

Overview of Fairfax County Travel Demand Modeling

presented to

COG/TPB Travel Forecasting Subcommittee

presented by

Cambridge Systematics, Inc.

Feng Liu, Ph.D.

David Kline and Dan Stevens, Fairfax County DOT

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CAMBRIDGE
SYSTEMATICS

Outline

- ④ Uses of Travel Demand Model in the County's Planning Process
- ④ Model Applications
- ④ County Model Update

Uses of Travel Demand Model

- ③ Comprehensive Plan Updates
- ③ Subarea Studies
- ③ Corridor Studies

Examples of Model Applications

- Reston Comprehensive Plan Update
- Tysons Plan Update
- Tysons Street Grid/Network Study
 - » Cube Subarea Extraction (VISUM)
- Huntington Area Transportation Study
- Braddock Road Multimodal Transportation Study

Subzone (County TAZ) Structure

Subzone Structure

» Nested in regional TAZ structure

» Enhanced in activity centers
(MWCOCG and Fairfax County)

- Baileys Crossroads/Skyline
- Beltway South
- Dulles
- Fairfax Center
- Fairfax City-GMU
- Fort Belvoir
- Herndon
- I-95 Corridor/Engineer Proving Ground
- Laurel Hill
- Merrifield/Dunn Loring
- Reston
- Route 1
- Springfield
- Seven Corners
- Tysons

Highway Network

- ④ Additional Network Detail
- ④ Link Attributes
 - » Intersection control device type
 - » Turn lanes
 - » Facility types (12)
 - » Intersection modeling indicator

Model Functionality

- ③ County-focused approach
- ③ Consistency with the latest MWCOCG Version 2.3.57
- ③ Highway assignment with enhanced modeling features
 - » Enhanced intersection modeling
 - » Drive access to transit

Intersection Modeling Objectives

- ① Investigate Congestion Effects
 - » Delay at the link and intersection level
- ① Analyze Traffic Impacts of Land Development
 - » Level of Service (LOS)
- ① Evaluate Mitigation Options
 - » Measures of effectiveness

Analytical Tools

- ④ Traffic Analysis Software
 - » HCM-based methodology for analyzing intersection LOS
 - » Traffic volumes estimated externally
 - » No feedback

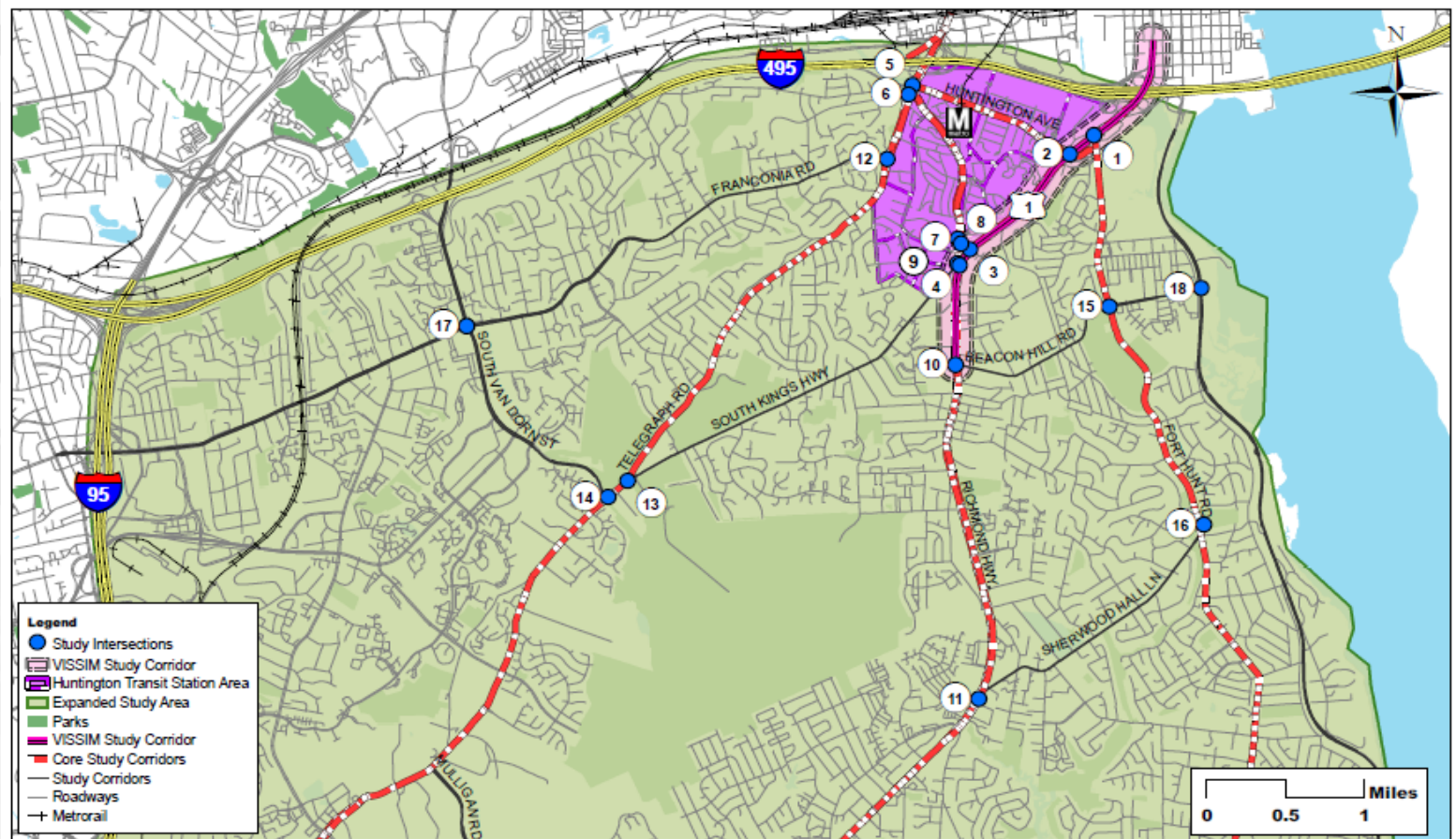
- ④ Regional Travel Demand Modeling
 - » Estimate/forecast traffic volumes
 - » No consideration of the effects of intersection delay

