TRANSIMS in the Buffalo / Niagara Falls Area

April 2010

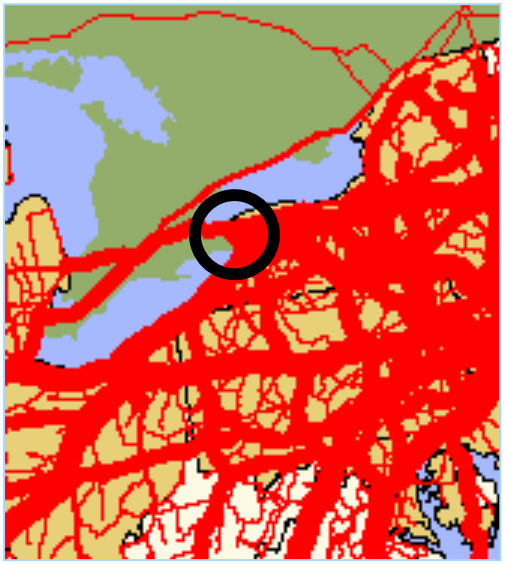
Scott Smith

TRANSIMS Workshop
at TRACC

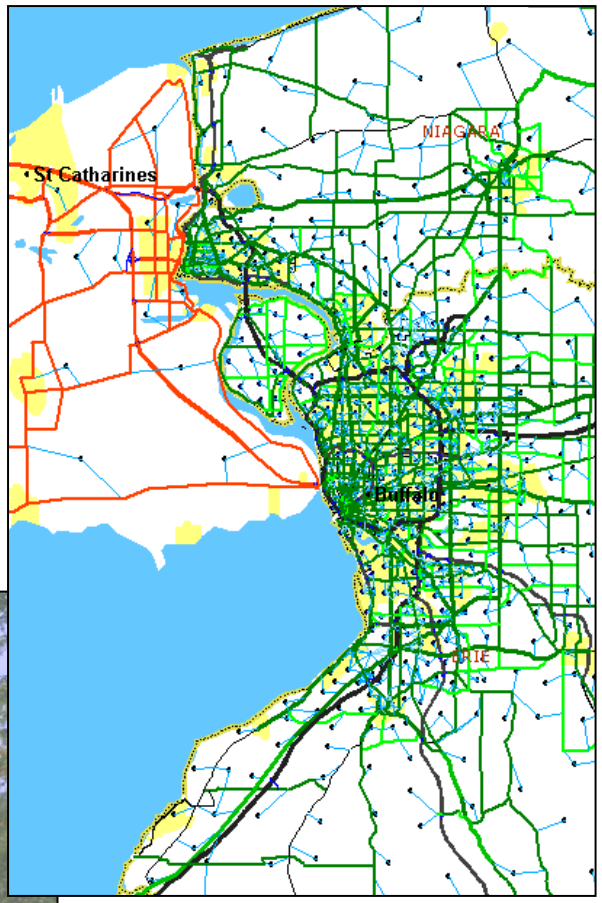
U.S. Department of Transportation

GBNRTC GREATER BUFFALO-NIAGARA REGIONAL TRANSPORTATION COUNCIL

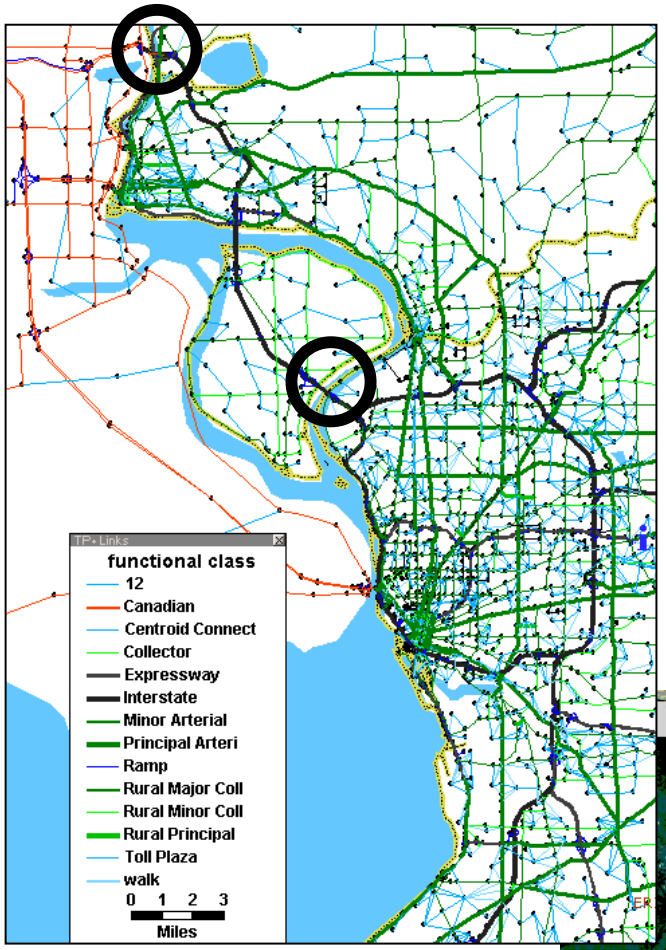
Major Issues



- Freight
- Cross border congestion
- Domestic issues



Gap between Planning and Operational Models



Planning:

- Entire region
- Average flows over several hours
- Trip generation, mode choice, route choice

