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CASE STUDY

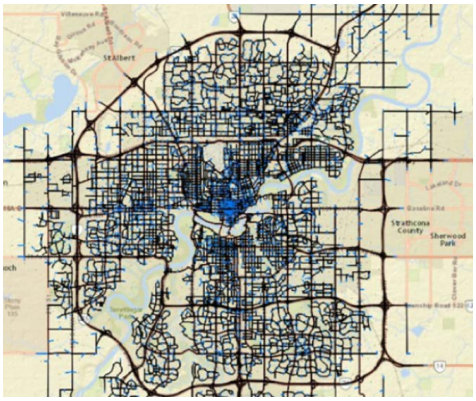
City of Edmonton Develops Citywide Traffic Simulation and Modeling for Fast-growing City

Using OpenPaths™ DYNAMEQ®, City Planners Developed a Roadmap to Model Edmonton's Roadways for Smarter Future Planning

MEETING TRAVEL DEMAND IN A FAST-GROWING CITY

Edmonton is the capital city of the Canadian province of Alberta. It is also the country's fastest growing city, with a 25% population growth over the past 10 years. City planners knew that to meet demand, they would need to launch a new transportation master plan, emphasizing greater multimodality that brought with it major infrastructure and development projects.

The entire plan consists of CAD 1 billion in freeway conversion investments. To support these investments, the city of Edmonton needed to efficiently make smart operational decisions for projects covering all phases of planning, design, and construction.



The OpenPaths DYNAMEQ city-wide traffic simulation model provides a consistent platform for operational traffic planning across the region.

ADVANCING CITY MODELING

City staff determined that additional modeling software was required to meet their needs. First, the new model would need to capture the effects of wide area route choice, including traffic diversion to alternate corridors, in addition to more localized project impacts. Second, the new model would need to operate across the entire city to form a consistent platform for operational traffic planning and forecasting, working as a complement to the city's existing OpenPaths EMME® strategic travel demand model.

Traditional modeling methods would be inefficient for a project of this size. Therefore, the city of Edmonton sought software that would enable them to create citywide traffic simulations and a dynamic traffic assignment (DTA) model for the entire city.

IMPLEMENTING A PHASED APPROACH

As they were already using OpenPaths EMME to model travel demand in the city, the urban planners chose OpenPaths DYNAMEQ as the preferred solution to meet this need. It provided the team with the operational detail necessary to evaluate transportation scenarios, such as queuing and delay, at the scale required to understand the impacts of congestion on route choice and trip diversion.

The city of Edmonton used OpenPaths DYNAMEQ to simulate individual vehicles with car-following, lane changing, gap acceptance, and signal control. It also produced reliable route choices on large networks and highly congested scenarios using a simulation-based DTA procedure, providing consistent traffic simulation at any scale for both project and regional level applications.

Using OpenPaths DYNAMEQ, the city began their phased approach, aligned with ongoing project timelines, to cost effectively implement traffic simulation and DTA. For the first phase, they required a traffic operations model that could accurately evaluate the impact of proposed alternatives on travel both in and off corridor within a compressed project timeline. So, they developed an OpenPaths

PROJECT SUMMARY

ORGANIZATION

City of Edmonton

SOLUTION

Roads and Highways

LOCATION

Edmonton, Alberta, Canada

PROJECT OBJECTIVES

- To create an efficient method of making smart operational planning decisions for the city of Edmonton.
- To find software capable of supporting diverse operational traffic studies across the city.

PROJECT PLAYBOOK

OpenPaths DYNAMEQ, OpenPaths EMME

FAST FACTS

- The city of Edmonton needed to efficiently make smart operational decisions for projects covering all phases of planning, design, and construction.
- OpenPaths DYNAMEQ helped provide the operational detail and scale necessary for the consistent evaluation of multiple project alternatives across the city.
- Edmonton used a phased approach to cost effectively develop the citywide traffic simulation model in support of capital planning projects.

