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Think Forward

Incorporating Intersection Delays in Subarea Travel Demand Modeling

presented to

North Carolina Model User Group

presented by

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May 11, 2016

Overview

- Objectives and Motivation
- Methodology
- Study Area
- Results
- Conclusions

Objectives

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

Analytical Tools

- Traffic Analysis Software
  - HCM-based methodology for analyzing intersection LOS
  - Traffic volumes estimated externally
  - No feedback
- Regional Travel Demand Modeling
  - Estimate/forecast traffic volumes
  - No consideration of the effects of intersection delay
- Subarea Travel Demand Modeling
  - Consideration of the effects of intersection delay

Two Modeling Approaches

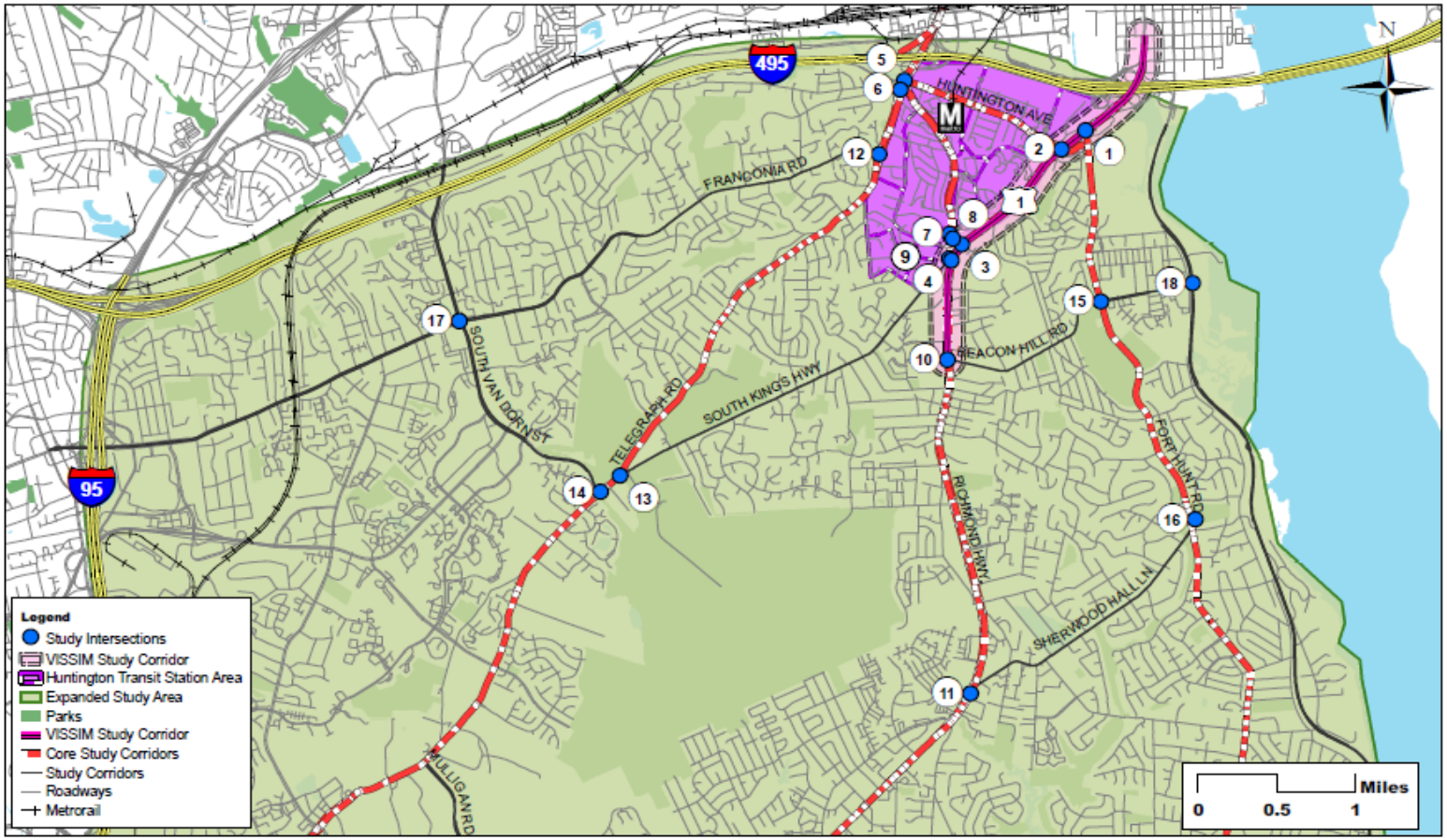
	Control Device Method	Intersection Modeling
Approach	Capacity-restrained assignment with link capacity and speed modified by intersection delays	Intersection-constrained capacity-restrained assignment, with HCM intersection methodology
Input/ Parameters	Network attributes: control devices, link facility types, total number of turn lanes Default: degree of progression (arrival type), cycle time, green time to cycle time ratios, and signal progression factor	Network attributes: link and intersections Geometric characteristics Signal timing