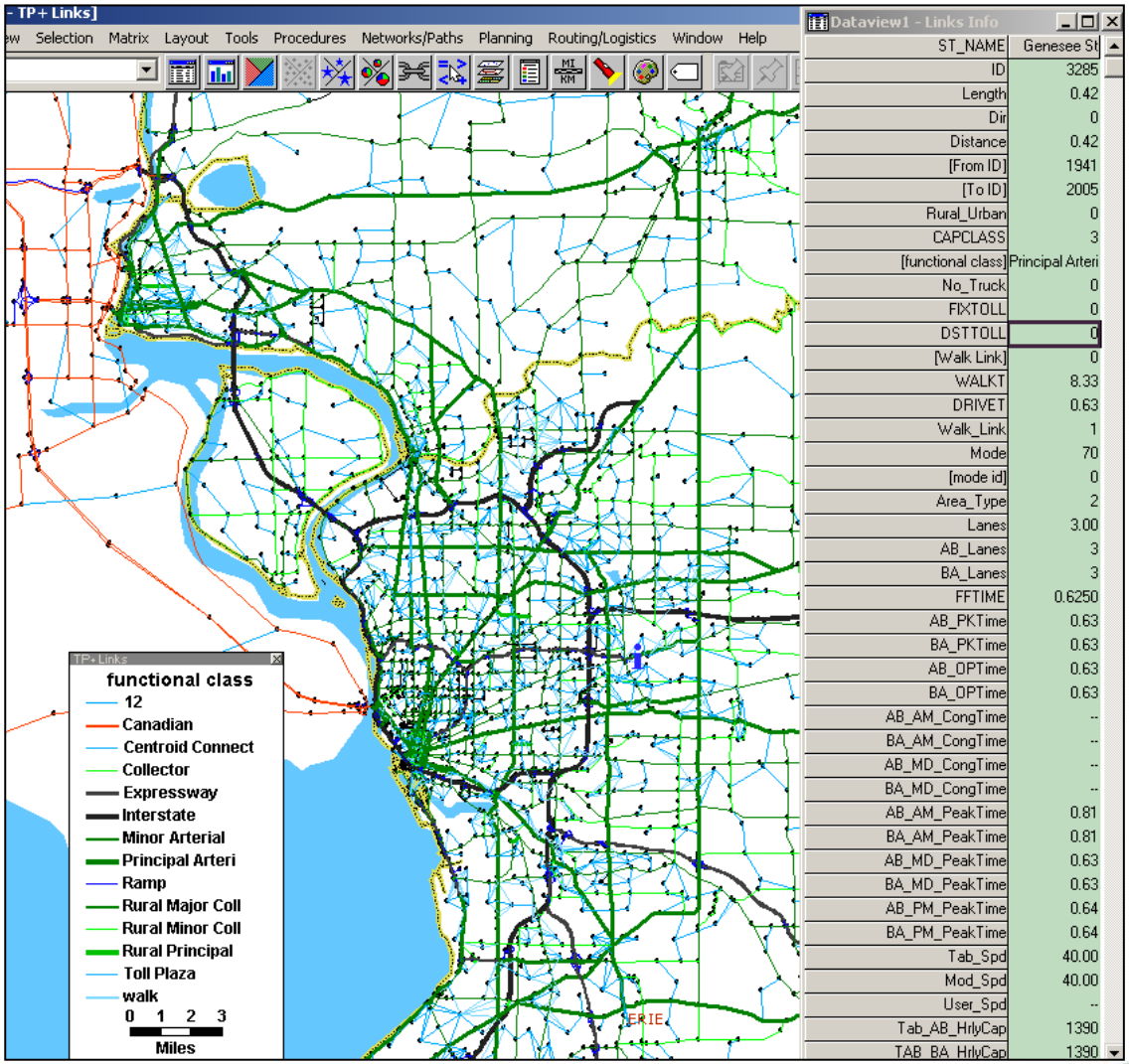
Operations:

- Small area
- Second by second
- Demand is typically fixed

Objectives of the TRANSIMS Implementation

- To show that a regional TRANSIMS model could be developed based on existing data
- To demonstrate the capabilities of this model, some of which go beyond those of a typical four-step model
  - Grand Island Bridge toll plaza changes
  - Increased freight
  - Lane configurations
- To transfer the TRANSIMS model and the development of further capabilities to GBNRTC

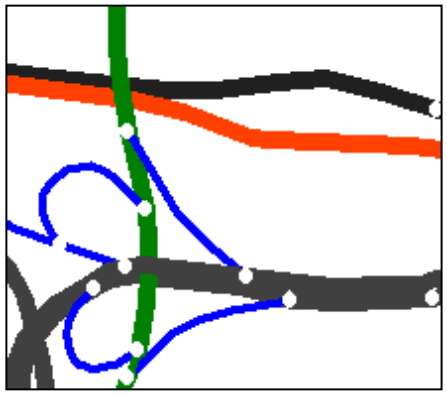
Existing Model Data



- Existing model
  - Links
  - Number of Lanes
  - Speed
  - Some tolls
  - Freeway interchanges
- List of signals
- Highway database
  - Lanes
  - Parking
  - Traffic count data

