SACOG
Activity-Based Travel Forecasting Model
Featuring ***DaySim***—the Person Day Activity and Travel Simulator

Phase 2

Working Paper Number 2.1
Integration of Phases 1 and 2
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Prepared for

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Prepared by

John L. Bowman, Ph. D.
Transportation Systems and Decision Sciences
5 Beals Street Apt. 3, Brookline, MA 02446 USA
+1-617-232-3478 John_L_Bowman@alum.mit.edu http://JBowman.net

in association with

Mark Bradley
Bradley Research & Consulting

DKS Associates
Transportation Solutions

Introduction

SACOG has been developing a new suite of travel and land use models since 2000 when a household travel and activity survey was done. The current project is Phase 2 of a multi-phase project that is contributing to the overall effort by completing an activity-based travel model that will be applied in the development of the 2007 Metropolitan Transportation Plan and the 2007 ozone State Implementation Plan. Phase 1 is currently underway with 2 consultants (Mark Bradley and John Bowman) under contract. Phase 1 includes the estimation of the Population Synthesizer (PopSyn), the Long Term Choice Simulator, and the Person Day Activity and Travel Simulator (DaySim). Phase 2 will integrate these and other model components in CUBE, carry out validation and calibration exercises, and complete an initial forecast.

This document is the first deliverable of Phase 2, laying out a joint work program that spans phases 1 and 2, and replacing the work programs prepared separately for the two phases. It is needed because phases 1 and 2 are occurring in parallel, their tasks are related, and they share a very tight time schedule.

Work Program

This report provides descriptions of some of the phase 1 tasks and all Phase 2 tasks, as well as notes about task dependencies and known issues.

The accompanying Table 1 lists the tasks as defined in the Phase 1 contract (here numbered 1.0 through 1.12) and the Phase 2 contract (here numbered 2.1 through 2.9), plus an additional Phase 2 task that will be conducted under a separate contract (task 2.0). For each task, the task leader and primary contributors are noted, along with the deliverables, target dates, completion dates (of already completed tasks), participation required of SACOG and its Technical Advisory Committee (TAC), and task dependencies.

Table 2 lists the potential validation checks and calibration actions, as earlier documented in "Technical Memo Number 1: Model System Design".

Task 1.0 Prepare data for estimation

This task, conducted by SACOG staff, with data requirements specified by Mark Bradley and John Bowman, provides the data needed for estimating the models, and much of the data needed for base year model validation. Data preparation has taken substantially longer than anticipated, and is still not quite complete. Efforts will be made in the subsequent tasks of Phase 1 to reduce the schedule slippage, but it is likely that the main Phase 1 deliverable—Activity-based travel demand model application program, a task 1.12 deliverable—will be at least a month late.

Task 1.1 Finalize demand model design

This task is complete, and its deliverable, "Technical Memo Number 1: Model System Design", was included as part of the RFP for Phase 2.

Task 1.2 Write the demand model application program shell

This task will, among other things, provide a set of template files defining the input and output interfaces of the activity-based models within the larger model system framework. These are required by task 2.6, which integrates the activity models into the larger system, and can be delivered within a few weeks after the task 1.0 data is finalized.

Tasks 1.3 and 1.11 Population synthesizer (includes stage 2 of validation and calibration)

These two tasks design and implement the population synthesizer (PopSyn). The current target completion is August 12, although it would be nice to complete them sooner so that PopSyn can be incorporated into the model system sooner in task 2.6.

These tasks have been intentionally deferred while the ARC PopSyn is being finished (by PBConsult, with support from John Bowman), in the hope that it will be done in time for use by SACOG. However, although the ARC PopSyn is nearing completion, it is still not done, and its programmer has been hired by Citilabs. In addition, minor adjustments may be needed to use it for SACOG. There are two possibilities for getting it adopted (and potentially adapted) for use by SACOG. The first option is to wait and see whether PBConsult (with a new programmer) finishes it for ARC in a form that is directly usable by SACOG. It is unlikely that this approach will yield a usable PopSyn in time to use it in Phase 2, so with this approach we would develop and use a simpler population synthesizer, and possibly switch to the ARC PopSyn in a later phase of the project (2006 or later). The second option is for SACOG to convince (and possibly pay) Citilabs to have the original programmer complete the PopSyn for SACOG now. If SACOG wants to pursue the second option, this should happen now, so that the choice of option can be finalized by the end of June and the PopSyn can be finished by August 12.

