CAMBRIDGE SYSTEMATICS

Think Forward

FY 2016 Strategic Plan Implementation Task Orders

Status Update

presented to

Travel Forecasting Subcommittee

presented by

Cambridge Systematics, Inc.

Jay Evans, P.E. and Feng Liu, Ph.D.

July 22, 2016

Overview

- 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

Task Order 16.2 Advice and Testing

CAMBRIDGE SYSTEMATICS

Task Order 16.2 Advice and Testing

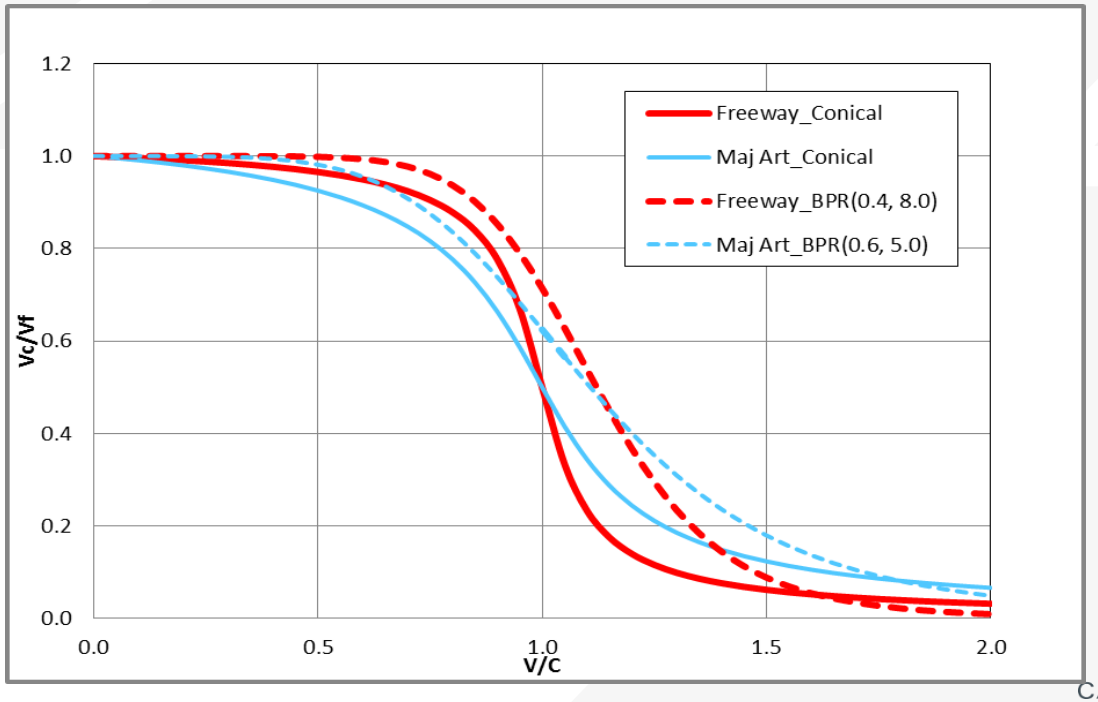
- CS, working with COG Staff
  - Version Control and Bug-Tracking Software
  - Speed/Travel Time Validation Improvement
  - Revise Bus Speed Linkage to Highway Speeds
  - Develop Parcel-Level Development Database (Specs)
  - Develop Census and Household Travel Survey Database (Specs)
  - Prepare Non-Motorized GIS Database (Specs)
- COG Staff, with CS Advising

Version Control and Bug-Tracking Software

- Recommendations
  - Recommend starting with GitHub and GitHub for Windows for version control and issue-tracking
  - 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
  - Designate a Git guru/manager
  - Assign a central controller for each project to manage issue resolution

Speed/Travel Time Validation Improvement (Gallop/CS)

- Recommendations
  - Testing modified BPR functions for freeways and expressways and major arterials.
  - Suggested initial values for Alpha and Beta are 0.4 and 8.0, respectively



CAMBRIDGE SYSTEMATICS

Revise Bus Speed Linkage to Highway Speeds

- Recommendation Considerations
  - Good baseline bus run time/speed
  - Future bus run time/speeds are based on relative changes in highway time/speeds
  - Segmentation by area types/facility types

Implementation of Public Transport Scripts (Gallop)

- Implemented a set of PT scripts for transit skim and assignment processes
- PT generated skim files are in the same format as the TB generated skim files
- Refined the PT process to consider station escalator/walk time at Metrorail stations and "shadow price" of Metrorail PnR stations
- Validated the PT generated skim data
  - Reasonableness of various non-transit links/legs
  - Reasonableness of PT generated skim data
  - Comparison of PT and TB generated skim data

