

Staff Report

To: Planning Advisory Committee

From: Chris Barney, Senior Transportation Planner

Item: Sonoma County Travel Model – Update to Administrative and Operational Travel Demand Modeling Guidelines – Final Revision

Date: September 13, 2017

Issue:

The Administrative and Operational Travel Demand Modeling Guidelines identify and describe the policies, procedures, and protocols that are used to guide SCTA's travel demand modeling program.

Background:

SCTA operates and maintains the Sonoma County Travel Model (SCTM) which is used to support SCTA's transportation planning activities and to provide analytic and modeling support to the Authority's member organizations. SCTA's Administrative and Operational Travel Demand Modeling Guidelines are used by staff to guide the operation, maintenance, improvement, and administration of the SCTM. This document outlines the goals and objectives, priorities, scope, products and services, maintenance, improvement, validation, and program evaluation strategies of the SCTA modeling program.

A draft update to these guidelines was provided to the PAC, TAC, and CAC for discussion and review in August of 2017. The final document has been revised based on feedback from these committees and staff level review.

Policy Impacts:

This document is used to guide how the travel model is used, updated, and maintained and outlines how the model shall be used to support SCTA and local planning and project delivery efforts.

Fiscal Impacts:

None at this time.

Staff Recommendation:

The final revisions to the Administrative and Operational Travel Demand Modeling Guidelines will be presented to SCTA in October for review and approval. Provide any comments on the document by September 27, 2017.

Administrative and Operational Travel Demand Modeling Guidelines

DRAFT

Sonoma County Transportation Authority
490 Mendocino Ave., Suite 206
Santa Rosa, CA 95401
(707) 565-5373

September 13, 2017

Table of Contents

Introduction	3
Program Administration	3
Modeling Goals and Objectives.....	3
Scope of the Program.....	4
Products and Services	5
Modeling Priorities	6
Coordination with other Modeling Efforts	7
Technical and Operational Policies	7
Transportation System (Network) Updates	7
Land Use Data Updates	8
Data dissemination.....	8
Model modification and improvement.....	8
Training.....	9
Model Validation	9
Program Evaluation	10

Introduction

These guidelines describe the policies, procedures, and protocols guiding the Sonoma County Transportation Authority's (SCTA) Travel Demand Modeling (TDM) program and were prepared to ensure that the Authority's governing board, and all of its member agencies support and are aware of these policies, procedures, and protocols. This document describes the products and services that are available through the modeling program and outlines how these benefit SCTA's and local planning activities.

Program Administration

Many transportation projects and development projects that are proposed, designed, or built in Sonoma County require an analysis of the potential impacts the project may impose on local and regional transportation systems. The Sonoma County Travel Model is regularly used to quantify these impacts.

In the past SCTA and local jurisdictions have relied on outside contractors to run travel demand models and to perform travel demand analysis. The SCTA modeling program has been configured to maintain and operate the travel model in-house. Routine model analysis and maintenance is performed by SCTA staff with outside consultants providing additional modeling support when necessary. By maintaining the countywide model in-house, SCTA is able to provide local control over the modeling process, and is better able to provide customized analysis for SCTA's planning activities and for member organizations quickly, efficiently, and economically. SCTA's modeling program provides in-house technical modeling expertise and allows SCTA's member organizations to exercise direct control over the modeling process. Local engineering and planning staff are able to participate in model development and improvement by participating in modeling discussions at SCTA advisory committees (the Technical Advisory and Planning Advisory Committees primarily), or by working directly with SCTA modeling and technical staff.

Modeling Goals and Objectives

SCTA's modeling program supports the authority's planning and programming functions as laid out by SCTA's mission statement:

"As a collaborative agency of the cities and County of Sonoma, we work together to maintain and improve our transportation network. We do so by prioritizing, coordinating, and maximizing the funding available to us and providing comprehensive, countywide planning. Our deliberations and decisions recognize the diverse needs within our county and the environmental and economic aspects of transportation planning."

The modeling program helps the Authority fulfill its mission by analyzing the transportation impacts of future growth, analyzing the countywide and local impact of regional projects, providing a modeling framework that allows staff to analyze alternative modes of transport, and by providing local modeling expertise and control over the maintenance, improvement, and operation of the travel model.

SCTA's planning goals are outlined in chapter 4 of the 2016 Comprehensive Transportation Plan (CTP). The travel demand model allows the authority to evaluate how different actions including project implementation and policy approaches can help SCTA achieve CTP goals. CTP Chapter 6 – Evaluating Plan Performance provides an overview of this process.

The modeling program provides modeling support, data, and analysis to the authority's member organizations, other public and private organizations, and the public at large. SCTA technical and modeling staff continues to work with local engineering and planning staff to ensure that model output and analysis is readily available to SCTA member agencies and their designates. Staff works regularly with members of the public to provide information and training on SCTA's travel demand model, travel modeling and forecasting theory and practice, and information and data produced by the modeling program or other agencies and organizations.

