Status report on COG/TPB's travel demand modeling improvement efforts

presented to

Travel Forecasting Subcommittee

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> CAMBRIDGE SYSTEMATICS

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Agenda

- FY15 work program quick refresher
- FYI6 work program to date
- Short-term implementation plan for trip-based model improvement
- Discussion



Relevant activities and products of the FY 2015 work program

- Stakeholder survey, meeting, and summary report
- National MPO survey and summary report
- Oraft seven-year strategic plan for model improvement



What's been learned from stakeholders?

- Nonmotorized travel should be improved
- Transit submodes need to be better distinguished
- Transit speeds need to be better linked to highway congestion
- Managed lanes are of strong interest and handling in the model could be improved



Key concepts from the strategic plan

- Developed with mindfulness of both stakeholder interests and the state of the practice
- Plan consists of three main phases of work:
 - » FY16–17: Version 2.5 Trip-based model improvements
 - » FY18–20: Version 3.0 Activity-based model with existing data
 - » FY21-22: Version 3.2 Enhanced activity-based model with updated data



Since the September TFS meeting...

- TPB staff formulated a task list for short-term modeling improvements (based on consultant recommendations)
- Workshop was held with CS to vet tasks and set priorities
- TPB staff and CS formulated an implementation plan for tripbased modeling improvements



Implementation plan for trip-based model improvements

- Transmitted on 11/13 as a memorandum.
- Incorporated tasks identified by both TPB and CS staff
 - » 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

Software/Scripts

- » Version control and bug-tracking software
 - CS will advise; TPB staff will implement, as warranted
- Model Structure/Components
 - » Non-resident trips update: special generators, airports, visitors
 - CS will offer input on approach; TPB staff will implement
 - » Screenline/cutlines update
 - TPB staff will lead this work
 - » Speed/travel time validation improvement
 - CS will adjust freeway volume delay functions using input data to be supplied by TPB staff



Task Order 16.2 – Advice and Testing (continued)

Transit

- » Migration of the path-building software
- » Perform transit network coding enhancements
- » Include transit drive access trips into highway assignment
- » Add external-to-internal transit trips
- » Revise bus speed linkage to highway speeds
- » Migration of mode choice application software
- » Walk access script enhancement



Significant CS role in performing

Primarily performed by TPB staff



Task Order 16.2 – Advice and Testing (continued)

- Data Preparation
 - » Develop parcel-level development database
 - » Develop Census and Household Travel Survey database
 - » Prepare non-motorized GIS database



Task Order 16.3 – Managed Lanes

- CS will explore options, offer design decisions that can be acted on, and begin to implement methods that improve HOT/HOV/managed lane modeling
- TPB staff will confirm the availability of supporting data
- Application experience in other regions will be used to inform recommendations
- COG/TPB staff plans to continue to review and test the revised modeling scripts that AECOM delivered to COG at the end of FY 14 to enhance toll and HOT modeling
- Implementation will be completed in FY17



Task Order 16.4 – Non-Motorized Model Enhancement

- Providing information and supporting design decision
- Possibilities include
 - » improving the existing non-motorized trip generation
 - » adopting a separate accessibility-based tool
 - » improving supply-side data (e.g., facilities database)
- Trip -based model enhancements would be completed in FY17



Task Order 16.5 – Mode Choice Model Enhancement

- Develop the model specifications for a new mode choice model and begin work to implement it.
 - » Use parcel level database and new pathbuilding capabilities would be available
 - » Improved representation of non-motorized access and reduced reliance on geographic constants (such as via inclusion of land-use and built-environment variables)
 - » Potentially less specificity of transit sub-modes in the mode choice step ("flattened mode choice model"), but more specificity in transit path-building and assignment
 - » Differential weights on in-vehicle travel time could be used in path-building to reflect the amenities associated with modes
 - » New mode codes and network coding instructions



Work Program Schedule Overview

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| Adding external-to-internal transit trips | 6 wks | |

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| Revise bus speed linkage to highway speeds | 26 wks | |

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| Migration of mode choice application software (AEMS => ModeChoice | 13 wks | |

