

A stylized map of Michigan is centered in the background, rendered in a dark blue color with a fine grid pattern. The map is partially obscured by the large white text of the acronym.

SEMICOG

Southeast Michigan Council of Governments



Traffic Micro-Simulation

Novi-Farmington Hills Area

Case Study

Jilan Chen

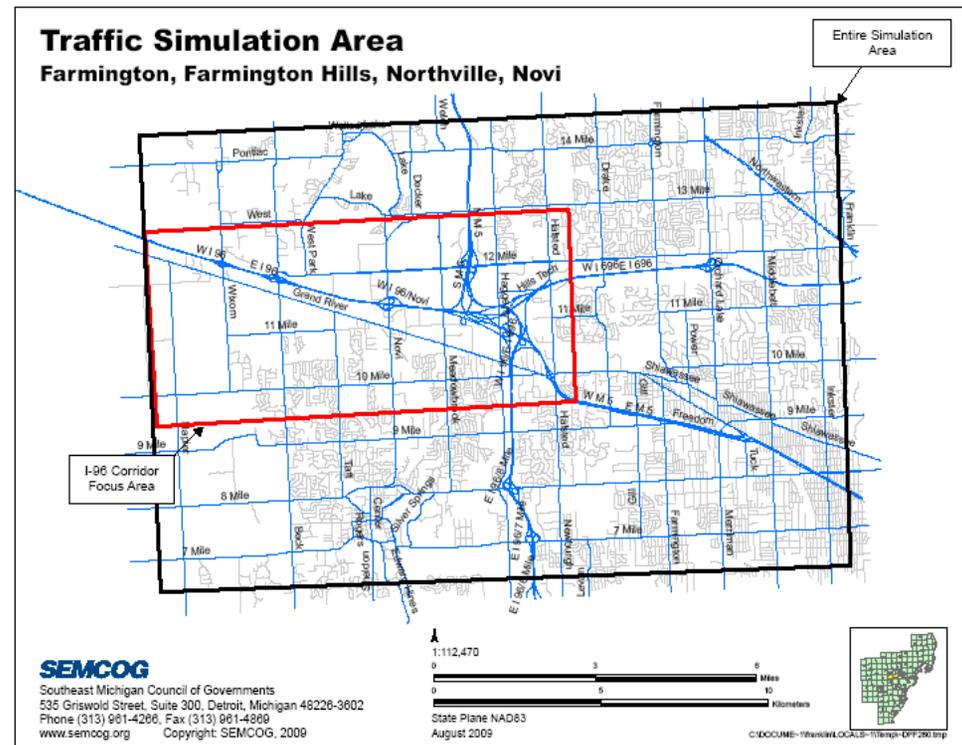
Transportation Modeling group

Project Background

- An I-96/I-696/I-275 corridor study on by MDOT, Oakland TSC and City of Novi
- SEMCOG's interest in micro-simulation
- Availability of software – TransModeler 2.5

Simulation Area

- Multiple cities
- Area boundary
 - E.B. of Inkster,
 - W.B of Napier,
 - S.B. of 7 Mile,
 - N.B. of 14 Mile
- 84 square miles



Key Components of A Simulation Project

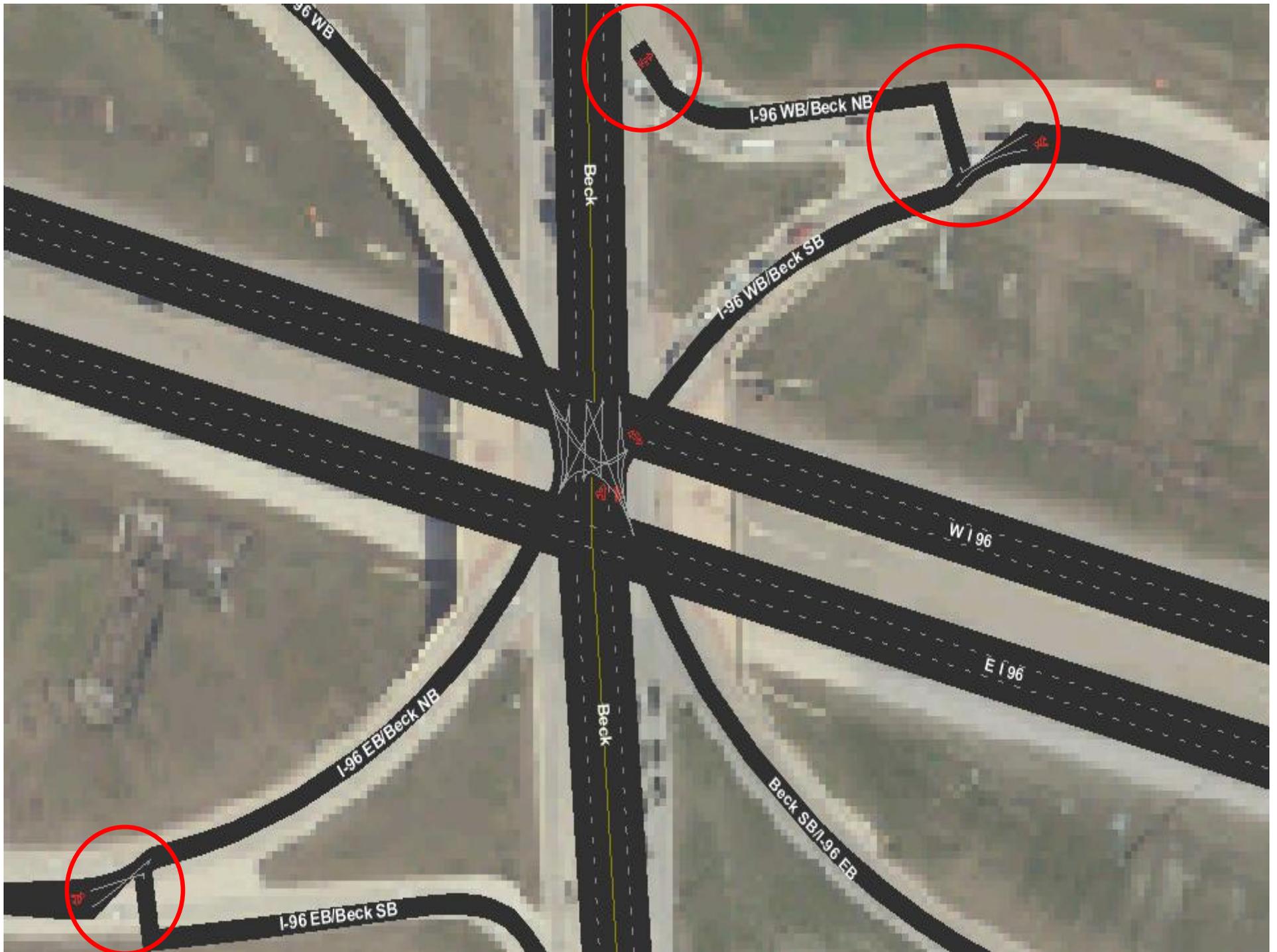
- A simulation network
- Trip tables
- Signal timing

