INTEGRATING ACTIVITYSIM & DYNAMIC TRAFFIC ASSIGNMENT

FOR A MEDIUM-SIZED CITY IN OHIO

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Transportation & Mapping Solutions

Maptitude • TransCAD • TransModeler

BACKGROUND ON CALIPER EFFORTS & GOALS

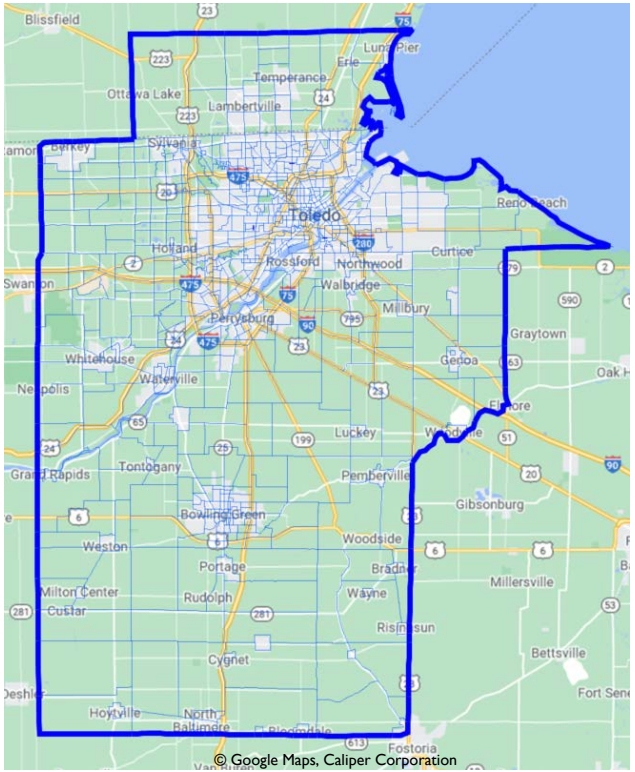
- One of multiple R & D projects to advance ABMs, DTA, and their integration.
- Take advantage of the unique TransCAD & TransModeler architectures to provide better support for ABM models in general and ACTIVITYSIM users in particular.
- Advance ABM-DTA integration to the next level.
- Fulfill a longstanding FHWA & ODOT desire to have a working and realistic ABM-DTA model example that runs fast enough to help explain concepts and explore issues.

PRIOR WORK

- TransCAD platform support for disaggregate models
- User interface creation for CC-ABM, a Caliper ABM.
- Numerous DTA projects with TransModeler.
- Establishment of DTA as routine in simulation studies.
- Extension of TransModeler DTA to respect the temporal constraints of activity schedules so that tours and trips cannot be made until after prior activities and their associated tours and trips have been completed.
- First regionwide deployment of an integrated ABM-DTA with a DAYSIM – TransModeler model for the 6 county North Florida TPO (Jacksonville) done in collaboration with RSG.

TMACOG MODEL REGION

- Toledo Metro Area
  - Midwest, industrial
  - Previous TransModeler simulation of downtown area
- 600k People
- 922 Zones



INITIAL ACTIVITYSIM IMPLEMENTATION

BASICS

- Started from SEMCOG version of ActivitySim
  - Except native TransCAD population synthesis (fast IPU)
    - Household and person controls at multiple levels of geography
    - Subarea re-synthesis
  - Limited transit modes for Toledo
  - Otherwise, "vanilla" ActivitySim

