Southeast Florida Transportation Council (SEFTC)

Peer Review

August 2015

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U.S. Department of Transportation
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16. Abstract This report details the proceedings of a peer review of the Southeast Florida Transportation Council's (SEFTC) transportation model. The peer review was intended to aid SEFTC in calibration and validation of its new regional travel model and to help guide the data collection activities SEFTC pursues.		
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1.0 Introduction

1.1 Disclaimer

The views expressed in this document do not represent the opinions of FHWA and do not constitute an endorsement, recommendation or specification by FHWA. The document is based solely on the discussions that took place during the peer review sessions and supporting technical documentation provided by Southeast Florida Transportation Council (SEFTC).

1.2 Acknowledgments

The FHWA would like to acknowledge the peer review members for volunteering their time to participate in this peer review. Panel members include:

- Greg Giaimo—Ohio Department of Transportation (ODOT);
- Kostas Goulias—University of California, Santa Barbara (UCSB);
- Elaine Martino—Martino Planning;
- Birat Pandey—Baltimore Metropolitan Council (BMC);
- Eric Phil – Federal Highway Administration (FHWA); and
- Ken Cervenka (Peer Review Advisor)—Federal Transit Administration (FTA).

Additional biographical information of each peer review panel member is located in appendix C.

1.3 Report Purpose

This peer review was supported by the Travel Model Improvement Program (TMIP), sponsored by FHWA. TMIP sponsors peer reviews so planning agencies can receive guidance from and ask questions of officials from other planning agencies across the nation. The peer review process is specifically aimed at providing feedback to agencies on travel modeling endeavors.

The primary objective of the SEFTC peer review was for SEFTC to receive guidance on their activity-based travel demand model (SERPM 7.0) with a specific emphasis on the data collection activities SEFTC should pursue to aid calibration, validation, and further estimation of their model.

The peer review panel convened for one day (April 28th, 2015). During that time, SEFTC presented background information and asked for guidance in specific areas of their modeling practices, and the panel discussed these items and offered a series of formal recommendations to SEFTC.

1.4 Report Organization

The remainder of this report is organized into the following sections:

- **Overview of the Southeast Florida Transportation Council (SEFTC)—**This section highlights the responsibilities of the council as well as some key characteristics of the Southeast Florida region.
- **Development of the SERPM 7.0 Model—**This section discusses SEFTC's existing model and the agency's goals for the current peer review.
- **Peer Review Discussion—**This section details the key discussions of the peer review panel with SEFTC over the course of the one-day peer review meeting.

- **Peer Review Recommendations—**This section highlights the official recommendations made by the peer review panel. Some of the key discussion points are revisited here, but some new details also are added.

Four appendices also are included:

- Appendix A—List of Peer Review Panel Participants;
- Appendix B—Peer Review Panel Meeting Agenda;
- Appendix C—Peer Review Panel Member Biographies; and
- Appendix D—Documentation Provided to Panel Members by SEFTC and Documents referenced in this report.

2.0 Overview of Southeast Florida Transportation Council (SEFTC)

2.1 SEFTC Role and Responsibilities

As a result of the 2000 U.S. census, the Miami Urbanized Area encompasses parts of Miami-Dade, Broward, and Palm Beach Counties. The Federally designated Metropolitan Planning Organizations (MPO) for each respective County responded to the potential of consolidating into a single MPO by committing to develop and implement a coordinated planning effort resulting in, but not limited to:

- Regional long range transportation plan covering the tri-county region;
- Regional project prioritization and selection process;
- Regional public involvement process; and
- Performance measures to assess the effectiveness of regional coordination.

After several years of ad hoc cooperation, the Southeast Florida Transportation Council (SEFTC) was created, under Florida Statutes Chapter 339. 175, to serve as a formal forum for policy coordination and communication to carry out these regional initiatives agreed upon by the MPOs from Miami-Dade, Broward, and Palm Beach Counties. An interlocal agreement between the three parties was completed in 2005 paving the way for the first SEFTC meeting in January 2006.

To support the decision-making process of each SEFTC member, the Florida Department of Transportation (FDOT) maintains a three county, regional travel demand model. The Southeast Regional Planning Model (SERPM) is utilized to measure the impacts of transportation improvements and inform the selection of projects to be implemented within each member's Long Range Transportation Plans (LRTP).

2.2 Regional Characteristics

SERPM 7.0 covers the urbanized areas of Miami-Dade, Broward and Palm Beach Counties. The population of the modeled area in 2010 was estimated to have a little over 5,500,000 people and approximately 2,600,000 jobs. The SEFTC planning area also estimates school and college enrollment of 1,260,000 students.

The modeled area covers three MPOs (Broward, Palm Beach and Miami-Dade) and two Florida Department of Transportation (FDOT) Districts (District 6 and District 4), as shown in Figure 2-1. Unlike many regions there is no single central city that attracts the majority of the trips; each county has its own central city, as well as numerous smaller areas of concentrations of trip attractors. The complexity of the SEFTC region dictated much of the model components. There are three international airports; three seaports; a huge tourist population, a huge seasonal population, a large college/university population, extensive toll facilities, managed lanes, commuter rail, heavy rail, three separate bus companies, and an extensive express bus network.