Supply: Filling in the Gaps

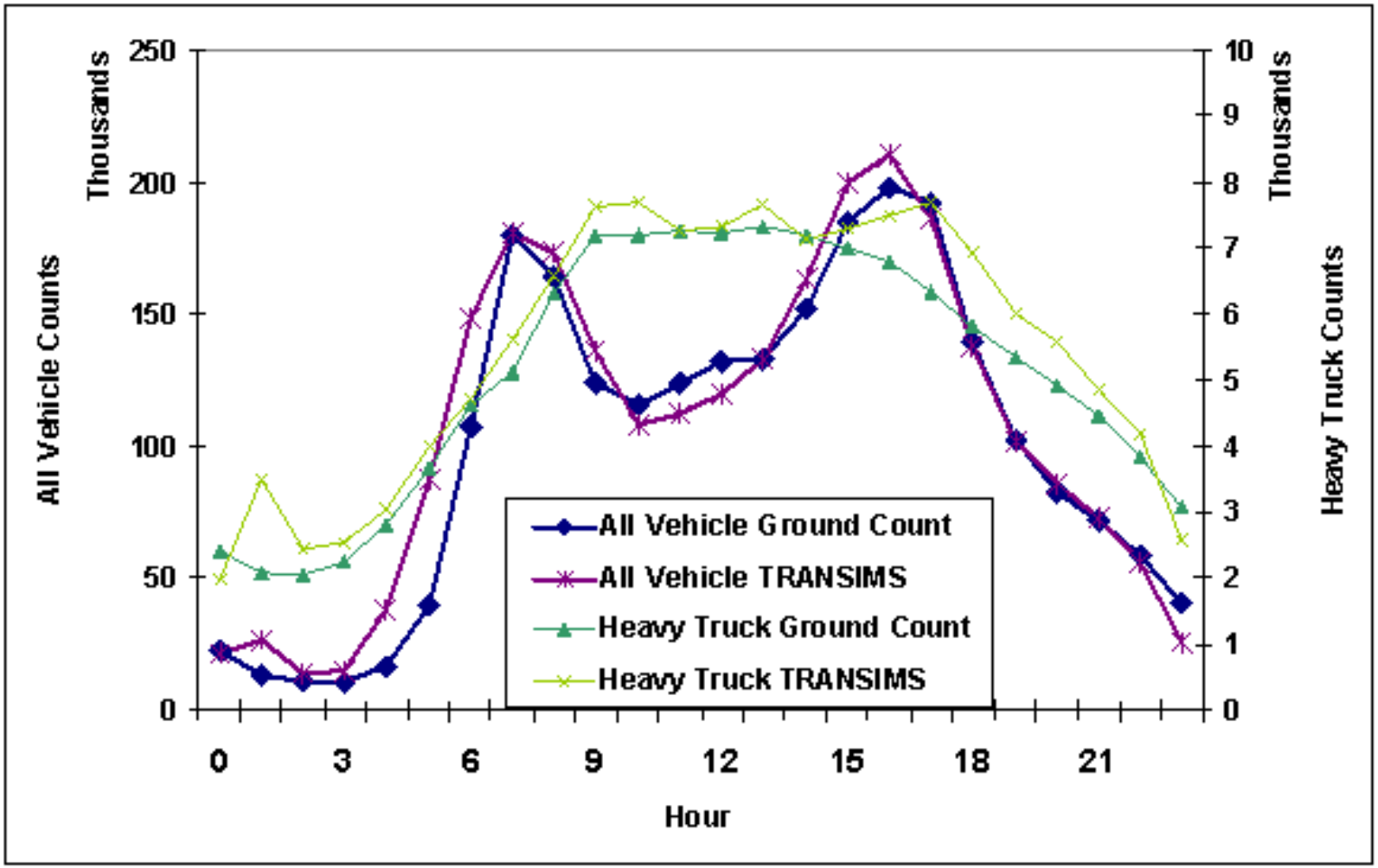
- Defaults
- Local knowledge
- Aerial photography
- Modifications to
  - Capacities
  - Speeds
  - Lane Connectivity



Modeling Demand

- Four-step model trip tables
  - Four time periods: AM, MD, PM, NT
  - Zones
- TRANSIMS can handle a greater level of detail
  - Minute – by - minute
  - Activity locations

