
very common



Images for US driving conditions

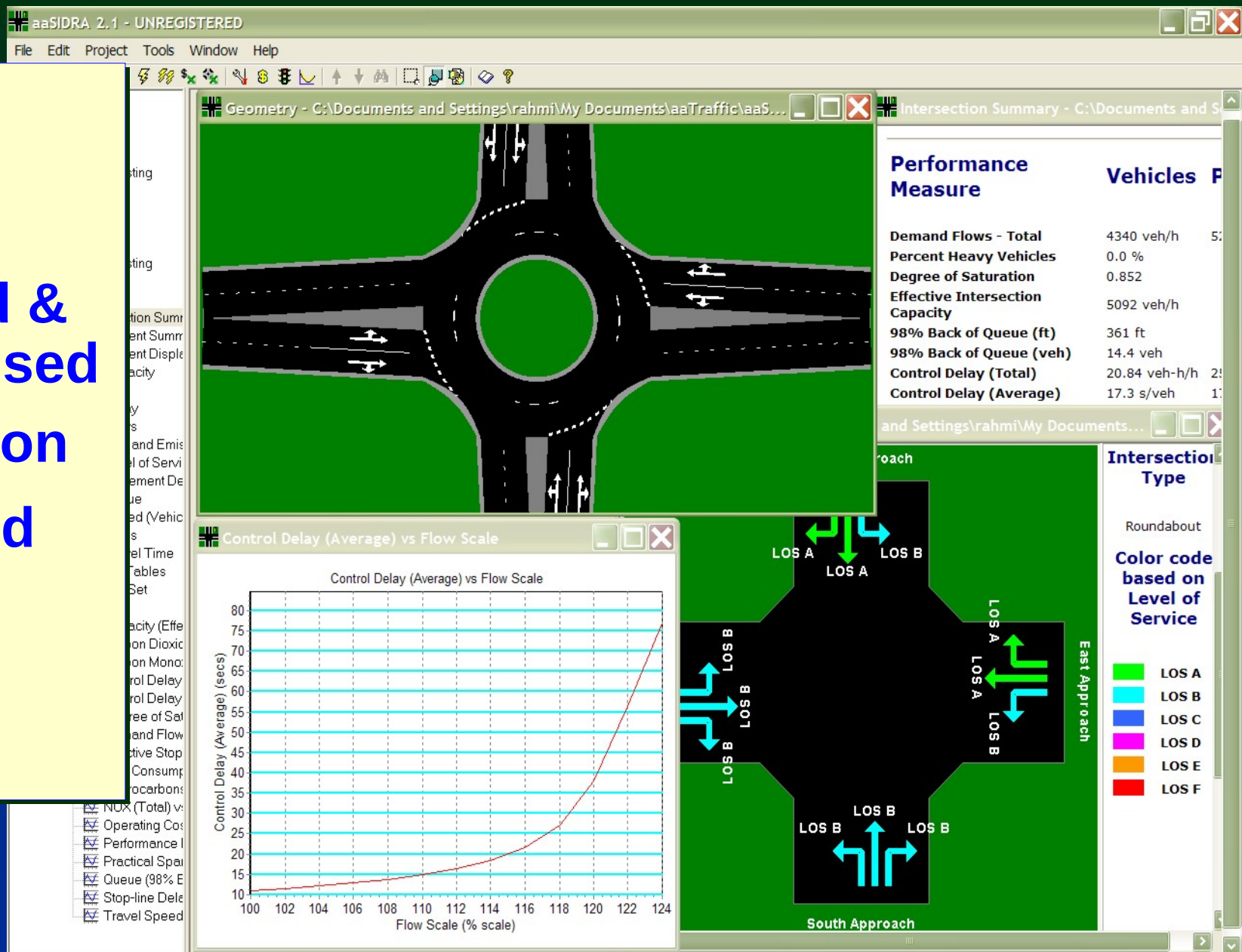
Australia...



Roundabouts are
very common



akcelik & associates Signalised & unsignalised Intersection Design and Research Aid