- Existing Auxiliary Models
  - Externals
  - Trucks

IMPLEMENTATION ISSUES / LESSONS LEARNED

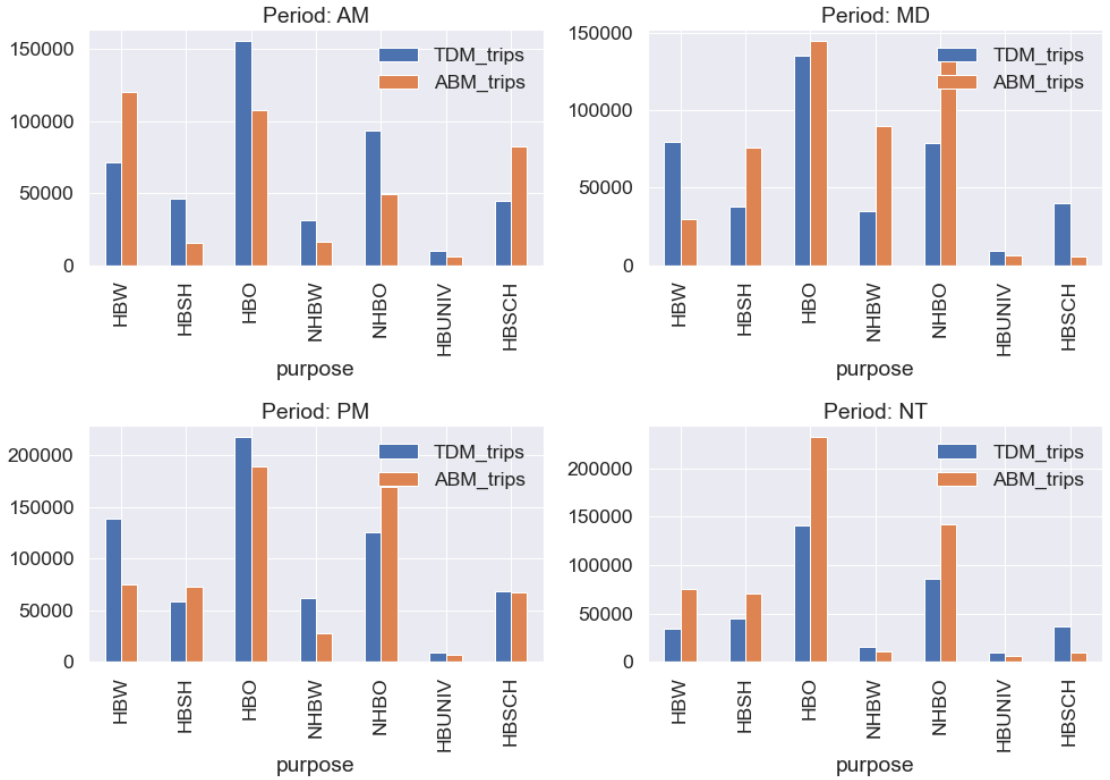
- Run configuration split across files (configs and configs_mp folders)

- A single model specification is spread over multiple files
  - Preprocessing of variables is specified in separate files
  - Variables in logsum calculations are a "subset" from specification
  - Makes understanding the effect of variables difficult
  - E.g. Tour mode choice – 3 files
  - Some variable definitions and units were unclear

- Changing modes
  - Multiple interdependent files makes editing and changes challenging
  - Requires trial and error