Two Modeling Approaches

	Control Device Method	Intersection Modeling
Intersection types	No control device; Stop sign; Yield sign; Major approach to a signalized intersection; and Minor approach to a signalized intersection	Signal-controlled intersections (four types) All-way stop-controlled intersection Two-way stop-controlled intersection Priority intersection (two-way yield controlled intersection) Roundabout
Output	Link level LOS	Intersection Delays and LOS
Mitigation measures	Evaluated directly (limited) and indirectly	Evaluated directly

Study Area

General Study Area



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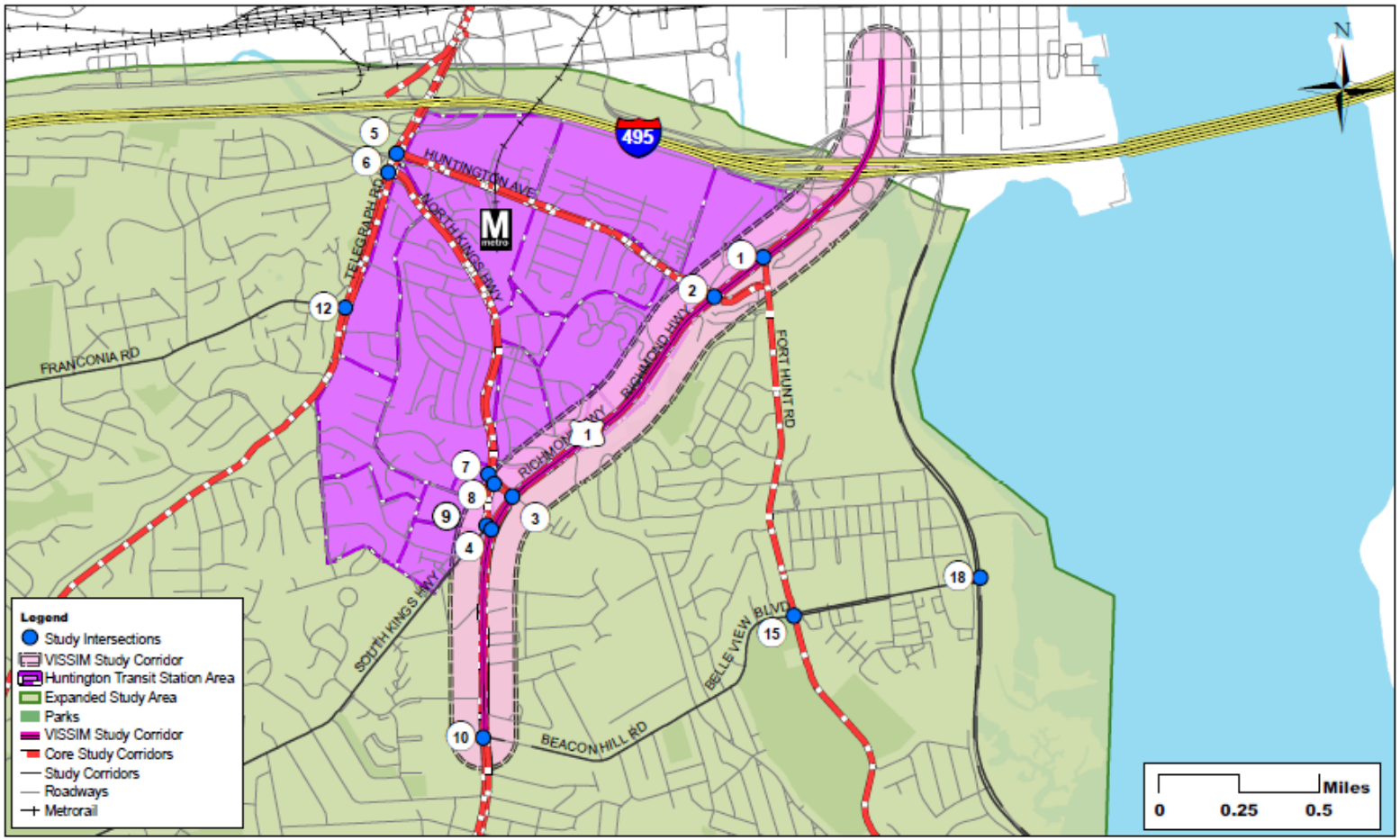
Study Area

