



## TRAFFIC RESEARCH LABORATORY FACT SHEET

*Research that is Essential, Indispensable, and Connected to our Customers.*

### PURPOSE

The Traffic Research Laboratory (TReL) is a unique combination of advanced hardware and software systems that can be used by researchers and practicing traffic engineers to assess and evaluate the impact of various combinations of advanced technologies, strategies, and policies prior to field installation. State-of-the-art traffic research and development of these systems are conducted in the laboratory. The laboratory provides an experimental testbed and analysis toolbox to facilitate FHWA's Research and Development (R&D) program in Advanced Traffic Management Systems (ATMS).

### DESCRIPTION

TReL contains the visualization, simulation, and communication capabilities needed to effectively conduct traffic engineering R&D. TReL affords ATMS researchers the ability to conduct innovative real-time, hardware-in-the-loop evaluations and studies. Researchers at TReL develop and evaluate prototype adaptive traffic control systems that are being evaluated and demonstrated in field trials. TReL staff also developed and maintain the Traffic Software Integrated System (TSIS), a suite of traffic analysis tools used to assess the impact of transportation improvements to a network. The traffic simulation model CORSIM, contained within the TSIS suite, is the core of the studies and evaluations conducted at TReL. CORSIM simulates traffic and traffic control conditions on combined surface streets and

freeway networks. It generates a wide range of operational and environmental measures of effectiveness to quantify the performance of a traffic network. Researchers at TReL utilize CORSIM to evaluate traditional and advanced traffic management systems and strategies, geometric design alternatives, and the effect of traffic incidents and events. They also refine, develop, and evaluate CORSIM algorithms. Other components of the TSIS suite, such as the traffic visualization tool TRAFVU and the graphical input processor TRAFED, are also maintained at the laboratory.

TReL provides the simulation tools needed to test and evaluate real-time adaptive traffic control systems (ACS) algorithms under a wide range of geometric and traffic conditions. Results of the TReL evaluations have been used to select, refine and finalize the adaptive control strategies used in the field-testing and implementation of ACS.

Collectively, these activities and capabilities enable the ATMS R&D team to effectively conduct research and provide guidance for the integration and deployment of advanced traffic operations and management systems, as well as other Intelligent Transportation System (ITS) components.

Developing and maintaining the enabling technology is the key to the ATMS R&D program. The Traffic Research Laboratory makes it possible.

### MISSION

- To conduct ATMS investigations, develop solutions, refine concepts, and facilitate the transfer of R&D products from the laboratory to the field.
- To advance the state-of-the-art and the state-of-the-practice in ATMS through the use of an advanced traffic research laboratory.
- To help fulfill the research, development, test, and evaluation initiatives in support of the ATMS R&D program.

### SPECIAL CAPABILITIES

- Provides day-to-day on-site support to the ATMS R&D team.
- Responds to hundreds of technical requests from practitioners and provides assistance to TSIS users.
- Houses a modest training facility that can be used to facilitate the transfer of technology.
- Applies hardware-in-the-loop concepts, where real traffic controllers are interfaced (physically connected) with simulated traffic in real time. Through this controller interface device (CID), TReL researchers can verify that the desired controller features are operating as expected.
- Assists with the development and evaluation of dynamic traffic assignment (DTA) systems.
- Assists with the development and evaluation of Traffic Estimation and Prediction Software (TREPS)

*The Turner-Fairbank Highway Research Center (TFHRC) has more than 24 laboratories for research in the following areas: safety; operations, including intelligent transportation systems; materials technology; pavements; structures; and human centered systems. The expertise of TFHRC*

*scientists and engineers covers more than 20 transportation-related disciplines. These laboratories are a vital resource for advancing this body of knowledge created and nurtured by our researchers. The Federal Highway Administration's Research, Development, and Technology*

*Service Business Unit operates and manages TFHRC to conduct innovative research to provide solutions to transportation problems both nationwide and internationally. TFHRC is located in McLean, Virginia. Information on TFHRC is available on the Web at [www.tfbrc.gov](http://www.tfbrc.gov).*

- Applies and evaluates traffic signal optimization software such as PASSER IV and TRANSYT 7E.
- Evaluates and demonstrates adaptive control prototypes.
- Demonstrates and applies traffic simulation packages such as PARAMICS, VISSIM and SIM TRAFFIC.

#### **LABORATORY COMPOSITION**

TReL consists of several computers running various systems (traffic simulation software, adaptive traffic control software, etc.), traffic control equipment, and two large display screens.

#### **PRODUCTS AND SERVICES**

- On-site support of the FHWA ATMS R&D program.
- Maintenance and development of new and existing traffic software systems.
- Maintenance and support of TSIS.
- Application of the CORSIM traffic simulation model and related tools.
- Application of the CID hardware-in-the-loop system.
- Evaluation of DTA prototypes.
- Development of simulation algorithms (ramp

metering, signal preemption, etc.).

- Route 7, Virginia, Signal Preemption Study utilizing CID.

#### **EXPERTISE**

TReL combines the expertise of traffic engineers, system engineers, and computer science professionals with experience in traffic research, highway safety, algorithm development, traffic simulation, system design, model development, and ITS.