Scope of the Program

The Sonoma County Travel Model was developed with a focus on the HWY 101 corridor and the larger regional transportation system. Efforts have been made to provide more detail in other parts of the county by incorporating local travel models into the countywide model, but the program's primary focus remains on countywide regional travel demand impacts and supporting SCTA's long range regional transportation planning efforts.

It is important to consider that travel demand model data in general and SCTM projections in particular have limitations and should be used to predict trends and provide a generalized idea about impacts and travel changes. Model output is highly dependent on the quality of input data that is provided by local jurisdictions, and should always be reviewed by local experts for reasonableness. Geographically, the SCTM is focused on the HWY 101 corridor and urbanized areas and the quality of the model output decreases as one moves away from these locations.

The model is intended to allow analysis of transportation and traffic impacts of projects and policies that impact a number of different jurisdictions, or to analyze impacts within cities that have regional significance. The model was not designed to perform detailed traffic studies for more local projects, though the countywide model data is often used as a starting point for these types of analysis. The

current model extent ends at the county boundary with limited representations of important out of county destinations and is primarily focused on travel occurring within Sonoma County. The model estimates travel for 24-hour average work days, and for work day AM and PM peak commute periods and does not currently estimate travel for weekends or holidays. Disclaimers explaining these limitations and discussing the intended uses of the provided data are provided when the data is delivered to the requesting party.

Products and Services

The data and analysis provided by SCTA's modeling program are used to support local and regional transportation planning and project development activities. Local agencies, their consultants, and the public often request model data or specialized analysis to support their planning and capital improvement activities or for informational purposes. SCTA staff has been faced with the challenge of trying to fill a variety of large and small data requests in a timely and efficient manner.

In order to meet the majority of this demand, SCTA provides baseline model run data and associated modeling input data upon request. Although it is relatively straightforward to provide data from already completed model runs, it can require a significant amount of staff time to fill data requests that require changes to the model or enhancements to baseline datasets. Staff works with data requestors to schedule and prioritize model work and other analysis in order to maintain the program's focus on supporting SCTA's countywide and regional long range transportation planning priorities, while also providing customized analysis for local projects in a timely manner.

Unprocessed data that has been developed or provided by other organizations for use in the modeling program is not provided without the explicit permission of that organization. Staff refers individuals requesting data provided by other organizations to the data originator unless previous agreements or arrangements have been made for SCTA to distribute this information to requesting parties.

Examples of data products made available through the modeling program:

- Vehicle Miles Traveled (VMT) estimates
- Level of Service (LOS) estimates
- Facility level existing and future traffic estimates
- Average travel times
- Average trip lengths
- Vehicle and person trip estimates
- Estimates of travel delay
- Mode share estimates
- Transportation bottleneck locations
- Trip path selection estimates

- Countywide travel flow estimates
- Future transit ridership
- County, jurisdiction, and traffic analysis zone housing and employment growth estimates
- GIS or cartographic representations of model input and output

Modeling Priorities

The travel model is being continuously updated and improved. The following list of modeling tasks and improvement priorities was assembled in conjunction with SCTA's modeling subcommittee and advisory committees. These priorities are re-evaluated on an ongoing basis and revised as necessary.

Tasks have not been prioritized individually but have been divided into work task groupings that will be addressed by staff in the short, mid, and long term. Short-term tasks are not necessarily more important than long-term tasks and vice versa.

Short-term or ongoing tasks (ongoing or to be completed over the next year):

- Provide baseline (2015) and projected year (2040) model projections in easily usable formats (Excel and GIS formats).
- Update current land use data and evaluating projection year (2040) data for possible update and changes based on new information.
- Maintain and update general plan buildout model estimates.
- Track local pending development and permitted projects and ensuring that these projects are reflected in model forecasts.
- Update model transportation networks.
- Prepare specialized data products.
- Evaluate non-Measure M projects.
- Revalidate travel model using 2015 traffic counts, transit ridership, active transportation counts, and transportation surveys and data.

Mid-term tasks (to be completed over the next 1-3 years):

- Analyze travel demand impacts of Measure M projects – to be completed as part of the next CTP update.
- Analyze travel demand impacts of other projects of regional significance (next CTP update).
- Improve modeling capability to analyze alternative modes.
- Improve model capabilities for analyzing tourism, visitor, and special event travel.
- Develop non-peak hour and weekend modeling methodology and data-sets.

Long-term tasks (to be completed as resources allow):

- Shift to activity based modeling framework.

- Expand geographic coverage of travel model beyond county boundary.