TRANSIMS Link Flows versus Counts by Hour

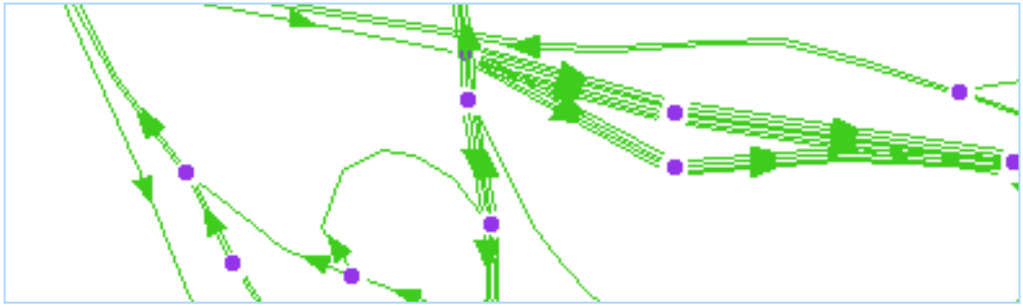


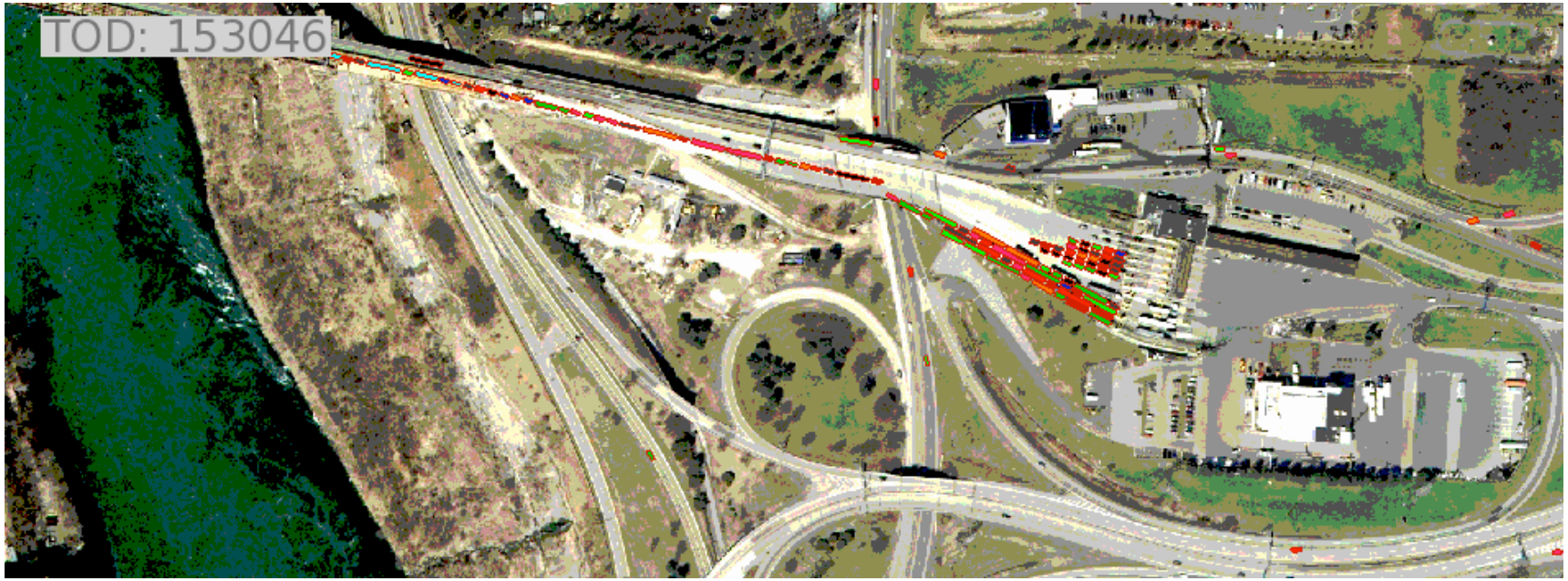
Activity Locations and Zones

- Activity locations are generated with the TRANSIMS network
  - Pairs along non-freeway, non-ramp links
  - Near each external zone
- Each zone typically includes many activity locations
- Zone – activity location assignment process
  - Default: nearest zone centroid
  - Use LocationData to associate activity locations with the proper zone based on the zone shapefile (supplied by GBNRTC)

Modeling a Border Crossing

Lewiston-Queenston Bridge:
U.S. Inspection





Modeling a Border Crossing

- Limited by primary inspection capacity
- TRANSIMS Router
  - Lowered capacity on the crossing
  - Penalties (via the Toll table) to discourage crossing the border to save a few minutes of travel time.
- TRANSIMS Microsimulator
  - Lane use restrictions to separate cars and trucks
  - Traffic signal with 2-minute red and 1-second green.

Bridge	**"Toll"**	**EB Lanes**	**EB Cap. (veh/hr)**
Lewiston-Queenston	900 sec.	6 car, 4 trk	180 car, 120 truck
Whirlpool (NEXUS only)	1200 sec.	2	60
Rainbow (no trucks)	900 sec.	15	450
Peace	900 sec.	18	540

Subarea Microsimulation

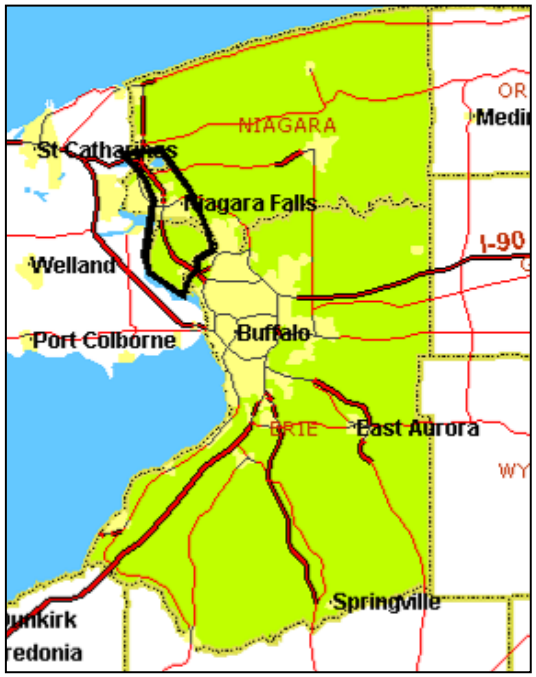
Subarea:

