

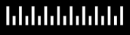
Do More • Do Better

TransModeler[®]

Traffic Simulation Software

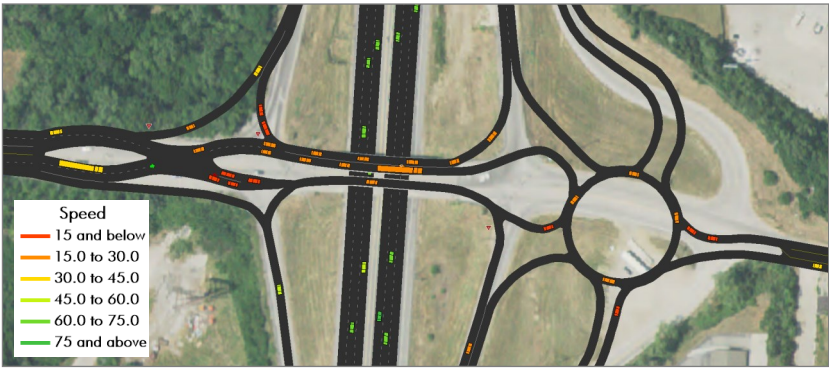


Caliper[®]



MICROSIMULATION REDEFINED

TransModeler is the most accurate and versatile traffic simulation software ever created, applicable to a wide array of traffic planning and engineering tasks. Based on the latest research, TransModeler combines advanced methodological techniques and software technology with unparalleled ease of use. Packed with efficiency-driven and productivity-boosting features and backed by expert customer service, TransModeler will make your simulation analysis more cost-effective than ever before.



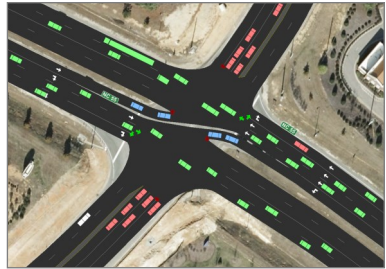
TRANSMODELER HIGHLIGHTS

WIDE-RANGING APPLICATIONS

- Perform studies of all sizes, from a single intersection to an entire corridor or whole metropolitan area.
- Analyze traffic impacts using a suite of integrated tools to calculate ITE trip generation, distribute trips, and simulate results.
- Conduct signal timing studies using uniquely effective microsimulation-based traffic signal optimization.
- Simulate complex freeway merging and weaving operations with ease.
- Faithfully represent all types of traffic conditions, both on interrupted and uninterrupted flow facilities and in urban and rural settings.

CONVENIENT AND COST EFFECTIVE

- Simple road editing tools, native GIS architecture, and import/export compatibility with a wide range of common file formats make it easy to achieve ground-truth road geometries and stunning 3D visualization.
- TransModeler uses microsimulation as the engine of your HCM analysis, reporting LOS based on simulated performance. It is also the animator in HCS™.



STATE-OF-THE-ART FEATURES

- Microsimulation-based Dynamic Traffic Assignment leverages the highest fidelity driver behavior models to capture important network effects of proposed projects more accurately than any other assignment strategy.
- Multi-resolution hybrid simulation allows different parts of the same network to run microscopically and mesoscopically at the same time.
- TransModeler offers a rich feature set for modeling Connected and Automated Vehicles (CAVs) and is continually being updated with the latest research.
- Don't worry about having to buy an add-on to get the features you need. ITS strategies, including managed lanes, ramp metering, and hard shoulder running, are standard features out of the box.

INTEGRATED FOR PLANNING AND OPERATIONS

- TransModeler simulation models can be integrated with trip-based and activity-based transportation planning models.
- There are no limits to the size and scope of your project. For over 10 years, TransModeler has been used for projects as large as entire cities, counties, and beyond.

WIDE-RANGING APPLICATIONS

TRAFFIC IMPACT ANALYSIS

TransModeler makes it simpler and more cost-effective to leverage micro-simulation to support traditional traffic studies, such as Interchange Modification/Justification Studies and Traffic Impact Analysis (TIA) studies. TIA tools allow you to add a proposed development and choose built-in ITE or custom rates to calculate trip generation, pass-by trips, and internal capture. Choose from one of several automatic trip distribution methods and visualize the resulting turning movement volumes on the map. To complete your analysis, simulate with and without the development's trips and produce any number of useful output reports, including simulation-based LOS results.