Core Study Area



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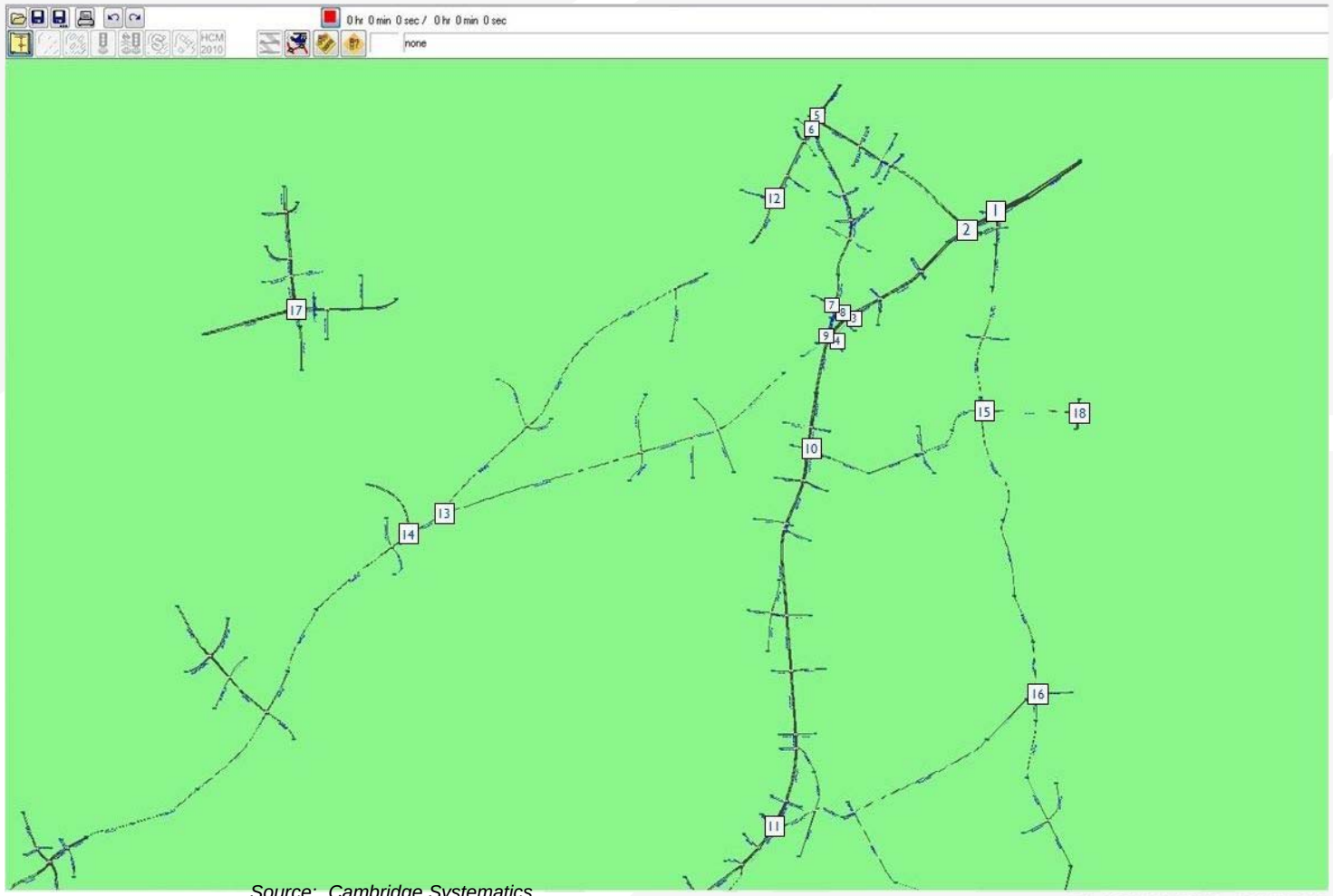
Intersection Modeling