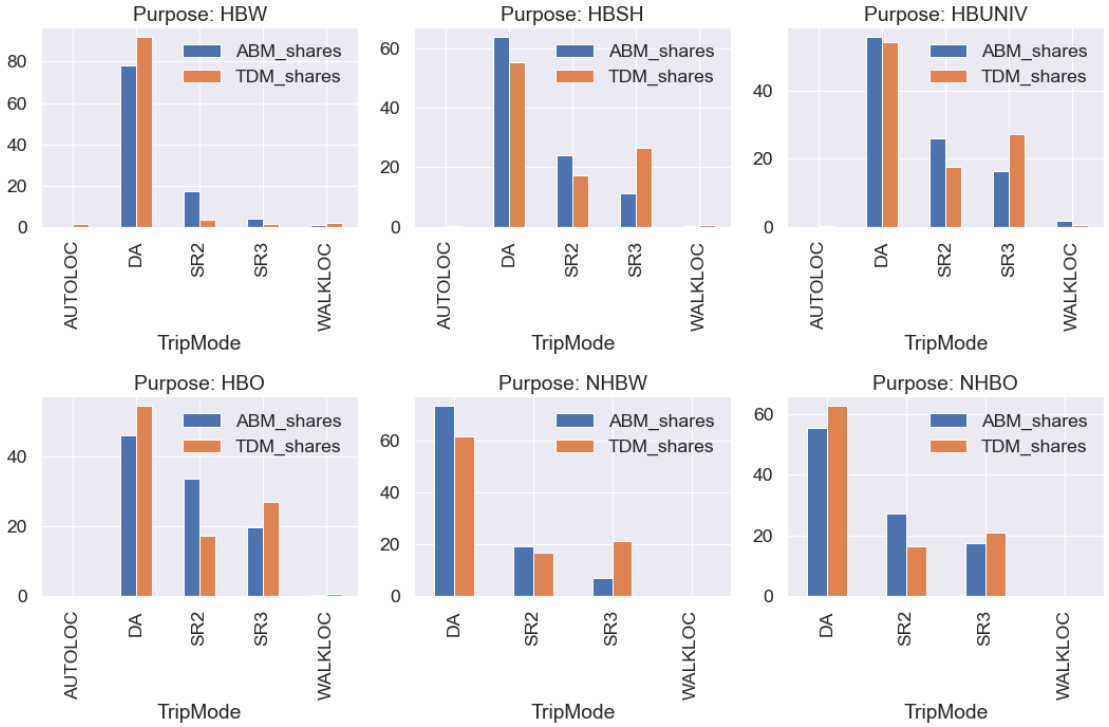
INITIAL RESULTS

- Number of trips by time-period, ActivitySim vs. "OSM" trip-based model



INITIAL RESULTS

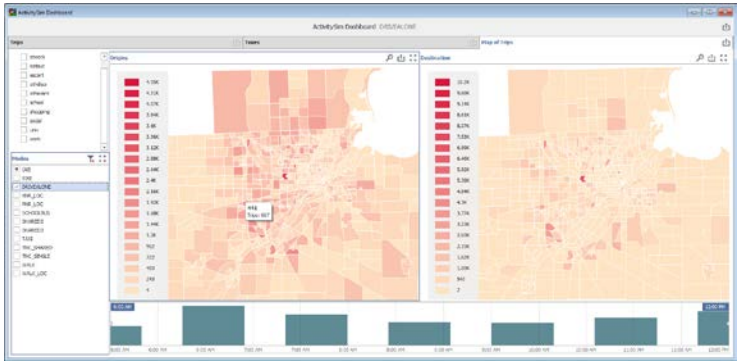
- Select mode shares by purpose, ActivitySim vs. "OSM" trip-based model