aaSIDRA Users

aaSIDRA
most popular
roundabout
analysis
software in the
USA



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

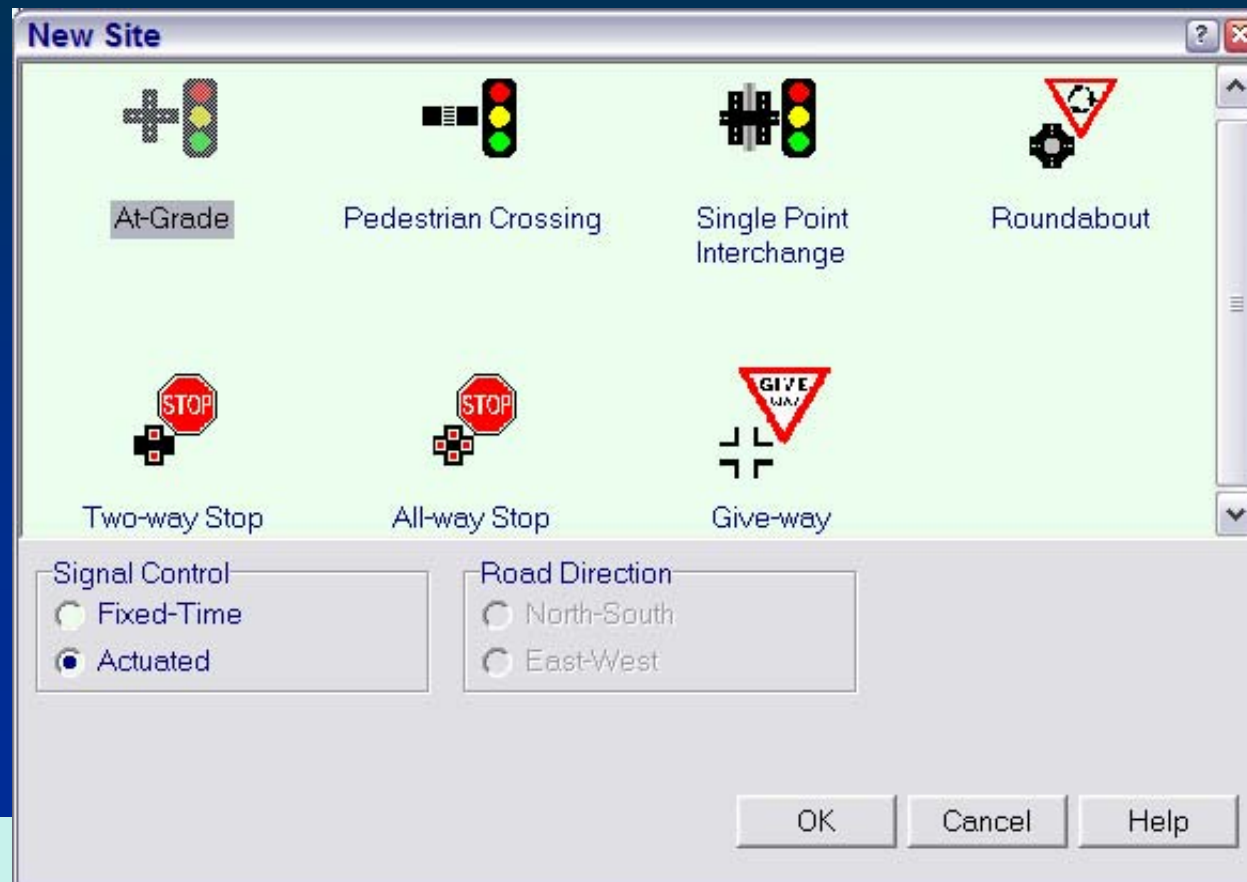
US Highway Capacity Manual (HCM) version of aaSIDRA

- ✓ 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.aatraffic.com/SIDRA/aaSIDRA_HCMversion.htm

What makes aaSIDRA different?

Total intersection analysis tool

Model CONSISTENCY in evaluating
alternative intersection treatments



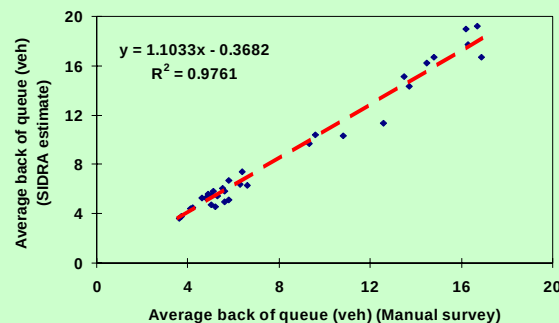
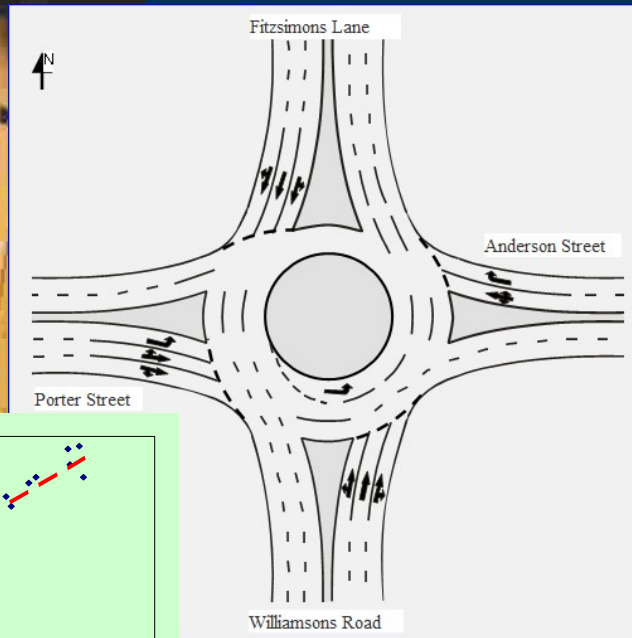
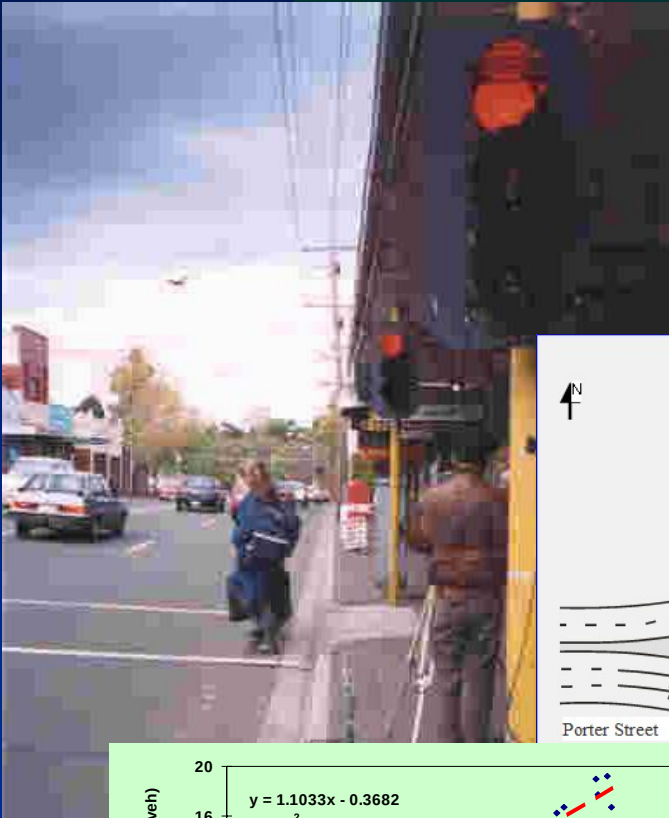
aaSIDRA areas of application