Methodology: Two Modeling Approaches

	Control Device Method	Intersection Modeling
Methodology	Capacity-restrained assignment with link capacity and speed modified by intersection delays	Intersection-constrained capacity-restrained assignment, with HCM intersection methodology
Input/Parameters	<p>Network attributes: control devices, link facility types, total number of turn lanes</p> <p>Default: degree of progression (arrival type), cycle time, green time to cycle time ratios, and signal progression factor</p>	<p>Network attributes: link and intersections</p> <p>Geometric characteristics</p> <p>Signal timing</p>
Intersection types	<p>No control device;</p> <p>Stop sign;</p> <p>Yield sign;</p> <p>Major approach to a signalized intersection; and</p> <p>Minor approach to a signalized intersection</p>	<p>Signal-controlled intersections (four types)</p> <p>All-way stop-controlled intersection</p> <p>Two-way stop-controlled intersection</p> <p>Priority intersection (two-way yield controlled intersection)</p> <p>Roundabout</p>
Output	Link level LOS	Intersection Delays and LOS
Mitigation measures	Evaluated directly (limited) and indirectly	Evaluated directly

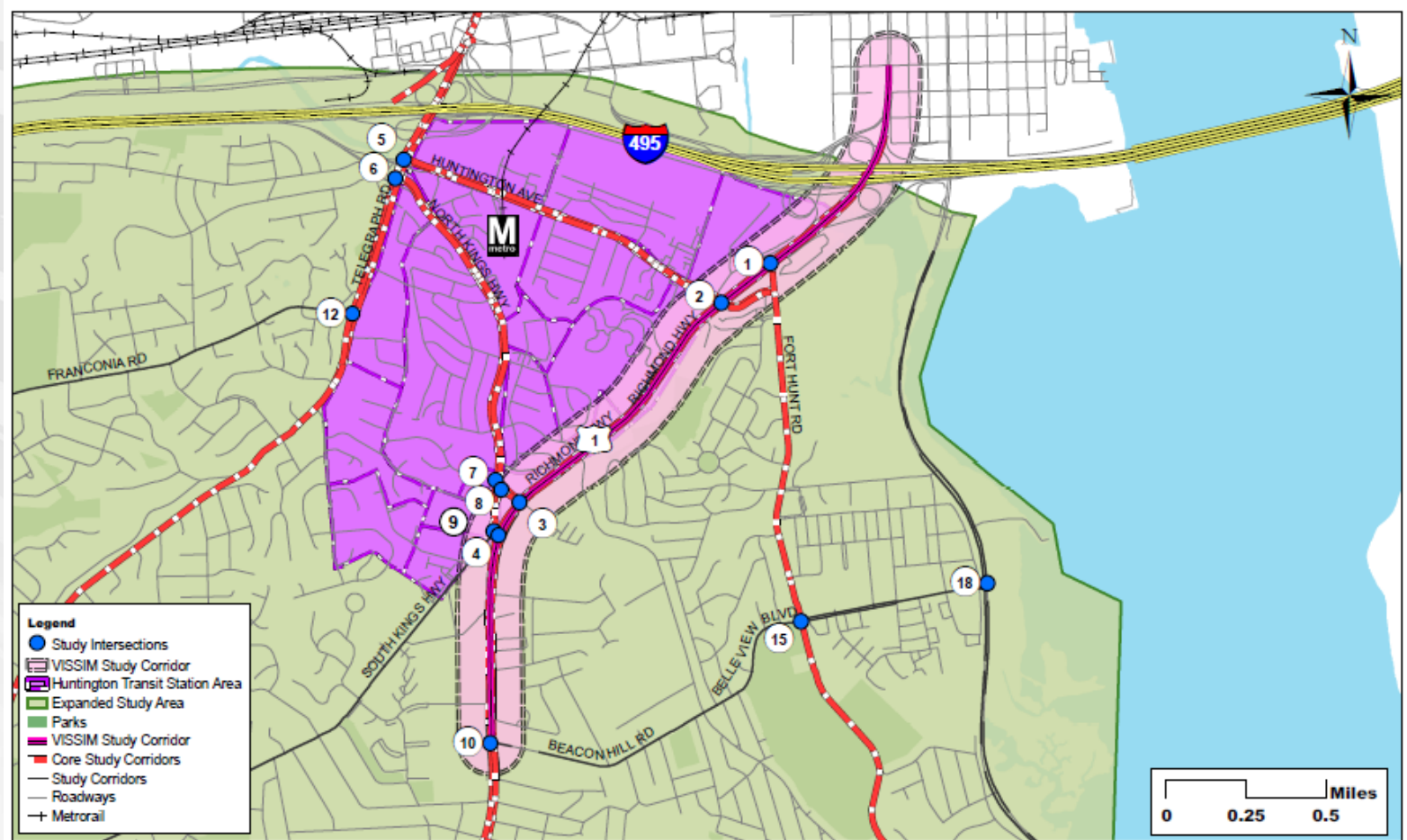
Subarea Study

General Study Area



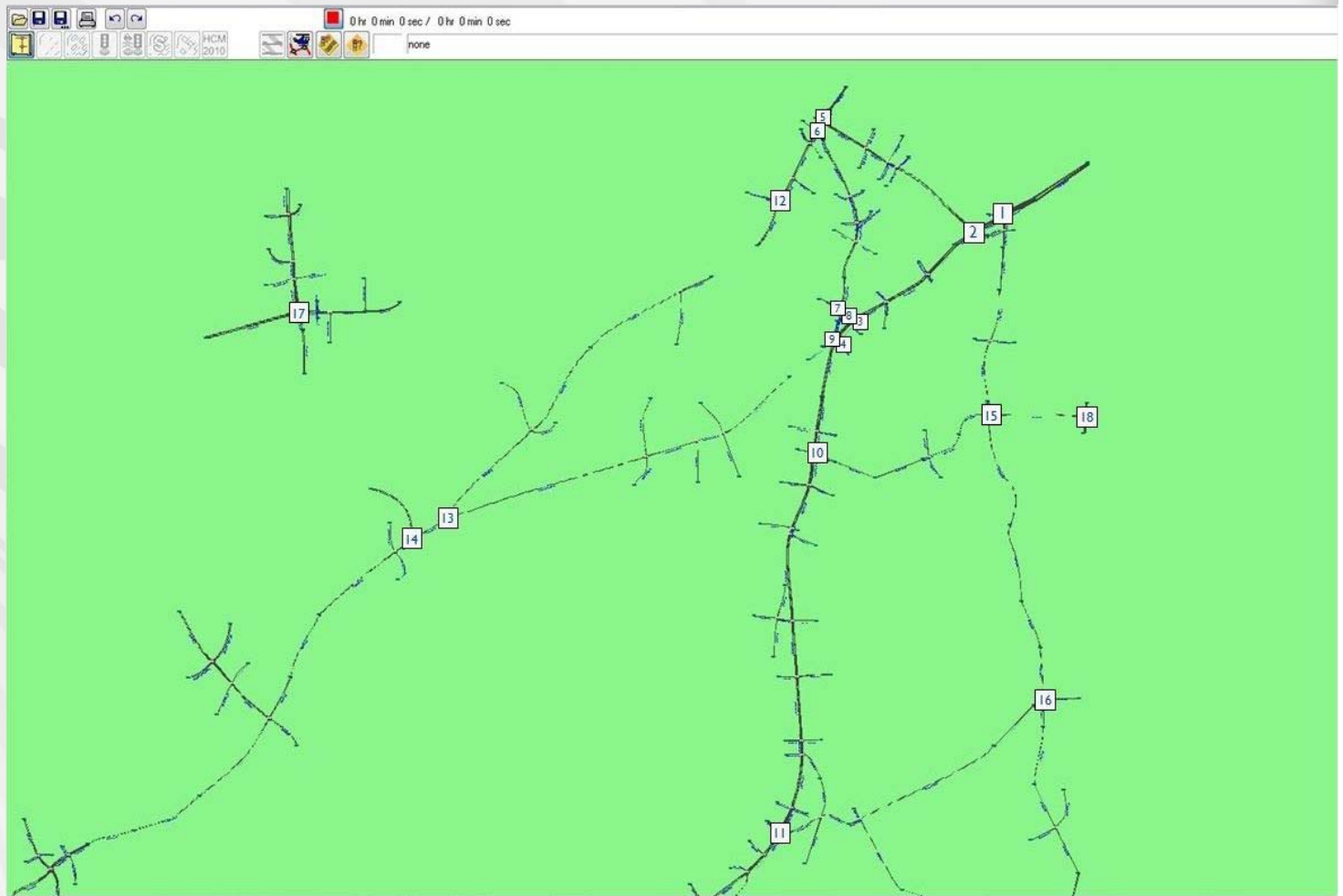
Subarea Study

Core Study Area



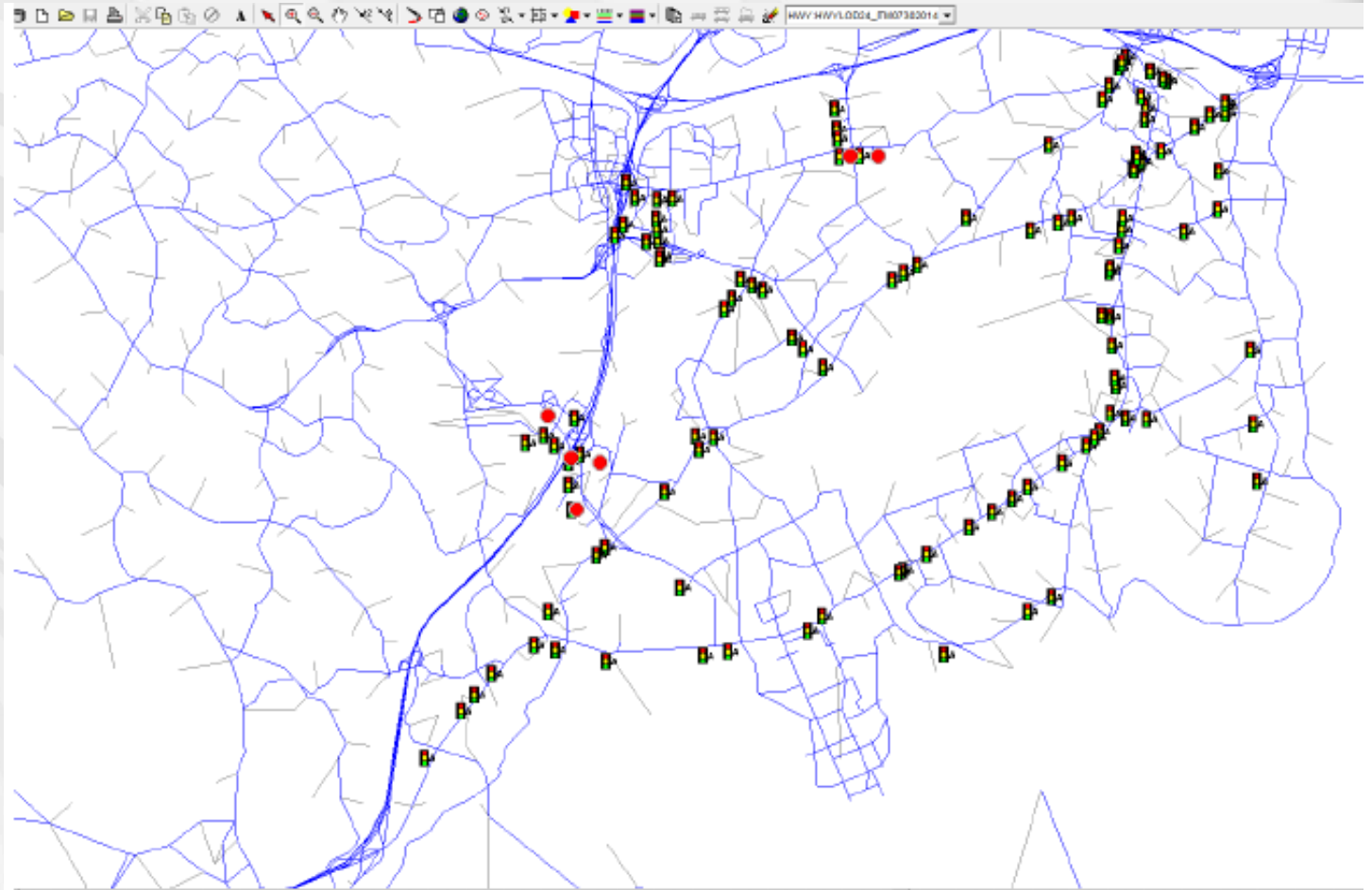
Intersection Modeling

Traffic Analysis Network



Intersection Modeling

Subarea Model Network

