



Exclusive Truckways: Exploring Potential in Canada's Heartland

Matthew Roorda, University of Toronto

Clarence Woudsma, University of Waterloo

Baher Abdulhai, University of Toronto

Cameron Smith, University of Waterloo



Presentation Outline

- This presentation is a description of work in progress
 - Research goals, objectives and motivation
 - Selection criteria and performance measures
 - Freeway traffic microsimulation
 - Accessibility analysis



Research Goal

- To assess the potential for highways or highway lanes that are specifically designated for commercial vehicle travel, and the associated operational, land use, and community impacts.
- Emphasis on developing tools and analysis methods, and identifying critical issues for implementation in the Greater Toronto Area

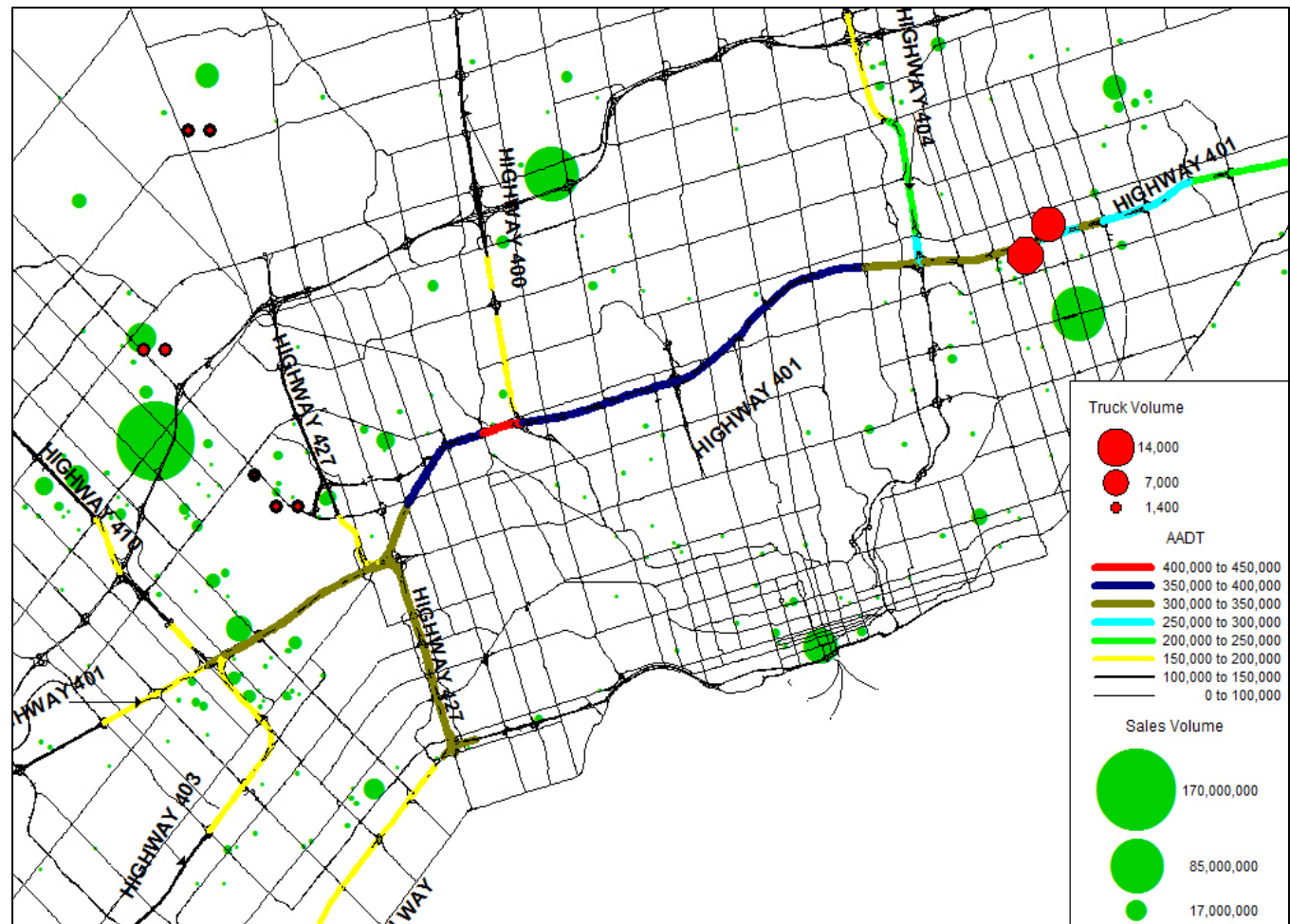
Motivation

- Highway 401 corridor through Toronto is one of the most heavily travelled corridors in North America (>400,000 veh/day)
- A key economic corridor with almost \$1B in commodity value, daily.
- Toronto Area is the manufacturing heartland of Canada, the economy relies on a reliable freight transportation system
- Toronto is a key freight bottleneck as well as a major freight generator