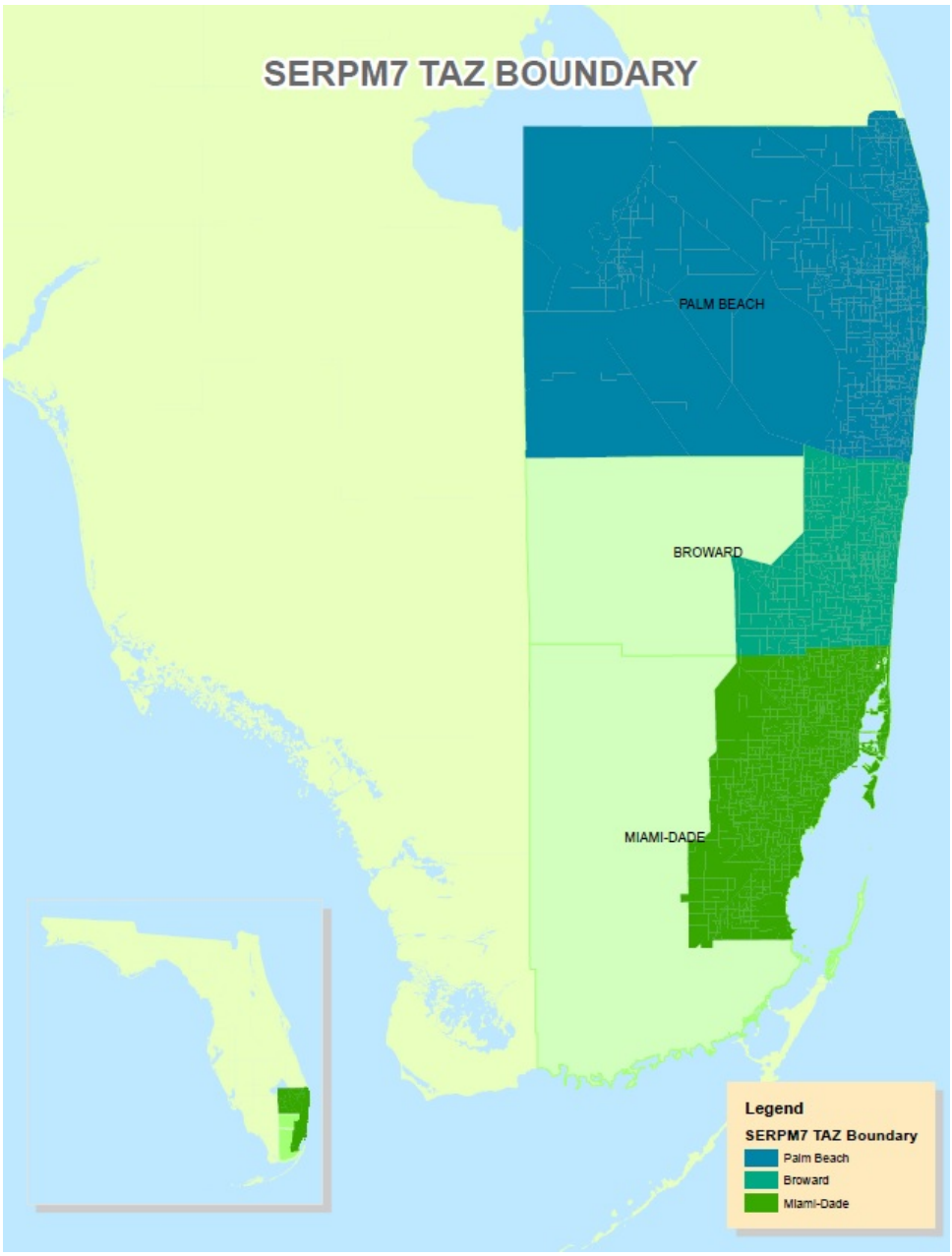

Figure 2-1: SERPM 7.0 Model Geographic Boundary
(Source: Provided by Broward County MPO, May, 2015.)

3.0 Development of the SERPM 7.0 Model

3.1 Existing Model

This section presents a summary of the existing SERPM 7.0 model. The information provided here is drawn from the draft report *Southeast Florida Regional Planning Model -- SERPM 7.0*, prepared by Parsons Brinckerhoff Inc. (PB), The Corradino Group, Inc., and BCC Engineering, Inc., dated February 2015.

SERPM 7.0 comprises several model components that address the vast majority of urban travel in the SEFTC region. At its core is the internal resident travel model, which is an activity based model (ABM) implemented using the CT-RAMP framework. This structure is the basis for forecasted travel for residents that start and end within the region, with the exception of travel to special events. Travel generated by overnight visitors is forecasted by the Visitor Model, which is also based on an ABM framework. External-external and internal-external travel is forecasted by traditional trip-based model components. Finally, like its predecessors, SERPM 7.0 includes a truck model and an airport ground access travel models. At this time, SERPM 7.0 does not model travel to special events.

The CT-RAMP framework, which is fully described in the following section, adheres to the following basic principles:

- Models individual and joint travel choices with a high degree of behavioral realism. In particular, it addresses both household-level and person-level travel choices including intra-household interactions between household members, and employs disaggregate (i.e., individual decision-maker) models throughout the model system.
- Operates at a detailed temporal (half-hourly) level, and considers congestion and pricing effects on time-of-day and peak spreading.
- Reflects and responds to detailed demographic information, including household structure, aging, changes in income, and other key attributes.
- Implements the Common Modeling Framework, an open-source library developed by Parsons Brinckerhoff specifically for implementing advanced travel demand models.
- Offers sensitivity to demographic and socio-economic changes observed or expected in the dynamic SE Florida metropolitan region. This sensitivity is ensured by the enhanced and flexible population synthesis procedures as well as by the fine level of model segmentation. In particular, SERPM 7.0 incorporates different household, family and housing types including a detail analysis of different household compositions in their relation to activity-travel patterns.
- Accounts for the full set of travel modes. PB's experience with previously developed ABMs has shown that mode choice is one of the least transferable model components, because each region has a specific mix of modes developed in the context of the regional urban conditions.
- Integrates with other model components. The CT-RAMP model is one component (person travel) and can integrate with other components such as the existing SERPM truck, airport and external models.