Develop Parcel-Level Development Database

- Recommendations
  - MdProperty View and DC GIS OpenData serves as the base data for jurisdictions in Maryland and DC, with efforts to improve quality
  - Parcel point/polygon data from local jurisdictions in Virginia should be compiled, processed, and standardized in a consistent georeferenced system
  - The new consolidated database should include key attributes such as coordinates, standardized property use/land use code, and a size variable such as square footage, at a minimum

Develop Census and Household Travel Survey Database

- Recommendations
  - Household Travel Survey 2007/8 and Transit On-Board Survey processing to support short- and long-term model improvement implementation
    - Geocoding to the block level
    - Developing micro-level variables in conjunction with other GIS database including non-motorized GIS database

Prepare Non-Motorized GIS Database

- Recommendations
  - Local non-motorized GIS data such as sidewalk, bike facilities and trail should be used where available
  - OpenStreetMap data provide an option for those jurisdictions where local non-motorized GIS data are currently unavailable
  - When compiling and collecting local data, standardization is needed to classify non-motorized facilities such as bike treatments of roadways

Task Order 16.3 Managed Lane Modeling

CAMBRIDGE SYSTEMATICS

Recommended Approach

1. Estimate/transfer VOT distributions
2. Define a set of VOT ranges
3. Obtain skims for each VOT level
4. Apply mode choice model separately for each segment, using the skims pertaining to that segment's VOT
5. Segment highway assignment by VOT level

Task Order 16.4 Non-Motorized Model Enhancement

CAMBRIDGE SYSTEMATICS

Non-Motorized Model Enhancement

- More recent trends
  - more accurate measurements of factors influencing non-motorized travel
  - more analytical capabilities, which enable evaluation and prioritization of infrastructure investments on active transportation modes

Non-Motorized Model Enhancement

- Recommendation Considerations
  - In the short-term, improve the trip-based model by enhancing the binary modal splits at the trip generation stage with use of disaggregate model estimation using 2007/8 household travel survey data and the existing database of information related to built-environment and non-motorized facilities.

Non-Motorized Model Enhancement

- Recommendation Considerations
  - In the longer-term (i.e., development of an activity-based model), incorporate non-motorized travel as part of the mode choice model nest structure, with full use of disaggregate model estimation and a new, integrated parcel-level database and a non-motorized facility database.

Non-Motorized Model Enhancement

- Short Term Implementation
  - A refined geographic unit of analysis is preferred
    - Sub-TAZ structure which can be developed with a combination of TAZ structures used in the existing county-level models in the region, e.g., Fairfax, Montgomery, Prince George's, and Loudoun.
    - Census Block geography
    - Parcel-level or parcel-point-buffer

Non-Motorized Model Enhancement

- Mode Estimation
  - Household Travel Survey 2007/8
  - Census and employment data at the block level
  - Non-motorized facility database

Task Order 16.5 Mode Choice Model Enhancement

CAMBRIDGE SYSTEMATICS

Transit Technology Choice

- Transit Technologies: CRT, LRT, BRT, Subway, Express Bus, Local Bus
- MPO models consider transit technology choice in different places:
  - Mode choice
  - Transit assignment
    - Simpler specification
    - Avoids labeling issues
- Recommendation: transit assignment

Access to Transit Measures

- Recommendations
  - Accessibility measures as replacement to density variables in mode choice
    - Measure linkage between transit and activity centers
  - Road network connectivity measures
    - Connectivity important to transit access
  - Land use mix variables
    - Mixed use typical of transit-oriented-development (TOD)

Transit Attributes in Mode Choice

- Recommendations
  - IVT discounts on premium transit service
    - Relates to superior attributes of these services
  - Consider non-traditional transit attributes
    - e.g., reliability, branding, station amenities, etc.
    - Reliance on transit attributes rather than model constants
  - Incorporate crowding effects
    - Limit to Metrorail service for initial deployment
    - Cube software includes this capability

Transit Path-Building & Assignment

- Recommendations
  - Update path-building & assignment to use Cube-PT's crowding capabilities
  - Include non-traditional transit attributes in path-builder and assignment processes
  - Implement transit skim feedback
    - Similar to highway congestion feedback
    - Ensures crowding effects on demand & supply side equilibrate

Data Needs

- Local street-level data
- Detailed Metrorail information
  - Effective capacities by time of day & route
  - Observed demand by time of day, route, station
  - Other qualitative or quantitative information
- Transit on-time performance by operator or on specific routes
- Classification of transit attributes by transit technology

Model Estimation, Calibration, Validation

- Recommendations
  - Use existing survey data to estimate new mode choice models
  - Model validation should compare model along more localized measures (e.g., corridor level)
  - Calibration & validation of mode choice & transit assignment should be handled jointly
  - Sensitivity tests should be developed