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

*more detailed
model of
traffic stream*

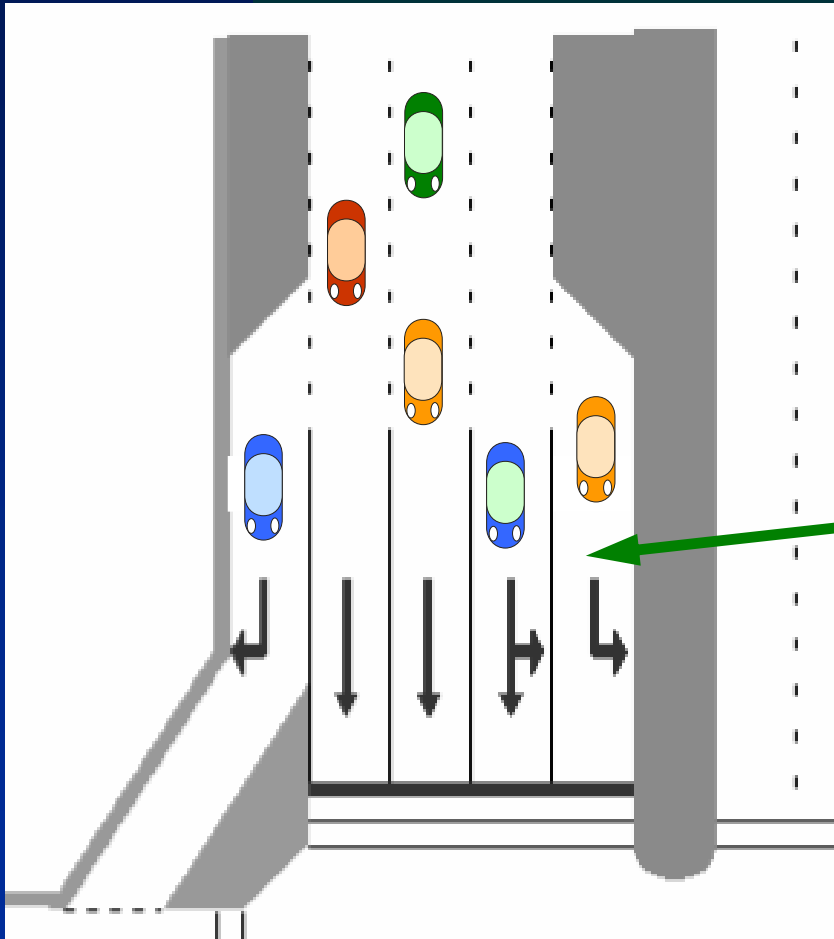
Individual vehicles			<i>Microsimulation models</i>
Drive cycles			aaSIDRA
Traffic flows	<i>Most traffic analysis models e.g TRANSYT, HCS</i>		
Speed-flow functions	<i>Most transport planning and economic analysis models</i>		
	Approaches	Lane groups	Individual LANES

**Micro-analytical
model**

more detailed model of road geometry

What makes aaSIDRA different?

Lane-by-lane analysis



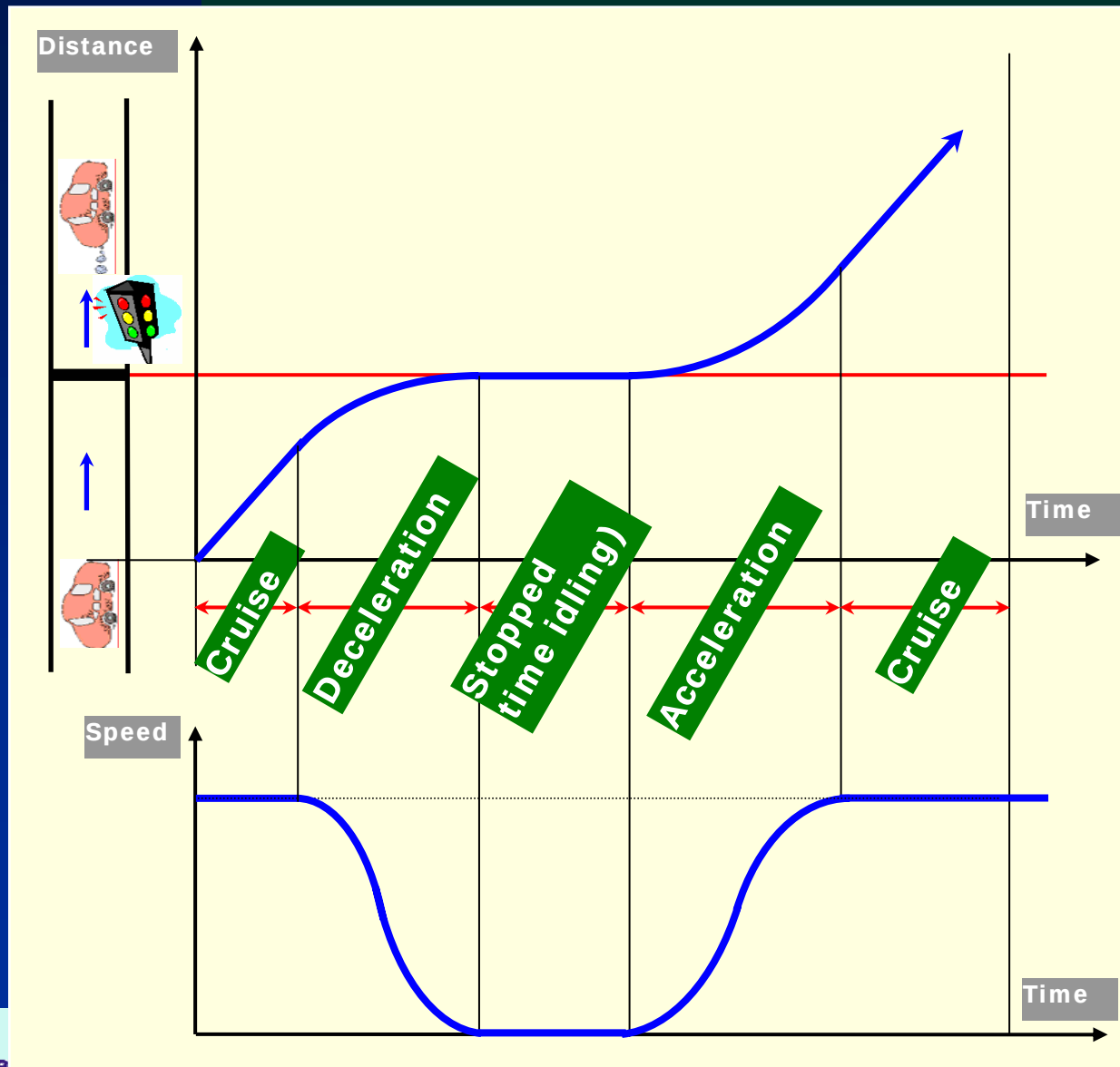
aaSIDRA is the **ONLY** major analytical software with **lane-by-lane analysis**