SERPM 7.0 was developed by transferring ABM components for resident and visitor travel developed for the San Diego Association of Governments (SANDAG) and adapting the trip-based model components of previous versions of SERPM. The SANDAG implementation structure was chosen over other CT-RAMP options primarily due to its treatment of transit access and similarity of transit options - the spatial representation of home, stops and activity

locations is based on micro-area zones, which improves the calculation of walk access/egress distances, and the set of current and planned transit modal options is the same between the two regions, which greatly simplifies the model transfer. The majority of network-based procedures, such as highway and transit skimming and assignment were adapted from earlier SERPM versions (6.5 and/or 6.7).

The 2009 National Household Transportation Survey (NHTS) add-on was used intensively in the development of SERPM 7.0. While the sample is insufficiently large to support the original estimation of most of the submodels that comprise SERPM 7.0, it provided sufficient information to develop region-wide calibration targets for most submodels. In developing these calibration targets, the NHTS was supplemented with a wide variety of other data sources, including Census and American Community Survey (ACS) data, Longitudinal Employment-Household Dynamics data, data from the Florida Department of Motor Vehicles, SunPass account sales data, transit on-board survey data, transit ridership data, and school attendance data, among others.

The SERPM 7.0 calibration targets were compared to similar targets developed for other regions, to verify that the aggregate tabulations of travel behavior across various person types and types of travel exhibited similar relationships. Because the SERPM 7.0 submodels could not be estimated with local data, a complete model specification was adopted, patterned after SANDAG's ABM deployment. The adequacy of the model transfer was evaluated by examining how well the transferred model, without updates, matched the calibration targets developed from the NHTS. The transferred model was in fact able to reproduce fairly well the Southeast Florida travel behavior at an aggregate level. The submodels that performed least well are, not surprisingly, the tour and trip location models. This can be explained partly by differences in model region size between San Diego County and the SEFTC region, and partly due to differences in multimodal accessibilities and the composition and location of employment. The development of the tour-level, mode choice submodels also relied on various relationships of transit tours to transit trips obtained from a recent Atlanta onboard passenger survey, given the near lack of transit tour observations in the 2009 NHTS sample

3.2 SEFTC's Goals for the Current Peer Review

Prior to meeting, SEFTC identified two main areas for which they wanted the peer review panel to comment and make recommendations. The two main areas and related questions are detailed below:

1. **Guidance on best-practice approaches to assess SERPM 7.0's performance**, given that the model parameters for the ABM and related sub-models are borrowed from another region with constants that were calibrated so the model reproduces aggregate targets developed from local data.
    - Is the magnitude of (and change in) the constants reasonable?
    - Does the calibrated model perform well, globally and by submodel/subarea/mode?
    - Are there additional tests that need to be performed or presented to better assess its performance?
    - Are there best-practice benchmarks that the model can be compared against, for example to establish acceptable ranges for trip/tour frequency, trip distance, mode share, etc., elasticities with respect to travel time and travel cost?

2. **Guidance on data collection effort to undertake in the short term (next 2 years), medium term (2-4 years), and long term.** The proposed data collection effort should be based on the performance and structure of SERPM 7.0, and consider all of the major travel markets that the model is expected to address: residential travel, overnight/visitor/seasonal resident travel and truck travel.
    - With what frequency should the various datasets be collected?
    - Should the next phase of the data collection program be focused on data required to re-estimate some or all model components, data required to calibrate/validate the model outputs, and/or data required to verify the model inputs?
    - What readily available “off the shelf” datasets have the panel found most useful/reliable in their efforts and which datasets are best collected locally?

4.0 Peer Review Discussion

The first half of the peer review was spent by SEFTC staff members and consultants making presentations on specific items to the peer review panel. During these presentations, many topics came up which initiated discussion among peer review panel members and between panel members and SEFTC. This section documents the key points that arose during these presentations.

4.1 Model Input Data

One of the presentations made by SEFTC to the peer review panel dealt with the data required for running, estimating, calibrating, and validating the model. SEFTC identified three areas of concern with regard to the available data sources:

1. There is no well-established source of regional and subregional employment control totals;

2. There are inconsistent travel behavior patterns across multiple data sources; and

3. The existing household travel survey and transit on-board survey are insufficient for extensive use in the modeling effort.

4.1.1 Employment Control Totals

SEFTC noted that there is no well-established source of regional and subregional employment totals for both the base and forecast years. Estimates of total regional county employment range from 2.3 million to 3.1 million depending on the data source. Some of the discrepancy is due to how each data source accounts for self-employed and under-employed persons. Each data source tends to have a similar distribution of households between the three MPO areas of Miami-Dade, Broward, and Palm Beach. However, when the currently developed socio-economic dataset is compared to the Census Transportation Planning Products (CTPP), the dataset, in some cases, widely under-predicts and over-predicts employment within each of the sixteen sub-regions. For resident and non-resident travel SEFTC is more concerned with making sure the distribution within the region is correct. However, for truck trips it is important that region-wide totals are correct.