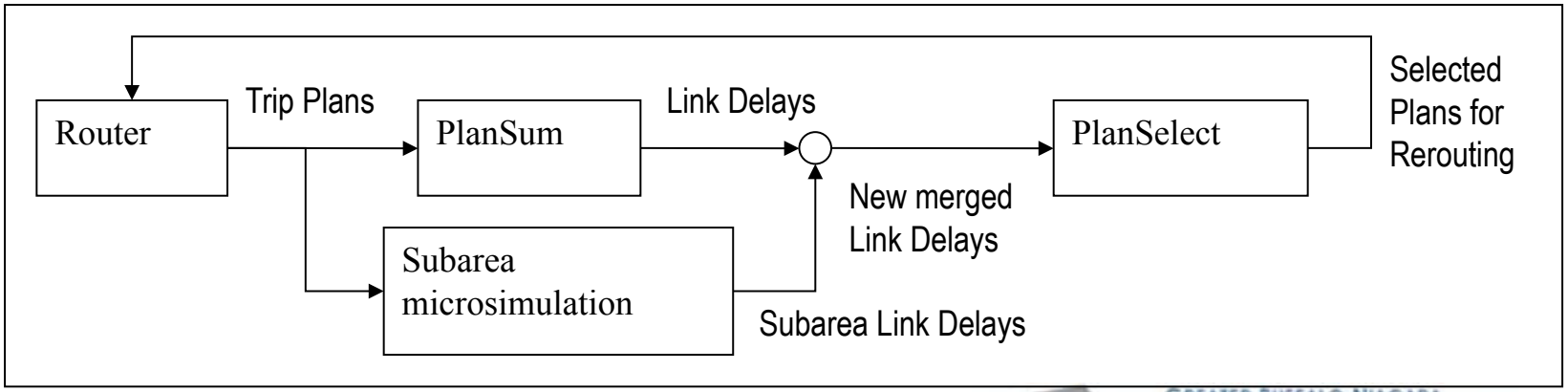
•I-190 corridor - North side of Buffalo to Lewiston-Queenston bridge

Process:

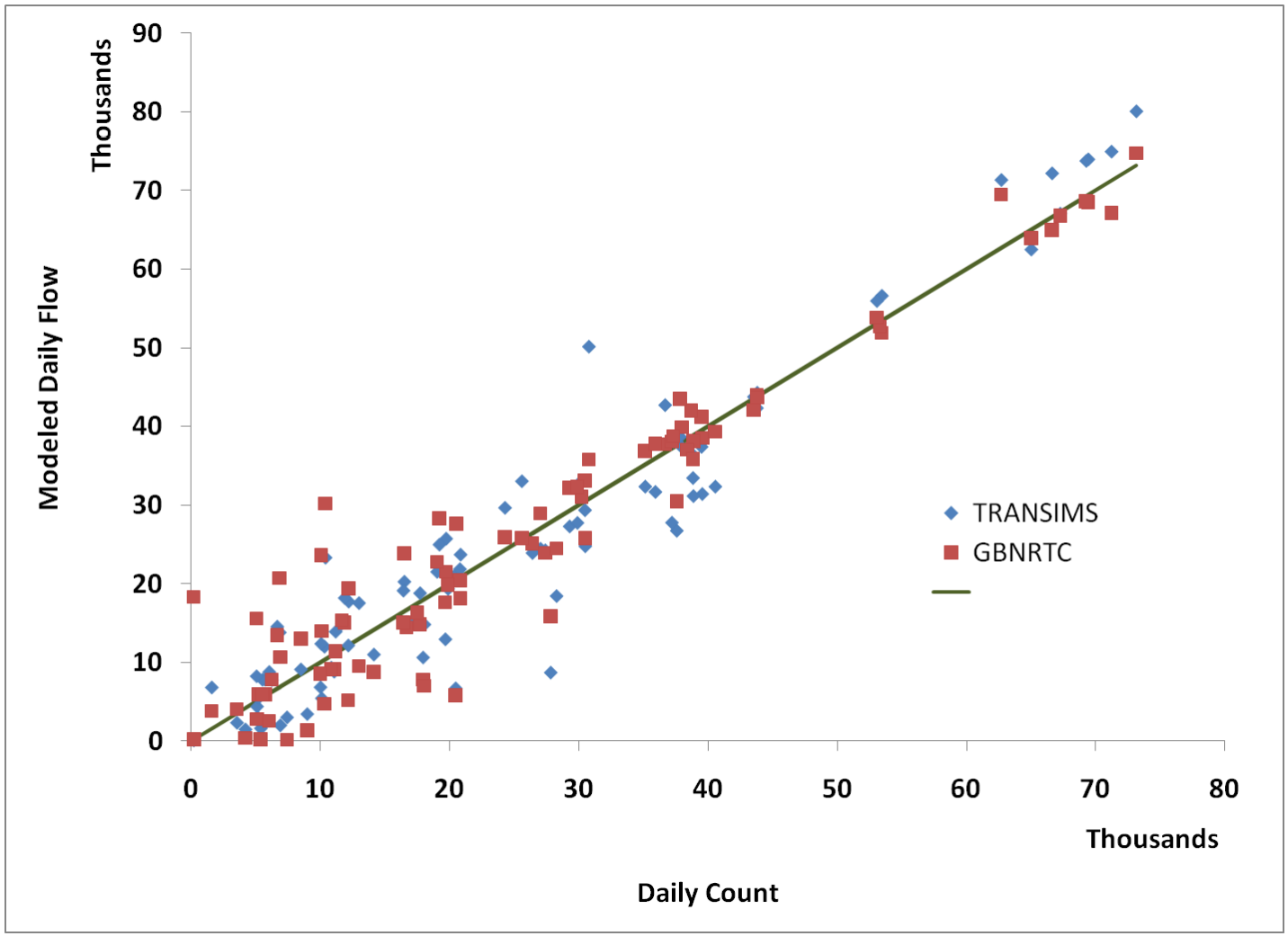
•Iterate between the microsimulator (sub area) and router (full area)