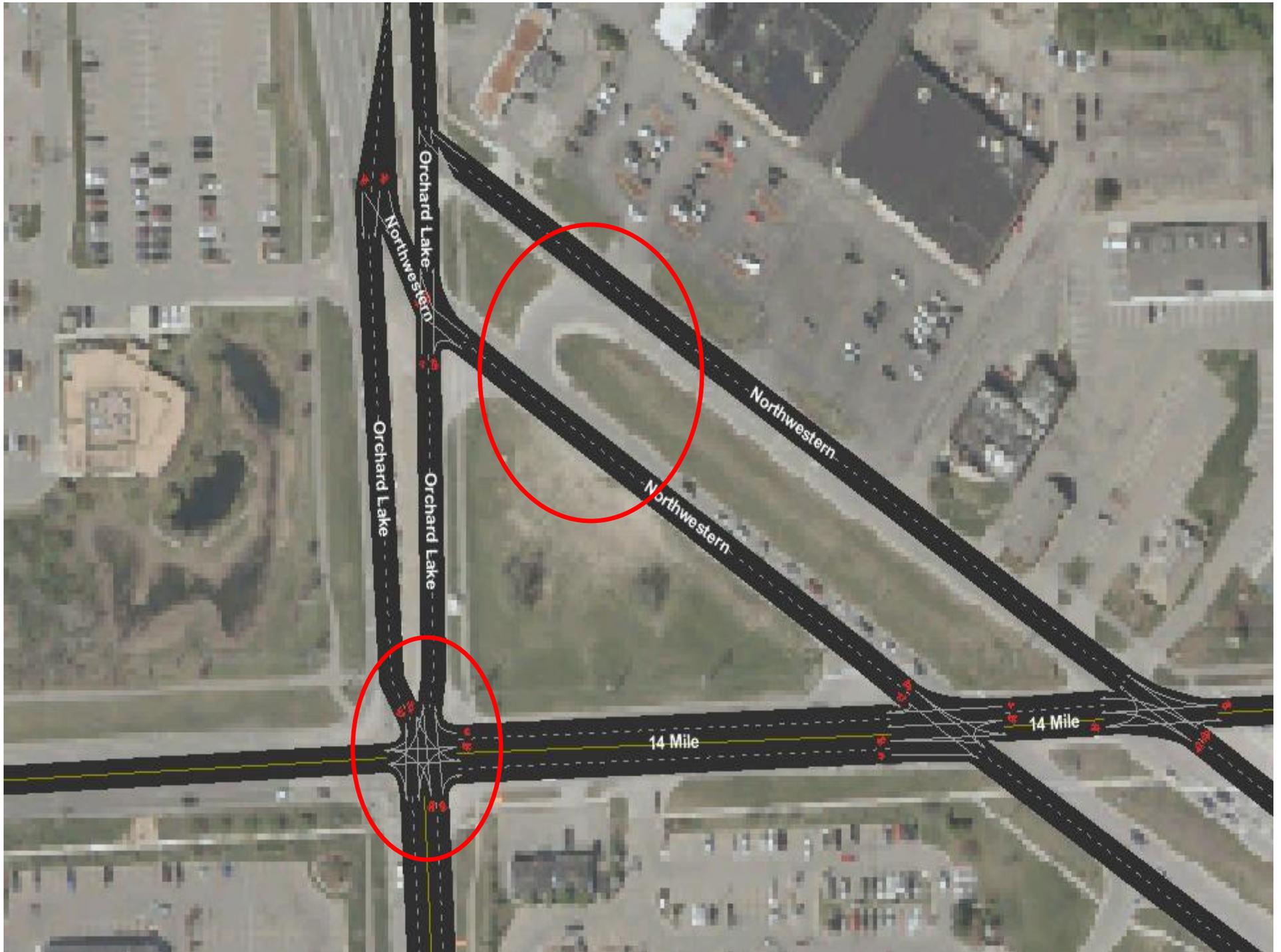
Network Preparation

- Extracted from SEMCOG E5 2010 regional travel model in TransCAD
 - 1341 links (386 Centroid Connectors)
 - 202 zones (112 internal and 90 external)
- Converted to TransModeler Simulation database

Network Preparation (Cont.)

- Initial network check and corrections
 - Geometry distortion
 - Lane alignment & connection errors
- Other network components