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| Walk access script enhancement | 8 wks | |

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| Develop parcel-level development database | | |

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| Develop Census and household travel survey database | | |

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Revise bus speed linkage to highway speeds
Migration of mode choice application software (AEMS => ModeChoice
Walk access script enhancement
Develop parcel-level development database
Create Specifications
Assemble Database
Develop Census and household travel survey database
Develop Census and household travel survey database
Create Specifications
Assemble Database
Prepare non-motorized GIS database
Create Specifications
Begin implementation
Complete implementation of enhancements
Enhance manged lanes modeling
Review alternative approaches/confirm/assemble input data
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Work Program Schedule Task Order 16.2

CS	WBS	Task Name	Duration	11	/15	12/15	1/16	2/16	3/16	4/16	5/16	6/16
16.2	2.1.A	Version control and bug-tracking software	6 wks									
16.2	2.2.A	Non-resident trips update	13 wks									
16.2	2.2.B	Screenlines/cutlines	13 wks									
16.2	2.2.C	Speed/travel time validation improvement	13 wks									•
16.2	2.3.A	Migration of transit path-building software	20 wks									
16.2	2.3.B	Perform transit network coding enhancements	20 wks									
16.2	2.3.C	Include transit drive access trips into highway assignment	6 wks									
16.2	2.3.D	Adding external-to-internal transit trips	6 wks						I			
16.2	2.3.E	Revise bus speed linkage to highway speeds	26 wks									1
16.2	2.3.F	Migration of mode choice application software (AEMS => ModeChoice	13 wks									-
16.2	2.3.G	Walk access script enhancement	8 wks									
16.2	2.4.A	Develop parcel-level development database										
16.2	2.4.A	Create Specifications	4 wks				5					
16.2	2.4.A	Assemble Database	9 wks			9						
16.2	2.4.B	Develop Census and household travel survey database							-			
16.2	2.4.B	Create Specifications	4 wks				Ь					
16.2	2.4.B	Assemble Database	9 wks			P 9						
16.2	2.4.C	Prepare non-motorized GIS database						-				
16.2	2.4.C	Create Specifications	4 wks									
16.2	2.4.C	Begin implementation	14.6 wks						9			
17.x		Complete implementation of enhancements	26 wks									
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Work Program Schedule Task Orders 16.3, 16.4, and 16.5

16.3	3.1.A E	nhance managed lanes modeling							
16.3	3.1.A	Review alternative approaches/confirm/assemble input data	6 wks		Ь				
16.3	3.1.A	Determine/design improvement approach/schedule	6 wks		9		Ь		
16.3	3.1.A	Begin implementation	16.8 wks			(
17.x		Complete implementation of enhancements	26 wks						
16.4	4.1.A E	nhance treatment of non-motorized trips							
16.4	4.1.A	Review alternative approaches/confirm/assemble input data	6 wks		Ь				
16.4	4.1.A	Determine/design improvement approach/schedule	6 wks		>		}		
16.4	4.1.A	Begin implementation	18.6 wks			9			
17.x		Complete implementation of enhancements	26 wks						
16.5	5.1.A I	mprove the trip-based mode choice model							
16.5	5.1.A	Review alternative approaches/confirm/assemble input data	6 wks		Ь				
16.5	5.1.A	Determine/design improvement approach/schedule	6 wks			Ь			
16.5	5.1.A	Begin implementation	18.6 wks			9			
17.x		Complete implementation of enhancements	34.6 wks						
17.x	6.1.A C	General enhancements							
17.x	6.1.A:	Reducing model run times	13 wks						
17.x	6.1.A:	Ease of use and adaptability	13 wks						
17.x	6.1.A:	Error checking automation	13 wks						
17.x	6.1.A4	Review modeling scripts to improve efficiencies	13 wks						
17.x	6.2.C S	ensitivity testing of the regional travel model	16.6 wks						



Next Steps

- Move forward with the implementation program
 - » Commence the FY16 CS task orders
 - » Continue TPB staff activities that support the program
- Continue to gather stakeholder feedback
- Maintain regular reporting at the TFS meetings



Discussion and Questions