Tasks 1.4 through 1.10 Model estimation tasks

These tasks depend heavily on the availability of task 1.0 data and have been deferred while the data is being prepared. As mentioned above, although every effort will be made here to reduce the slippage that has occurred in data preparation, it is likely that the delivery dates of these tasks will slip by at least a month.

Task 1.12 Finalize activity-travel demand model application program and internally validate entire model system with estimation data (includes stage 1 of validation and calibration)

This task incorporates the results of tasks 1.4 through 1.10, so it is subject to the same potential delays arising from delays in data prep task 1.0. The subsequent validation, integration and calibration tasks (2.2, 2.3, 2.6 and 2.7) use the program produced by this task.

Task 2.0 Calibrate Existing Six-County Version of SACMET

This is an optional task that was not included in DKS' $200,000 cost proposal. It assumes that the last MINUTP MATRIX code running in SACMET is converted to TP+ as part of a separate project. It is included in this proposal as an optional task, and would be an add-on to the scope and budget for this proposal, if SACOG so desires. The objectives of the task are three: 1) complete routine system checks, de-bugging, and calibration of the converted MINUTP mode choice code; 2) complete a series of system checks for the roadway and transit networks for the latest version of the 6-county SACMET model; and 3) prepare and document a calibration and validation technical memorandum for the TP+/Cube version of the 6-county SACMET model. The primary benefit of this work for this project is that the confidence level of the skims, which will be used for the activity model estimation, will be increased. This calibrated version of the aggregate SACMET model will be used as a point of comparison for the calibrated activity model later in the project. An additional benefit of this work to SACOG is that it will have validation documentation for the version of SACMET which will be utilized for the 2005 MTP update.

Task 2.1 Working Paper on Integration of Phases 1 and 2

The current working paper is the product of task 2.1, which is substantially complete.

Task 2.2 Compare Synthetic Population to Expanded Household Survey (stage 3 of validation and calibration)

The DKS Team will compare the activity-based model results for synthetic population to reported results for expanded household survey. This effort will be lead by Mark Bradley with some assistance from John Bowman.

When the activity based models have been validated with the survey sample (task 1.12), and the synthetic population has been validated, we can substitute the synthetic population for the survey sample, and see how closely the new predictions match the expanded survey sample results at each step down the model chain. The aggregate statistics used for the comparison will be the same as in Stage 1 validation (task 1.12). New discrepancies may appear if the synthetic population differs substantially from the expanded survey. Although it will be impossible to know for sure whether discrepancies are caused by weaknesses in the models or in the expanded household survey distribution, this validation test may indicate the need to re-estimate some of

the models or, possibly, to introduce calibration parameters to compensate for weaknesses in the survey sample.

Task 2.3 Calibrate Long-term Components (stage 4 of validation and calibration)

The DKS Team will calibrate long term components of the activity-based model system with census and SACOG counts. John Bowman, with assistance from Mark Bradley, will conduct this task.

Stage 4 begins the formal calibration process. The base scenario predictions of the long term model components (work location choice, school location choice and auto availability) are compared to census data (work location, auto availability) and to SACOG inventories (school location). If significant discrepancies exist, then it may be necessary to include procedures that partially constrain the location choice models so that the model results match census totals. In application, the census constraints would be replaced by employment and school enrollment forecasts of the land use model. Alternatively, it may be possible to implement a few simple calibration factors. In the best case, the results would match closely enough without calibration.

Task 2.2 and 2.3 Deliverable: Working Paper on Household Synthesizer and Long-Term Components of the Activity Model.

Task 2.4 Adaptation of Commercial Vehicle Model

The DKS Team will adapt the commercial vehicle model and the external generators from the current SACMET model into the new model system. This effort will be lead by Bruce Griesenbeck with assistance from John Gibb.

To the extent possible the current zone-based model structure will be used. The most important change will be the use of new employment categories for the commercial vehicle model update.

Task 2.5 Development of an Airport Access Model

The DKS Team will adapt the airport access model that was developed as part of the Downtown-Natomas-Airport light rail AA/EIS/EIR project into the new model system. This effort will be lead by John Gibb with assistance from Bruce Griesenbeck. DKS will assist SACOG in securing any permissions or release to use the RT datasets.