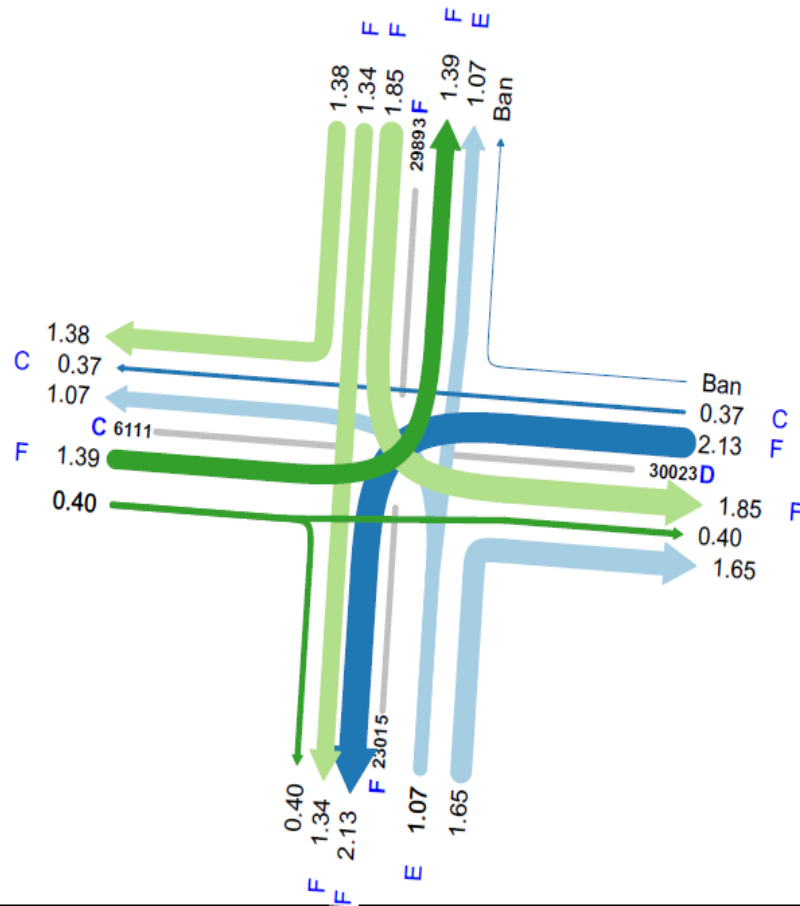


Intersection Modeling

- Intersection LOS
- Comparisons with Traffic Analysis Software

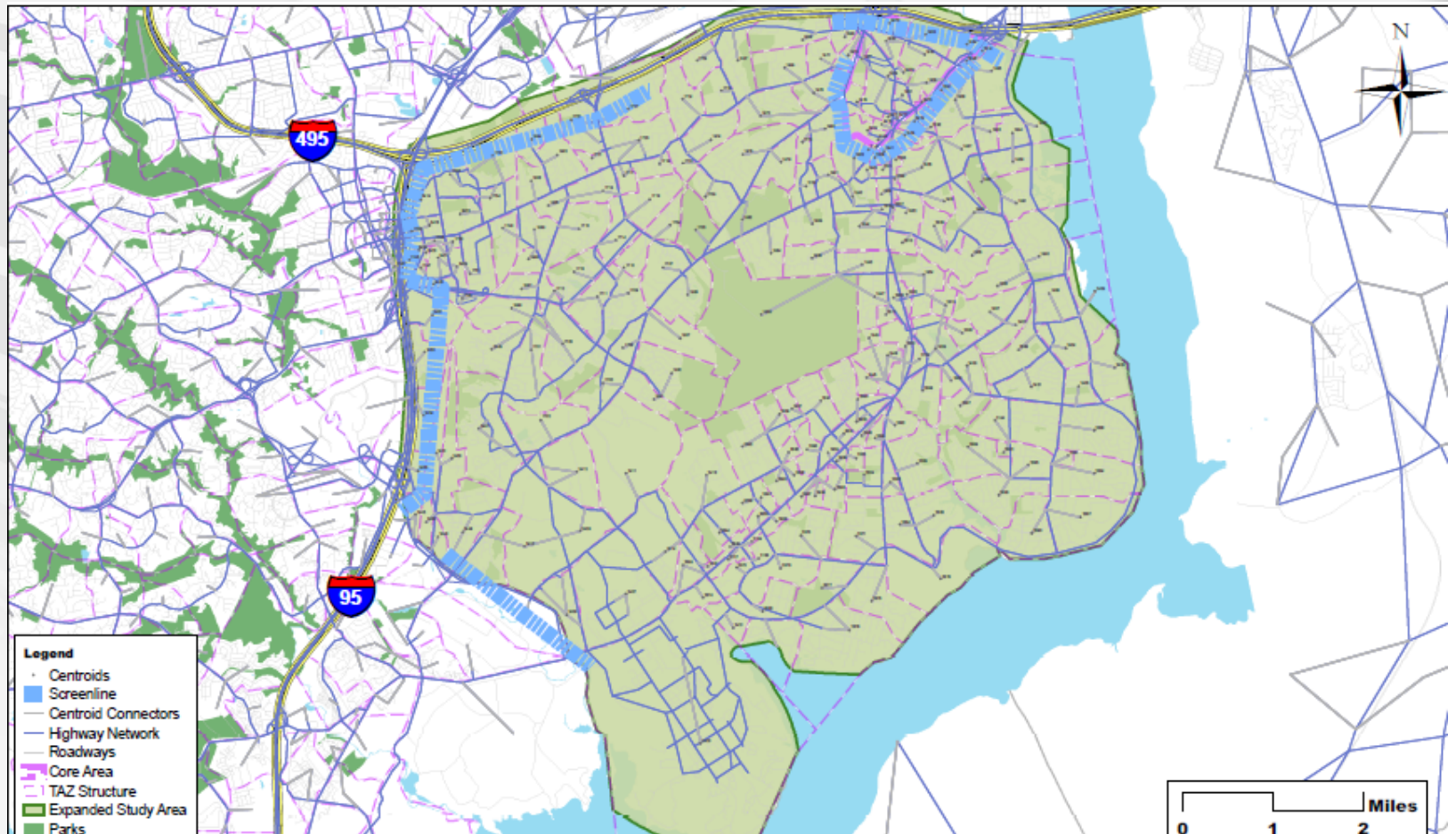
Intersection Type : Adaptive Signal; Model Period : 180 minutes
 Attribute : Delay

LOS: D



Model Validation

Screenlines



Model Validation

Model-Estimated vs. Observed Daily Volumes -- % Difference (%RMSE)

Facility Types	Control Device Method	Intersection Modeling
Freeway/ Expressway	4% (32%)	-4% (27%)
Major Arterial	-15% (27%)	-7%(15%)
Medium/Minor Arterial	-1% (9%)	1%(12%)
Collector	-7% (38%)	-5%(27%)
Total	-6% (27%)	-4%(18%)

Findings

● Subarea Travel Demand Modeling

- » Control device modeling
- » Intersection modeling
 - HCM methodology
 - Detailed representation of intersection
 - Delays and intersection LOS
 - Congestion effects on route choice and diversion

● Model capability

- » Evaluate mitigation measures
- » Evaluate traffic impacts of land development

Questions?

daniel.stevens@fairfaxcounty.gov