



TRANSPORTATION SYSTEM SIMULATION MANUAL (TSSM)

This fact sheet outlines the need for TSSM, and the development of the first TSSM edition.

INTRODUCTION

As the transportation system environment grows in complexity, increasing pressure is placed on agencies to identify more innovative and efficient solutions to a wide range of issues. Simulation analysis has become increasingly vital for evaluating these solutions prior to implementation.

Several countries have developed simulation guidelines, but these have not gained recognition in the United States. Numerous State departments of transportation (DOTs) have produced their own simulation protocols, but none have gained nationwide acceptance. The Federal Highway Administration (FHWA) developed the content-rich Traffic Analysis Toolbox,¹ but this source has not achieved familiarity levels approaching those of the Highway Capacity Manual (HCM) or Highway Safety Manual (HSM). Agencies and States are now requesting the development of a

national Transportation System Simulation Manual (TSSM) that can provide the necessary guidance to support 21st century traffic analyses.

BACKGROUND

The Saxton Transportation Operations Lab at FHWA's Turner-Fairbank Highway Research Center in McLean, VA, is working on addressing this need by developing the first ever TSSM. Funding is provided by the Traffic Analysis and Simulation Pooled Fund Study (TPF-5(176))² in collaboration with the Transportation Research Board (TRB) System Simulation Task Force (AHB80T). The team is receiving input from many stakeholders as demonstrated in figure 1. Informational webinars with stakeholders such as members of TPF-5(176) and of AHB80T, as well as other invited simulation experts are held regularly to discuss topics covered in the TSSM.

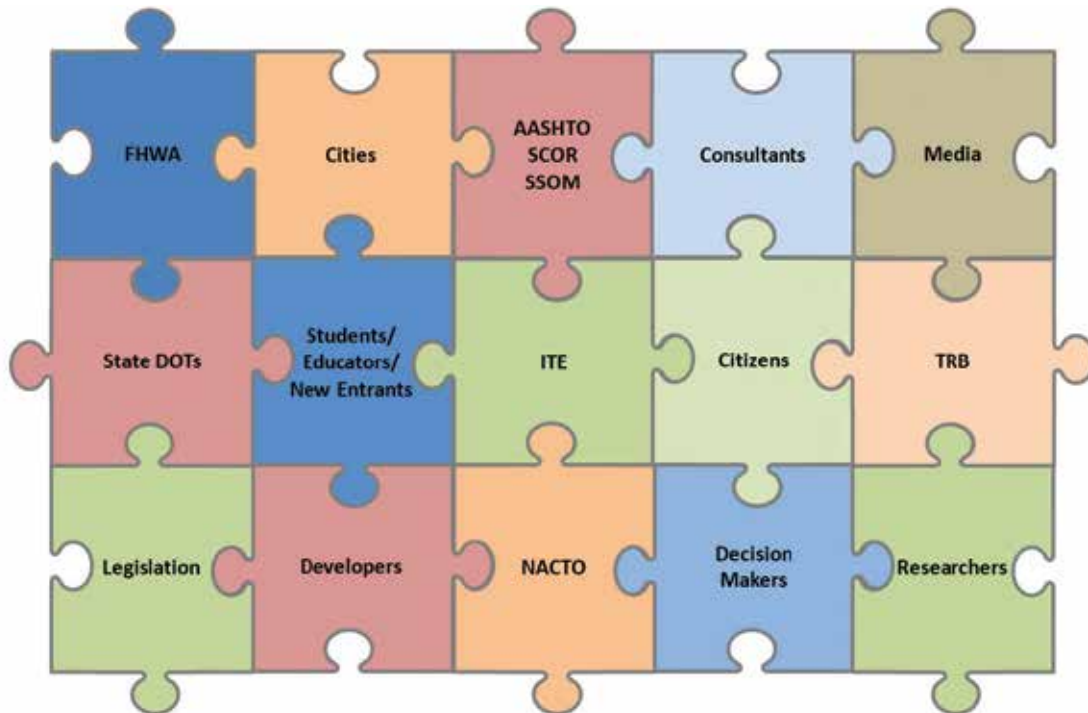


Figure 1. Stakeholders* involved in TSSM development (source: FHWA)

*AASHTO SCOR SSOM: American Association of State Highway and Transportation Officials Special Committee on Research and Innovation Subcommittee on Systems Operation and Management

ITE: Institute of Transportation Engineers

NACTO: National Association of City Transportation Officials

THE MANUAL

Once finalized, the TSSM will consist of nine chapters to walk practitioners through scoping and applying transportation simulation.

VOLUME I. THE BASICS	
Chapter 1. What is Simulation	Chapter 3. Principal Ideas in Simulation
Chapter 2. What Options Exist	Chapter 4. Issues that Can Arise in Simulation
VOLUME II. MODELING GUIDANCE	
Chapter 5. Defining the Problem	Chapter 8. Verification, Calibration, and Validation
Chapter 6. Data	Chapter 9. Analysis and Presentation
Chapter 7. Creating the Model	Chapter 10. Post Project Validation
VOLUME III. SUPPLEMENTAL MATERIAL	
Chapter 11. Freeway System Models	Chapter 14. Multimodal Systems
Chapter 12. Arterial System Models	Chapter 15. Other Materials
Chapter 13. Freeway/Arterial System Models	

Figure 2. Outline of Chapters in TSSM (source: FHWA)

Volume I

The TSSM begins with an introduction to transportation system simulation, walking users through the analytical benefits, requirements, and underpinnings of simulation. The manual then helps users decide which traffic analysis model to use. Simulation might not always be the best option based on limitations and project stakeholder expectations.

Volume II

If users decide that transportation system simulation is the right method, the critical need chapters (5 through 9) provide guidance on successful simulation. In chapter 5, users receive guidance on determining the scope and scale of their simulation project. Chapter 6 provides insights into the data requirements for various forms of simulation. Once the data are gathered, chapter 7 describes the data entry process, in which many real-world processes must be translated into numerical entries. Verification, calibration, and validation (VC&V) are the next steps, after the preliminary simulations are complete, to ensure the outputs are reflective of real-world behaviors and outcomes. When results are calibrated and finalized, users can share their results visually and analytically. It is important for users to properly interpret the results received from simulation and, ultimately, to make informed decisions based on those results. The final chapter in volume II, chapter 10, will address the necessary steps to conduct post-project validation—an under-appreciated and likely under-used source of crucial insights that can then be applied towards future simulation projects.

Volume III

The last TSSM section will consist of a series of freeway and arterial case studies. This includes detailed supporting files/documents as well as other helpful supplemental material. The case studies will exemplify the procedures and practices recommended within volume II. The current plan is for the TRB Task force on system simulation to develop the bulk of the material for volume III.

PROJECT STATUS

The research team is in the early stages of TSSM development. Stakeholder webinars are ongoing and chapters are in draft stages. The critical need chapters (5 through 9) will be drafted in November 2017 and finalized in January 2018. Intermediate need chapters (1 through 4; chapter 10) will be drafted in March 2018 and finalized May 2018. Completion of the TSSM is expected in fall 2018.

Once the TSSM is completed, the TRB task force will assume responsibility for maintaining and enhancing all chapters of the manual.

REFERENCES

1. FHWA. “Traffic Analysis Toolbox” (website). Available online: <https://ops.fhwa.dot.gov/trafficanalysisistools/index.htm>. Last accessed October 20, 2017.
2. National Cooperative Highway Research Program (NCHRP). “Traffic Analysis and Simulation” (website). Available online: <http://www.pooledfund.org/Details/Study/403>. Last accessed October 30, 2017.