Coordination with other Modeling Efforts

SCTA staff compares SCTM output, assumptions, and methodology with regional, county, and jurisdictional travel demand models in the San Francisco Bay Area region. Efforts are made to coordinate modeling efforts within Sonoma County with other existing regional and local models where possible. Staff attends regional travel demand modeling workshops and user group meetings to stay informed on regional model developments, and will keep up to date on any local modeling efforts being undertaken by Sonoma County cities.

Technical and Operational Policies

SCTA's travel demand modeling efforts focus predominately on maintaining and updating model inputs, running the model and interpreting model output, and model improvement and validation. STCM model inputs are maintained in GIS (geographic information system) and tabular databases, which can be seamlessly displayed and combined with other data maintained by SCTA staff and local jurisdictions. In previous versions of the SCTM, the model inputs and outputs were created without any geographic orientation and were maintained in proprietary formats which made exporting and displaying this information unwieldy and difficult. The transfer of model inputs and outputs into a GIS based database system has streamlined data maintenance and data sharing processes, allowing all model inputs to be maintained in a single system that is easy to use, and that most local staff and their consultants are able to access and work with easily.

The quality of model estimates and output are only as good as the input data that is being used to run the model. As demographic, land use, and transportation network data improve and are more accurate, model projections are also be more reliable. Staff continues to incorporate demographic, development, and project completion data available from local jurisdictions, regional, state, and federal agencies, and other data sources into the travel model. Continuous model updates and improvements ensure that model inputs are current and accurate, and reflect current land use and travel conditions and trends in travel behavior.

Transportation System (Network) Updates

The regional transportation system is represented in the travel model by simplified networks. These networks are coded with information representing road capacity, functional classification, average speeds, directional travel, headways and fares for transit, and facility location and connectivity. It is important that this information accurately represent the current state of the transportation system and that the future projected transportation network be a

good representation of what will be built in the future. Staff continues to monitor changes in Sonoma County's transportation network and makes changes as necessary to ensure that representations of the existing and future transportation system are accurate. Future network additions are focused on Measure M projects, Caltrans projects, and local projects with significant regional importance and are consistent with the regional travel demand model (Travel Model One), Plan Bay Area 2040, and SCTA's Comprehensive Transportation Plan.

Land Use Data Updates

Historically updates to travel model land use inputs have coincided with the Comprehensive Transportation Plan (CTP) update schedule. CTP updates generally occur on a four-year cycle. These major CTP updates are supplemented by intermittent updates as requested by local jurisdictions which are associated with project level analysis or local planning efforts. Staff will continue to maintain the major model update schedule associated with the CTP update and is working with local jurisdictions to develop a countywide permitted and pending development database which will be used to ensure that model land use assumptions are consistent with local planning activities and development trends. Staff uses universal data collection reporting methodologies to categorize and track housing, employment, and other growth in order to ensure that development data provided by different organizations is consistent countywide.

Data dissemination

As discussed earlier in this document, model data products will be made available upon request including GIS and tabular versions of: input land use data for base (2015) and projected year (2040), model road and transit networks, travel demand projections by Traffic Analysis Zone (TAZ) and network section, and other standard model reports summarizing VMT, delay, travel times, and other transportation metrics. Any work requiring additional manipulation of the baseline model output shall be handled on a case-by-case basis and may require the data user to a pay market rate fee for the additional services being requested or shall enter into a formal agreement allowing the user to obtain a copy of the model for use outside the program.

Those requesting model inputs, outputs, scripts, or reports shall complete and submit a *SCTM Data Request* form to SCTA staff identifying the requesting individual/ organization, data/files requested, and data purpose (see Attachment A). Any changes or improvements to model files, inputs, or reports should be submitted to SCTA staff for possible inclusion in the countywide model.

Model modification and improvement

Over time a number of local travel models have been incorporated into the SCTM. Detail from the Santa Rosa, Rohnert Park, Windsor, and Petaluma travel demand models has been incorporated into the countywide model.

Functional and technical improvements are routinely made to the model when time and resources allow. Improvements have included changes and increases to model TAZs, network changes, additions or changes to model land use categories and trip generation formulas, improved reporting and visualization functionality, and coding efficiency changes. These structural changes and model improvements are undertaken when they are able to improve the quality and usability of the products produced by the modeling program.

Training

New modeling techniques, software, and GIS capabilities should be incorporated into the modeling program when they will improve the quality of the output, and/or make it easier to deliver model information to SCTA's member organizations, their consultants, or the public. SCTA staff regularly participates in regional, statewide, and national technical modeling training programs and information exchange networks in order to keep up with recent developments and trends in travel demand modeling. Staff is also available to provide information on and provide training to local staff on the SCTM, travel modeling, and technical data analysis.

Model Validation

The model should be able to replicate observed conditions before being used to produce future-year forecasts. *The Model Validation and Reasonableness Checking Manual* published by the U.S. Department of Transportation (Federal Highways Administration – FHWA) provides guidance on how travel demand models should be validated and checked for reasonableness. SCTA bases its model validation procedure on the recommendations provided in this document.