The current procedure for developing the socio-economic dataset is for each MPO to put together their own estimates of employment. Then the modeling team decides if each MPOs estimates are reasonable. However, this task is not easy given the lack of well-established sources of regional employment. The modeling team in the past has attempted different approaches to develop a regional employment dataset:

1. Built employment from the bottom-up using Infogroup data and from the top-down using aggregate level totals provided by the MPOs. However, there was concern that the MPO forecasts that were the basis for the aggregate level totals were not accurate.

2. Used an indexing approach, which involved providing each MPO with a control total and then instructing each MPO to provide distributions within their area.

The panelists were concerned that the inability of employment totals to match targets is confounding the efforts to understand the source of discrepancies in matching validation targets. The panelists stressed the need to resolve the development of both base year and forecast year employment totals and distributions before doing any further model improvements. One panelist also commented that TAZ-level distributions should reflect regional-level distributions in the forecast year rather than keeping the TAZ-level distribution the same as the base year.

4.1.2 Inconsistent Travel Behavior Patterns across Multiple Data Sources

SEFTC presented a number of charts and tables depicting how the model results compare to various data sources, such as NHTS, Longitudinal Employer-Household Dynamics (LEHD), CTPP, and observed vehicle miles traveled (VMT) data from traffic counts. The model, when compared to observed VMT, over-estimated morning peak travel and under-estimated mid-day travel. The VMT estimates include the truck and visitor model. There was no bias between arterials and highways. SEFTC noted that they need to adjust their tour scheduling model in order to shift travel from the peak periods to the off-peak periods, but were holding off until new data is collected.

One panelist recommended conducting further analysis to examine why the time-of-day inconsistencies occur.

4.1.3 Existing Surveys are Insufficient for Extensive Use in Modeling Effort

The most recent household travel survey conducted for the region is the Florida 2009 NHTS add-on. This dataset contained approximately 2,600 household records. However, 10% of those records were incomplete since one or more adults from the household were missing travel information. The dataset over-sampled retired persons (i.e. 37% of the sample was composed of retired households but only make-up 20% of the population), and under-sampled the following markets:

- Transit users
- Long-distance commuters
- College students
- School aged children

The sample also did not have adequate spatial distribution across the region. For all of these reasons, the dataset contained very large sample weights. SEFTC, against the warning of NHTS, had to change the weights in many instances where unreasonable travel patterns existed.

Despite the issues with the household travel survey, the data was still used extensively for development of SERPM 7.0. The data was used for computing aggregate calibration targets in conjunction with other data sources. In addition, SEFTC compared the calibration targets to other regions to determine if the calibration targets derived from the household survey were reasonable.

The existing transit on-board surveys for the region are missing trip origin/destination information for many of their records. Currently, SEFTC only has access to an on-board survey for one transit system although a system-wide survey is currently underway.

One panelist was concerned that SEFTC did not account for the fact that the 2009 NHTS survey was undertaken during the peak of the recession. The panelists understood the struggles with attempting to work with incomplete surveys and stressed the need, when undertaking a household travel survey, to focus on collecting high-quality data that has a fully complete household rather than on collecting as many surveys as possible.

4.2 Assessing the Model Transfer Outcome

Another presentation made by SEFTC to the peer review panel focused on understanding how well the model was able to replicate regional conditions, given that the coefficients for each model component were transferred from the SANDAG ABM model. Many of the models were

calibrated to SEFTC data sources by adjusting model constants. Other models were fully transferred from SANDAG without further calibration since the available data sources were unable to support further calibration.

The calibration effort undertaken by SEFTC involved evaluating the initial estimated travel patterns, before undertaking regional calibration, against model calibration targets to understand where adjustments needed to be made. SEFTC developed the model calibration targets using the NHTS survey and supplemented with other sources. They evaluated the targets for reasonableness by comparing the targets to other regions. Once the model was calibrated, SEFTC assessed the magnitude of the constant or parameter adjustments that were necessary to match the regional targets to ensure that adjustments were not too large.

The SEFTC presentation discussed the calibration effort and results for the auto ownership model and work tour mode choice model, average trip lengths resulting from location models, the calibration effort related to the daily activity pattern model, and model time-of-day comparisons to observed data resulting from departure time-of-day models. SEFTC also presented the results of a number of sensitivity tests that were undertaken to analyze model reasonableness and the model's ability to handle policy scenarios.

4.2.1 Auto Ownership Model and Work Tour Mode Choice Model

The 2010 American Community survey was used as the regional data source for calibration of the auto ownership model. Before calibration the model over-estimated zero-vehicle households, but otherwise performed well against the observed data. The additional SERPM constants that were added to the model, in addition to the SANDAG constants, were not excessive.

In contrast, the work tour mode choice model did not compare well against observed data before calibration was undertaken. This was not surprising given the different transportation options available in SEFTC compared to SANDAG. Significant adjustments to mode constants were required to more closely match observed data.

4.2.2 Average Trip Lengths Resulting from Location Models

Before regional calibration, the work and school location models over-predicted short-distance locations and under-predicted long distance locations. In contrast, all other location models required adjustments to shorten the distances.