- Traffic Analysis Network



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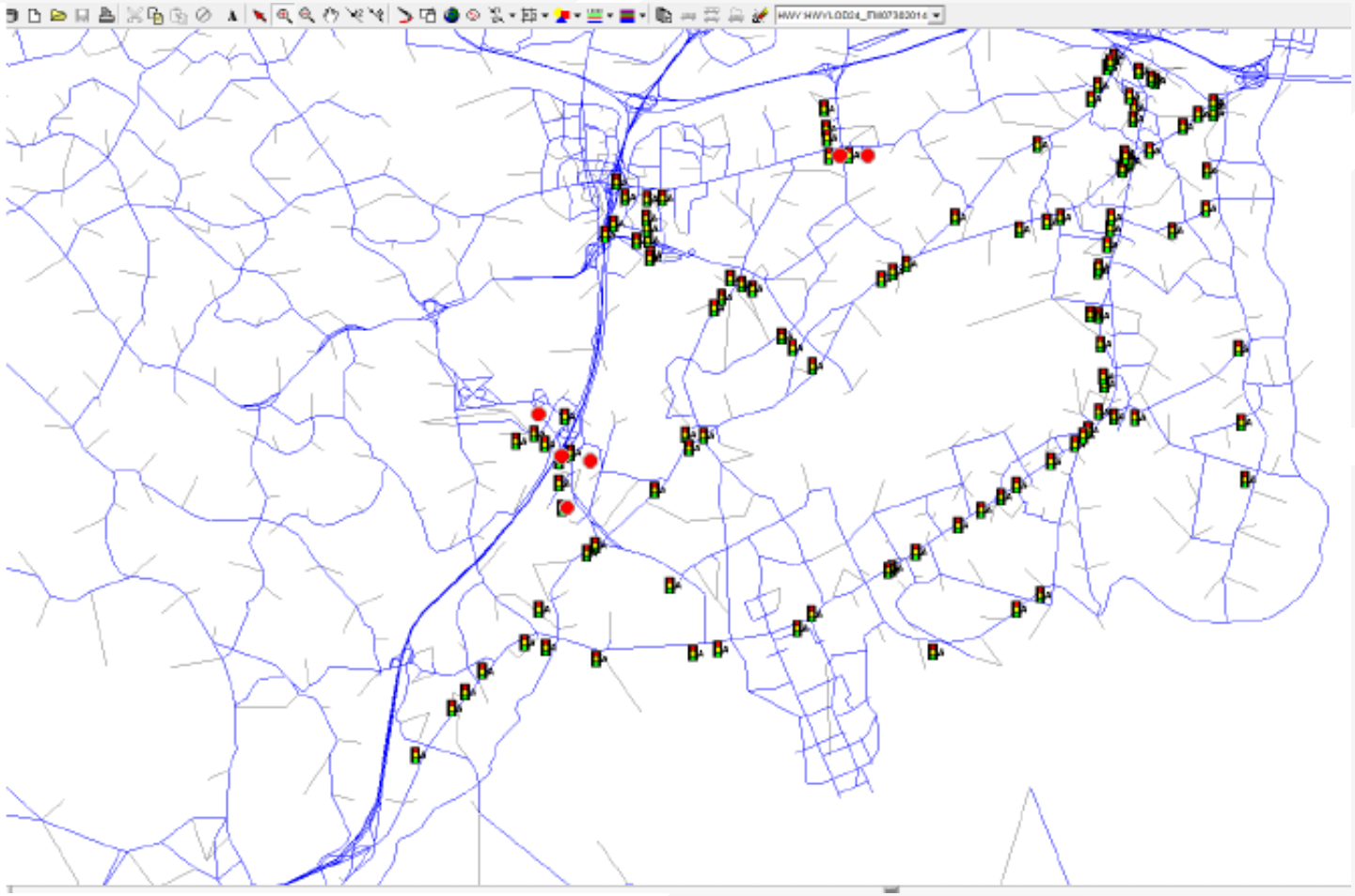
Intersection Modeling