Motivation

- Truck traffic exceeds 20,000 per day on Highway 401
- Trucks grew by 40-63% over the period from 1995 to 2000 almost twice the growth rate of autos
- Major distribution centres along the corridor



Motivation

- Travel time and travel time reliability is increasingly becoming an issue
- Congestion has spread throughout the midday period, when truck traffic peaks

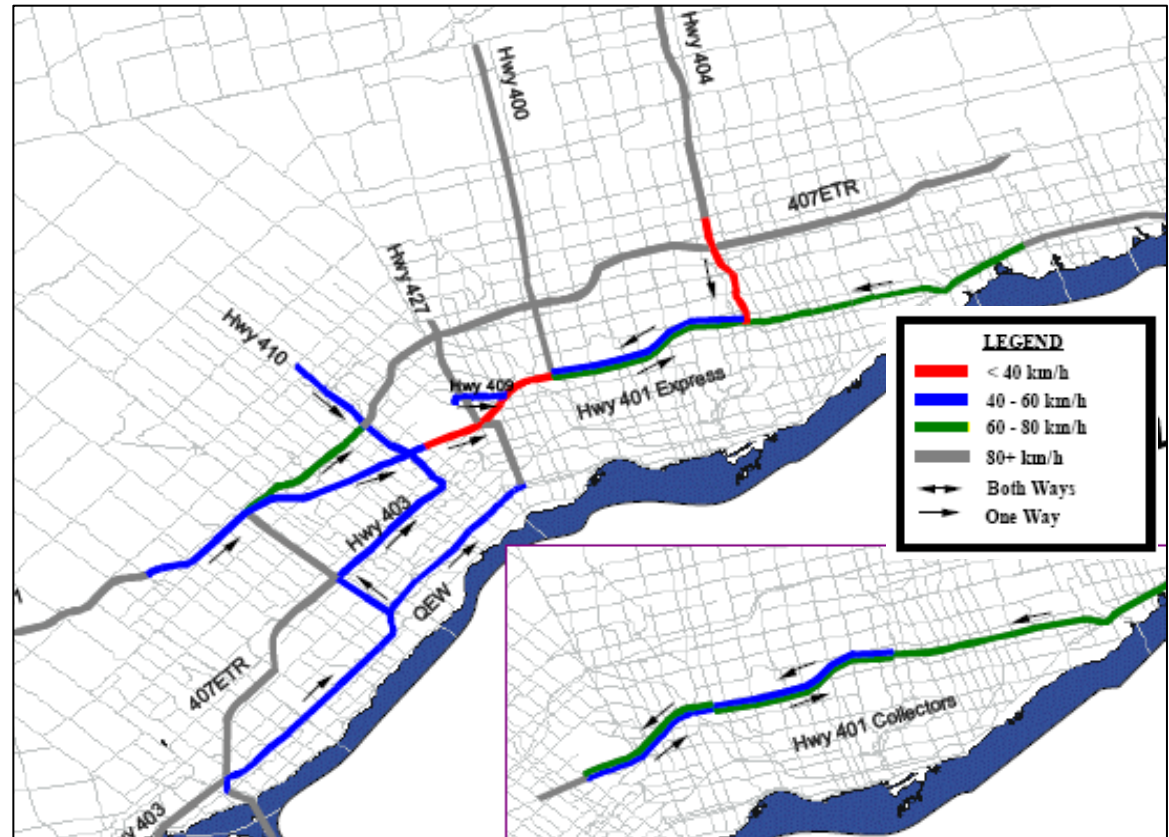


Figure 4 Central Ontario A.M. Average Speed on Freeways
Source: (iTrans, 2004)



Congestion impacts on industry

- “1987 Metropolitan Toronto Goods Movement Study” - Congestion costs for trucking in the City of Toronto and Peel Region approximately \$2 B per year
- “Region of Peel Commercial Travel Survey” 600 shippers in Peel Region - Traffic **congestion was the most frequently cited issue** that affected the business operations of the company.
- “Study of Goods Movement in Peel: Strategic Overview” interviews with 29 shippers and carriers that congestion on highways and at intersections was a problem for **all companies** contacted.