The work location model was calibrated for both full-time and part-time workers, income-level, and auto ownership, but did not include adjustments by occupation. These overall adjustments were relatively small. Additional County-to-county distance terms were added to the model to better match within- and inter-county home to work travel. Within the work location model presentation there was a discussion among SEFTC and the panel on the use of shadow pricing. It was noted that shadow pricing is not transferable between regions and that it is necessary to recompute the shadow pricing strategy for each forecast year. The shadow pricing implemented involved double constraining the work location model and matching worker occupation on demand side to occupations on the supply-side for each forecast year. SEFTC implemented manual adjustments to shadow pricing on a district basis rather than completely allowing the shadow pricing formula to fully adjust the model.

The school location model was also adjusted to lengthen school location distances and also included shadow pricing based on school enrollment data.

The panel noted that k-factors and special generators can be misused to over-specify the model, but careful, targeted, use of k-factors and special generators can be beneficial. One panelist noted the location choice model should be SEFTC's first priority of their model improvement efforts.

4.2.3 Daily Activity Pattern Model

Without regional calibration the daily activity pattern model did a reasonable job matching observed percentages of mandatory, non-mandatory, and home activities for population segments that composed a high share of the total population (e.g., full-time workers, non-working adult, non-working senior). The population segments requiring larger adjustments during calibration were for smaller population segments such as part-time workers, university students, and pre-school children. Once calibration was undertaken both mandatory and non-mandatory tour frequencies compared very well to observed data.

4.2.4 Tour Time-of-day Comparisons to Observed Data

The work-tour departure from home and arrival to home time-of-day distributions compared closely to observed data without further regional calibration. The shopping-tour departure time observed data tended to be more "lumpy" (i.e. small spikes in travel) than the model results. The calibration effort focused on trying to better match these spikes in travel. As mentioned in Section 4.1.2, the model, when compared to observed VMT, over-estimates morning peak travel and under-estimates mid-day travel. There is a desire to further adjust the time-of-day models to move more travel from the peak periods to the mid-day periods, but there is a concern that the existing observed data is not able to provide reliable calibration targets. Therefore, SEFTC is holding off on further calibration until more observed data can be collected.

4.2.5 Sensitivity Tests and Validation

SEFTC discussed the results of several sensitivity tests that were undertaken using SERPM 8 which produced reasonable results. They conducted a transit fare test by decreasing the base fare by 20% which resulted in a 12% increase in transit ridership. A sensitivity test which extended Metrorail into Broward County resulted in a significant increase in transit trips having destinations consistent with the new alignment. Another sensitivity test doubled the parking costs in the Miami CBD. As expected, overall trips to the Miami CBD decreased by 5%, and trips to other destinations increased. A land-use development test added households and jobs to an area of Palm Beach County, resulting in origin and destinations increasing in that area. A final sensitivity test discussed was an increase in labor force participation for persons 60-75 years old. Overall trip making and average trip lengths for this age group increased. Transit trips for this age group increased significantly.

Upon questioning from the panel, SEFTC reported that validation is an on-going process and that initial results show that screenline reports are good and that highway assignment is marginally better than the trip-based model results. The panel noted that the model is only one year old and that more effort needs to be put into validation before a complete assessment can be made on the model's performance.

The panelists were unable to comment directly on whether the entire model system, or any individual model, was successfully transferred from SANDAG and calibrated to the SEFTC region. One panelist did comment that transferring the model from SANDAG and simply adjusting the coefficients was not useful. The panelist recommended the development of a completely new activity-based model that is fully tailored to the region. Most other panelists believed that is an extreme position, but agreed that more work needs to be put into further

calibrating and validating the model before any position can be taken on the success of the transfer. The panelists did note the limitations of developing a disaggregate time-of-day, demand-side, activity-based model and then coupling that model with a static four-time period, supply-side, aggregate assignment model.

4.3 Plan for New Data Collection Effort

The development of the SERPM 7.0 activity-based model has amplified the existing gaps and insufficiencies in the existing data. The last household travel survey was conducted over six years ago and had many issues as described in Section 4.1.3. The data does not account for recent technological changes and travel demand management strategies that have been implemented. The current set of travel surveys and observed data also lack sufficient information on attitudes (e.g., attitudes with regard to transit or managed lanes), mode choices, and willingness to pay.

In October 2014, the SEFTC board approved the development of a five-year Memorandum of Understanding (MOU) to dictate future plans for data collection. Currently, SEFTC has approximately 1.5 million dollars to spend on data collection. They have identified five different data collection efforts they would like to undertake:

1. Household travel survey,
2. Attitudinal and stated preference survey,
3. Origin-destination survey,
4. Freight movement survey, and
5. Visitor survey.

4.3.1 Household Travel Survey

SEFTC desires for the household travel survey to collect data on daily activity-travel behavior of both permanent and seasonal residents. The survey should include over-sampling of transit users, toll-paying customers, park-and-ride transit users, renters, zero-car households, and large households. They outlined a desire for the survey to include a GPS sub-sample and to use cellular devices to aid in data collection.

The panel stated that for improved data collection and given recent advances in survey data collection technology, the household survey should be a full GPS survey with validation via prompted recall. It is very difficult to compute trip purpose and mode from GPS data without the use of prompted recall. The panel also stressed that it is very important to ensure that each household has a complete set of high-quality travel records. The focus should be on collecting quality data rather than a high quantity of data records.

4.3.2 Attitude and Stated Preference Survey

SEFTC would like to gather more information on individuals' attitudes toward certain travel modes such as transit and non-motorized transportation and on individuals' willingness to make changes in their current travel behavior. They also want to gauge a user's willingness to pay for faster and more reliable travel options. They, therefore, would like to implement an attitudinal and stated preference survey with a focus on certain corridors that are candidates for travel demand management improvements.