- Subarea Model Network



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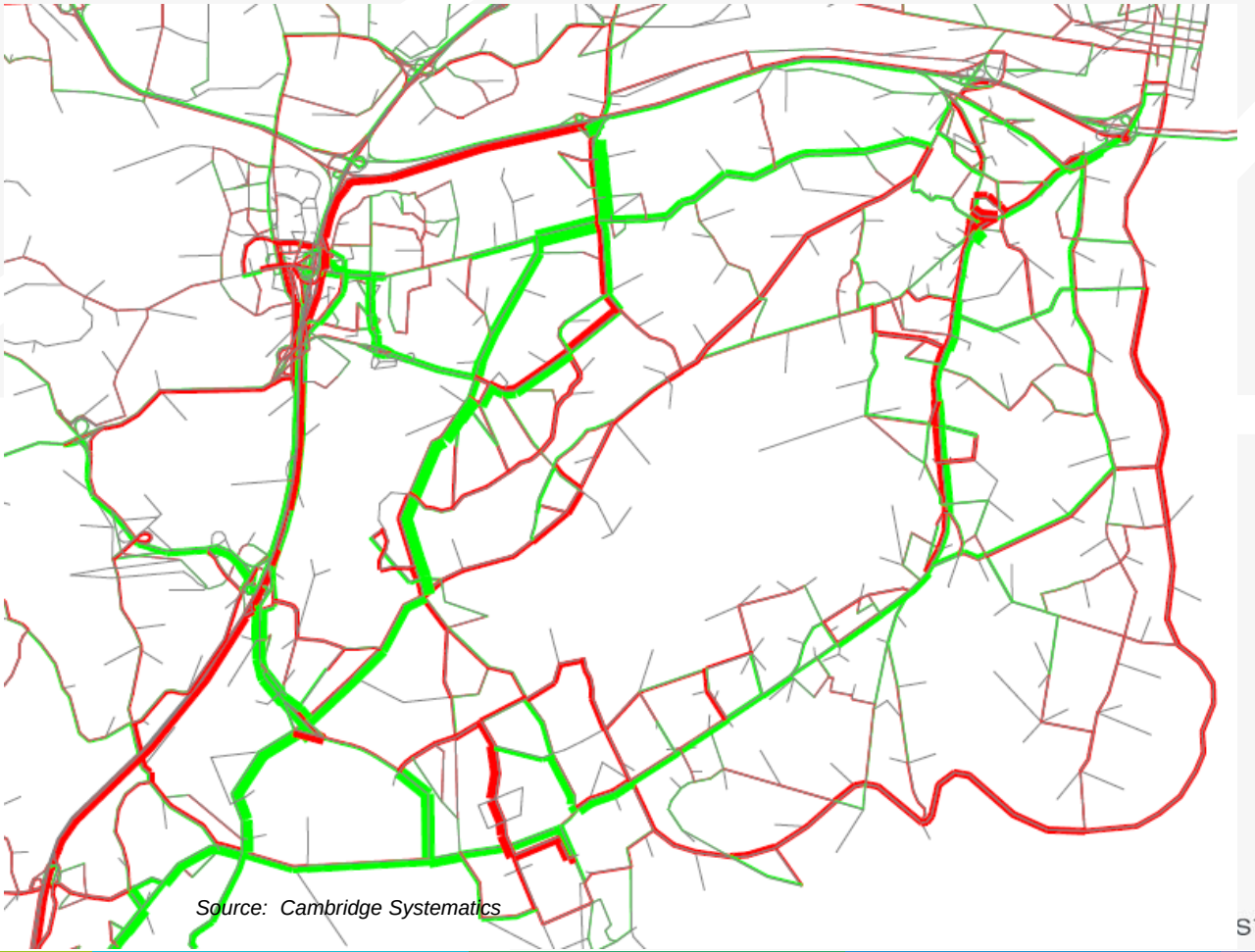
Intersection Modeling

