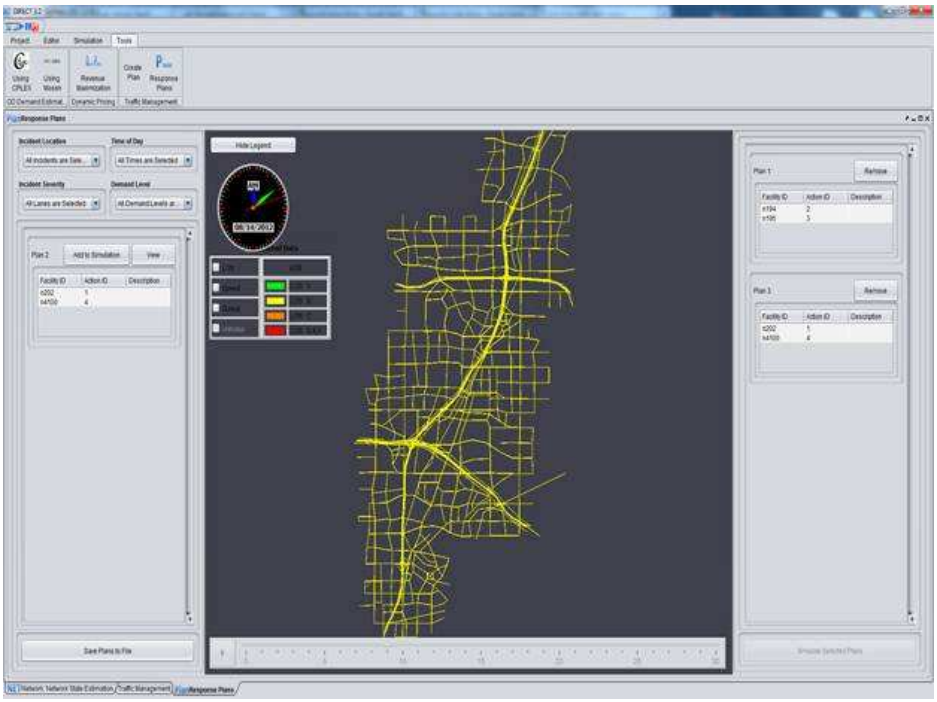
STAGE 2

US-75 INTEGRATED CORRIDOR MANAGEMENT:
ANALYSIS, MODELING, AND SIMULATION



The Stage 2 of the Integrated Corridor Management Program focused on Analysis, Modeling, and Simulation (AMS) of the Integrated Corridor Management (ICM) strategies being proposed by the Dallas Site. The goal was to estimate the benefits that could be achieved from implementing various ICM strategies. The AMS effort assisted the Dallas Site in identifying the optimum combinations of ICM strategies by providing a corridor-wide evaluation and, in turn, assisted the stakeholder in identifying which ICM strategies to invest.

The modeling effort began with obtaining vehicular, truck, and transit demand from the region's travel demand model maintained by the North Central Texas Council of Governments. The travel demand was then incorporated into a mesoscopic model developed for the US 75 corridor. The DIRECT model developed by Southern Methodist University (SMU) was chosen as the simulation tool to analyze the corridor because DIRECT models each individual traveler as required to assess transit diversion strategies. DIRECT uses a multi-objective shortest path algorithm where each traveler chooses the optimal path based on a generalized cost function that considers travel time and travel costs. The optimal path is the path (route) that minimizes this cost function and is calculated at every simulation interval. The Dallas Site calibrated and validated the mesoscopic model using speed, travel time, vehicular volume, and transit passenger volumes collected on US 75.

The Dallas Site conducted a cluster analysis to examine the frequency of various types of scenarios such as travel demand, incidents, and weather conditions. The cluster analysis led to identifying the highest occurring scenarios. The ICM strategies were then applied to these scenarios.

Figure 1. Overview of US 75 ICM Strategies

Strategies \ Scenarios	Daily Operations - No Incident		Minor Incident		Major Incident		
Demand	Med	High	Med	High	Low	Med	High
Traveler Information							
Comparative, multi-modal travel time information (pre-trip and en-route)	●	●	●	●	●	●	●
Traffic Management							
Incident signal retiming plans for frontage roads			●	●	●	●	●
Incident signal retiming plans for arterials			●	●	●	●	●
Managed Lanes							
HOV lane[1]	○	○	○	○	○	○	○
HOT lane (congesting pricing)	●	●					
Express toll lane (congestion pricing)	●	●					
Light Rail Transit Management[5]							
Smart parking system						●	●
Red line capacity increase						●	●
Station parking expansion (private parking)						●	●
Station parking expansion (valet parking)						●	●

[1] HOV lane 2+ is currently in operation, thus is not considered an ICM strategy but is part of all scenarios.

Benefits of ICM

The US 75 Corridor AMS results show significant benefits, resulting from the deployment of ICM strategies:

- The 10-year life cycle of the ICM systems yields a total benefit of **$278.8 million**.
- The 10-year life cycle cost to deploy the ICM system is estimated at **$13.6 million**.
- The estimated benefit/cost ratio for the ICM deployment over the 10-year life cycle of the project is **20.4:1**.
- Expected annual savings include 740,000 hours of person-hours of travel, a reduction of fuel consumption by 981,000 gallons of fuel, and a reduction of 9,400 tons of vehicular emissions.

Figure 1 identifies the US 75 ICM strategies evaluated during the AMS stage of the project. The strategies are grouped into traveler information, traffic management, managed lane, and transit management strategies.

The analysis investigated various operating scenarios on the U.S. 75 Corridor, including high, medium, and low travel demand; daily operations; and major and minor freeway incidents. ICM strategies analyzed include comparative travel time information (pre-trip and en-route); incident signal retiming plans for arterials and frontage roads; managed lanes, Light-Rail Transit (LRT) smart parking system; LRT capacity increase; and LRT station parking expansion.

To be able to compare different ICM strategies within a corridor, a consistent set of mobility, travel reliability, and environmental performance measures were applied.

These performance measures were used to calculate the benefits of the proposed ICM implementation. The benefits are attributable to reduced travel times, improved travel time reliability, reduced fuel consumption, and reduced mobile emissions.

FOR MORE INFORMATION

Ravi Gundimeda
Project Manager
Dallas Area Rapid Transit
rgundimeda@DART.org • 214-749-3685