The panel noted that a stated preference survey must also include a revealed preference survey to appropriately interpret the stated preference information. Before developing the survey

SEFTC must figure out exactly what they want the survey to answer and then develop the survey around answering that question. The panel recommended caution when interpreting answers to attitudinal questions.

4.3.3 Origin-Destination Survey

SEFTC would like to collect origin-destination data and questioned the panel on how to utilize existing data collected from cell phones. Most of the discussion related to this topic took place during a post-meeting e-mail discussion. SEFTC during this post-meeting discussion noted their concern about the accuracy, and caveats, of using cell-phone data (e.g., AirSage) to develop observed trip tables.

The panel, in response, noted that data fusion and manipulation are required to use these cell-phone data. Just like all data, one has to understand the limitations and strengths of the data and use it carefully. The panel noted that other practitioners have had success in combining other data sources with the cell-phone data to provide a work around to many of the known limitations of cell-phone data.

4.3.4 Freight Movement Survey

SEFTC's proposed freight movement survey would focus on the commodities movement from approximately twenty major ports and freight hubs. They would assess the daily travel patterns of the truck trips and gather economic information from the establishments.

The panelists questioned the benefit of doing a freight survey that included a very low sample size of only twenty establishments.

4.3.5 Visitor Survey

SEFTC specified that the previous survey was conducted in 1999. It was an intercept survey in hotel lobbies and asked respondents to recall the previous day's travel patterns. The data was then used to develop a visitor travel model. The survey missed visitors not staying at hotels. SEFTC would like to update the visitor model with new survey data. The visitor survey would collect data at hotels and major attractions during the high tourist season (i.e. winter).

The panel noted that cell-phone data may be able to provide information on the magnitude and temporal patterns of visitors.

5.0 Peer Review Panel Recommendations

On the last half day of the meeting, the peer review panel spent about one-and-one-half hours in an executive session, closed to all other participants of the meeting The reason for this closed session was to allow panel members to speak freely and openly among themselves while developing formal recommendations. This section details those panel recommendations

5.1 Further Calibration, Validation, and Testing of SERPM 7.0

In response to SEFTC's request for guidance on best-practice approaches to assess SERPM 7.0's performance, as outlined in Section 3.2, the panel made the following recommendations:

- Perform the same traditional checks as you would for a trip-based model. Refer to *NCHRP Report 716: Travel Demand Forecasting - Parameters and Techniques* and *NCHRP Report 365: Travel Estimation Techniques for Urban Planning* for further guidance.
- Compare SERPM 7.0 constants and coefficients to other Florida models, and compare the overall transfer experience of other regions, such as the experience of transferring DaySim from Sacramento, CA to Jacksonville, FL and then DaySim and parts of FAMOS to Tampa, FL.
- Perform further validation including before-and-after studies, run the model for year 2015 and compare to traffic counts and travel time data, and perform further tests on the travel time and cost elasticity of the model as described in Todd Litman's report titled *Understanding Transport Demands and Elasticities How Prices and Other Factors Affect Travel Behavior*.

5.2 Guidance on Data Collection Effort

In response to SEFTC's request for guidance on short-term, medium-term, and long-term data collection efforts, as outlined in Section 3.2, the panel made the following recommendations:

- Before creating a data collection plan lay out a long-term vision for SERPM that includes the policies that SERPM needs to address in the near and long-term and the functional capabilities of SERPM to handle those policy analyses.
- The current budget of 1.5 million dollars is not enough to pursue all of the data collection efforts that SEFTC desires. Thus, it is important to prioritize data collection based on the policies SEFTC wants to concentrate on in the medium-term versus long-term.
- The short-term priority for data collection should focus on collecting data to help with the more traditional calibration and validation efforts. This effort would include collecting traffic count and travel time data, and origin-destination data (i.e. purchasing of cell-phone data). This data collection effort could be undertaken with the existing 1.5 million dollar budget.
- The second priority of data collection should be to collect data that aids SEFTC in quantifying and understanding specific regional travel markets such as collecting data to understand the magnitude of visitor and seasonal residents or truck trips. In the short-term cell-phone data could help quantify these markets. Then, SEFTC could undertake a detailed travel pattern survey to further understand the travel patterns of these markets. A targeted survey could focus on understanding different value-of-time groups such as a survey of toll-users. With a little bit more budget, SEFTC could perform these targeted surveys.
- A full regional household travel survey cannot be undertaken without a significant increase in data collection budget. If more budget can be obtained, SEFTC should consider undertaking data collection efforts that focus on collecting data to help re-estimate the location choice models and undertaking a broad establishment survey with more than 20

establishments sampled. Finally, if a full regional travel survey is undertaken it should be a 100% GPS-based survey with prompted recall validation, which has a higher price per survey than traditional household survey efforts.

- Consider moving to ongoing versus an episodic data collection strategy for all data collection efforts.

5.3 General Recommendations

The peer review panel made several additional recommendations to SEFTC related to improvements of SERPM:

- Develop a task-force for figuring out how to develop employment estimates for both the base and forecast year. Employment should be developed at the regional level rather than by each MPO separately.
- Consider replacing the regional truck model with the statewide freight model for modeling truck travel.
- Put effort into improving model run times and other strategies to ensure efficiency of model application.
- Update the calibration effort by scaling model parameters rather than just modifying model constants as discussed in TMIP's report *Guide for Travel Model Transfer*.
- Given SERPM currently has a disconnect between disaggregate time-of-day demand model coupled with an aggregate (4 time-period) supply model, improvements should be made to the supply-side assignment model, such as:
    - Moving to finer time periods;
    - Developing dynamic intersection models; and
    - Using more disciplined network coding practices to create a more realistic network.