ROI

- Using OpenPaths DYNAMEQ empowered the city to make smart infrastructure investment decisions to maximize limited public resources.
- Now, the city can evaluate the impact of multiple concurrent projects both in and off the corridor.
- The off-the-shelf traffic simulation model reduces both timeline and cost of traffic operations projects throughout the city.

"The OpenPaths DYNAMEQ model is an effective tool to evaluate traffic diversion impact due to network supply capacity changes, and the model results are credible and highly recognized by the city council and transportation professionals."

– Peter Xin, Senior Transportation Engineer, City of Edmonton

DYNAMEQ model, which successfully met this need. Furthermore, the rapid bridge reconstruction timeline provided an opportunity to build model credibility by validating results against volumes and travel times collected during construction.

For the second phase, they developed a larger model and applied it on several projects to evaluate traffic impacts and develop mitigation measures for corridor construction work, lane reductions, turn bans, and parking restrictions. This model helped the city plan, design, and evaluate the impacts of multiple concurrent and overlapping projects. It provided significant value in terms of timeline and cost savings that wasn't practical with conventional project-specific microsimulation tools.

After successfully implementing the first two phases, the city began phase three. They applied OpenPaths DYNAMEQ to a transit analysis. The Valley Line light rail transit (LRT) model was developed and applied to analyze route diversion and the traffic impact of the LRT system, including signal control operations and transit signal priority. OpenPaths DYNAMEQ simulations of the planned LRT system were able to successfully capture traffic impacts on major arterials, including diversions up to two miles away from LRT crossings.

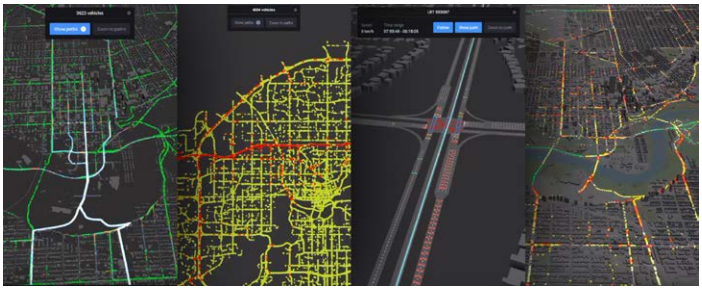
A ROADMAP FOR CITYWIDE TRAFFIC SIMULATION AND DTA

Today, planners benefit from a citywide OpenPaths DYNAMEQ model that has also been applied on a range of capital planning projects including road improvements, bike lanes, neighborhood redevelopment, and transit planning studies. The model is trusted for operational forecasting across the city and has also been used to consider more effective project alternatives at a fraction of the cost of conventional microsimulation tools in collaboration with the city's traffic engineering group.

The OpenPaths DYNAMEQ model is now regularly updated and calibrated for three-hour peak periods – in the morning and the evening – across 2030 and 2050 forecast years, consistent with the city's OpenPaths EMME strategic travel model horizons. The OpenPaths DYNAMEQ simulation model was found to be suitable for medium- and long-range forecasting, both in terms of reliable route choice through DTA convergence and the capability to synthesize reasonable future year signal control plans from simulated traffic patterns.

The city's experience with OpenPaths DYNAMEQ represents a roadmap for successful model deployment. A modest pilot study enabled the city to establish model credibility and confidence with minimal investment. The city then scaled up new initiatives in lockstep with capital planning projects to expand key decision support. "When the OpenPaths DYNAMEQ pilot originally started, it was initiated by a small team," said Arun Bhowmick, general supervisor with the city of Edmonton. "However, since then, the project has grown and is now management-driven as a citywide initiative."

Today, the citywide OpenPaths DYNAMEQ traffic simulation and dynamic traffic assignment model is trusted for operational traffic planning projects across the city, enabling longer-term planning studies and integration with the regional travel model.



The city of Edmonton needed to efficiently make smart operational decisions for projects covering multiple phases of planning, design, and construction. From left to right: Walterdale Bridge, YHT Regional Travel Corridor, LRT Lane Signal Priority, River Crossing projects.

OpenPaths DYNAMEQ supports key decision support for operational traffic planning in lock-step with the city's capital planning project requirements.