- AM Volume Comparison: Intersection Modeling vs Control Device Method



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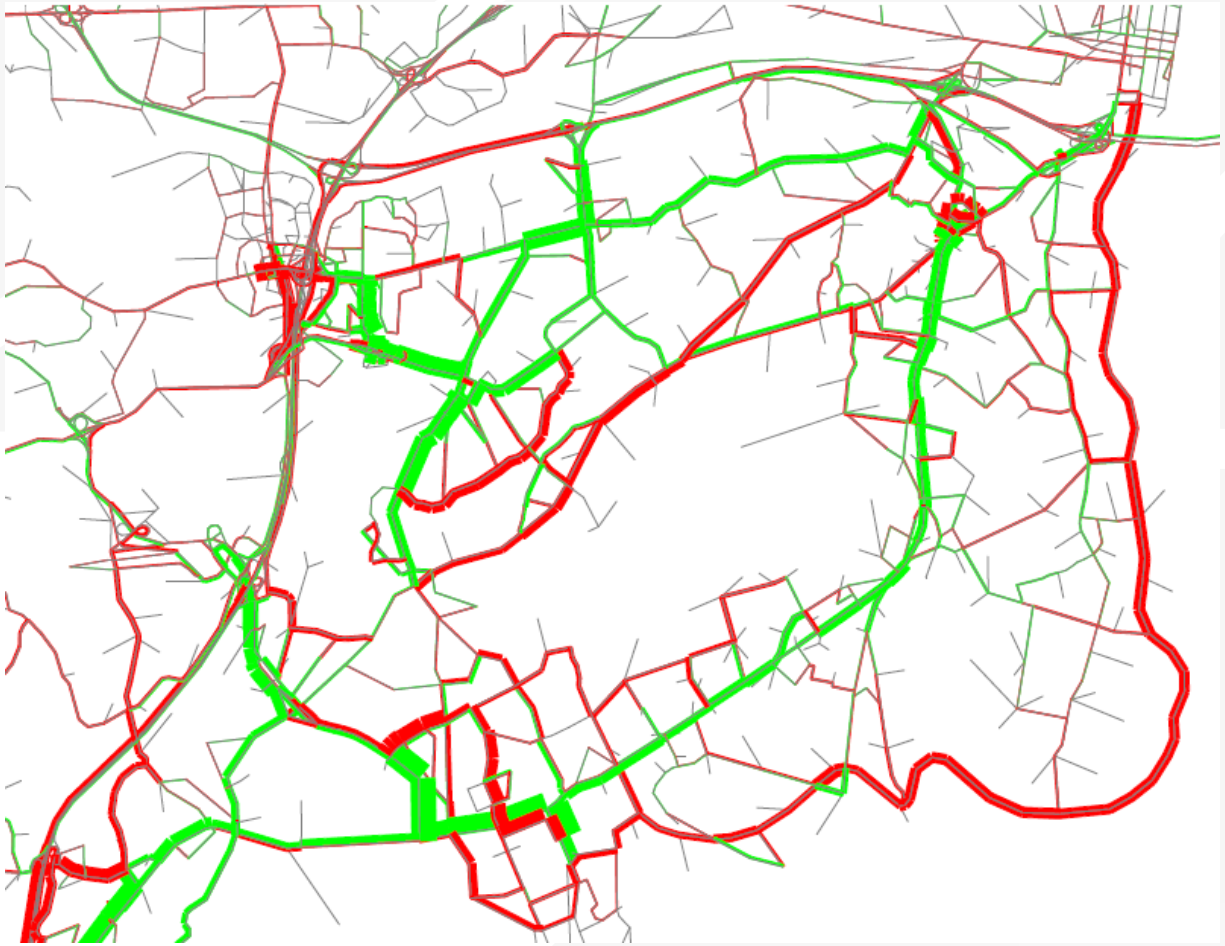
Intersection Modeling

