

Why is the integration of the new HCM 2010 model into SIDRA INTERSECTION important for your roundabout design?

Highway Capacity Manual 2010 introduces a new capacity model for roundabouts based on US research. SIDRA INTERSECTION software Version 5.1 offers the best implementation of this new model with powerful extensions to enhance your roundabout design capabilities. The roundabout capacity model is the only method in HCM 2010 which uses lane-by-lane analysis. This is best applied through SIDRA INTERSECTION which has been using lane-by-lane methodology since the 1980s.

Lane-By-Lane Model and Other Unique Features SIDRA INTERSECTION Offers

Unlike other software packages, SIDRA INTERSECTION does not claim to be a simple replication of the HCM procedures. Instead, it offers significant extensions on the capabilities of HCM with calibration using HCM defaults.

For all types of intersection, SIDRA INTERSECTION uses more advanced models and methods, including **lane-by-lane analysis** (rather than analysis by *lane groups in the HCM*), modelling of short lanes, detailed modelling of average and percentile queue lengths, stop rates, geometric delays, and the use of drive cycles (cruise, acceleration, deceleration and idling) for detailed modelling of delay and travel time components as well as operating cost, fuel consumption and emission estimation.

Some HCM models or methods are used in all versions of SIDRA INTERSECTION, including the **Level of Service** methods, the delay and queue progression factors for signal coordination effects, and so on. The HCM version of SIDRA INTERSECTION is based on the **calibration of most model parameters using the HCM defaults** as applicable.

Major Extensions SIDRA INTERSECTION Offers for Roundabouts

The **US HCM Versions** of SIDRA INTERSECTION 5.1 will use the HCM 2010 roundabout capacity model as the default model. SIDRA INTERSECTION will also continue to offer the SIDRA Standard model with a default Environment Factor of 1.2 to match the lower capacity estimates based on US roundabout research. The extensions of the HCM 2010 roundabout model available in SIDRA INTERSECTION include:

- **Geometry:** Roundabouts with **more than 2 lanes** can be analysed with any configuration of number of approach and circulating lanes, lane types and lane disciplines.
- **Templates:** SIDRA INTERSECTION offers numerous Templates for roundabouts including all roundabout configurations given in MUTCD 2009 and the TRB 2010 Roundabout Informational Guide. All Templates will be updated for US HCM Versions of SIDRA INTERSECTION.
- The US HCM Version of SIDRA INTERSECTION offers options for **US Customary** and **Metric units**.
- **Roundabout Metering Signals** can be analysed using the HCM 2010 roundabout capacity model.
- **Capacity Constraint:** This essential element of roundabout modelling is readily available in SIDRA INTERSECTION.

- **Heavy Vehicle factor** for capacity adjustment is calculated for *each lane* using relevant movement HV percentages rather than the whole approach or lane group.
- **Pedestrian Effects:** The effects of pedestrians on roundabout entry and exit lane capacities are determined.
- **Lane Flows** are determined allowing for user-specified and program-determined lane underutilisation cases including downstream short lane effects. The method is extended to *more than two lanes* in a lane group.
- **Short Lane** capacity and any excess flow into adjacent lanes are determined using equivalent gap-acceptance parameters from the HCM 2010 model.
- **Shared and exclusive slip lanes** and **continuous bypass lanes** at roundabouts can be modelled. Single and multiple bypass lanes can be modelled, and slip lanes can be give-way / yield or stop controlled.
- Parameters for modeling **unbalanced flow conditions** can be used.
- **Level of Service:** SIDRA INTERSECTION offers *alternative LOS methods* (including **HCM 2010** and **HCM 2000** methods), *alternative LOS thresholds for roundabouts*, and a **LOS Target** parameter to specify different acceptable LOS levels for different intersection types, e.g. for Design Life analysis.
- **Model Calibration:** The parameters of the HCM 2010 roundabout capacity model can be calibrated as lane-based model parameters.
- Roundabout **negotiation speeds and distances** are estimated and **geometric delays** are calculated as a function of approach, exit and negotiation speeds and distances.
- **Geometric delays** are included in delay estimates allowing for roundabout negotiation speeds and distances.
- **Back of queue** models, including flexible **percentile queue** modeling, are used for roundabouts and sign-controlled intersections (not available in the HCM) consistent with signalized intersections and are useful for modeling of short lanes and for estimating the **probability of blockage** of upstream lanes.
- Estimates of **stop rates** and **proportion queued** are provided for all types of intersection.
- Time-proven models of **fuel consumption, emissions** and **operating cost** used for estimates consistent with the HCM 2010 model are important model extensions offered by SIDRA INTERSECTION.
- For **closely-spaced roundabouts**, or pedestrian crossings near roundabouts, the Capacity Adjustment parameter can be used to specify capacity reduction for upstream intersection lanes using the **probability of blockage** estimated for downstream intersection lanes with limited queue space.

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