SIMULATION-BASED COORDINATION OPTIMIZATION



When you need to understand how traffic signal operations impact the adjacent intersections in the network, simulation is the only option. Simulation is especially important in over-saturated conditions in which queues may spill back to upstream intersections or disrupt the arrival patterns of traffic between intersections, phenomena that are not

well accounted for in traditional methods employed by other signal optimization software. Leverage our unique microsimulation-based traffic signal optimization in TransModeler to compute robust, operations-sensitive cycle lengths and offsets for coordinated signals.

ENGINEERING AND DESIGN

Take advantage of ground-truth geography and geometry to simulate traffic with the most faithful portrayal of storage, capacity, and operations. Import CAD design files to precisely replicate infrastructure projects. Moreover, without having to use the application programming interface (API) or purchase add-ons, you can simulate more urban street features than any other simulator, such as:

- Two-way left turn lanes (TWLTL) and reversible lanes
- Access management control, from curb cuts to restricted crossing U-turn intersections (RCUT)
- Street diets and smart streets
- Public transit strategies, such as bus lanes and transit signal priority (TSP)



TransModeler allows you to simulate intersections with greater detail and accuracy than any other microsimulation software. For highways, TransModeler simulates driver behaviors and vehicle interactions in merging and weaving sections in ways that other traffic simulators cannot. Our road editing tools make it possible to accurately model horizontal and vertical curvature (i.e., grade) so that you can capture the critical impacts of geometric delay, particularly on heavy vehicles. Moreover, you can simulate passing maneuvers both in passing lanes and in the opposing lane on two-lane highways.

TRANSPORTATION PLANNING

TransModeler is the best tool to help transportation planners prioritize projects for Transportation Improvement Programs. Use TransModeler to evaluate the benefits of various projects with operational fidelity and select the right projects to account for the projected growth in your region. TransModeler is multimodal and simulates passenger cars, heavy vehicles, buses, trains, bicycles, motorcycles, and pedestrian impacts. You can further customize your vehicle fleet, including the ability to designate vehicle classes as having varying levels of automation capabilities.

CONVENIENT & COST-EFFECTIVE

EASY ROAD EDITING

Road editing tools in TransModeler make it easy to model non-standard geometries and novel intersection and interchange designs. TransModeler automatically creates many elements of the road network for you, saving you time and budget, and has shortcuts that make routine editing tasks easy. With the Road Editor, create a host of network features in two clicks or less:

- Roundabouts
- Turn bays
- Acceleration/deceleration lanes
- Pedestrian crosswalks
- Channelized turns
- Bus pullouts
- Two-way left-turn lanes
- Center medians



GIS TOOLS

Because TransModeler is also a Geographic Information System (GIS), you have a wealth of GIS tools at your fingertips. Automatically load map layers and aerials imagery from Google Earth™, Google Maps™, OpenStreetMap®, USGS Topographic Maps, and more directly into your project with a single click making network creation easier than ever. Create buffers around a point or line layer and accurately measure distances or grades using built-in tools. Do you have multiple projects in the same area? Easily combine multiple projects into one by merging projects together.

SYNCHRO IMPORT

TransModeler makes it easy to advance analysis previously performed in Synchro®. Import network geometries, turning volumes, and signal timings

from Synchro and expand your analysis to freeway facilities, ITS operations, or public transportation.

LOS ANALYSIS + HCS INTEGRATION

TransModeler is the only microsimulation software to report simulation-based level of service faithful to Highway Capacity Manual definitions, including intersection LOS by approach, lane group, and lane as well as LOS for roundabouts, interchanges, urban streets, and freeways. TransModeler is also the animator for urban streets and freeway facilities in HCS™, and HCS files can be imported into TransModeler to extend your HCS analysis with simulation.

BUILT IN 3D VISUALIZATION

Showcase your completed design to audiences with TransModeler's powerful Unity™ 3D Viewer. Beautiful graphics will enhance public presentations by fully capturing the project from all angles. Create custom flight paths through the study area and record them to video directly in the 3D Viewer. With TransModeler, you can produce professional and dynamic visual aids without having to purchase additional, expensive 3D modeling software or transfer street geometrics and vehicle trajectories between software platforms.