For the RT project, the application was applied to an expanded version of the airport passenger survey dataset. The advantages of using the survey dataset are many. The survey dataset includes both resident and non-resident traveler characteristics. No locally-based data source includes detailed information on non-resident travelers. The survey includes detailed information about the travelers which are crucial to their mode choice decision. Examples are the duration of the trip (not the ground access trip, but the trip they are taking from the Airport), the presence/absence of a household member or co-worker who could drive them to the airport, the

purpose of their trip, how much luggage they are carrying, etc. For the RT project, the model was applied as a spreadsheet, with skims dropped in from SACMET. Resulting passenger information was manually merged in with the non-airport results of SACMET model runs.

For this project, a stand-alone program will be developed which will allow for airport ground access to be forecasted as a new trip purpose, and fully integrated with either aggregate SACMET (for the 2005 MTP Update) or for the activity model. The program will require a simple set of user inputs (total airport passenger origins and destinations, etc.), and the standalone program will scale up the survey dataset accordingly, compute airport passenger trips by mode, apply user-specified peaking or diurnal factors, and prepare assignable vehicle and person trip tables which can be merged in with other trip tables for final assignments.

Task 2.6 Establish Trip Assignment Procedures in CUBE (or Voyager)

The DKS team will establish trip assignment procedures in the CUBE (or Voyager) software framework. This effort will be conducted by John Gibb with assistance from Bruce Griesenbeck.

As shown in Figure 1, page 4 of the Phase 1 Model System Design, the person trip list will be aggregated into Origin/Destination trip tables and combined with the other trip types. Assignments of vehicle trips and transit person trips will be done using Citilabs software programs. The components of the travel forecasting model system will be integrated with an iterative equilibration between traffic assignment and the tour and trip generating components as described in Technical Memo Number 1 'Model System Design' on page 3 and in Figure 1. This will be done within the Cube Application Manager framework. The code to apply the individual models will be provided by Mark Bradley and John Bowman in executable units (DLL's) that can be called from within the Cube application.

SACOG is extremely interested in using Voyager as the primary platform for the new model. It is possible to simply run TP+ or CUBE code within the Voyager "front end" program. However, Voyager offers options and functionality which are not available in TP+ or CUBE. DKS can assist SACOG in evaluating what, if any, of the additional features of Voyager may be of interest for the activity model. For purposes of Phase 2, though, it is explicitly assumed that the primary assignment procedures will be zone-based rather than node-based.

At the conclusion of Task 6, it is proposed that a SACMET TAC meeting be held. The purpose of the meeting will be to share results of Tasks 1-6, and to get input from the TAC on some of the validation tests and sensitivity tests which the TAC would like to include in Tasks 7 and 8. It is expected that comparisons of the results and capabilities of the activity model to results of the aggregate SACMET will be requested. The DKS Team will assist SACOG in developing the agenda for this TAC meeting, and developing a proposal for validation and sensitivity test regime for discussion by the TAC. Working papers (three total) would be provided for review by the TAC.

Deliverable for Tasks 2.4, 2.5, and 2.6: Working Paper on Travel Model Enhancements and Assignment Procedures.

Task 2.7 Calibrate Integrated Model System (validation and calibration stage 5)

The DKS Team will calibrate the integrated model system with expanded on-board survey, census, screenlines, and other counts. This critical stage of the model development process will be joint effort involving Bruce Griesenbeck, John Gibb, Mark Bradley and John Bowman.

After validation and calibration Stages 1 through 4, the population synthesizer and activity based model will be ready for validation and calibration of the integrated model system. By this time, the CUBE-based model system application will be in place, integrating the population synthesizer, activity based model, commercial flows, special and external generators, and assignment models. A validation run will consist of running a base year 2000 scenario of the entire model system to an equilibrated state, and comparing aggregate results to the best available external information about the actual base year characteristics on a typical weekday. The aggregate comparison will include comparisons made in validation and calibration stages 1 and 4, as well as new comparisons based on screenline counts, transit boarding counts, and transit trip estimates from the on-board survey. Comparisons will also be made between the new activity model and the aggregate SACMET results.

It is expected that some substantial discrepancies will surface at this time. In particular, it is not until this stage that comparisons can be made of modeled results to screenline counts, the primary data for compensating for underreporting of trips that probably occurred in the household travel survey. Transit counts or expanded onboard survey results will be used to identify mode share discrepancies resulting from limited volumes of transit in the estimation data set. If estimates of bicycle OD flows or screenline counts are available, especially in Davis and at least one lower traffic area, then these data will be used in calibration as well. Other discrepancies may also surface, such as time-of-day results between the counts and the model outputs.