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

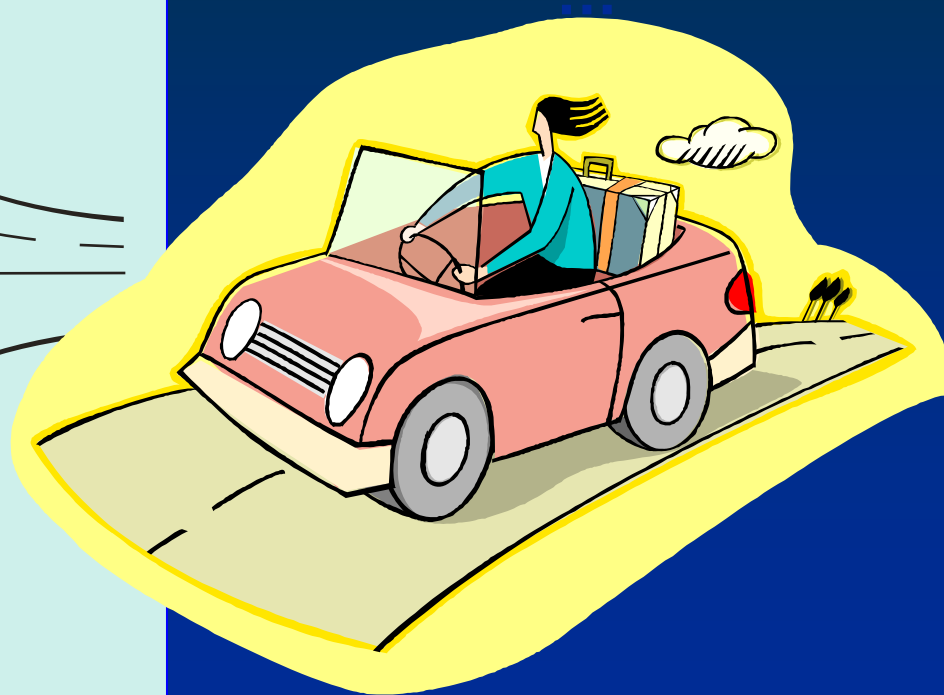
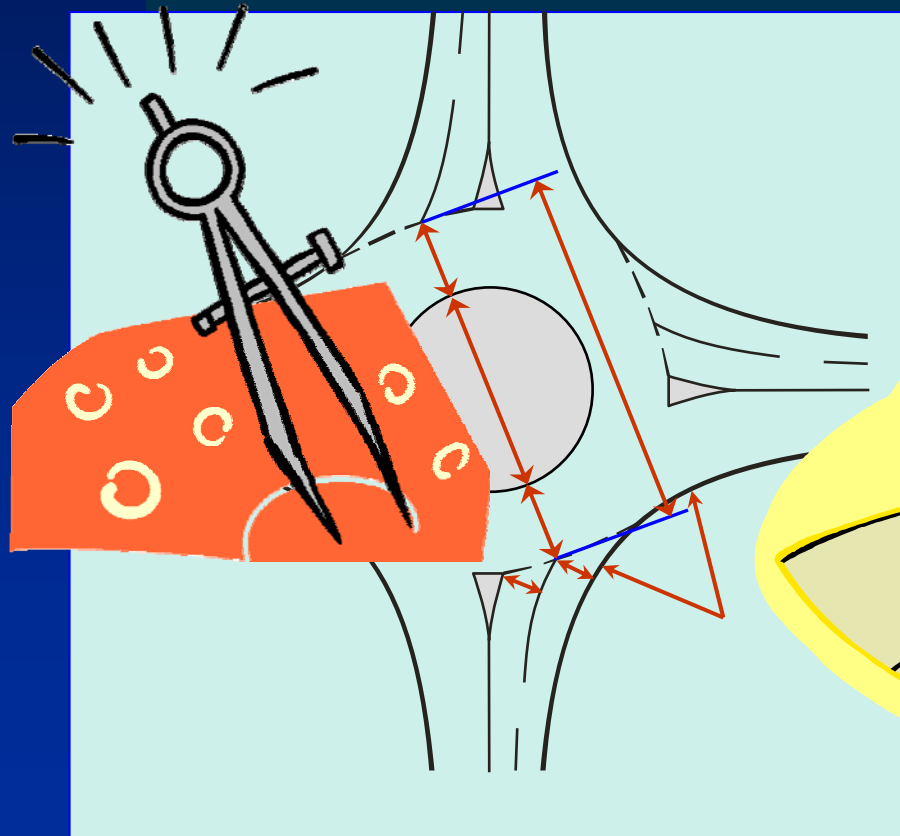
Model **CONSISTENCY** in evaluating
alternative intersection treatments