Rationale for Exclusive Truck Infrastructure

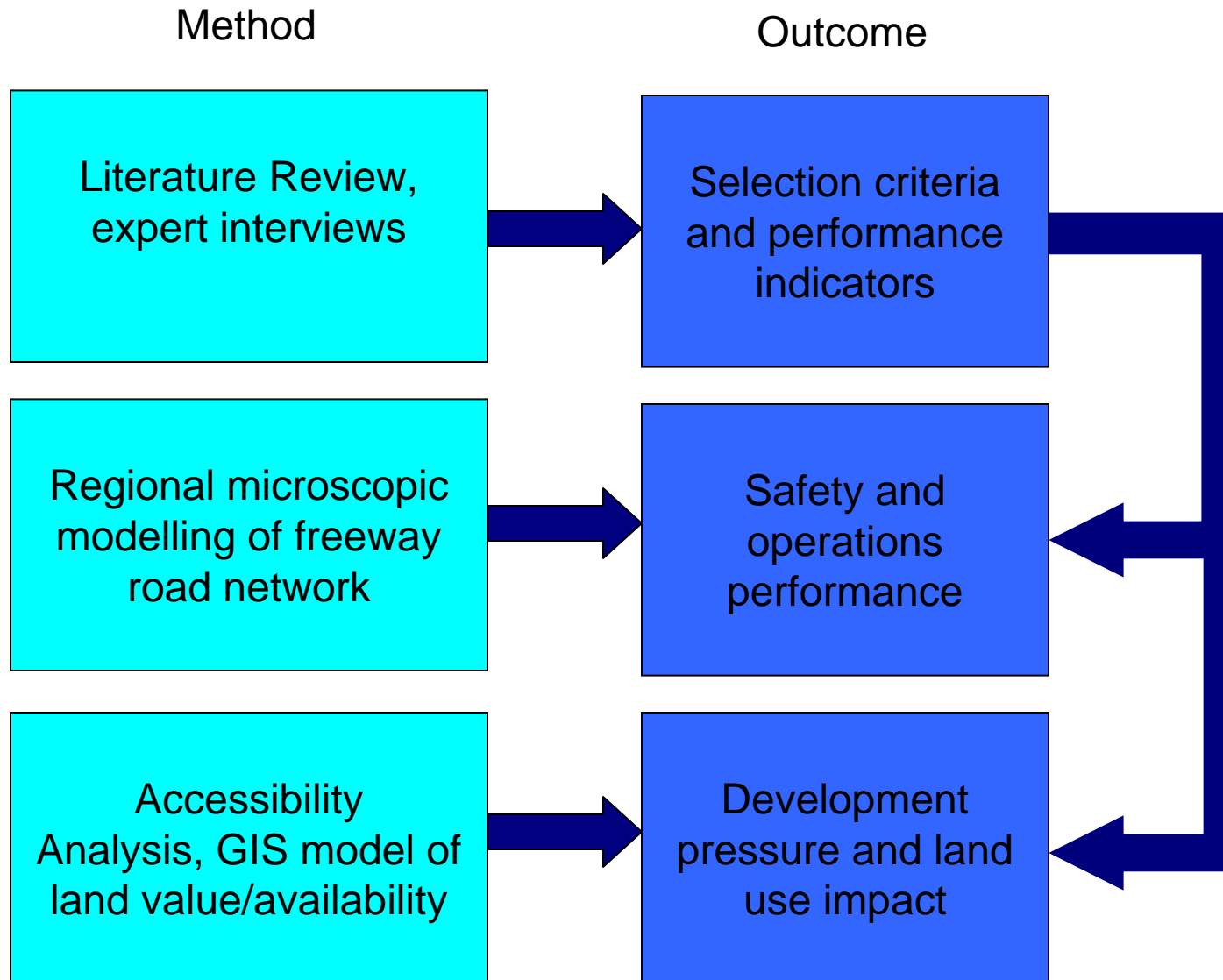
- Congestion relief – improvement in reliability
- Potential safety improvements (and pitfalls)
- Construction cost and potential revenue through tolls
- Productivity gains