•Link delays from the microsimulator are inputs to the router





Daily Flows



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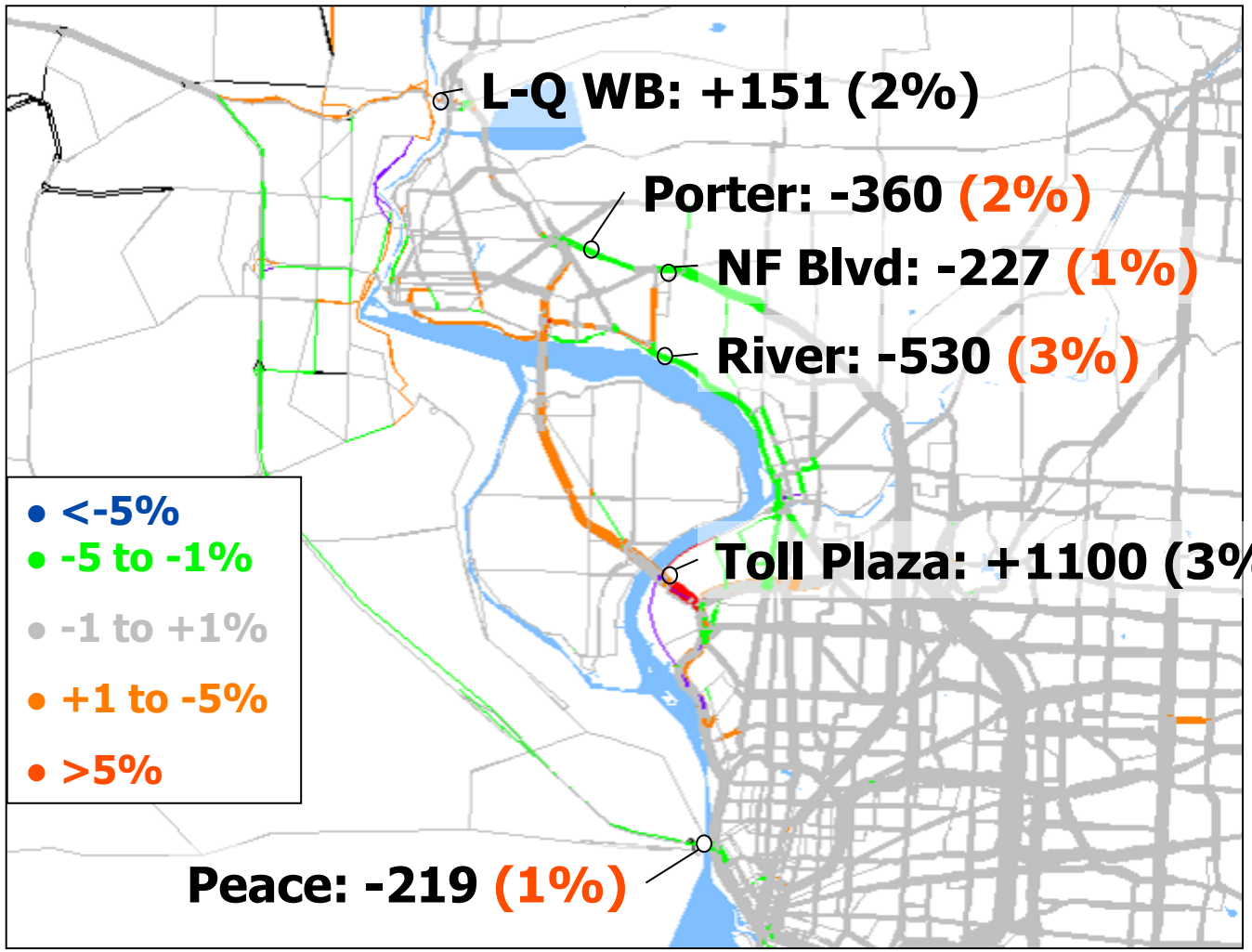
Scenario Test: Toll Plaza on Bridge