Roundabout Model

- Geometry
- Driver-Vehicle Characteristics

BOTH are
included in
aaSIDRA (not
just Geometry)





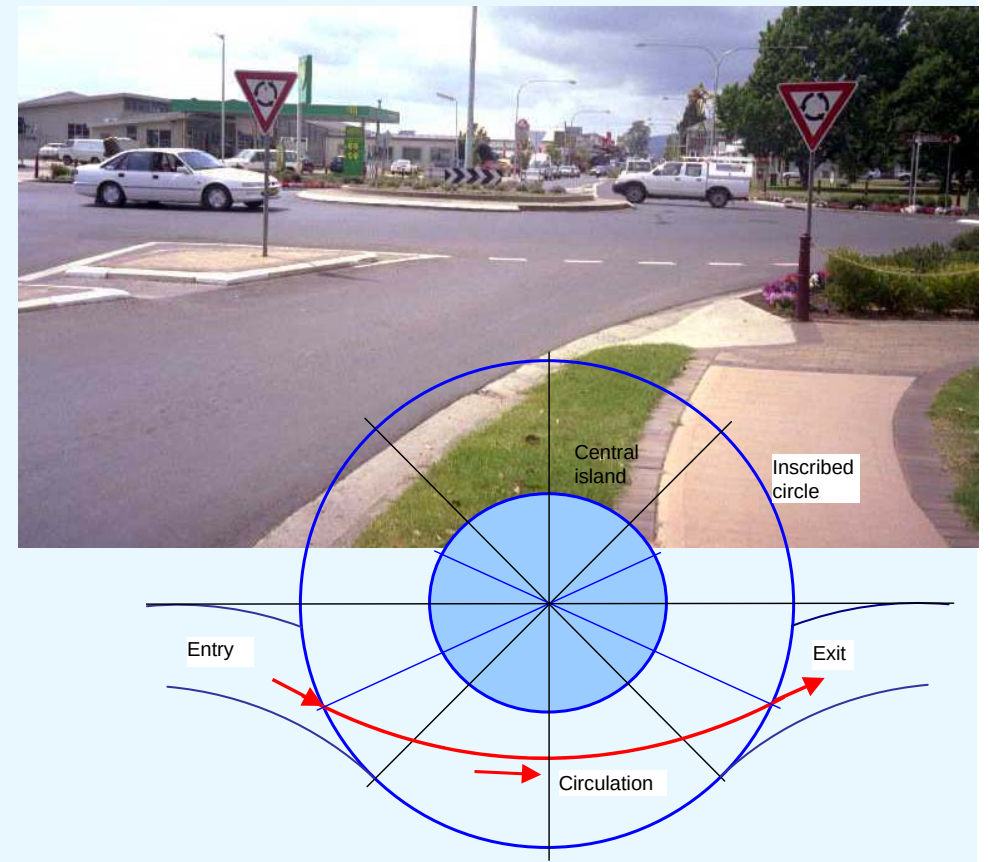
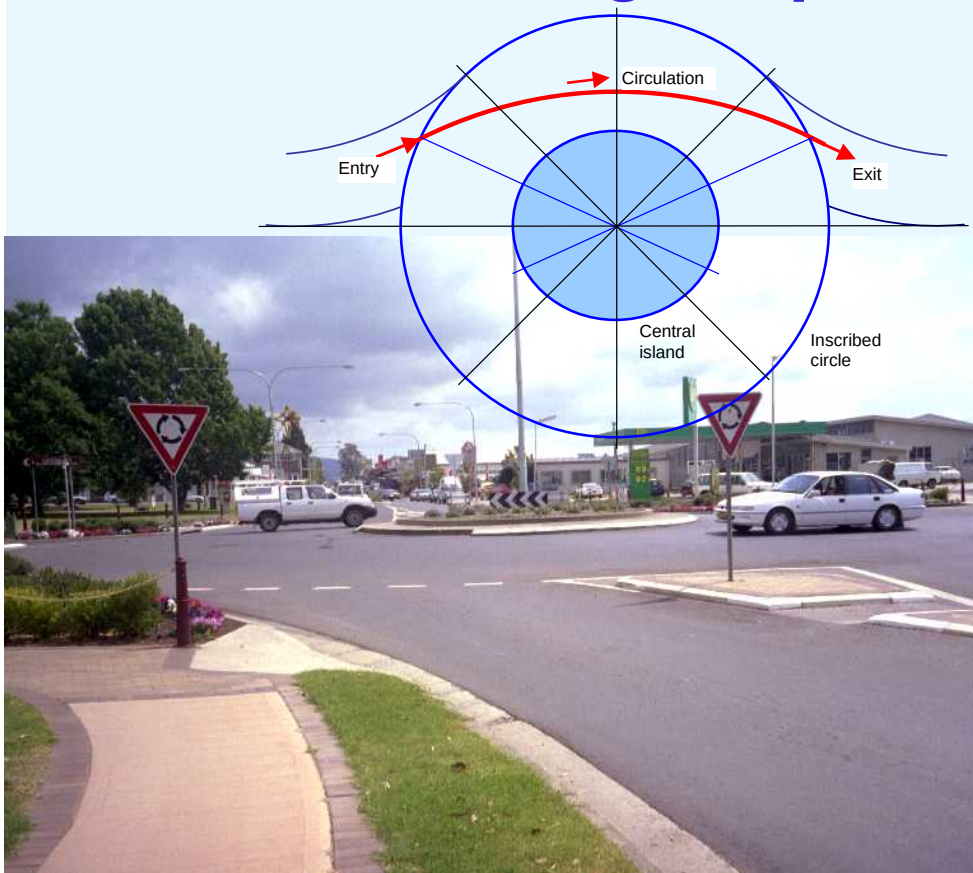
**Modeling of
LANE USE at
roundabouts is
very important**



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**



What makes aaSIDRA different?