Model validation is performed in conjunction with major model updates that precede updates to SCTA's Comprehensive Transportation Plan. The services of independent consultants familiar with travel demand models and model validation are retained to assist staff with model validation.

Staff uses the following methods to validate the travel model:

- Check modeled countywide vehicle miles traveled and trips per person rates against typical values provided by FHWA and values reported by MTC and other counties for reasonableness.
- Compare predicted or modeled link volumes to ground traffic count volumes using available traffic counts. Peak hour and daily traffic count data is obtained from Caltrans and local jurisdictions. Link volume comparisons should be scattered across the countywide transportation system where ground counts are available, and should cover high and lower volume transportation system links. Staff

generates a list and map of network/transportation system links and available ground count locations in order to determine if steps should be taken to collect additional ground counts in locations where data is unavailable.

- Predicted/modeled link volumes should be within the deviation ranges to ground count volumes recommended by FHWA. Higher functional class links (freeways and principal arterials), which normally carry larger travel volumes (10,000 Annual Daily Traffic (ADT) and above), are recommended to be within a 7% deviation of ground counts, and lower functional class links (collectors or roads with volumes of 5,000 ADT and below) to be within a 25% deviation of ground counts.
- Check future trip generation, distribution, and link volume for reasonableness by comparing model results to regional and statewide model results, comparison to transportation trends, and consultation with SCTA advisory committees.
- Compare predicted or modeled mode shares and transit ridership to existing transit ridership counts and historical/observed mode share rates (US Census, Bay Area and CA Statewide travel surveys).
- Land use audits – Model land use inputs are reviewed using visual and tabular representations of this data. Outliers and gaps are identified and corrected as necessary. Draft model run results are used to identify possible errors or omissions in land use inputs.
- Transportation network audits - Model networks are reviewed using various visual representations and tabular versions of input transportation network data. Draft model run results will often quickly highlight any errors or omissions in model transportation networks. Corrections and revisions are made as necessary.
- Dynamic Validation/Sensitivity Testing – Dynamic validation tests the model's ability to respond reasonably to changes in inputs. Changes to land use, road networks, transit service, travel costs, and transportation policies are tested as part of the SCTM dynamic validation process.

Program Evaluation

In order to ensure the long term viability of the program, it is critical that the program be periodically reevaluated. Staff will work with SCTA advisory committees to evaluate the model program and to recommend changes to the modeling program or its associated policies periodically.

From an administrative standpoint the following questions will be used to assess the performance of the program:

- Is the SCTM being primarily used to support the planning priorities of SCTA?
- Is the SCTM being adequately maintained and does it accurately represent current and expected countywide travel?
- Are the data products and analytical services available through the program sufficient for SCTA and local planning needs?
- Is there a significant unmet data need that would warrant changes to the model, model focus, or data products available through the modeling program?

From a technical/operational standpoint, the following performance criteria will be used to evaluate the adequacy of the modeling program:

- Can the existing structure and functionality of the SCTM be used to adequately support the long range planning priorities of the SCTA?
- Are existing land use update procedures and protocols working?
- Is there a significant deficiency in model outputs that would warrant a major reconfiguration of the existing model?

Staff will routinely review the status of the modeling program and will address any deficiencies as resources allow. Staff will conduct a comprehensive review of program operations and model performance during each major model update and will make recommendations for addressing possible deficiencies. Staff will work with SCTA advisory committees to perform this comprehensive program review as part of the CTP update cycle.

Sonoma County Transportation Authority
Travel Model Data Request Form

Firm/Organization: _____

Requested by: _____

Address: Street: _____

City/State/Zip: _____

Phone/Fax: _____

E-mail: _____

Project/Application:

Detailed description of requested data/files (include formats, model run years, etc.):

Purpose/Use of requested data:

I understand and agree to the following terms related to the use of the request data/files:

Travel model files prepared by SCTA including the associated input and output files, were developed for use by SCTA for countywide planning purposes. The appropriate use of such data in other planning programs and studies must be determined entirely by the planners and analysts of the firm or agency undertaking such projects. SCTA makes no warranties, expressed or implied, of the appropriateness or accuracy of any results or opinions derived from any project not conducted or sponsored by SCTA utilizing SCTA's technical data. SCTA welcomes verifiable modifications that would enhance the integrity of the modeling process or input/output files. Please provide a detailed list of any model file modifications and a justification for any modifications to SCTA staff at the conclusion of this project.

Signed: _____ **Date:** _____

Mail, Email, or Fax to: SCTA
Attn: Chris Barney, Transportation Planner
490 Mendocino Ave., Suite 206
(707)565-5373
cbarney@sctainfo.org
fax: (707) 565-5370