Challenges associated with truckway infrastructure

- Goods movement increasingly recognized in planning documents, but it is an ongoing challenge for freight to gain traction in the transportation debate
- Many unanswered questions
 - Potential safety impacts as well as potential safety improvements
 - Access/egress operational issues
 - Differential land use impacts – property value impacts
 - Community impacts
- Few operational truckways in North America

Methodology



Existing Cases

New Jersey Turnpike

- Dual-dual toll roadway
- Auto-only (inner road), general purpose lane (outer road)



Los Angeles I-5 truck bypass lanes

- Barrier separated
- Interchange bypass

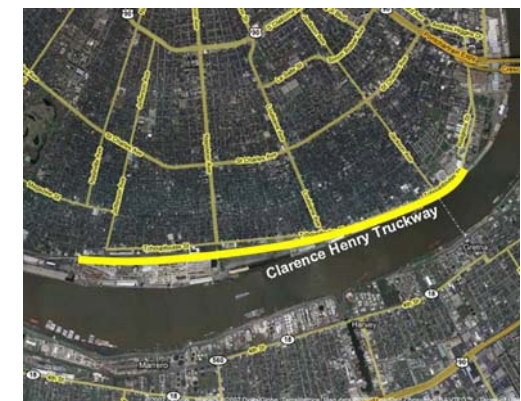
Clarence Henry Truckway

- 3.5 mile road reserved for port related traffic



South Boston Haul Rd

- 1.5 miles, of converted rail line
- Commercial vehicles only



Projects Under

Study

- Trans Texas Corridor
- Metro Atlanta
- SR 60 in Southern California
- I-4 Crosstown Connector–Tampa
- I-710 Truckway LA
- I-81 in VA
- Dallas

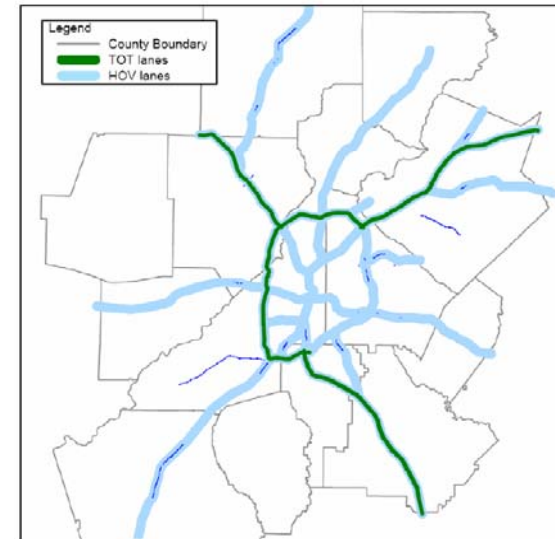


Figure 2 TOT Alternative Concept 1, Major Truck Corridors





Example Selection Criteria (from literature)

- AADT > 100,000 veh per day
- Truck Volume > 10-20,000 trucks / day
- Fraction of lane miles with truck volume > 10,000 per day
- Truck % > 20%
- LOS E or lower
- Proximity to intermodal facilities, airports
- Construction cost and revenue potential
- Connectivity to broader freight network