Roundabout model

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

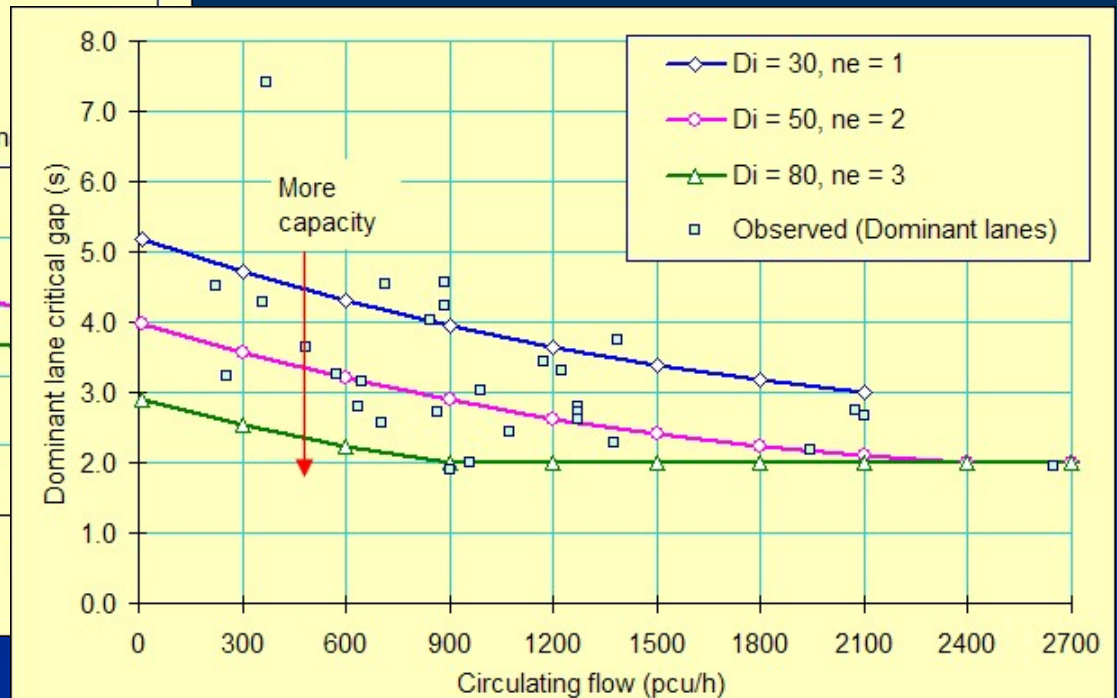
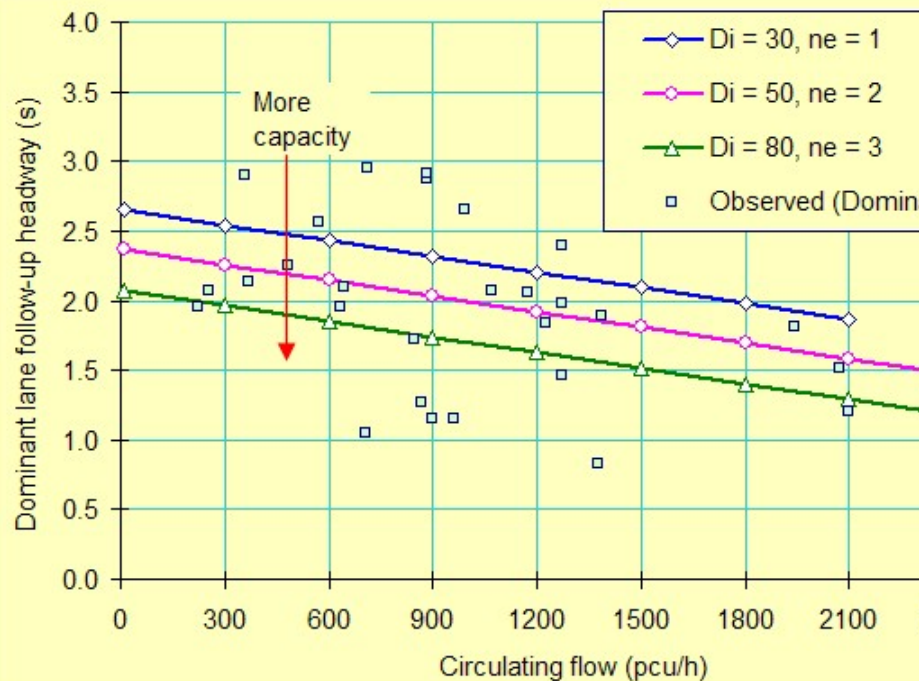
unequal lane use (both approach and circulating lanes).