STATE-OF-THE-ART FEATURES

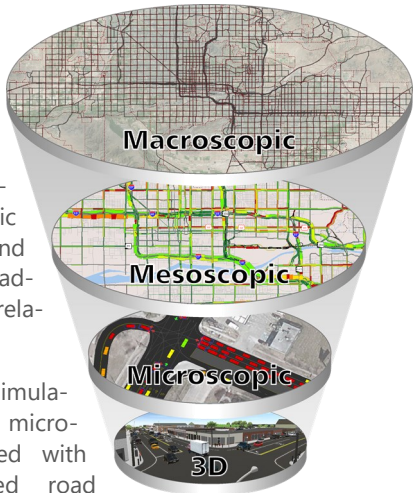
DYNAMIC TRAFFIC ASSIGNMENT (DTA)

DTA is a tool for modeling complex interactions between driver route choices and congestion patterns as they evolve over short time intervals. TransModeler is the most advanced and cost-effective DTA platform available, capable of microsimulation-based, mesoscopic simulation-based, and hybrid micro- and mesoscopic simulation-based DTA. Its unique microsimulation-based DTA is the only tool that can appropriately address transportation problems that require a detailed handling of driver behavior and network performance not afforded by mesoscopic DTA or traditional static traffic assignment approaches.

MICROSCOPIC, MESOSCOPIC, AND COMBINED HYBRID SIMULATION

In addition to the most detailed microsimulation, TransModeler can simulate traffic with mesoscopic and combined micro- and mesoscopic (i.e., hybrid) fidelity. TransModeler's mesoscopic model combines a microscopic representation of individual drivers and vehicles with the computational advantage of aggregate speed-density relationships.

TransModeler also provides a hybrid simulation capability in which high-fidelity microsimulation can be readily intermixed with mesoscopic simulation on selected road segments. The areas of the network of greatest sensitivity and interest can be simulated with microsimulation, and other areas can be simulated using the mesoscopic model in a single network. This hybrid capability makes it possible to simulate very large networks with modest computing power and without sacrificing accuracy and level of detail where it is most needed.

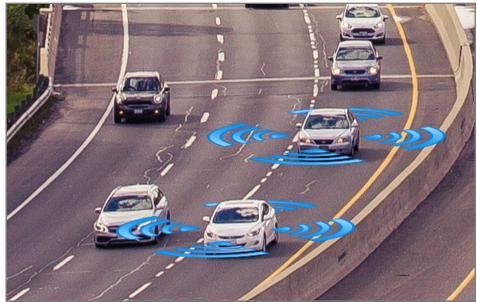


CONNECTED & AUTOMATED VEHICLES

TransModeler incorporates the very latest research recently conducted for FHWA to study the potential impacts of CAV vehicles on the surface

transportation system. Some of the highlights of CAV modeling in TransModeler include:

- Apply SAE International automation levels to default and customized vehicle classes.
- Analyze the impacts of CACC and Speed Harmonization with a variety of customizable car following models right out of the box.
- Create exclusive AV lanes (e.g., CAV-only express lanes) and designate the level of automation permitted on those lanes. Vehicles can then operate under AV operation on certain roads and human operation on others.
- Simulate trips lists, such as those created by an ABM, that explicitly identify CAV trips.



ITS-CAPABLE

You can simulate active traffic management systems (ATMS) and intelligent transportation system (ITS) strategies without having to purchase any add-ons or write any code. ATMS and ITS strategies that you can analyze include:

- Reversible lanes
- Hard shoulder running
- Speed harmonization
- Ramp metering
- Variable speed limit signs
- Electronic toll collection

MANAGED LANES

TransModeler is a complete, flexible solution for analyzing managed lanes projects. TransModeler simulates data collection and information dissemination assets in the field, including the cameras and detectors that monitor the performance of the system, dynamic message signs (DMS) that convey the current price to the driving public, and back-office systems that calculate price updates. With the help of DTA, you can explore the tradeoff between delay and travel time savings that is at the root of driver willingness to pay. TransModeler supports any value-of-time distribution, simulates a diversity of pricing strategies, and offers exhaustive revenue reporting so that you can fully explore the traffic and revenue implications of your design.

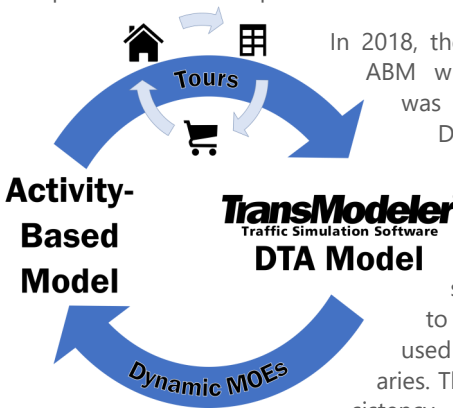
INTEGRATED FOR PLANNING & OPERATIONS

PLANNING MODEL INTEGRATION

TransCAD is Caliper’s market-leading travel demand modeling software. TransCAD and TransModeler together provide unprecedented capability for integrated demand and traffic modeling. Use TransModeler with TransCAD to perform operational analyses of transportation improvement projects and plans. TransModeler can analyze large-scale networks or subareas of networks in greater detail to better understand the extent and source of recurring or non-recurring traffic congestion. TransModeler has the flexibility to integrate with:

- Trip-based models and activity-based models (ABM)
- Other planning software platforms

TransModeler streamlines the use of simulation with travel demand forecasting by allowing you to import street networks and trip tables from popular planning models and GIS applications, such as TransCAD, Cube™, and Emme®. TransModeler features powerful built-in tools to help develop demand inputs for both existing conditions and future years, including O-D matrix estimation (ODME) for calibrating demand to observed counts and comprehensive matrix operations for estimating future demand.



In 2018, the first successful integration of an ABM with a microsimulation-based DTA was completed when a TransModeler DTA model was integrated with an ABM in Florida. Tours from the ABM are fed into the TransModeler DTA model. In turn, TransModeler produces dynamic skim matrices, which are fed back to the ABM model where they are used to update tours and traveler itineraries. This loop is repeated to achieve consistency.

REGIONAL MICROSIMULATION

Historically, microsimulation was believed to be too difficult and expensive to

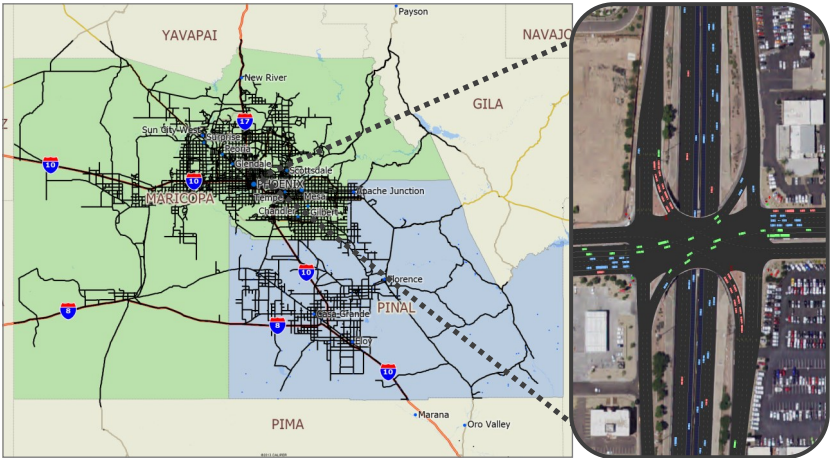
apply to wide areas. While DTA is an emerging modeling practice for evaluating traffic operations and management improvements, many do not realize that TransModeler makes microsimulation-based DTA a feasible option for models of all sizes. TransModeler's efficient software architecture has allowed it to be deployed as a microsimulation-based DTA in regional networks across the United States for over 10 years. The largest model to date covers most of the Detroit metropolitan area.

Selected Caliper DTA Models, 2008-2020

Location	Miles in Network	AM Trips	PM Trips
Detroit, MI	6,690	2.2 million	4.7 million
Phoenix, AZ	8,295	2.5 million	4.0 million
Las Vegas, NV	2,234	945,000	1.9 million
Jacksonville, FL	5,439	692,000	900,000
Virginia Beach, VA	471	165,600	201,000
Lake County, CA	726	36,540	68,850

The regional microsimulation model of the greater Phoenix area has also been used as a warehouse of microsimulation inputs (i.e., geometry, signage, signal timings, traffic counts, traffic demand, etc.,) and serves as a valuable resource for further traffic simulation tasks, such as:

- Subarea and local traffic studies
- Public presentations
- Multimodal regional planning
- Data sharing



About Caliper

Caliper is a US-owned and operated corporation and is a leading developer of transportation and mapping software. Caliper is the creator of **TransCAD** transportation planning software, **TransModeler** traffic simulation software, and **Maptitude** geographic information system software packages. Caliper is also a highly regarded consulting and R&D provider offering professional services in transportation and quantitative management consulting.

Caliper's software applications are being used by more than 100,000 users in over 75 countries around the globe and are making businesses and governments more efficient and effective.

TransModeler SE

Are you simulating smaller projects for traffic impact and other studies? TransModeler SE is a complete traffic analysis software solution for up to 20 intersections or 100 links for only \$995. TransModeler SE is a powerful microsimulation, traffic impact analysis, and traffic signal optimization tool that is HCM-compatible and is the official animation tool for HCS™.

Learn more about TransModeler at www.caliper.com/TransModeler.

Learn more about TransModeler SE at www.caliper.com/TransModeler-SE.



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