Regional Microscopic Freeway Traffic Simulation

■ Safety Indicators

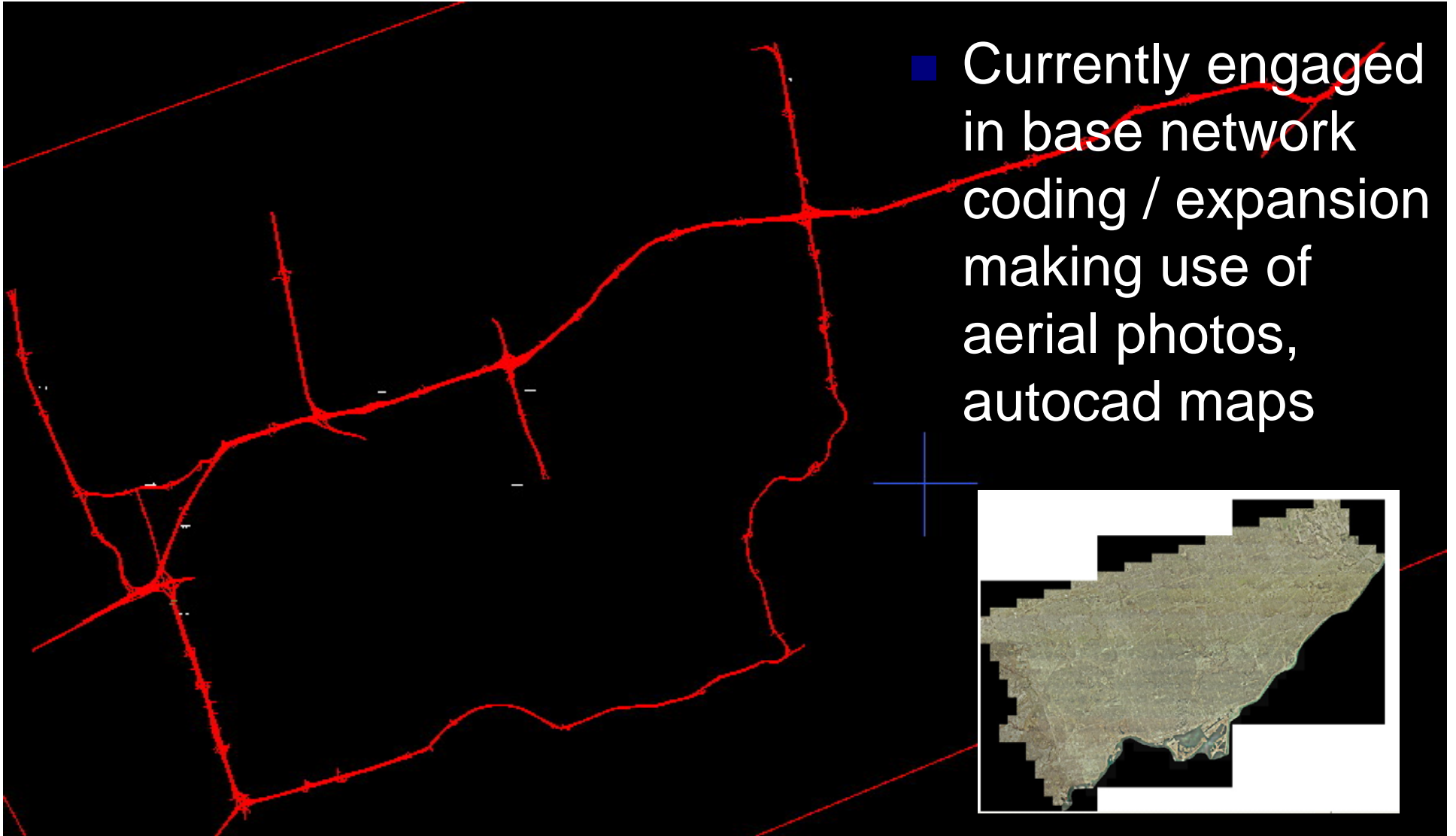
- Number of lane changes (Autos vs. trucks)
- Assessment of car-to-truck traffic conflicts
(after hypothetical case study by Garber and Liu)

■ Operations Indicators

- Travel time and speed (Autos vs trucks)
- Reliability of travel time and speed (Autos vs. trucks)
- Accelerations and decelerations (related to emissions) (Autos vs. trucks)

Regional Microscopic Freeway Traffic Simulation

- Currently engaged in base network coding / expansion making use of aerial photos, autocad maps