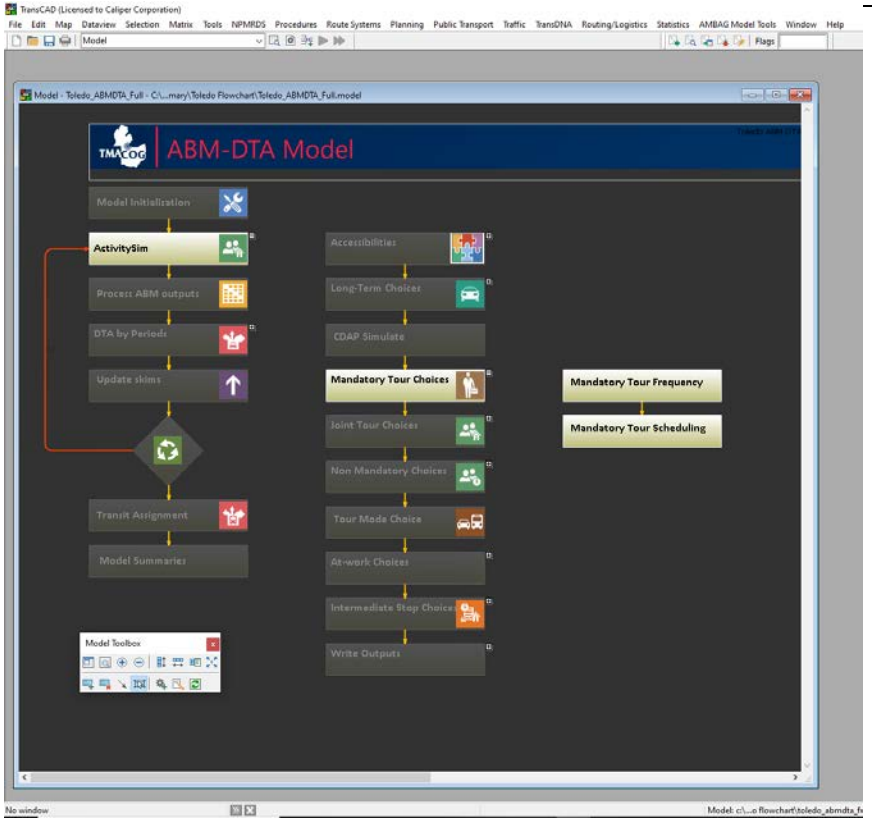
USABILITY IMPROVEMENTS & GRAPHICAL USER INTERFACE

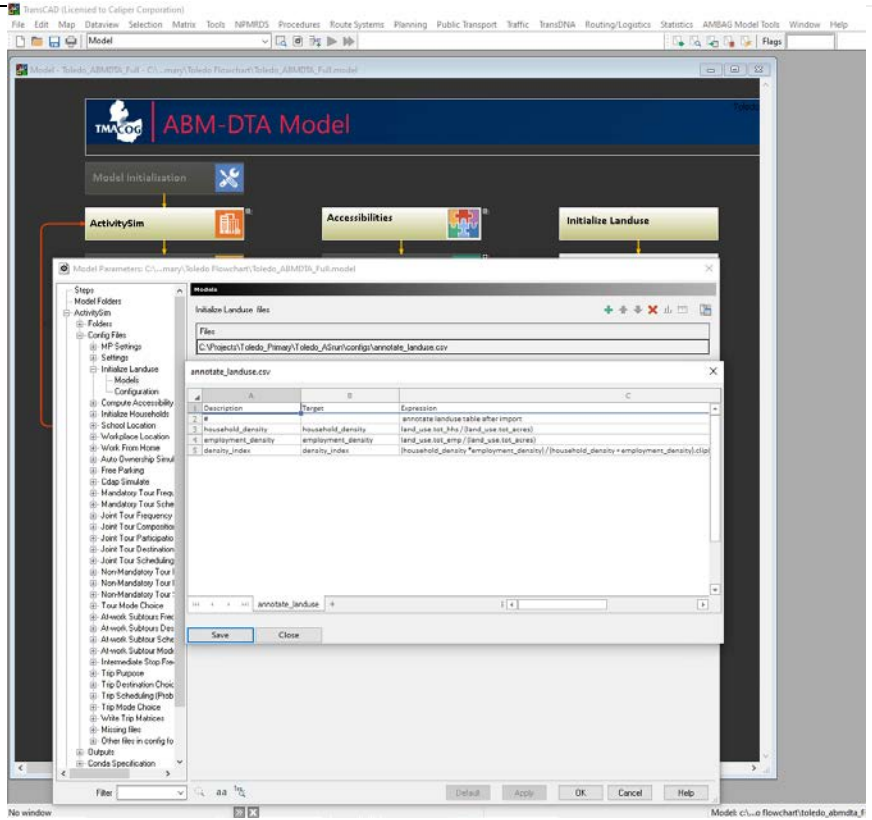
INTEGRATED INTERFACE

- Organize and expose parameters for editing
- Scenario management
  - e.g., alternative future telework assumption
- Control pipeline execution of components via flowchart
  - e.g., non-mandatory only run for short-run impact scenario
- Visualizations & reporting
  - Dashboards



