Overview

- FY 2016 Strategic Plan implementation Task Orders

- Task Order 16.2 – Advice and Testing

- Task Order 16.3 – Managed Lanes

- Task Order 16.4 – Non-Motorized Model Enhancement

- Task Order 16.5– Mode Choice Model Enhancement

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Task Order 16.2 Advice and Testing

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Task Order 16.2 – Advice and Testing

➤ CS working with COG staff
  » Version control and bug-tracking software
  » Speed/Travel time validation improvement
  » Revise bus speed linkage to highway speeds
  » Develop parcel-level development database (specifications)
  » Develop census and household travel survey database (specifications)
  » Prepare non-motorized GIS database

➤ COG Staff with CS advising

Task Order 16.2 – Advice and Testing

➤ Version control and bug-tracking software
- » Survey of select MPOs (ARC, MTC, PSRC, SANDAG)
- » Current version control system – GitHub
- » GitHub Clients – GitHub for Windows
- » Recommendations
  - ▪ Recommend starting with GitHub and GitHub for Windows
  - ▪ Test another Git graphical user interface (GUI) tool such as SmartGit if further needs are identified during implementation tests
  - ▪ Establish a review process for incorporating new changes
  - ▪ Establish a unit testing approach – a method for validating new improvements within a modular unit of the model – as part of the integration process
  - ▪ Designate a Git guru/manager

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Task Order 16.2 – Advice and Testing

➤ Speed/Travel time validation improvement

» Volume delay functions for freeways

» Review recent studies

» Evaluate observed speed data

» Refine volume delay functions for freeways

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Task Order 16.2 – Advice and Testing

➤ Revise bus speed linkage to highway speeds

  » Review the latest practice
    ▪ Bus speed curves
    ▪ Regression model
    ▪ Highway time/speed with bus delay

  » Factors affecting transit speeds on mixed traffic
    ▪ Auto travel speed/time on roadway network
    ▪ Acceleration/deceleration of transit vehicles
    ▪ Dwell time at stops/stations
    ▪ Recovery time at the end of each trip

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Task Order 16.2 – Advice and Testing

➤ Revise bus speed linkage to highway speeds

» Establish an explicit relationship between bus speed and highway speed, along with bus delay

- $Time_{bus} = Time_{auto} + Bus\ Delay$
- Transit submodes, peak and off-peak periods, area types, and facility types
- Considering capping: minimum speed

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Task Order 16.2 – Advice and Testing

➤ Parcel/Point data development

- » Synthesis of existing databases
- » Database specification
- » Options for addressing limitations and issues

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Parcel Polygon/Point Data

- Maryland: MdProperty View (Maryland Department of Planning)
  - » Geographic representation of real property as point or polygon (X, Y)
  - » Parcel size (land area) and building size (number of buildings, stories, units, foundation structure size)
  - » Land use activity of each parcel (land use classification)

- District of Columbia
  - » DC GIS OpenData: Owner Point/Polygons

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Parcel Polygon/Point Data

Jurisdiction	Number of Parcels (2012/13)
Montgomery	336,764
Prince George's	291,961
Anne Arundel	211,091
Howard	106,404
Frederick	95,671
Carroll	66,501
Charles	64,845
St. Mary's	49,259
Calvert	42,799
Total	1,265,295

Source: MdProperty View Database, Maryland Department of Planning

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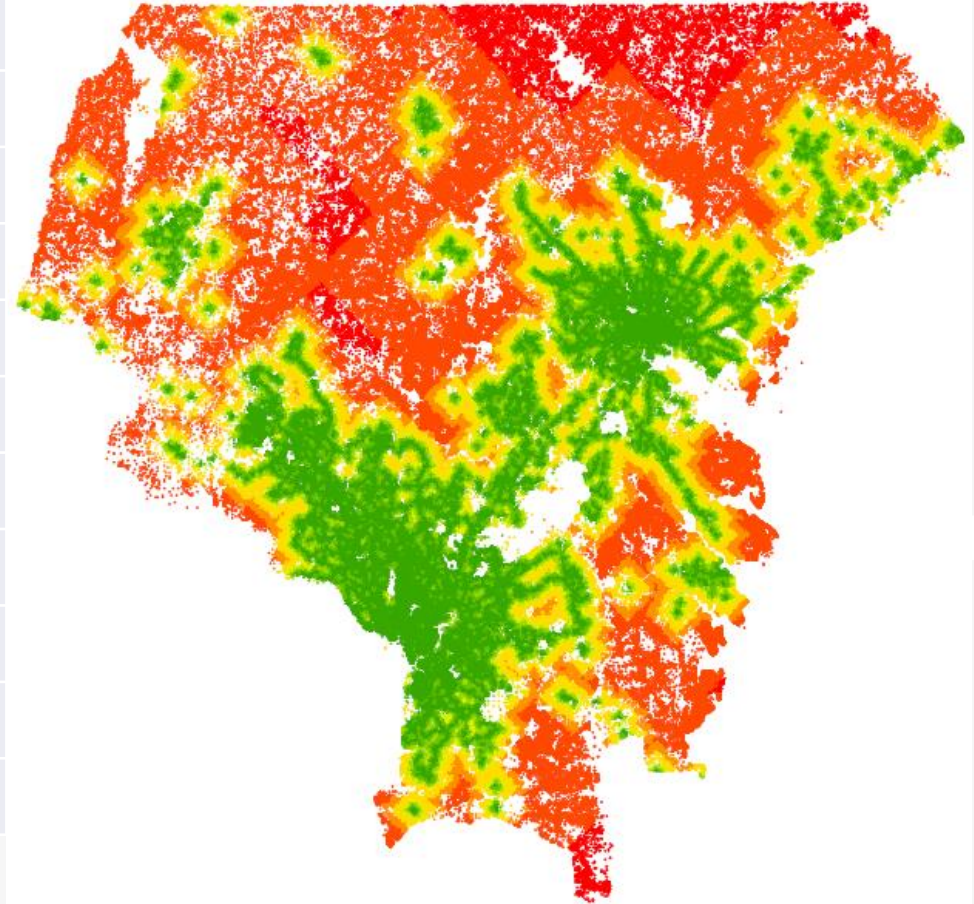
Parcel Polygon/Point Data