 - Left/right turn pockets at intersection
 - Ramp acceleration/deceleration lanes at highway entry/exit
 - U-turn coding on wide-median roadway



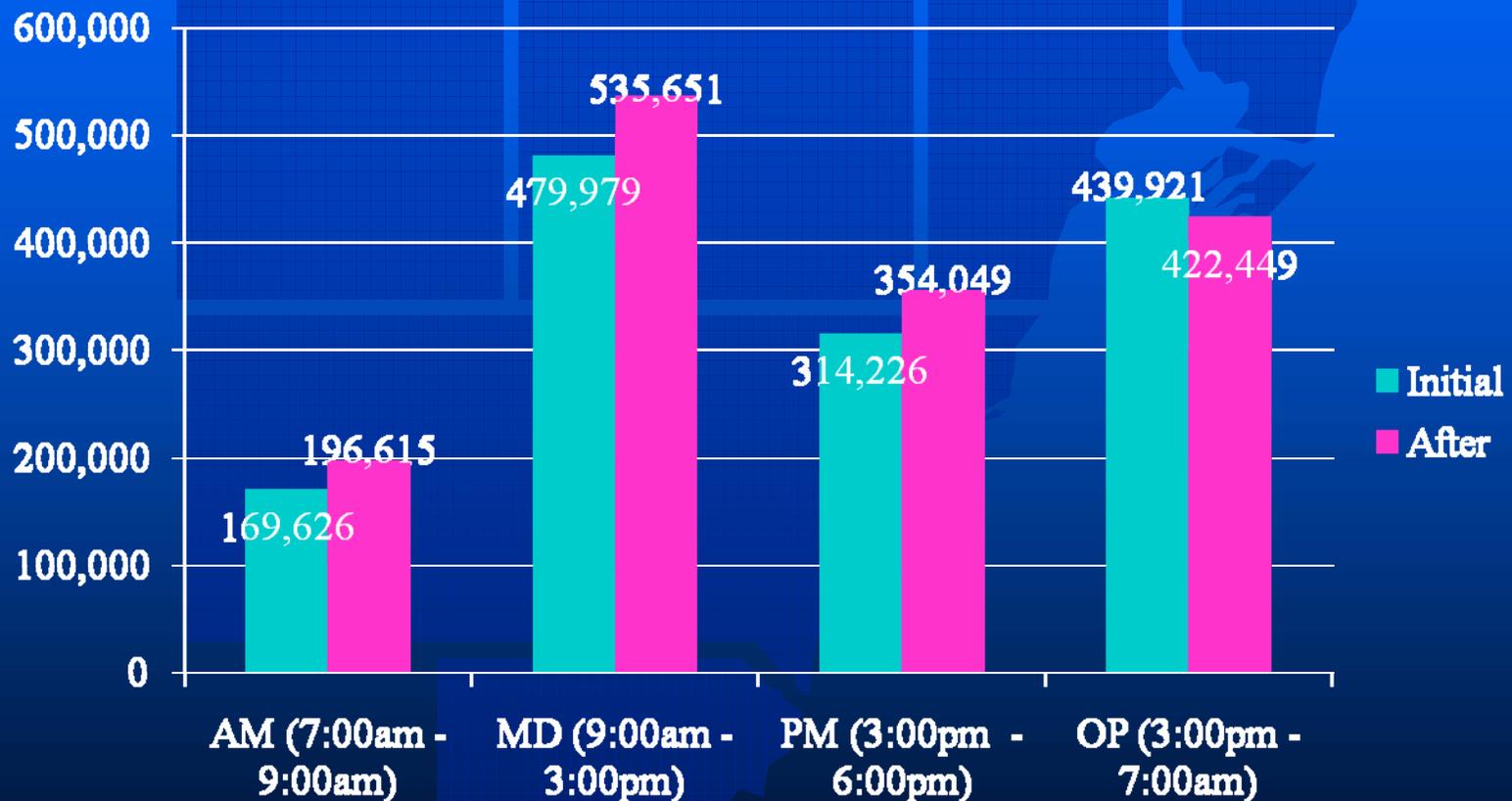




OD Trip Table Development

- Multiple classes subarea analysis
- Origin-Destination matrix estimation
 - Combined four vehicle classes
 - Based on 539 traffic counts collected from 2005-2008
 - With 50% constraint
 - Vehicle daily trips were up 7.5%