ACTIVITYSIM FLOWCHART DEMONSTRATION





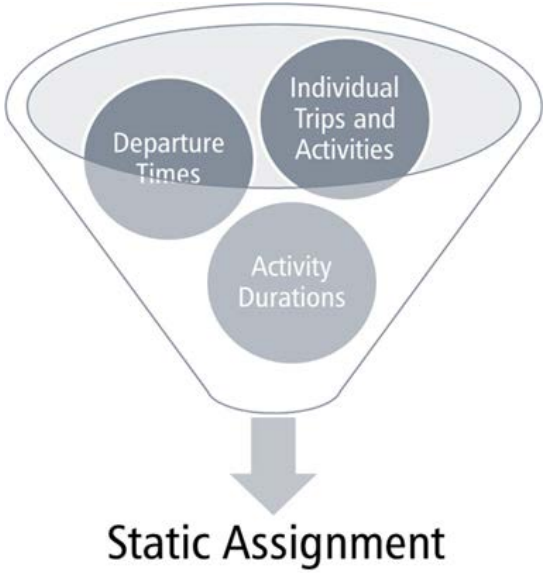
DTA INTEGRATION

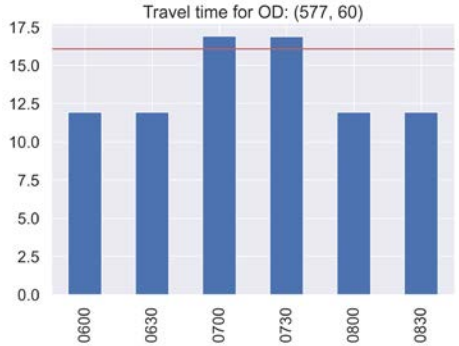
WHY DTA?

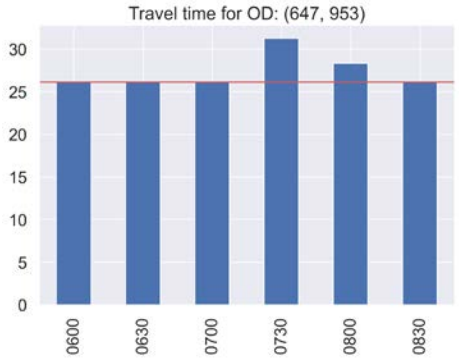
- Travel times vary considerably over short intervals
- Realistic queuing, spillback are crucial to project evaluation
- DTA can capture influence of travel time variability, queuing on route choice
- Route choice can be sensitive to individual characteristics, behaviors
- DTA Simulation can and should preserve order of trips and tours
- Support animation for analysis and stakeholder engagement

DYNAMIC SKIMS FOR ACTIVITYSIM

- Information loss in period-level skims
- Currently adapting ActivitySim to accept dynamic skims