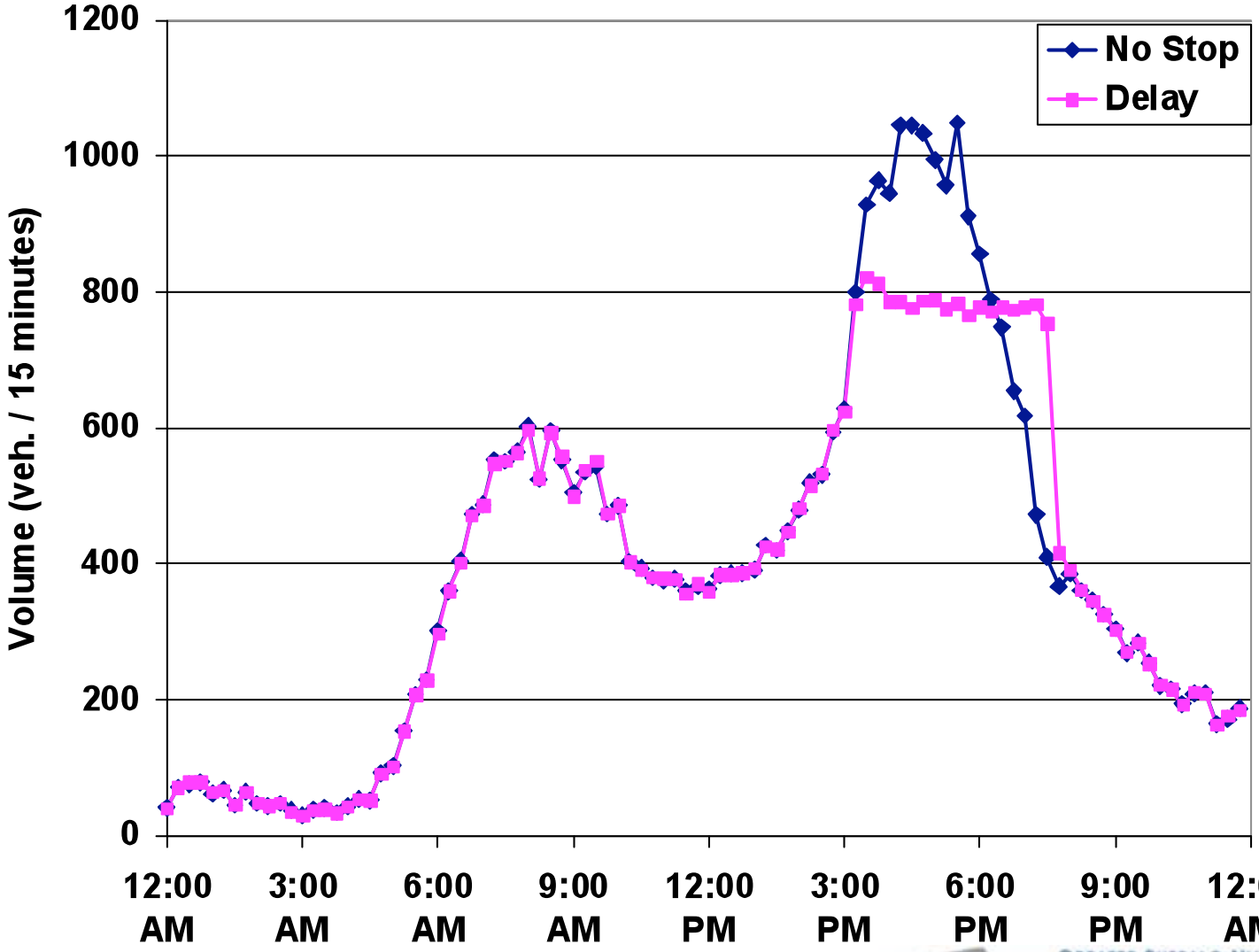
Baseline:
6 second **delay** for all traffic at toll plaza

Scenario: **No stop** at the plaza

Changes in Daily Flows



Flow at Plaza (link 6228)



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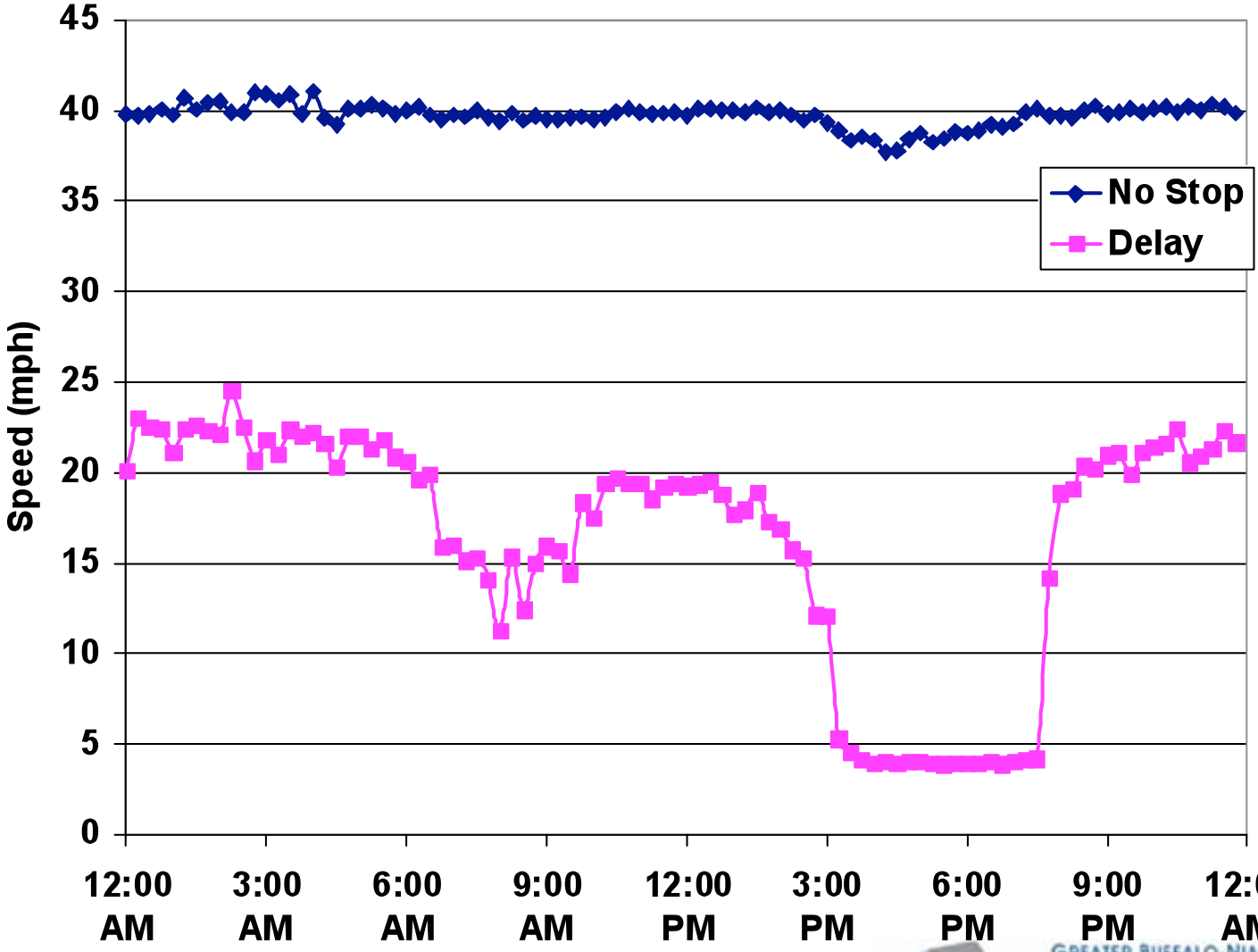
Speed at Plaza (link 6228)