OD Trips By Period



Signal Timing Creation

- No field signal timing available
- Software created signal timing applied
 - Select a set of nodes for signal timing
 - Based on turning movement volume
 - The result file is in .tms format
 - Signal timing can be adjusted manually

Signal Setting Sample

TransModeler (Licensed to semcog)

Intersection Control Editor (fg10sa_signal.tms)

Control: Pretimed (Sequential Phasing) Start Time: 00:00:00 Node: 405

General | Turn Movements | Phase Table

Phase 1

Settings

Cycle (sec): 120.0 Coordinate Beginning of: Green Edit Splits:

Offset 1: 0

Phases

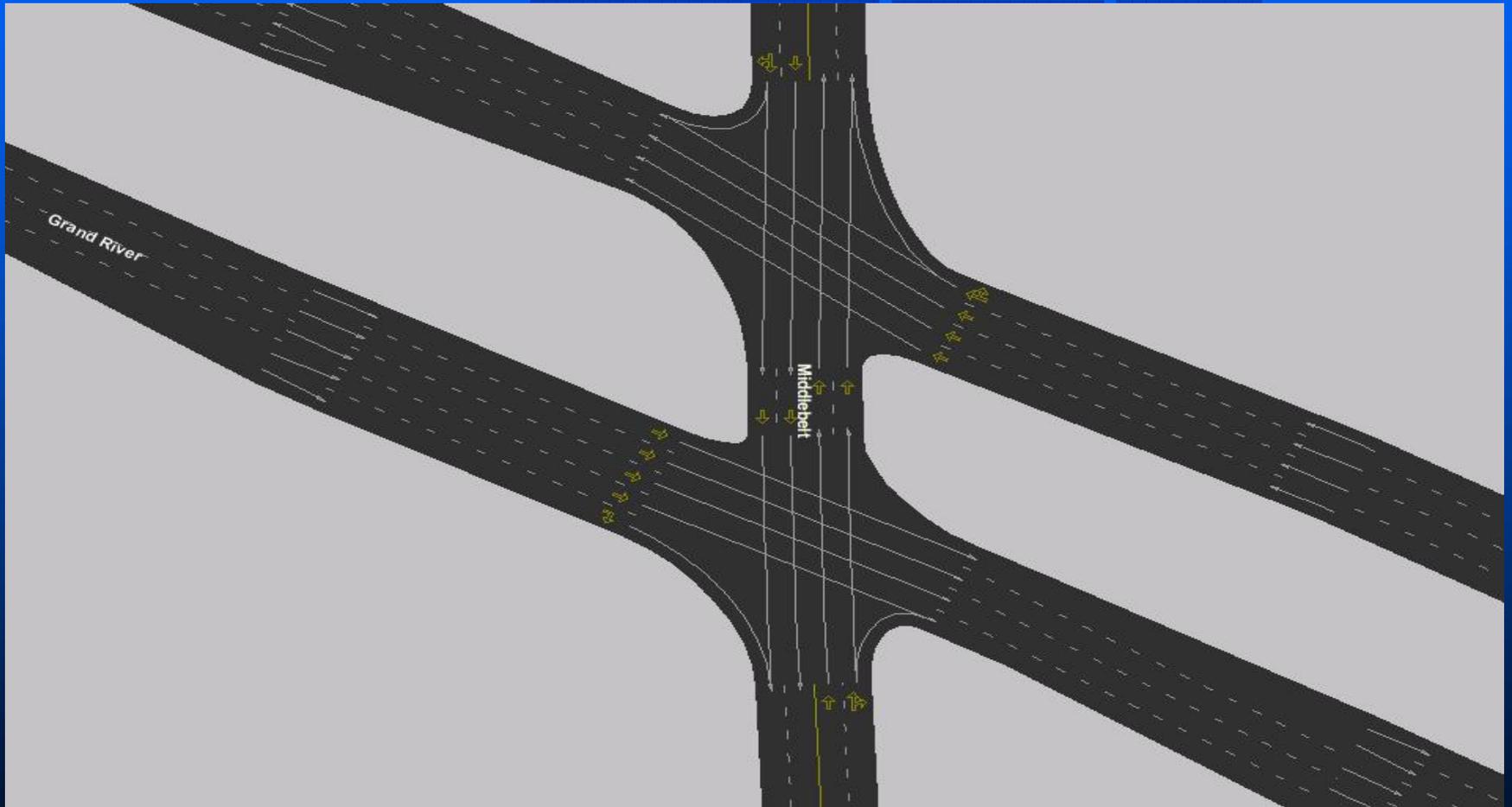
ID	1	2	3	4
Min Split	9	9	9	9
Max Split	40	40	40	40
Green	10	45	10	35
Yellow	3	3	3	3
Red Clearance	2	2	2	2
Split	15	50	15	40
Ped Links				

Map scale: 1 Inches = 0.03428 Miles (1:2,172)