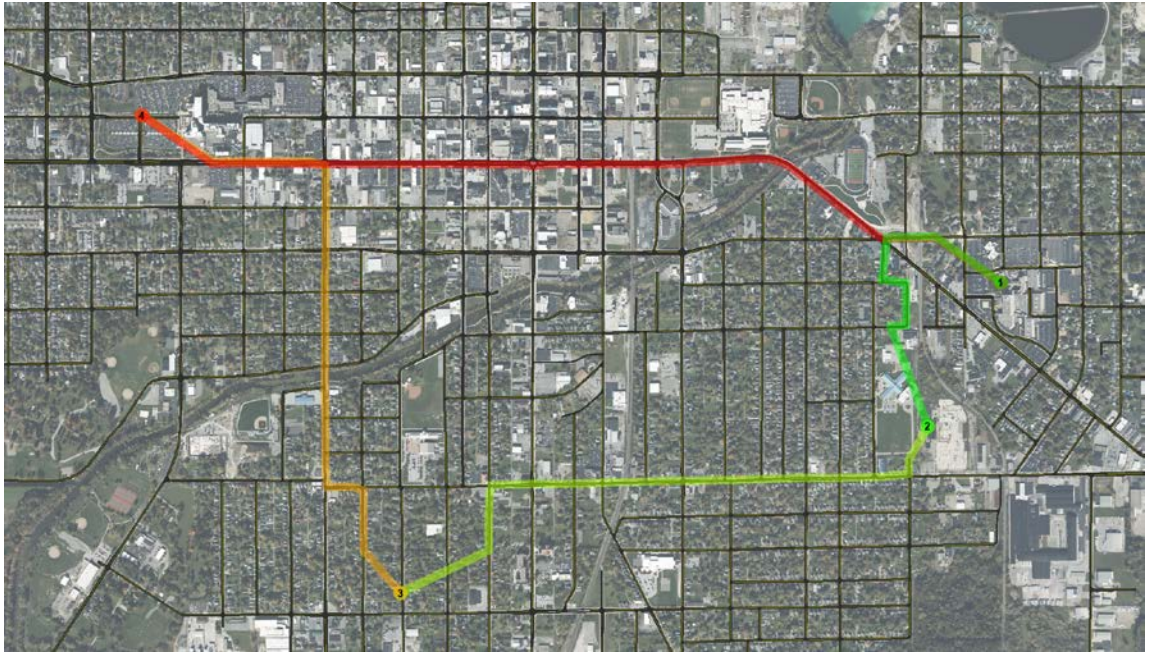






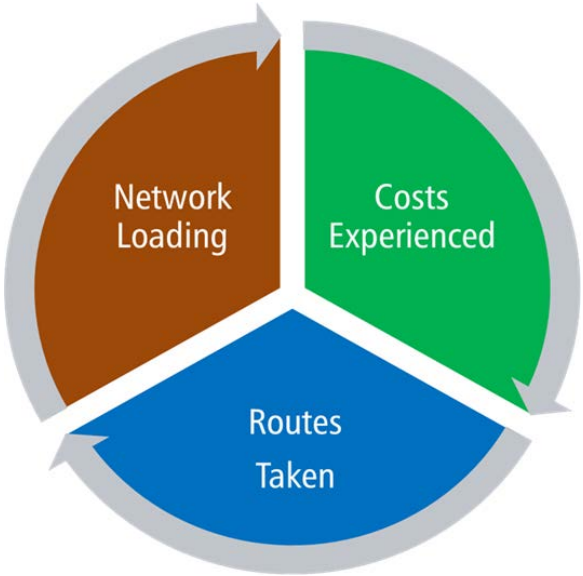
TOUR SIMULATION + VISUALIZATION

Trip	Departure Time	Purpose
1	8:00 AM	Home to school day care drop-off
2	8:05 AM	Day care to school drop-off
3	8:10 AM	School drop-off to work
4	5:00 PM	Work to home



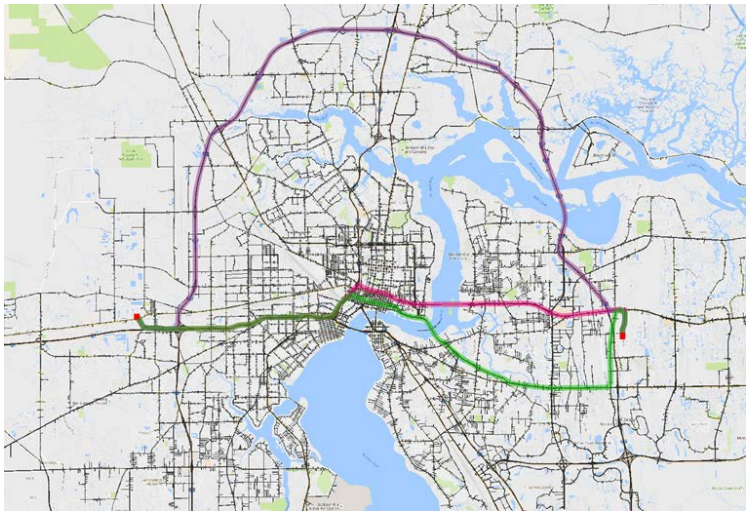
WHAT IS DTA?

