1.4 Organization of the Report

The report is organized into 12 chapters with several Appendices.

1.4.1 Chapter 1 Introduction

Chapter 1 describes organization of the documentation, version history, and public access.

1.4.2 Chapter 2 Model Overview

Chapter 2 is oriented toward model users and provides information relevant to setting up and running the model such as hardware/software requirements, setting up model inputs, a review of model outputs, and troubleshooting common issues that arise when running the model.

1.4.3 Chapter 3 Model Structure

Chapter 3 describes the overall structure and flow of the SACSIM model, along with descriptions of each SACSIM submodel. The submodels include:

- *DAYSIM* is the person-day activity and travel simulator, which is the only true activity-based tour component of SACSIM. DAYSIM accounts for all travel by residents of the SACOG region for their travel within the region. The simulation is at person level, so the major outputs of DAYSIM relate to personal travel for work, school, social/recreational, and other non-work purposes. DAYSIM includes a set of *long-term choice* models at the highest level, and a larger set of *short-term choice* models at lower levels.
- *Airport ground access* to the Sacramento International Airport is modeled separately, at the traffic analysis zone (TAZ) level. This model is adapted from work done by the Sacramento Regional Transit District for its evaluation of the Downtown-Natomas-Airport transit corridor.
- *Commercial vehicle travel* is also modeled separately from resident travel and is modeled at the TAZ level. It includes all trips made for transportation of goods and services. This submodel was adapted from SACMET, and operates with conventional four-step trip generation, distribution, and assignment.
- *External trips* include both internal-external (trips made by region residents to points outside the region), external-internal (trips made by residents from outside the region to points within the region), and trips that pass through the region without stopping. These trips are fixed as exogenous, scenario variables. Only the portion of these trips that occur within the SACOG region are modeled.

Trips from all the submodels are aggregated to create conventional trip matrices which are assigned to the highway and transit networks. This process includes a *trip aggregator*, plus all the usual trip assignment programs.

SACSIM runs within an application shell, scripted in Citilabs® TP-Plus software. DAYSIM itself is a stand-alone program written in C#, and compiled to run within the SACSIM application. All trip aggregation, plus the non-DAYSIM components, are TP-Plus scripts.

1.4.4 Chapters 4 and 5 Land Use and Demographics

Chapters 4 and 5 cover key land use and demographic input data files required by SACSIM. Chapter 4 provides a description of the *parcel land use file*, which is the SACSIM equivalent of a zonal data

file in a conventional four-step model. In addition to descriptions of the key variables included in the file, Chapter 4 provides an overview of how the file is produced, starting from SACOG's land use model. Chapter 5 provides a description of the *representative population file*, which is a person-level representation of the region's household population. The population file is required to run activity-based tour models like SACSIM. The cumulative demographics (household size, workers, income distribution, age) of the representative population file reflect key demographic projections and forecast assumptions which underlie SACOG's travel demand forecasts. Chapter 5 provides an overview of how the population file is produced.

1.4.5 Chapters 6, 7, and 8 Transportation Networks

Chapters 6, 7, and 8 cover transportation network input files and assumptions. Chapter 6 provides a detailed description of the *highway network files* used by SACSIM. Highway networks are required for generating cost or level of service matrices (also called *skims*), which represent the level of accessibility of travel by automobile.

Chapter 7 describes SACSIM's transit network. By their nature, transit networks are more complicated than highway networks. First, more attributes need to be represented in transit networks, including stop locations, service frequencies, transfer locations, access points (e.g. park-and-ride lots), and hours of operation. Second, access to transit (i.e. how a traveler gets from his or her origin location to the first transit stop) is more difficult to characterize in computer models, and additional network features and coding are required to capture the options which can be used to access transit. Finally, transfers and fare policies vary among operators and passenger types, which results in a large variety of potential fares for each trip itinerary and person type. Together, these transit inputs allow creation of transit skims, which represent the level of transit access between TAZs.

Chapter 8 discusses SACSIM's bike and walk network, which is a subset of its highway network. It also discusses the method by which SACSIM takes advantage of its detailed, parcel-level land use data to estimate the distances of short trips (e.g. trips that start and end within the same TAZ, or between nearby TAZs) more accurately than can be done by the SACSIM highway network on its own.

1.4.6 Chapter 9 Auto/Transit Cost and Pricing

Large variations in fuel prices over the last several years have initiated a re-evaluation of fuel price and auto operating costs as it affects travel costs and behavior in travel demand models. Chapter 9 provides a SACOG-specific and California perspective on actual fuel prices and recent changes, and describes how fuel prices are represented in SACSIM. The chapter also explains how transit fares are represented in the model.

1.4.7 Chapter 10 System Equilibration

Chapter 10 describes the theoretical foundation behind and process by which SACSIM iterates in order to reached system equilibration and describes the relationships between the network

assignment and DAYSIM to determine person trip travel patterns and mode choices relating to congestion.

1.4.8 Chapter 11 Sensitivity Tests

Chapter 11 presents the results of several sensitivity tests applied to SACSIM, which test to see if the model's responses to changes in factors like fuel price, transit fare, income, land use density reasonably align with observed responses in travel behavior to changes in these factors. Chapter 11 also summarizes the results of a "random variation" test, which test to see how much variation there is in model outputs due to the probabilistic nature of many of its choice models.

1.4.9 Chapter 12 Model Calibration, Validation and Reasonableness Check

Chapter 12 describes the observed travel and transportation system data sources used for estimating, calibrating, validating, and reasonableness checking SACSIM along with a discussion on the quality and limitations of each source.