Scenario: Simulation Project D:\FG105A_Study\Simulation

start | Inbox - ... | Document | Microsoft... | TransMo... | untitled -... | Search Desktop | EN | 3:30 PM

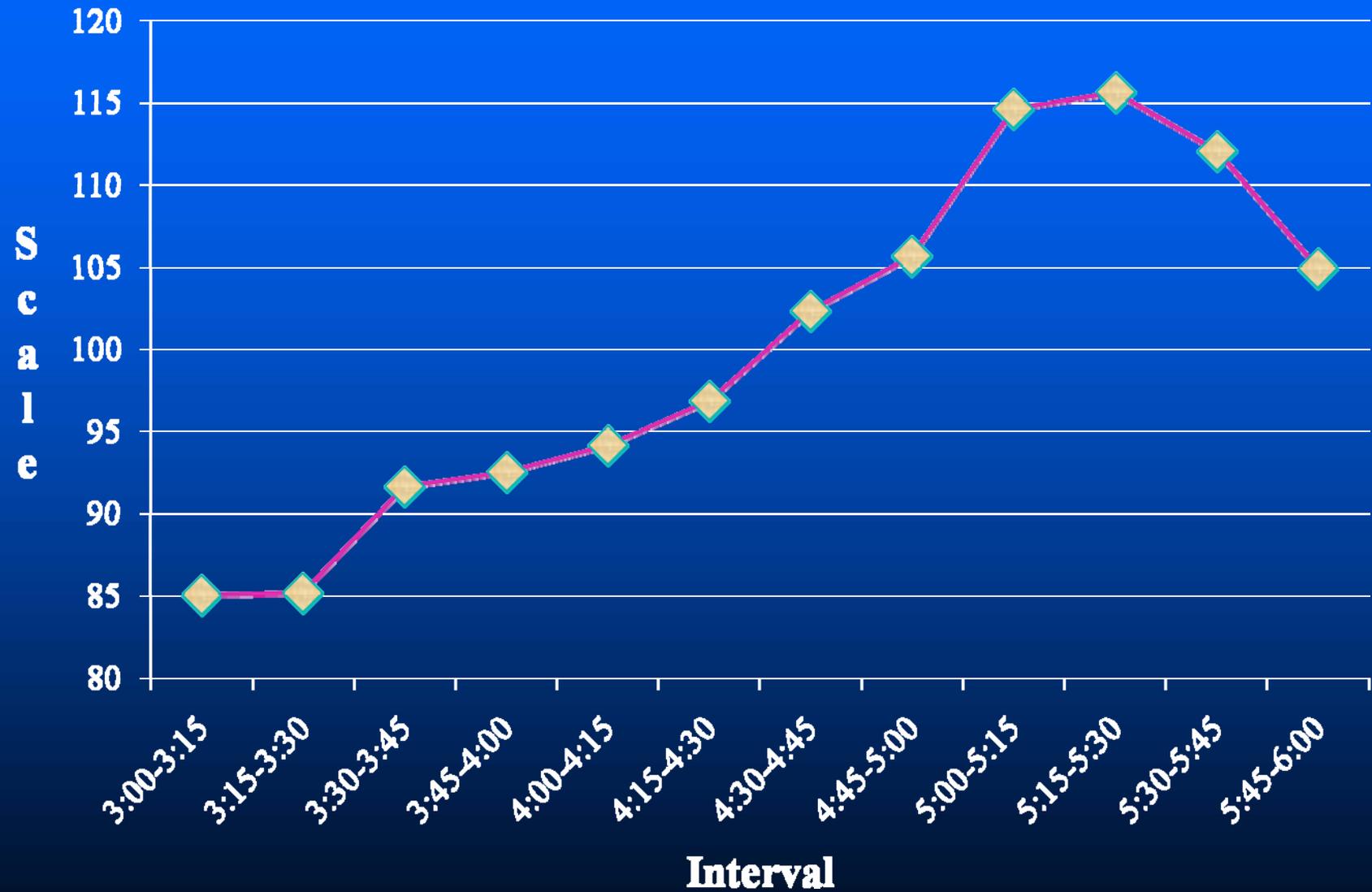
Signal Timing Coordination



Simulation Setting

- Simulated pm peak period (3pm-6pm) with 15 minutes departure interval
- Started from an empty network
- Applied historical travel time and turning delay
- Tested trip loadings incrementally:
50% → 75% → 90% → 100%