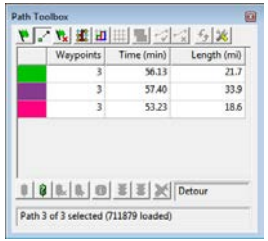
- A traffic assignment in which routes taken are motivated by *costs experienced* at the time of travel



ROUTE CHOICE

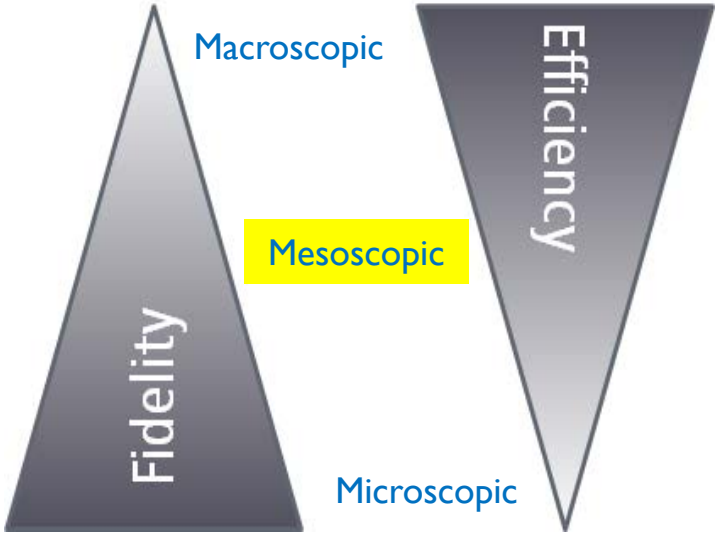
- Must be reasonable for a robust DTA
- Must be fast for a practical DTA
- Must be sensitive to occupants, VoT
- Must be auditable





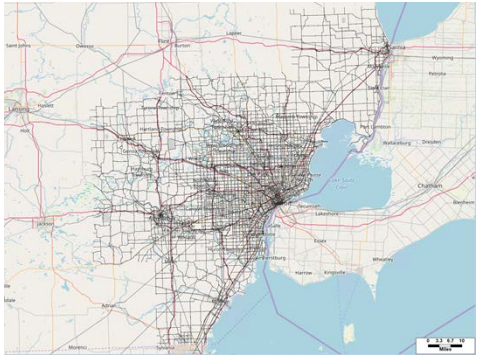
TIME DEPENDENT NETWORK LOADING

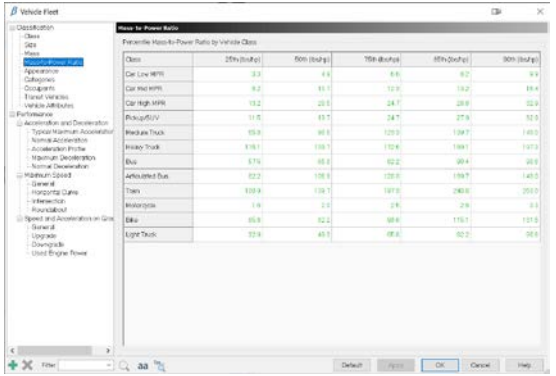
- Network loading can be macroscopic, mesoscopic, or microscopic

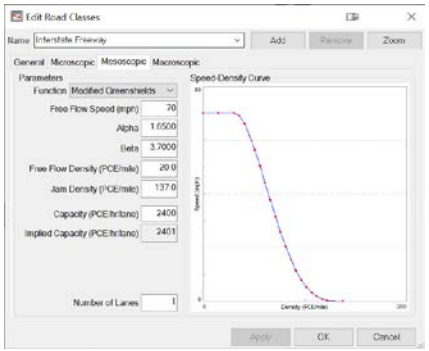


MESOSCOPIC DTAS VARY WIDELY

- Scalability
- Running time
- Level of detail
- Operational sensitivity
- Ease of use
- Compatibility with travel models
- TransModeler touches all the bases







TIME-DEPENDENT SIMULATION OF TRAFFIC DEMO

3D ANIMATION DEMONSTRATION

CLOSING THOUGHTS

TOLEDO EXPERIENCE TO DATE

- Successful ActivitySim implementation
- Full integration with TransCAD flowchart GUI
  - Scenario management, partial execution, parameter exposure, output visualization dashboards
- Integration with TransModeler's mesoscopic DTA
  - Realistic traffic and visualizations
- Reasonable (fast) system runtimes

CONTACTS

Howard Slavin, PhD | President

howard@caliper.com | +1 617-527-4700

Vince Bernardin, PhD | Vice-President

vince@caliper.com | +1 812-459-3500