At a minimum, the validation of the activity model would include normal validation tests (trip/tour length frequency, traffic volumes by screenline or facility type, transit volumes, etc.) would be provided. Comparisons between the activity model and aggregate SACMET would be provided for these tests.

Ideally, sensitivity tests would also be conducted, focusing on three areas: 1) pricing; 2) land use mix/density and urban form; and 3) transportation infrastructure. For the sensitivity tests, the results of the activity model would be highlighted, and some comparisons to results of similar tests using aggregate SACMET would be made. However, in light of the project's time pressures, and the likely delay in the beginning of this task due to schedule slips arising from delayed data at the beginning of Phase 1, it is likely that aggregate sensitivity tests will not be conducted in task 2.7. Rather, the primary aggregate sensitivity test of Phase 2 would occur with the task 2.8 model forecast.

Task 2.8 Produce Initial Forecast to Test Model Performance

The DKS Team will produce an initial forecast to test model performance. This task will be joint effort involving Bruce Griesenbeck, John Gibb, Mark Bradley and John Bowman. An initial application of the completed model system will include a forecast of the preferred land use scenario and accompanying transportation networks from the Sacramento Region Blueprint: Land Use/Transportation Study, December 2004. Transportation system performance measures developed for the Blueprint study will be produced from the new model system for comparative purposes.

Performance of this task requires provision of future year land use datasets by SACOG, including for the forecast year all the data that was assembled for the base year and actually used as input in the new model system. In light of the tight timeframe for this project it will be important that this data be available on October 1, 2005.

This task also requires provision of future year network data. This involves converting the format of the network data used for the Blueprint forecast to the new formats determined in task 2.6. DKS will perform this data conversion.

Schedule slippage arising from delays in early phases might make it impossible to complete task 2.8 in 2005. If this should happen, then the following contingency plan would be implemented. First, the task 2.9 final report would be produced in 2005 or early 2006 prior to the completion of task 2.8. Second, the task 2.8 forecast would be completed in early 2006. Third, adjustment of the new model system, to overcome problems discovered during the completion of the task 2.8 forecast, would be deferred and completed as part of subsequent phases of SACOG's ongoing long-term effort to develop and enhance its suite of travel and land use models.

Task 2.9 Produce the Final Report

The DKS Team will produce the final report that covers material in all the working papers from Phase 1 and Phase 2, plus comments received from SACOG staff and model users in the region. This task will be joint effort involving Bruce Griesenbeck, John Gibb, Mark Bradley and John Bowman.

Table 1: Integrated Task List and Schedule

Task	Who[1]	Deliverable	Target Start	Target Deliver	Actual Deliver	Dependencies; SACOG and TAC participation,
1.0. Prepare data for estimation	SAC	Census, network and TAZ data.		Feb 25	Apr 12	
		Parcel data; on-board and survey data with parcel info		Mar 11		
1.1. Finalize demand model design	JLB MAB	Technical memo 1 on model design specification, including model hierarchy, choice set definitions, range of variables to be tested, and proposed calibration and validation procedures	Feb 25	Mar 11	Mar 4	Joint participation in design by Gordon Garry and others as needed.
1.2. Write the demand model application program shell	MAB JLB	Technical memo 1.2 describing the structure of the application program and its use for internal model validation.		Mar 25		SACOG delivery of specified network, TAZ, and on-board survey data by Feb 25 and parcel-level attributes by Mar 11
1.3. Define population synthesizer specification and census data requirements	JLB MAB	Technical memo 1.3 describing population synthesizer specification and input data		Apr 8		SACOG delivery of raw 2000 census data (specific CTPP and STF tables, plus PUMS records for relevant PUMAs) by Feb 25 . Participation by experts in PLACES and land use model outputs.
1.4. Estimate mode choice models	MAB JLB	Technical memo 1.4 describing estimation results and internal validation		Apr 29		Same as task 1.2 above.
1.5. Estimate intermediate stop location choice model	JLB MAB	Technical memo 1.5 describing estimation results and internal validation		Apr 29		Same as task 1.2 above.
1.6. Calculate mode / destination	MAB	Technical memo 1.6 describing the		May 13		Same as task 1.2 above.