➤ Virginia

  » Public sources: apparently available online or upon request
    ▪ Alexandria, Arlington, City of Falls Church, Fairfax County,
    ▪ Fauquier, Spotsylvania, Stafford, King George, Clarke County

  » Public sources: apparently available with a fee
    ▪ City of Fairfax
    ▪ City of Fredericksburg
    ▪ Manassas
    ▪ Manassas Park
    ▪ Loudoun County
    ▪ Prince William County

  » Private vendors with a fee

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Potential Parcel-Level Buffer Variables

Category	Variables
Density	Employment by categories, households, college students, school students
Diversity (Land Use Mix)	Entropy, population and jobs mix measures
Design	Intersection by types Street network connectivity
Access to transit	Distance to nearest transit stop/station Density of transit stops/stations

Task Order 16.3 Managed Lane Modeling

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Overview

> Task Order 16.3 – Managed lanes

» Objective

» Approach

» Schedule

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Objectives

➤ To improve the TPB managed lane modeling capability

» Improvements will take into consideration regional needs and constraints

» Data availability

» Long-term model improvements will be considered

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Approach

➤ Review current practice resources

» NCHRP 364 - Estimating Toll Road Demand and Revenue

» NCHRP 722 - Assessing Highway Tolling and Pricing Options and Impacts

» Select MPO model documentation review

▪ SCAG, SANDAG, WDOT, MTC, DRCOG, SE FLORIDA

➤ Review of current TPB toll/managed lane treatment

» Methodology

» Issues with current methodology

» Prior consultant recommendations

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Approach (continued)

➤ Review data needs

➤ Perform a gap analysis

» Short-term improvements

» Longer-term improvements

➤ Recommendations

➤ Potential implementation

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Current "State-of-the-Practice"

➤ Five main approaches to modeling managed lanes

  » Implementation of managed lanes at the mode choice component of 4-step model

  » Modeling managed lanes within the trip assignment component through trip diversions:

    ▪ Monetary toll is translated into value of time (VOT)

    ▪ Application of binary route type choice model (toll versus non-toll)

  » Post-processing steps to divert volume from general purpose lanes to managed lanes

  » Sketch planning methods (example: FHWA's model)

  » As part of activity-based model (ABM) – toll in decision hierarchy

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Key Findings (1)

➤ There is no consensus for best method in representing managed lanes in regional models

➤ Very few models have incorporated all trip and tour-level dimensions in consistent way

➤ Many models use assignment and binary route type choice models (toll versus non-toll)

➤ Some regions apply peak-spreading models, with ABMs offering a better framework for their implementation

 » Note: Peak-spreading or time of day models are sensitive to travel times, but not to varying toll costs throughout the day

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Key Findings (2)

➤ Many models, including ABMs are characterized by a discrepancy between the user segmentation VOT in the demand model compared to network simulation

➤ There are observed inconsistencies between generated trip tables for toll users and their assignment onto highway networks

➤ Toll models attempt to equilibrate supply and demand by feeding travel times and costs from the assignment step back to trip distribution or mode choice

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Key Findings (3)

➤ Among reviewed models, SANDAG, SE FL, and ARC utilize an ABM framework for regional travel and managed lanes modeling

➤ SCAG, Portland Metro, and NCTCOG utilize 4-step models using binary choice and assignment models to represent toll roads

➤ DRCOG uses two models:

» Trip based model: toll structure is coded into the trip distribution step and highway assignment

» ABM: tolls represented in decision hierarchy

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Review Conclusions

➤ NCHRP 722 recommends incorporating pricing at the assignment stage and as part of generalized cost function

➤ The report also recommends segmentation by mode, occupancy, and purpose

➤ The following features are recommended in managed lanes projects:

» Mode choice and time-of-day choice that represent first-order response to pricing

» Multiclass assignment (to minimize assignment bias) or all-or-nothing assignment

» Network simulation and route choice sensitivity to tolls

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Next Steps

- Wrap up documentation of current practice of modeling managed lanes in the regional modeling (March)

- Evaluate appropriate near-term options for managed lanes modeling (April)

- Review data availability to support managed lanes modeling (April)

- Make short-term implementation recommendations (May)

- Potentially begin implementation (June)

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Task Order 16.4 Non-Motorized Model Enhancement

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Non-Motorized Model Enhancement

- Establish a baseline

- Provide an update to the latest practice of modeling non-motorized travel in regional modeling framework

- Evaluate options for enhancing non-motorized travel modeling

- Make recommendations

- Begin implementation

Task Order 16.5 Mode Choice Model Enhancement

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Mode Choice Model Enhancement

➤ Review the latest practice

➤ Evaluate options for enhancing mode choice modeling

- Representation of nonmotorized transit access

- Inclusion of land-use and built-environment variables

- Segmentation of time periods

- Model structure and model forms

➤ Make recommendations

➤ Begin implementation

Questions?

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