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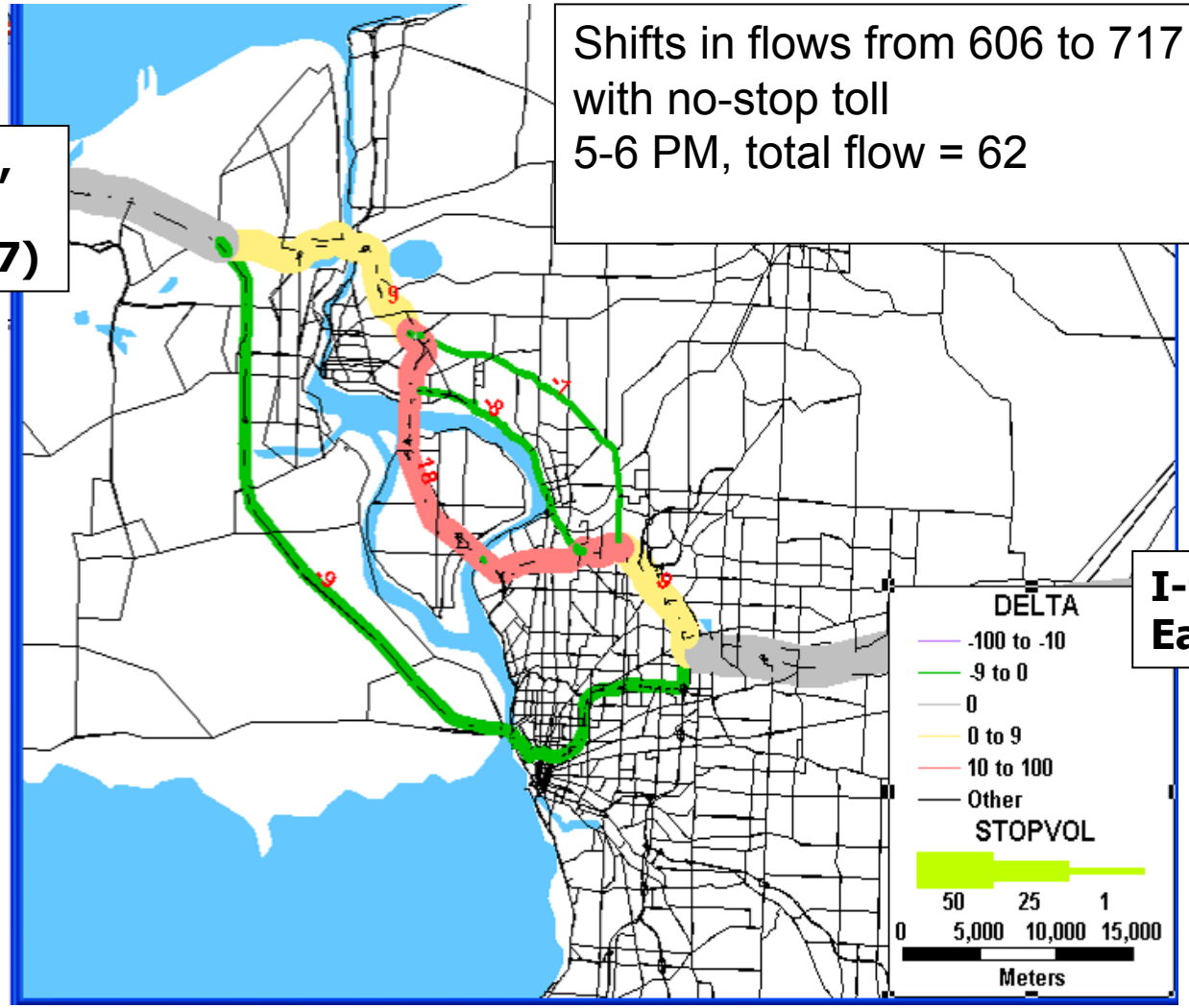
Shift in I-90 to Canada Flow



Technical Lessons Learned

- It is possible to set up a usable TRANSIMS model with existing data
  - Run time and quality of results comparable to existing four-step models
- Typical issues in going from a four-step model to a TRANSIMS model
  - TRANSIMS is more sensitive to time-of-day information in the trip tables
  - Some advanced features in a four-step model might need to be addressed in the microsimulator, not the router
  - The TRANSIMS microsimulator is much more sensitive to network fidelity (signals, stop/yield signs, lane configurations, etc.) than a four-step model

Future Work

- SUNY-Buffalo project
  - Assess the feasibility of using TRANSIMS for on-line transportation management during emergencies
  - Builds upon the model presented here
- TRANSIMS – version 5
  - Major enhancements to TRANSIMS, due later in 2010
  - Improved toll / border delay modeling
  - Vehicle – following model for microsimulator
    - Higher fidelity than the current cellular automata model