[1] Task leader is listed first

Task	Who[1]	Deliverable	Target Start	Target Deliver	Actual Deliver	Dependencies; SACOG and TAC participation,
accessibility measures for use in upper level models	JLB	specification and calculation of measures.				
1.7. Estimate day pattern models: numbers of tours and stops and allocation of stops to tours	MAB JLB	Technical memo 1.7 describing estimation results and internal validation		Jun 3		Same as task 1.2 above.
1.8. Estimate destination choice models: tour, usual work location, usual school location	JLB MAB	Technical memo 1.8 describing estimation results and internal validation		Jun 3		Same as task 1.2 above.
1.9. Estimate auto ownership model	JLB MAB	Technical memo 1.9 describing estimation results and internal validation		Jun 24		Same as task 1.2 above.
1.10. Estimate time of day models	MAB JLB	Technical memo 1.10 describing estimation results and internal validation		Jul 8		Same as task 1.2 above.
1.11. Implement and validate population synthesizer for the base year (stage 2 of validation and calibration)	JLB MAB	Population synthesizer application program. Preliminary technical manual. Technical memo 1.11 on base-year validation.		Aug 12		Delivery of properly formatted 2000 census data and TAZ conversion tables by May 20 .
1.12. Finalize activity-travel demand model application program and internally validate entire model system with estimation data (stage 1 of validation and calibration)	MAB JLB	Activity-based travel demand model application program. Preliminary technical manual. Technical memo 1.12 describing internal validation.		Aug 12		Same as task 1.2 above. May be revisited during subsequent validation and calibration tasks (2.2, 2.3 and 2.7)
2.0. Calibrate Existing Six-County Version of SACMET	DKS		May 25	Aug 31		SACOG provide model files, converted TP+ code
2.1. Working paper on Integration of Phases 1 and 2	JLB	Working paper 2.1 on integration of phases 1 and 2	May 25	Jun 17		**Kick-off meeting (May)**
2.2. Compare Synthetic Population to Expanded HH Survey (stage 3 of validation and calibration)	MAB JLB		Aug 1	Oct 31		Phase 1 done by Aug 12 May be revisited during subsequent validation and calibration tasks (2.3 and 2.7)

Task	Who[1]	Deliverable	Target Start	Target Deliver	Actual Deliver	Dependencies; SACOG and TAC participation,
2.3. Calibrate Long-term components of demand model (stage 4 of validation and calibration)	JLB MAB	Working Paper 2.2/3 on validation with synthetic population (task 2.2) and calibration of Long-Term Components of the Activity Model (task 2.3)	Aug 1	Oct 31		Phase 1 done by Aug 12 (Moved TAC to after task 2.6) May be revisited during subsequent validation and calibration task (2.7)
2.4. Adaptation of Commercial Vehicle Model	DKS		Jun 1	Aug 31		SACOG provide new employment class definitions
2.5. Development of an Airport Access Model	DKS		Jun 1	Aug 31		
2.6. Establish Trip Assignment Procedures in CUBE	DKS	Working Paper 2.4/5/6 on Travel Model Enhancements and Assignment Procedures (tasks 2.4, 2.5 and 2.6) Operational integrated (uncalibrated) model system	Jul 1	Sep 30		Testing and debugging require only dummy model outputs from Phase 1, task 2.4 and task 2.5. Evaluation requires output of working models. Citilabs software to John Bowman upon notice to proceed.
2.7. Calibrate Integrated Model System (stage 5 of validation and calibration)	DKS JLB MAB	Operational integrated (calibrated) model system	Sep 1	Nov 15		**Workshop** **SACMET TAC (Oct)** Calibration cannot begin until task 2.6 produces the operational model system, although preparation of calibration data and procedures can begin before then. Includes validation checks of earlier validation and calibration with tasks (1.12 and 2.3) and may require revisiting those tasks.
2.8. Produce Initial Forecast to Test Model Performance	DKS JLB	Forecast of preferred LU scenario and networks from Blueprint: Land	Oct 1	Nov 30		SACOG provide L.U. datasets by Oct 1.