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

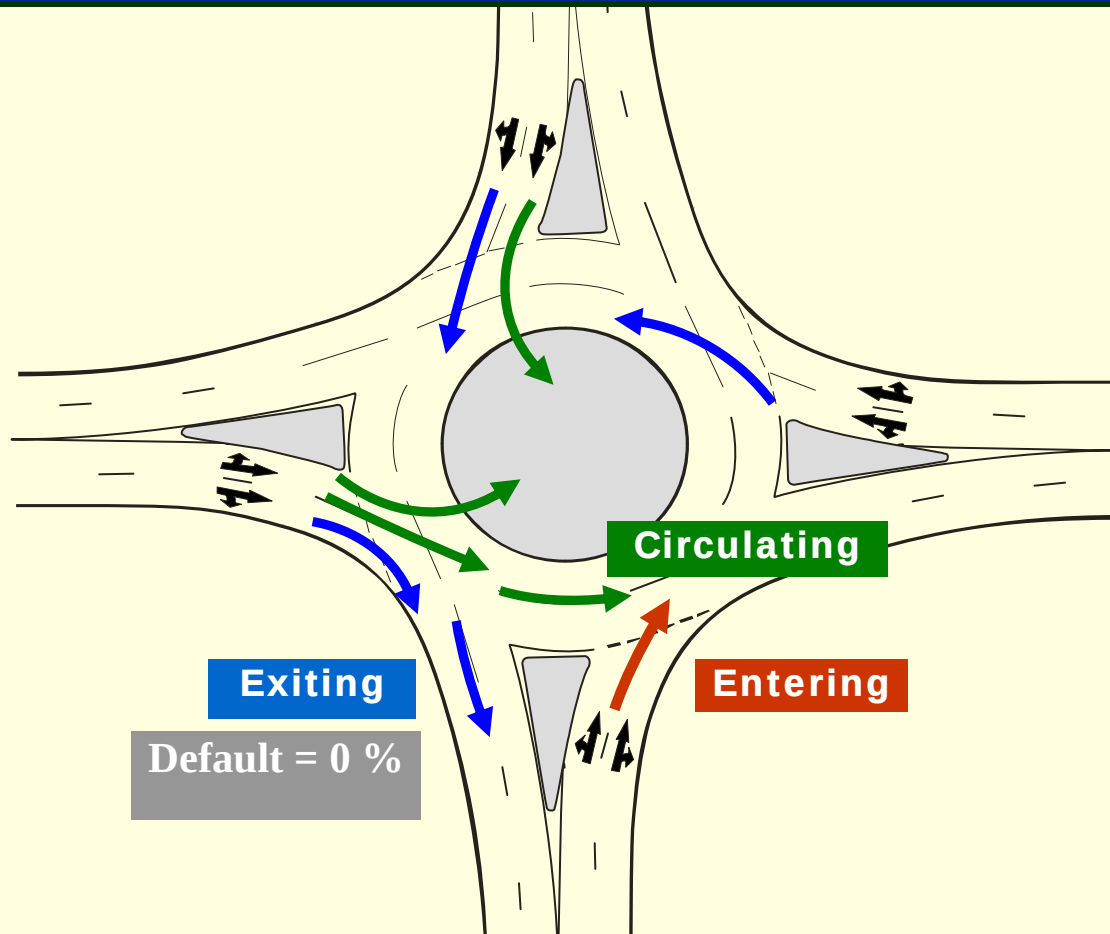
aaSIDRA gap-acceptance parameters are **NOT fixed**, but vary with roundabout geometry and flow rates.





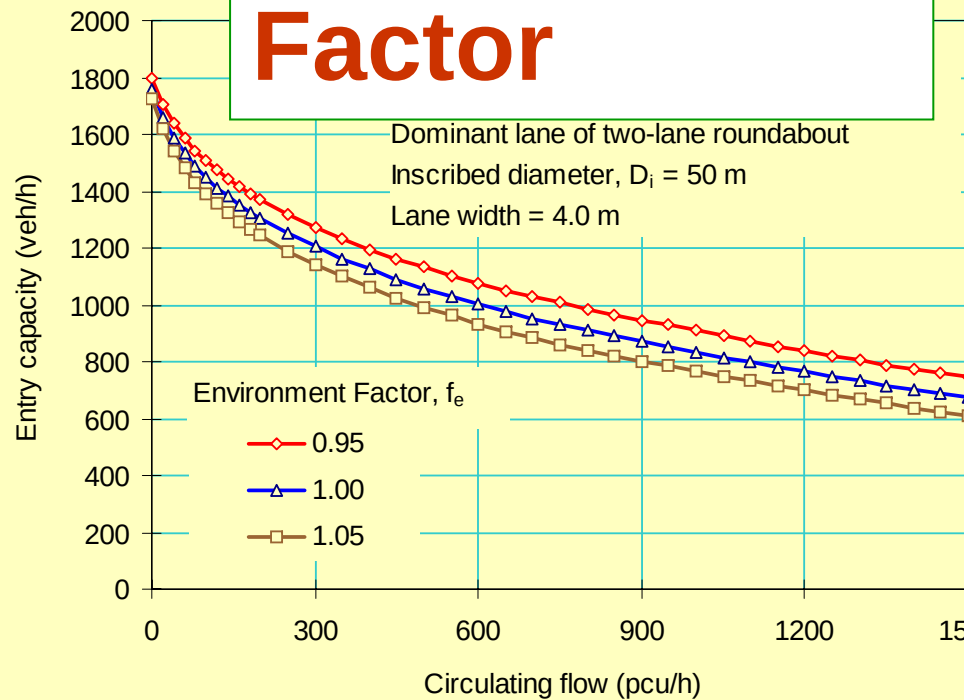
**Dominant flows
at roundabouts
(effect of O-D
demand pattern)**