Appendix A List of Peer Review Panel Participants

This section lists all individuals who attended the meetings, including panel members, SEFTC staff and consultants, and peer review support staff.

A.1 Peer Review Panel Members

Panel Member	Affiliation
Greg Giaimo	Ohio Department of Transportation (ODOT)
Kostas Goulias	University of California, Santa Barbara (UCSB)
Elaine Martino	Martino Planning
Birat Pandey	Baltimore Metropolitan Council (BMC)
Eric Phil	Federal Highway Administration (FHWA)
Ken Cervenka (Peer Review Advisor)	Federal Transit Administration (FTA)

A.2 SEFTC Staff

Name	Affiliation
Paul Flavien	Broward Metropolitan Planning Organization (Broward MPO)
Shi-Chiang Li	Florida Department of Transportation (FDOT)
Wade White	Whitehouse Group
Luke Lambert	Palm Beach Metropolitan Planning Organization (PB MPO)
Seth Contreras	Palm Beach Metropolitan Planning Organization (PB MPO)
Ken Kaltenbach	The Corradino Group
Wilson Fernandez	Miami-Dade MPO (MD MPO)
Bill Davison	Parsons Brinkerhoff (PB)
Rosella Picado	Parsons Brinkerhoff (PB)
Yongqiang Wu	Gannett Fleming
Nicholas Torres	Whitehouse Group
Srin Varanasi	The Corradino Group
Nick Uhren	Palm Beach Metropolitan Planning Organization (PB MPO)
Greg Stuart	Broward Metropolitan Planning Organization (Broward MPO)
Hui Zhao	Florida Department of Transportation (FDOT)
Genessa Casanova	Florida Turnpike
Neil Lyn	Florida Department of Transportation (FDOT)

A.3 TMIP Peer Review Support Staff

Name	Affiliation
Sarah Sun	Federal Highway Administration (FHWA)
Lee Ann Jacobs	Federal Highway Administration (FHWA)
Eric Pitts	Federal Highway Administration (FHWA)
Rachel Copperman	Cambridge Systematics, Inc.

Appendix B Peer Review Panel Meeting Agenda

Table B-1: April 28, 2015 Agenda

Time	Description
8:30 am - 8:45 am	Welcome and Introductions
8:45 am - 9:00 am	Review Purpose of Peer Review: • What it is? • What it is *NOT*?
9:00 am - 9:35 am	Presentation of SERPM 7.0 input data, structure and IT requirements
9:35 am - 10:10 am	Presentation of SERPM 7.0 calibration, validation and sensitivities
10:10 am – 10:25 am	Break
10:25 am – 10:45 am	Review of questions being asked of the panel: 1. SERPM 7.0 uses model parameters for the ABM and related sub-models borrowed from another region with constants that were calibrated so the model reproduces aggregate targets developed from local data. Please provide guidance to ascertain whether the magnitude of (and change in) the constants is reasonable, guidance to ascertain whether the calibrated model performs well, globally and by submodel/subarea/mode, and, additional tests that need to be performed or presented to better assess its performance. ***Are there best-practice benchmarks that the model can be compared against, for example to establish acceptable ranges for trip/tour frequency, trip distance, mode share, etc., elasticities with respect to travel time and travel cost?*** 2. ***Given the performance and structure of SERPM 7.0 and the data upon which it relies, what data collection and analysis activities does the panel recommend in the short term (next 2 years), medium term (2-4 years), and long term? With what frequency should the various datasets be collected? Should the next phase of the data collection program be focused on data required to re-estimate some or all model components, data required to calibrate/validate the model outputs, and/or data required to verify the model inputs? What readily available "off the shelf" datasets have the panel found most useful/reliable in their efforts and which datasets are best collected locally?*** Please consider all of the major travel markets that the model is expected to address: residential travel, overnight/visitor/seasonal resident travel and truck travel.
11:00 am - 12:00 pm	Question & Answer Session
12:00 pm - 1:00 pm	*WORKING LUNCH (OUTSTANDING QUESTIONS)*
1:00 pm - 3:00 pm	Panel Deliberations
3:00 pm - 3:15 pm	*BREAK*
3:15 pm - 4:15 pm	Presentation of Findings and Recommendations
4:15 pm - 5:00 pm	Discussion of Findings and Recommendation
5:00 pm	Adjourn

Appendix C Peer Review Panel Member Biographies

C.1 Greg Giaimo, Ohio Department of Transportation

Greg Giaimo is a professional engineer with the Ohio Department of Transportation. He graduated from Ohio State University with a BSCE (1989) and MS (1991). He has worked for ODOT as a traffic modeler since. Besides day to day project and corridor analysis, he is in charge of new model development and technical processes related to the planning process such as the statewide congestion management system, integration of TDM's with MOVES and HPMS volume forecasts.