Task	Who[1]	Deliverable	Target Start	Target Deliver	Actual Deliver	Dependencies; SACOG and TAC participation,
	MAB	Use/Transp Study, Dec 2004				Problems with forecast results may require revisiting earlier project tasks to adjust the model system. Forecasts must be reproduced when tasks 1.12, 2.3 and 2.7 change the model. **SACMET TAC (Dec)**
2.9. Produce the Final Report	DKS JLB MAB	Final Report	Nov 1	Dec 31		All other tasks should be done first. However, the contingency plan for schedule delays would defer completion of task 2.8 until after task 2.9, and defer to subsequent phases any substantial adjustments of the model system needed to resolve problems unearthed in task 2.8.

Table 2: Integrated List of Potential Validation Checks and Calibration Actions

Validation stage (project task)	Data source	Model output level	Validation check	Calibration action
stage 1 (task 1.12) stage 3 (task 2.2)	HH survey (stage 1) SynPop (stage 2)	Work Location	# workers by work end RAD by HH income # workers [regionally] by travel time to work mean travel time to work [by home end RAD] mean travel time to work [by work end RAD] OD matrix [RAD] by person type, HH type	
		School Location	# students by school end RAD by primary & other #students [regional] by travel time to school by person type mean travel time to school [by home end RAD] mean travel time to school [by school end RAD]	

Validation stage (project task)	Data source	Model output level	Validation check	Calibration action
			OD matrix [RAD] by person type	
		Auto Availability	Compare by RAD and regionally: #HH by #vehicles avail, HH size & HH income #HH by #vehicles avail, #workers & HH income #HH by #vehicles avail and #age16+	
		Activity Pattern	#patterns by pattern type, person type, HH type and RAD #patterns by amounts of travel time, activity time, travel+activity time, person type	
		Tour	#tours by purpose, #stops, mode, time period, person type, HH type, RAD quartiles of tour distance by #stops, purp, mode, time period, person type, HH type, RAD tour OD matrix (RAD) by purpose, #stops, mode, time period, person type, HH type time arriving at work by work end RAD tour mode by purpose and subregion (Davis vs all other RADs) mode to work by HH income by work end RAD mode to work by HH income by home end RAD	
		Trip/ Stop	#stops by tour purp, stop purp, mode, time, person type, HH type, RAD quartiles of trip distance by tour purp, stop purp, mode, time, person type, HH type, RAD trip OD matrix [RAD] by tour purp, stop purp, mode, time, person type, HH type, RAD transit trip origins by RAD, transit mode, purpose transit trip destinations by RAD, transit mode, purpose daily transit trips, perhaps by submode	
stage 4 (task 2.3)	census	Work Location	# workers [by work end RAD] by HH income (ctpp2-30) # workers [regionally] by travel time to work (ctpp1-19) mean travel time to work [by home end RAD] (ctpp1-19) mean travel time to work [by work end RAD] (ctpp2-19)	
	SACOG estimates	School Location	# students by school end RAD by primary & other	
	census	Auto Availability	Compare by RAD and regionally: #HH by #vehicles avail, HH size & HH income (ctpp1-76) #HH by #vehicles avail, #workers & HH income (ctpp1-79) #HH by #vehicles avail and #age16+(ctpp1-68)	
stage 5 (task 2.7)	Screen line counts	Assignment	vehicles crossing screenline by time period	Aggregate underreporting of trips across screenlines will require the use of calibration constants in the pattern model and/or stop frequency model to increase the incidence of trips in patterns. Uneven spatial or temporal distribution of discrepancies may require re-estimation of destination or time-of-day models to capture subregional idiosyncrasies
	Transit on-board survey	Assignment	transit trip Os by RAD, submode & purp transit trip Ds by RAD, submode & purp transit OD matrix by purp & time of day	Aggregate under- or over-reporting of transit trips relative to auto trips will require investigation of transit LOS calculations in data, and may require the use of mode-specific calibration constants.

Validation stage (project task)	Data source	Model output level	Validation check	Calibration action
				Submode-specific discrepancies may require re-estimation of mode choice models with submode- specific parameters. Subregional discrepancies will require investigation of transit LOS calculations subregionally. It may require re-estimation of mode choice models with subregion-specific variables, or the use of subregion-specific calibration constants.
	Transit boarding counts	Assignment	transit boardings by station or TAZ or RAD	See notes above for transit on-board survey.
	Bike flow counts or OD survey	Assignment	O-D flows for specific high bicycle traffic facilities, and OD pairs (unlikely that data will be available)	
	Pedestrian flow counts	Assignment	O-D flows for specific high pedestrian traffic facilities and OD pairs (unlikely that data will be available)	