Effect of Exiting Flow can be included

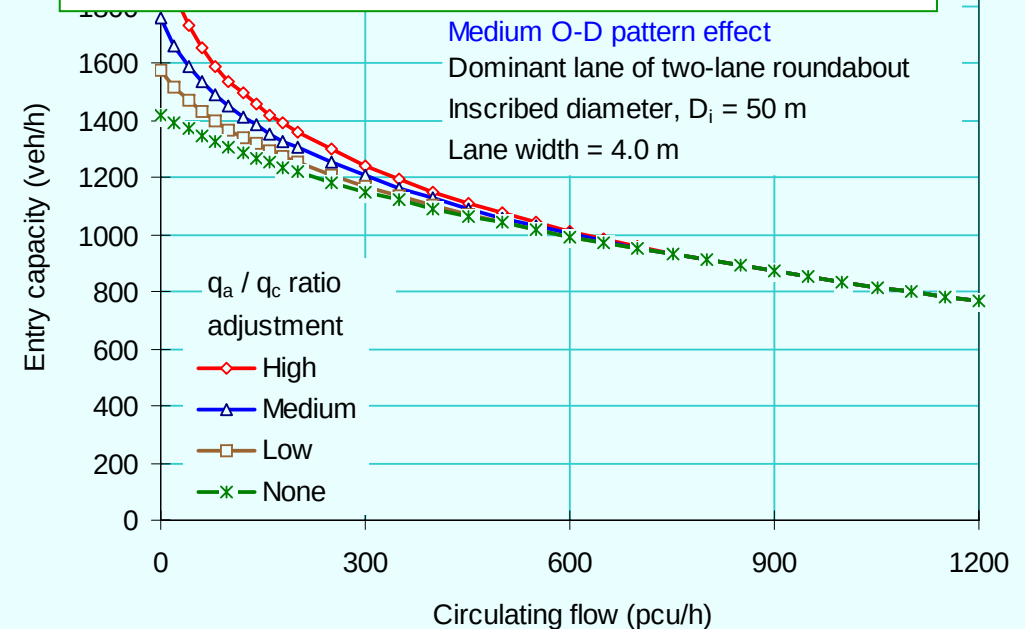


Model Calibration for local conditions

Environment Factor



Adjustment for the Entry Flow / Circulation Flow Ratio



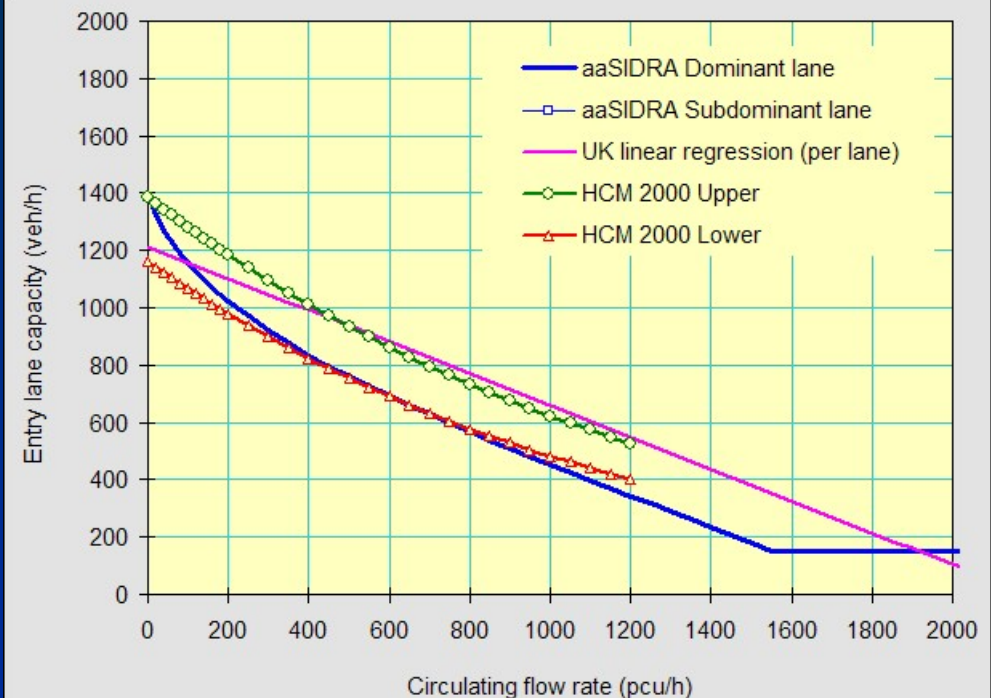
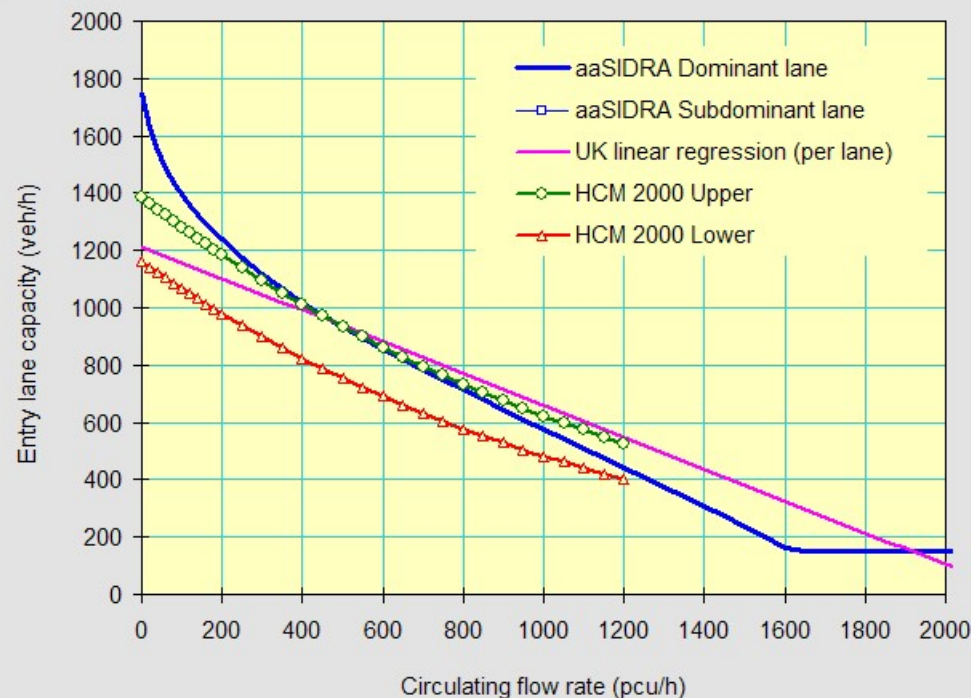
Model Calibration for local conditions

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.aatraffic.com/SIDRA/roundabouts.htm



>> TO MAIN
Presentation

aaSIDRA for Roundabouts

CONCLUSION

- 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 ...



[Animated Flags—By 3DFlags.com](http://3DFlags.com)