C.2 Kostas Goulias, University of California, Santa Barbara

Konstadinos G. Goulias is a professor of transportation at the University of California Santa Barbara Department of Geography and director of the GeoTrans laboratory. He served as professor of transportation in the Civil and Environmental Engineering Department of the Pennsylvania State University from 1991 to 2004 where he also directed transportation research centers and programs. He chaired the Travel Behavior and Values Committee and the Task Force on Moving Activity-based Approaches to Practice for the Transportation Research Board (TRB) and served in many other organizations and task forces, including the Institute of Transportation Engineers and the American Society of Civil Engineers. Goulias edited two books (Transportation Systems Planning: Methods and Applications, published by CRC Press and Transport Science and Technology, published by Elsevier) and published more than 270 research reports and papers. He is the co-founder and co-editor in-chief of the journal Transportation Letters; he is also a member of the Editorial Advisory Board of Transportation Research Part B and the Journal of Intelligent Transportation Systems. Goulias worked in Australia, Germany, Greece, Italy, Japan, the Netherlands, Portugal, and the United States developing new household survey methods and other data collection techniques as well as statistical and spatial modeling techniques, simulation frameworks, and expert reviews of technologies and engineering practice and policies. He holds a Ph.D. in Engineering from the University of California-Davis (1991), an MS in Engineering from University of Michigan-Ann Arbor (1987), and a Laurea (5 years and a thesis) degree in Engineering from the University of Calabria in Italy (1986).

C.3 Elaine Martino, Martino Planning

Elaine Martino is President of Martino Planning & Associates. She has been involved with various transportation planning experiences in Florida including all aspects of short and long range transportation studies, travel demand and land use modeling and demographic/socio-economic development. In addition, she has primarily worked with FDOT General Planning Consultant contracts that involve on-site assistance for Intermodal Planning activities that include the development and enhancement of various regional models, data structure development, socioeconomic forecasts, sub-area and corridor analyses, project traffic forecasts, regional transportation plans, MPO Long Range Transportation Plan development, and various travel surveys. Prior to starting Martino Planning & Associates, she worked with local Engineering & Planning Consultants and was a Transportation Planner with a local MPO.

C.4 Birat Pandey, Baltimore Metropolitan Planning Organization

Birat Pandey, P.E., is a Senior Transportation Engineer/Modeler for Baltimore Metropolitan Council. He possesses a unique blend of working knowledge in the fields of regional transportation modeling and policy analysis, air quality modeling, traffic operational analysis and traffic engineering design. His professional experience includes metropolitan planning organizations (MPO), private consulting businesses, university research and INGO; and has incurred in-depth understanding of transportation land-use relationships that are crucial to transportation planning. Mr. Pandey holds a M.S. degree in Transportation Engineering from University of Illinois, Chicago, IL.

C.5 Eric Pihl, Federal Highway Administration

Eric Pihl is a travel forecasting specialist with the FHWA Resource Center Planning team. He provides training and technical support to state and local agencies related to the development, refinement, and application of travel forecasting and technical planning methods. Eric has developed and instructs workshops on innovative traffic analysis tools, land-use forecasting, and metro and statewide passenger and freight models.

Prior to joining FHWA, Eric worked in FTA's Office of Planning, where he assisted transit agencies on forecasting methods for major transit planning studies under the New Starts investment program. He has previous experience developing and applying regional travel models for long range systems and project planning also and application support for large-scale regional models while with the Atlanta Regional Commission.

As a member of the TRB committee on Traveler Behavior and Values, he has contributed to several national research projects that support the integration of planning, land-use, and operational analysis tools. He holds a MS in Transportation Engineering and a Master of City Planning from the Georgia Institute of Technology.

C.6 Ken Cervenka, Federal Transit Administration

Ken Cervenka is a Community Planner at the FTA, where has worked since 2007. His major responsibilities include technical assistance to MPOs, transit providers, and other agencies interested in preparing transit rider "on-board" surveys and transit ridership forecasts. For forecasts submitted by project sponsors in support of New Starts and Small Starts projects, his responsibilities include a formal assessment of the plausibility of those forecasts for use in FTA's project evaluation process. Prior to joining FTA, Ken worked as the Travel Forecasting Manager at the North Central Texas Council of Governments, the MPO for the Dallas-Fort Worth area.

Appendix D Documentation Provided to Panel Members by SEFTC and Documents Referenced in this Report

Southeast Florida Regional Planning Model – SERPM 7.0
Prepared by Parsons Brinckerhoff Inc. (PB), The Corradino Group, Inc., and BCC Engineering, Inc., dated February 2015.
Provides information on the development of the CT-Ramp framework for use in the SEFTC region and additional model components.

SEFTC web site—Regional Information
http://seftc.org/pages/regional-information
Provides information on the 2035 Regional Transportation Plan.

TMIP Report: Guide for Travel Model Transfer
Prepared by Cambridge Systematics, Inc. with Chandra R. Bhat, Ph.D., October 2014.

NCHRP Report 716: Travel Demand Forecasting - Parameters and Techniques
Prepared by Cambridge Systematics, Inc., Vanasse Hangen Brustlin, Inc., Gallop Corporation, Chandra R. Bhat, Shapiro Transportation Consulting, LLC, Martin/Alexiou/Bryson, PLLC. Transportation Research Board, 2012.

NCHRP Report 365: Travel Estimation Techniques for Urban Planning
Prepared by Barton-Aschman Associates, Inc. National Academy Press, Washington, D.C., 1998.

Victoria Transport Policy Institute Report: Understanding Transport Demands and Elasticities: How Prices and Other Factors Affect Travel Behavior
Prepared by Todd Litman. Victoria Transport Policy Institute, 2013.

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