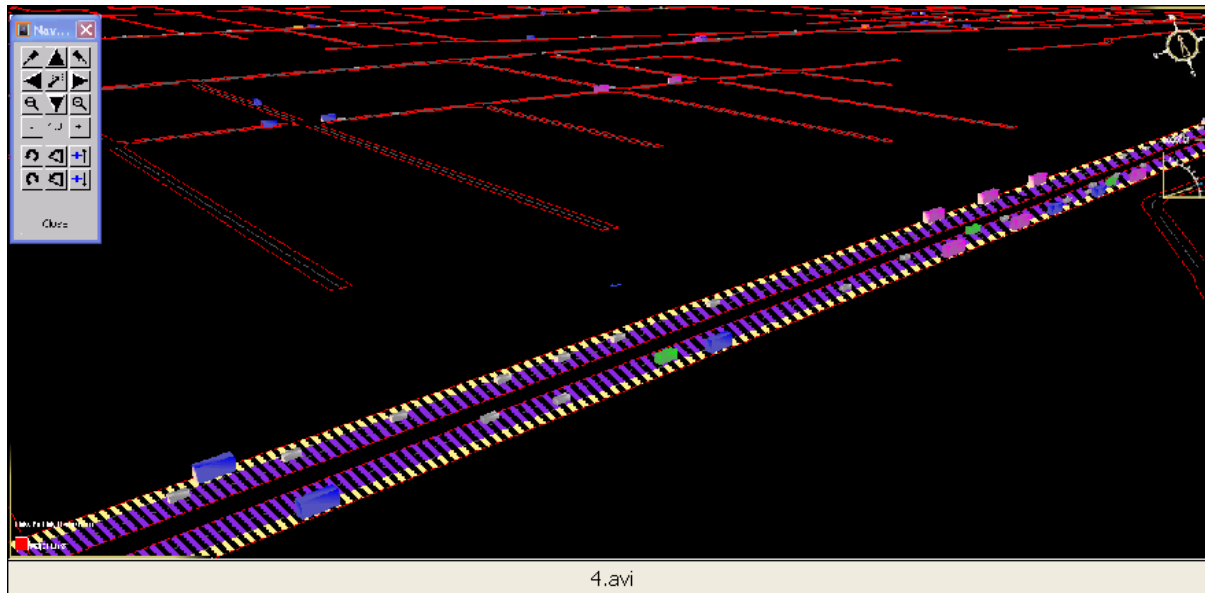




Regional Microscopic Freeway Traffic Simulation - Demand data

- Passenger travel data from 5% trip diary survey
- Truck data:
 - Ministry of Transportation of Ontario - Commercial Vehicle Survey,
 - Urban commercial vehicle model, developed for the Ministry.
- Freeway (ramp-to-ramp) demand developed using EMME/2 traversal matrix, updated to reflect freeway mainline and ramp counts.

Regional Microscopic Freeway Traffic Simulation

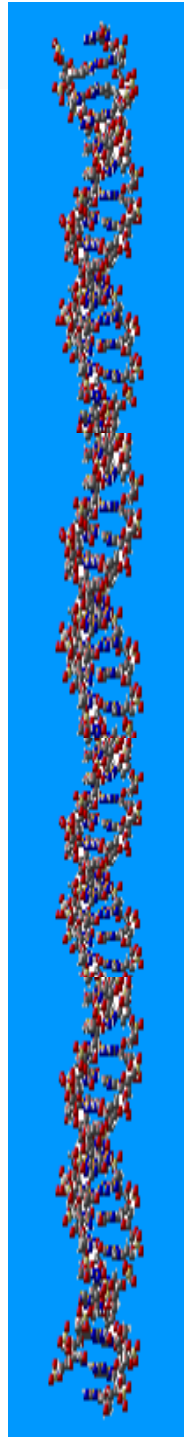
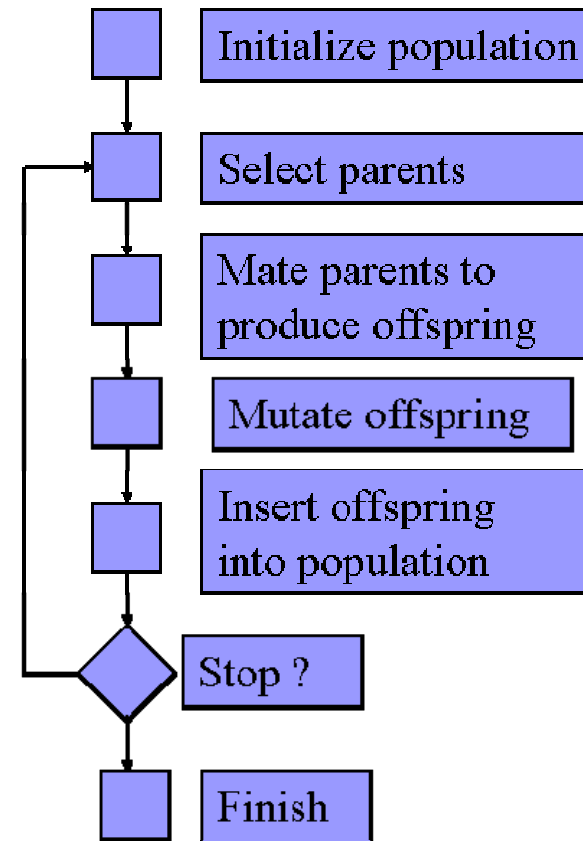


- Preliminary tests of performance of alternative truckway configurations
 - Barrier separated truck lane vs. separate roadway
 - Inner lane vs. outer lane
 - Access / egress configurations
- Testing of model parameters