- PM Volume Comparison: Intersection Modeling vs Control Device Method



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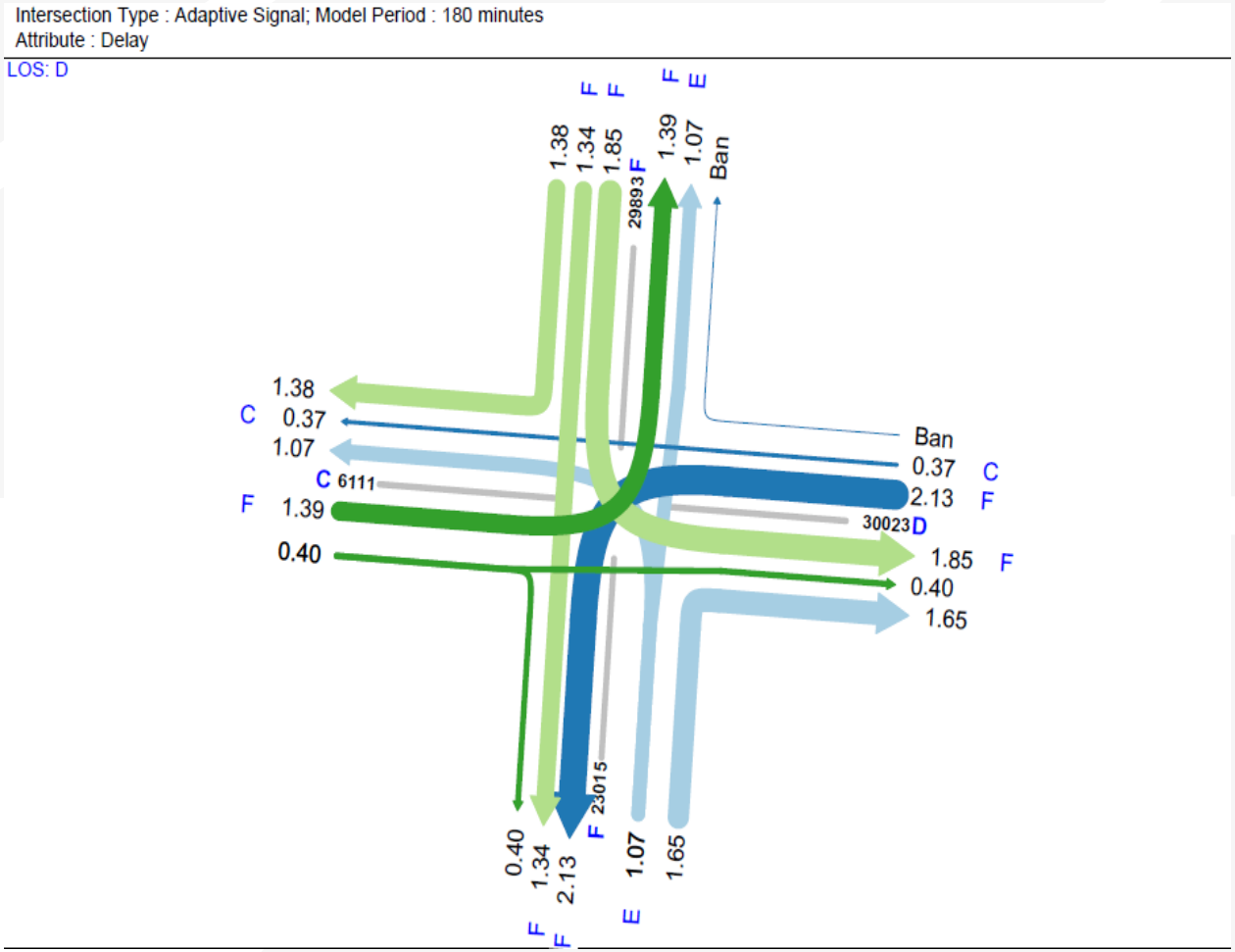
Intersection Modeling