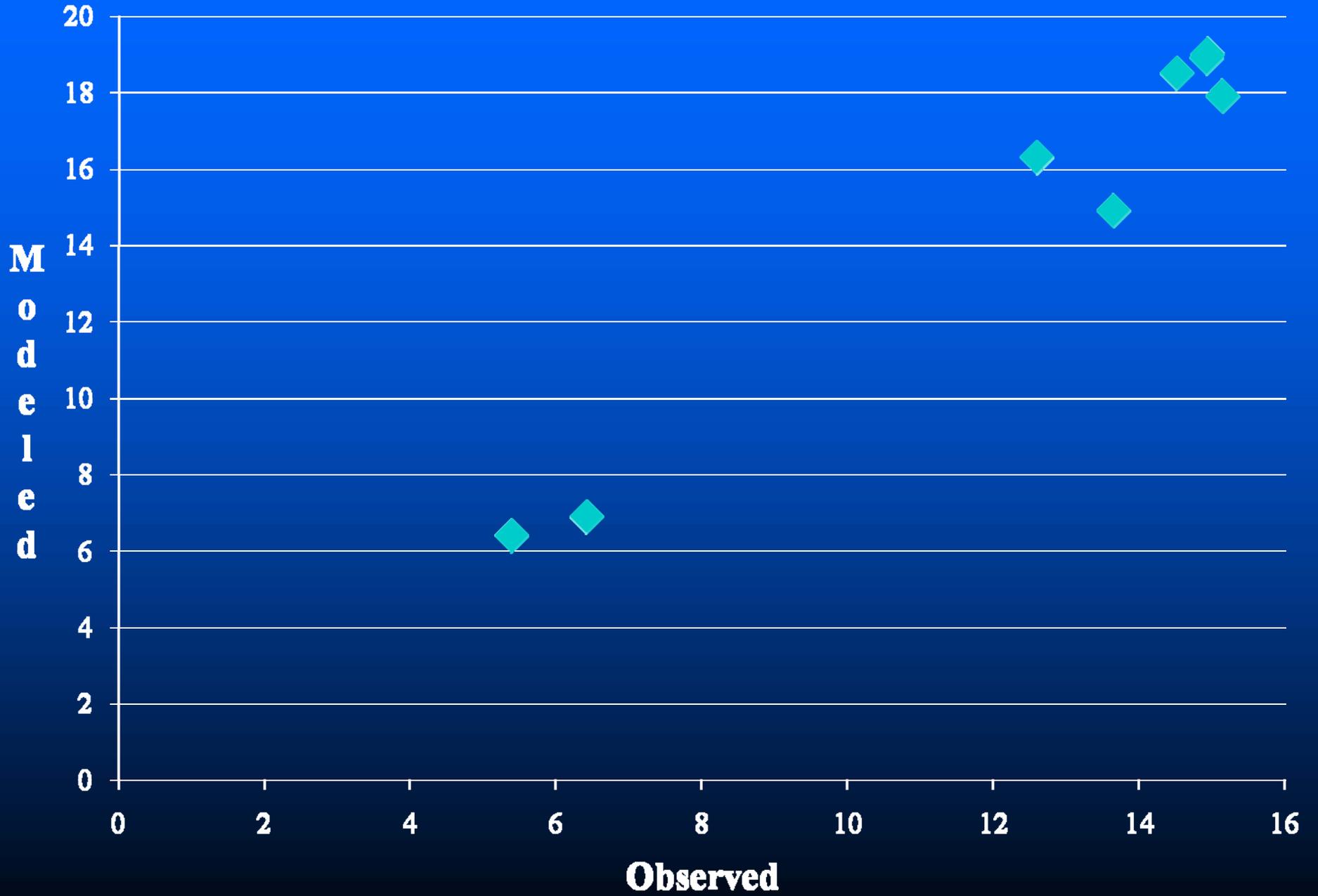
PM Peak Trip Departure Trend



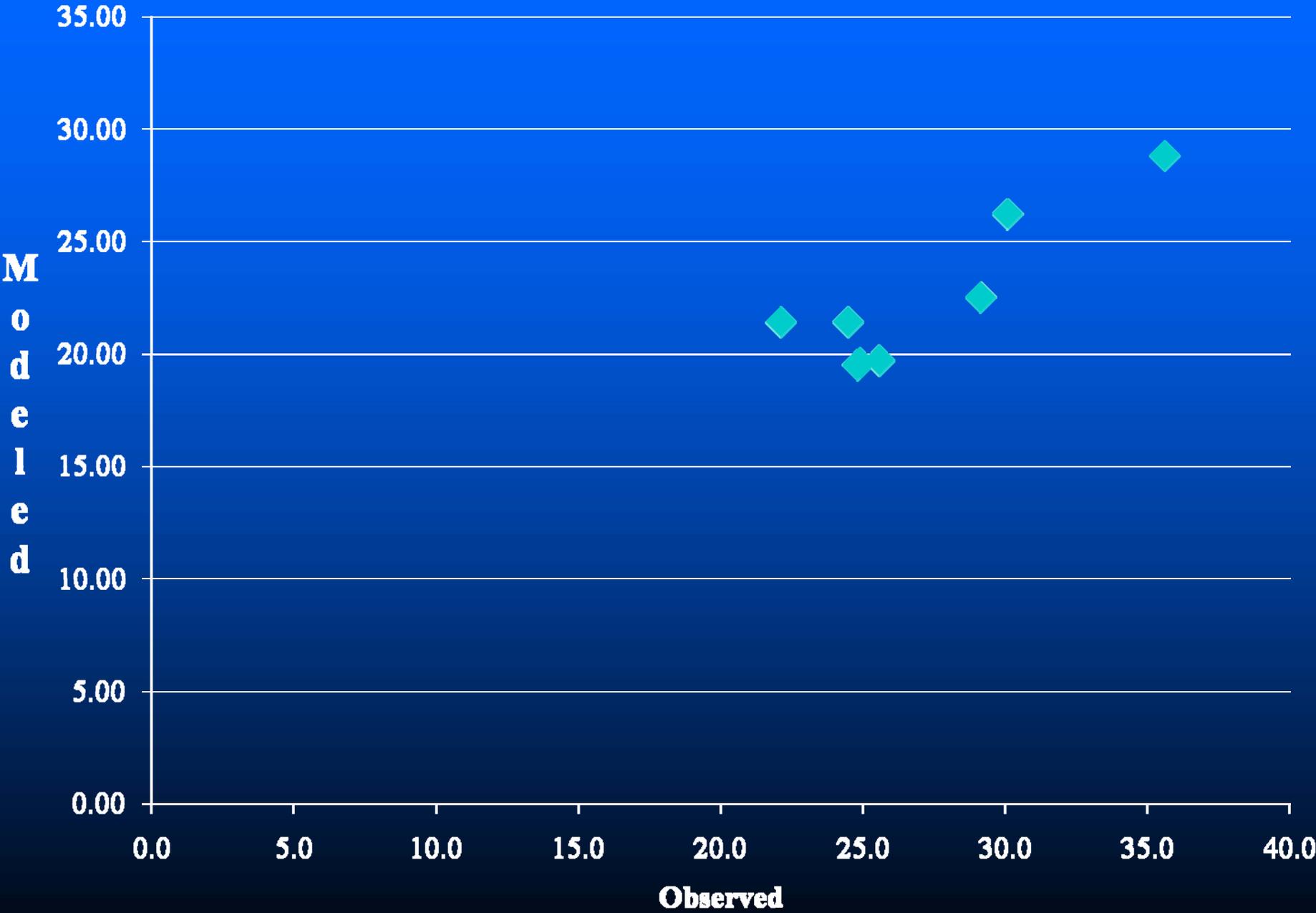
Performance Analysis

- Based on last two hours of simulation data
 - Travel time difference – 30% high
 - Speed difference – 20% low
 - Volume difference – 10% low for all types of road except connectors