Regional Microscopic Freeway Traffic Simulation

■ Parameter calibration

- Use of genetic algorithm to optimize parameter values for the traffic simulation
 - Mean headway
 - Mean reaction time
 - Feedback
 - Familiarity
 - Perturbation
- Mimics Darwinian evolutionary process



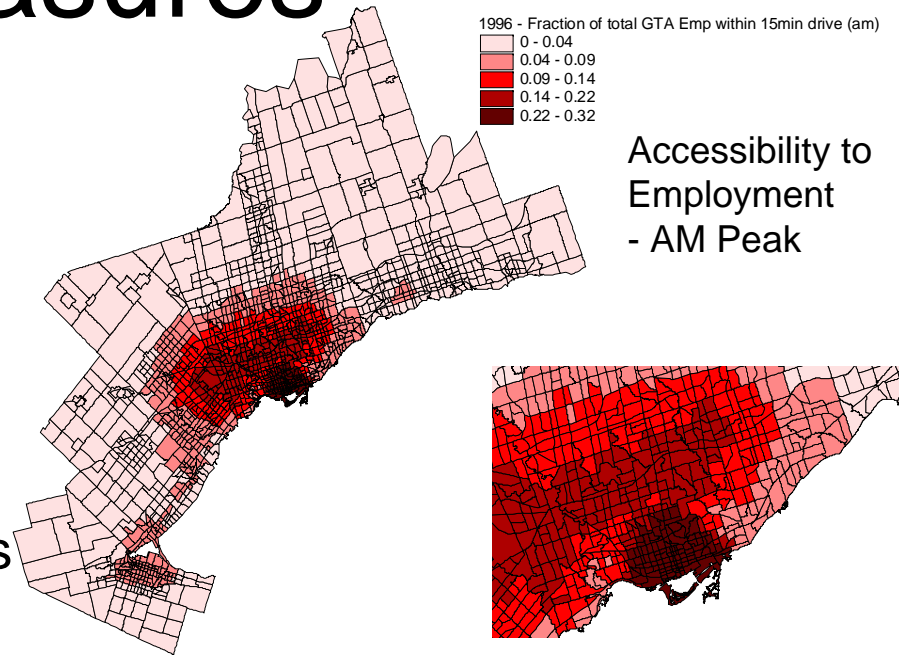


Accessibility Analysis

- Truckway infrastructure alternatives may result in considerably different development patterns and pressures than the construction of general purpose highways.
- Assess land-use and development impacts associated with truckway alternatives, through a GIS (Geographic Information Systems) visualization and spatial analysis of travel time accessibility
- Builds upon travel times developed in the transportation models

Accessibility measures

- Measure accessibility to:
 - Employment by industry
 - Gateways
 - Markets
 - Airport,
 - Truck-rail intermodal terminals



- Correlate accessibility with existing land values and undeveloped land parcels to determine potential pressure for new greenfields, brownfields and infill development



Request

- If you do have experience with analysis or management of exclusive truck facilities, please let me know.





Abstract

The negative aspects associated with urban traffic congestion are well documented and have been the focus of much research. The same can be said for efforts to more effectively manage and mitigate congestion. Among the many operational and technical solutions explored, the introduction of truck only lanes, or truckways, is relatively new. As such, there are many questions concerning the introduction and impacts of truckways that need to be addressed. The goal in this paper is to explore these impacts – specifically those related to communities, congestion, and land use. Research efforts have presented criteria by which jurisdictions can better evaluate their needs vis a vis truckways. As one of North America's busiest freeway systems, and the key Canadian logistics corridor, the 400 series of highways in and around Toronto meet many of these criteria. This presentation has two key objectives. The first is to detail a number of threads of discussion concerning truckways and their potential effectiveness and impacts. A synopsis of the current state of understanding, as drawn from the literature provides the basis for the discussion. The focus is on understanding the “why” of truckways as well as their potential impacts on traffic and their longer term impacts as they relate to communities and land use. The second objective is to outline and explain our innovative methodological approach to analyzing truckways. We employ a three pronged approach in our methodology including 1) a series of interviews with representatives of organizations that have implemented or studied truckway infrastructure used to develop a set of appropriate indicators by which to judge effectiveness of such alternatives; 2) development of a microscopic traffic simulation model of alternative truckway configurations for conducting detailed operational analysis and the measurement of congestion, and other identified performance indicators; and 3) an assessment of development pressure and land use impacts of alternative truckway configurations.