- Intersection LOS
- Comparisons with Traffic Analysis Software



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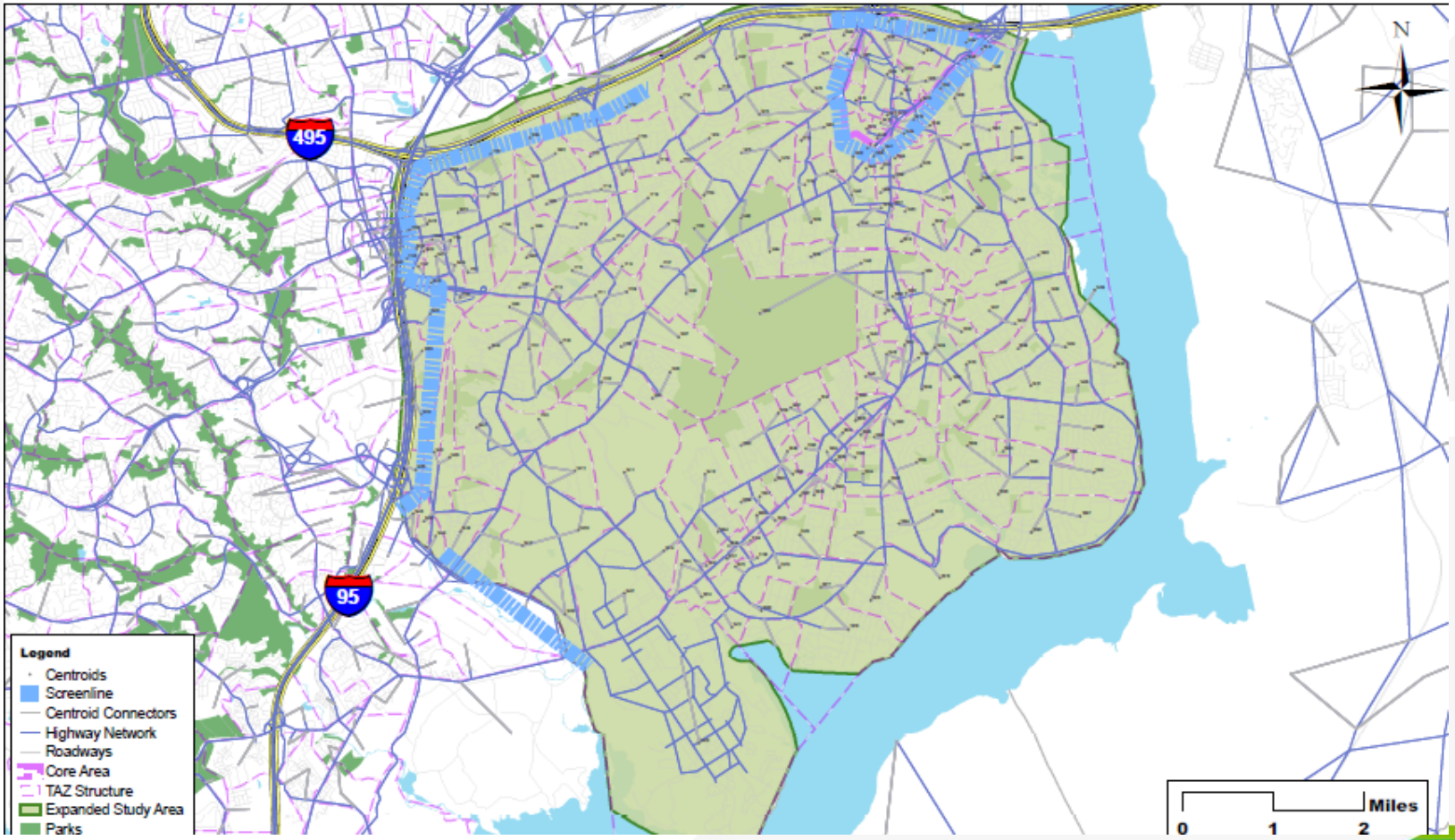
Model Validation

Screenlines



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Model Validation

Model-Estimated vs. Observed Daily Volumes

Policy Issues	% Difference (%RMSE)	
	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%)

Conclusions

- 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

Acknowledgement

- Fairfax County Department of Transportation (David Kline)
- Cambridge Systematics staff (Jay Evans, P.E., AICP, Xuemei Liu, Ph.D., Keir Opie)