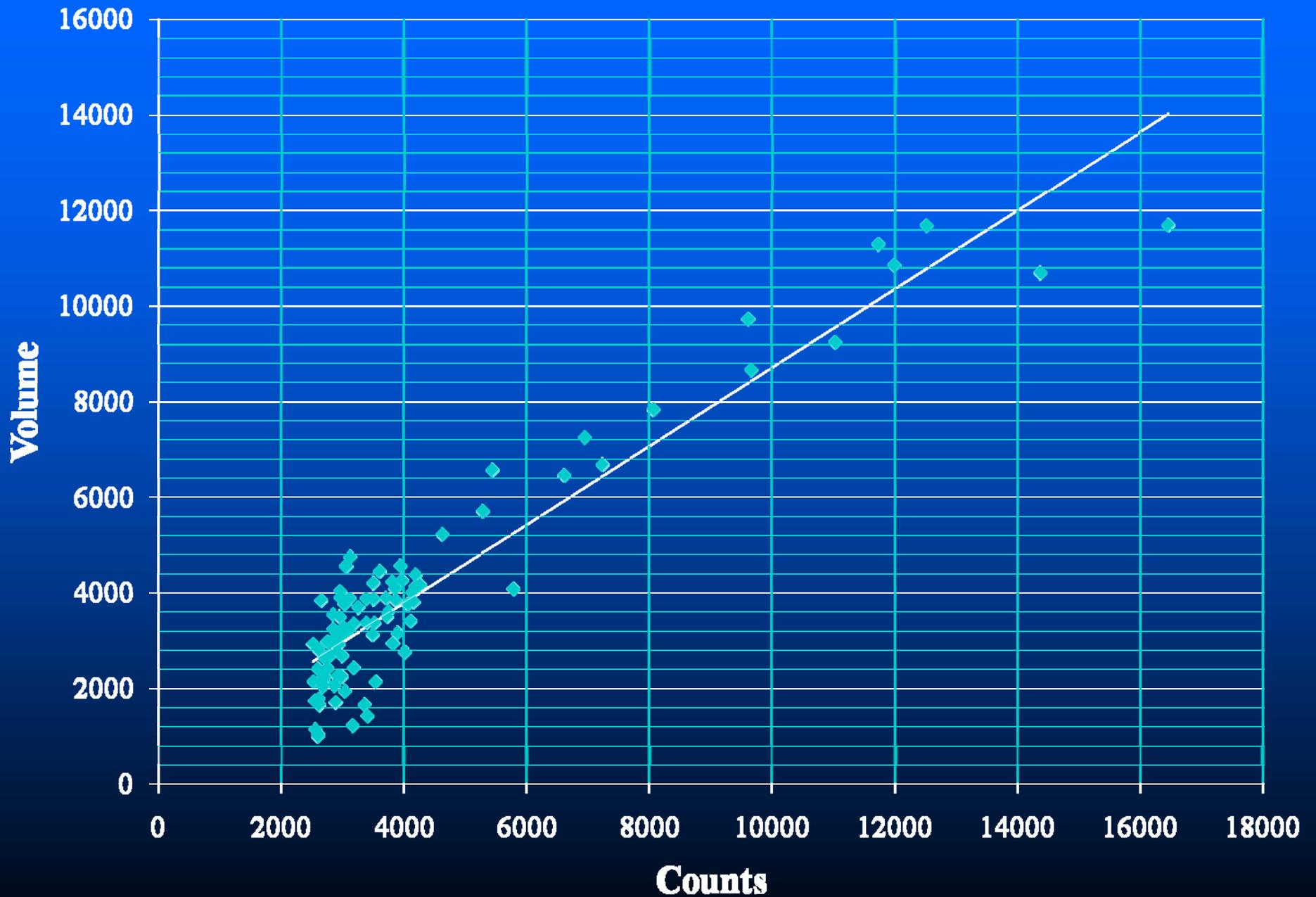
Travel Time in Minutes



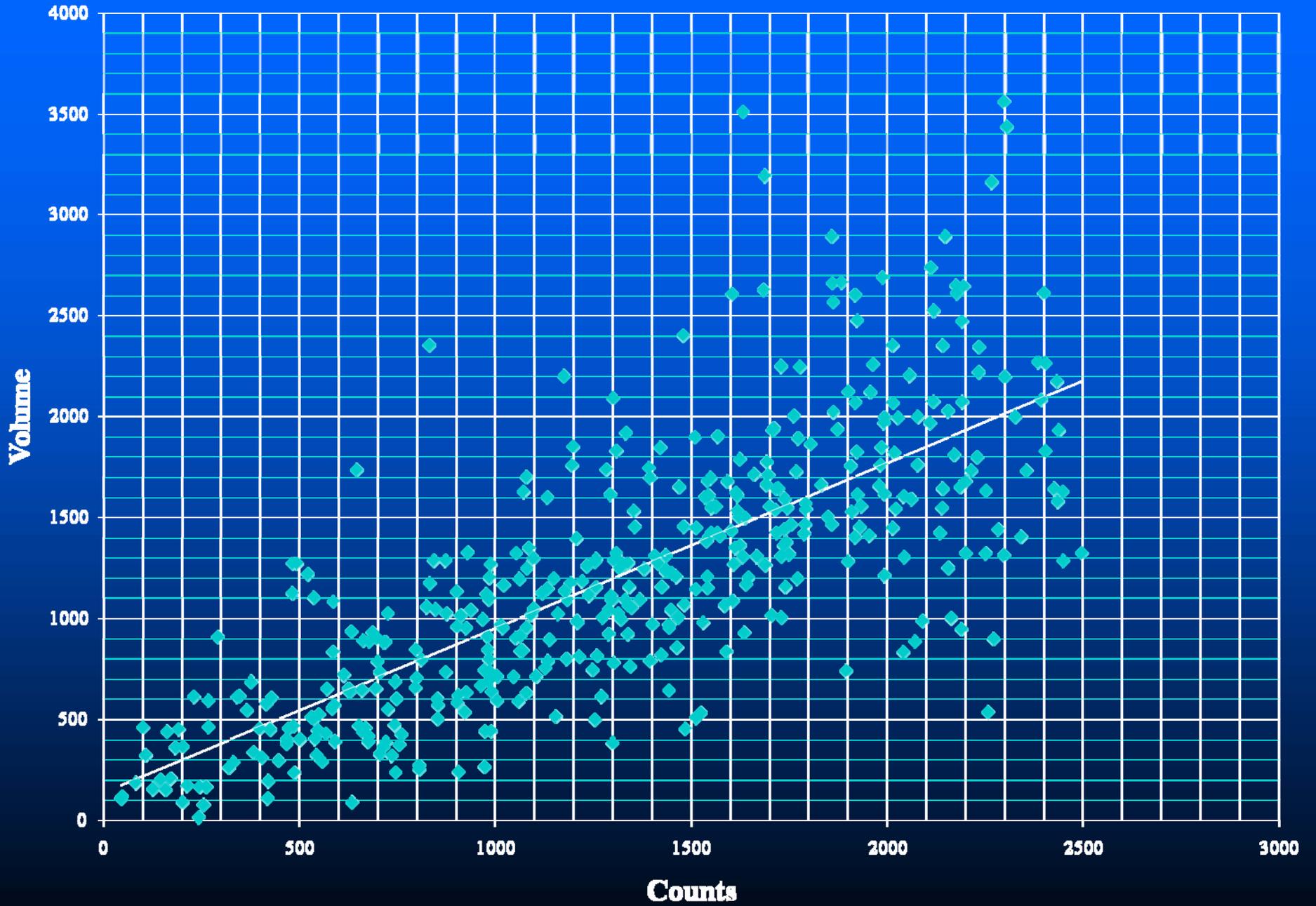
Speed in Miles per Hour



Counts Greater Than 2,500



Counts Less Than Or Equal To 2,500



Thoughts For Future

- Applying the real signal timing data
- Adjusting the simulation parameters
- Collecting more travel time and speed data for validation
- Exploring other functions -- “Traffic Actuated device”, “Incidents”, “Pedestrian crosswalk”, etc.

Potential Application Area

- Intelligent Transportation Systems (ITS)
- Complex junctions design and variable speed limits setting
- Restrictions to certain lanes
- Incident management
- Training for system operators and users



QUESTIONS?



THANK YOU

SEMCOG