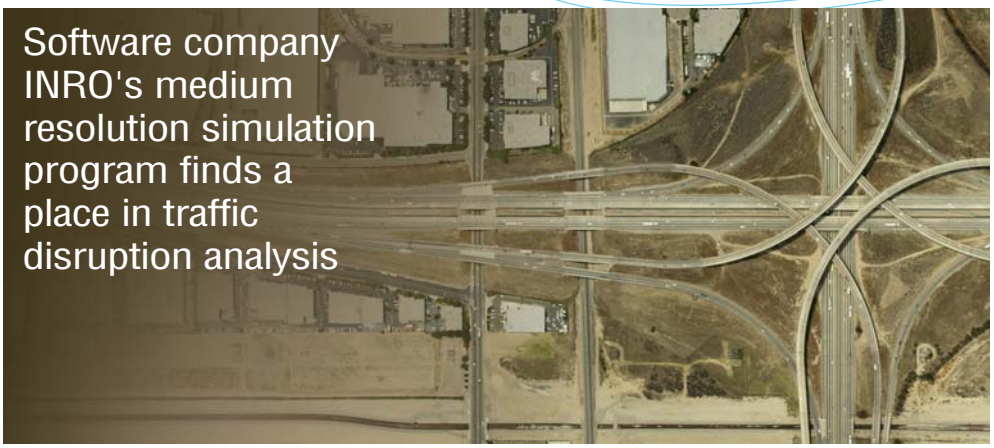
Dynameq: medium resolution simulation program

The new Dynameq traffic simulation tool from INRO has proved effective for assessing and mitigating the impact of a road upgrading project in California. Its relative ease of use compared to more detailed microsimulation tools allowed a wide area study to be made of the project and its surrounding road network.



Aerial view of part of the project

The reconstruction on the I-15 highway past the towns of Ontario and Riverside in southern California could have potentially been far more disruptive than its relatively short length of 3km would indicate. The Ontario area, some 80km east of the Los Angeles conurbation is rapidly growing, like much of the state, and the local roads are increasingly congested, especially the I-15 itself. The road is also the main through route to the casinos and entertainments of Las Vegas, so weekends in particular can see a surge in traffic as people head out Friday, and back on the Sunday afternoon.

Caltrans District Eight, the project client, wanted to virtually rebuild this section of the highway for a major reconstruction project which is gradually renovating the highway up to the Nevada border. The work would entail blocking major parts of its carriageway at times and blocking or closure of different slip and entry roads.

Just what impact this might have and how it could be kept to a minimum was crucial to understand, which is why civils, transport and environmental consultant Earth Tech was appointed to carry out a study. For a project like this it is not enough simply to model the highway and its entry points; it is also important to understand what traffic flow changes, diversions on to other routes and disruptions might be caused throughout the network of roads around it, and some distance back from the project.

An area of 17km along the north-south highway route and 5km deep across it was examined in the study, including surrounding roads and junctions.

Modelling a large number of junctions takes time in a microsimulation model where the road and junction layout has to be set up and the rules programmed for the behaviour of individual "cars".

But it can be done a little more easily in Dynameq which works at a lower fidelity level than many programs. It is not a micro-simulation but somewhere towards the mesosimulation level.

Though it models vehicles it restricts this to lane-changing and detailed junction models where individual vehicles interact and signal timing plans are respected. "So it still includes in the algorithms, lane changing behaviour and other aspects of the microsimulation type of model" says Dr Mithilesh Jha, transport planning director at the consultancy.

"But it is less detailed than the established models and has fewer parameters," he says. For certain tasks, like measuring the traffic impact of road and junction closure, this is enough. And he believes its results come fairly close to the output that a full microsimulation model would produce.

"It is a more 'forgiving' type of model if you like" he says "and somewhat faster to calibrate and validate than other models which are quite time consuming."

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>
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Calibration for the Ontario study was done by collecting traffic count data, speed data and travel times using more than 50 locations he said, "which means it was well covered".

Demand data was derived from a subarea analysis of a static type traffic model created in INRO's long term planning and static analysis toll EMME/2.

This was adjusted using conventional EMME/2 static demand adjustment procedure to calibrate against aggregated link counts.

The second step used a heuristic, rule-based dynamic demand adjustment directly in Dynameq.

For this study he says calibration results were very good, with close fits to observed data. The model's own dynamic assignment method gave a 98% regression analysis result.

The model has now been used to explore a variety of scenarios for lane closures and highway entry and exit ramp closures. One emerging result is that a particularly sensitive ramp closure should be possible. It was feared the high traffic movements it would block would cause major disruption, but it is likely that they will remain within acceptable boundaries once mitigation measures are in place.

The results of the study are now being used to devise re-routing and diversion measures that can mitigate the impact of the work, and will also be used for public information before and during works which begin in 2008 ■

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