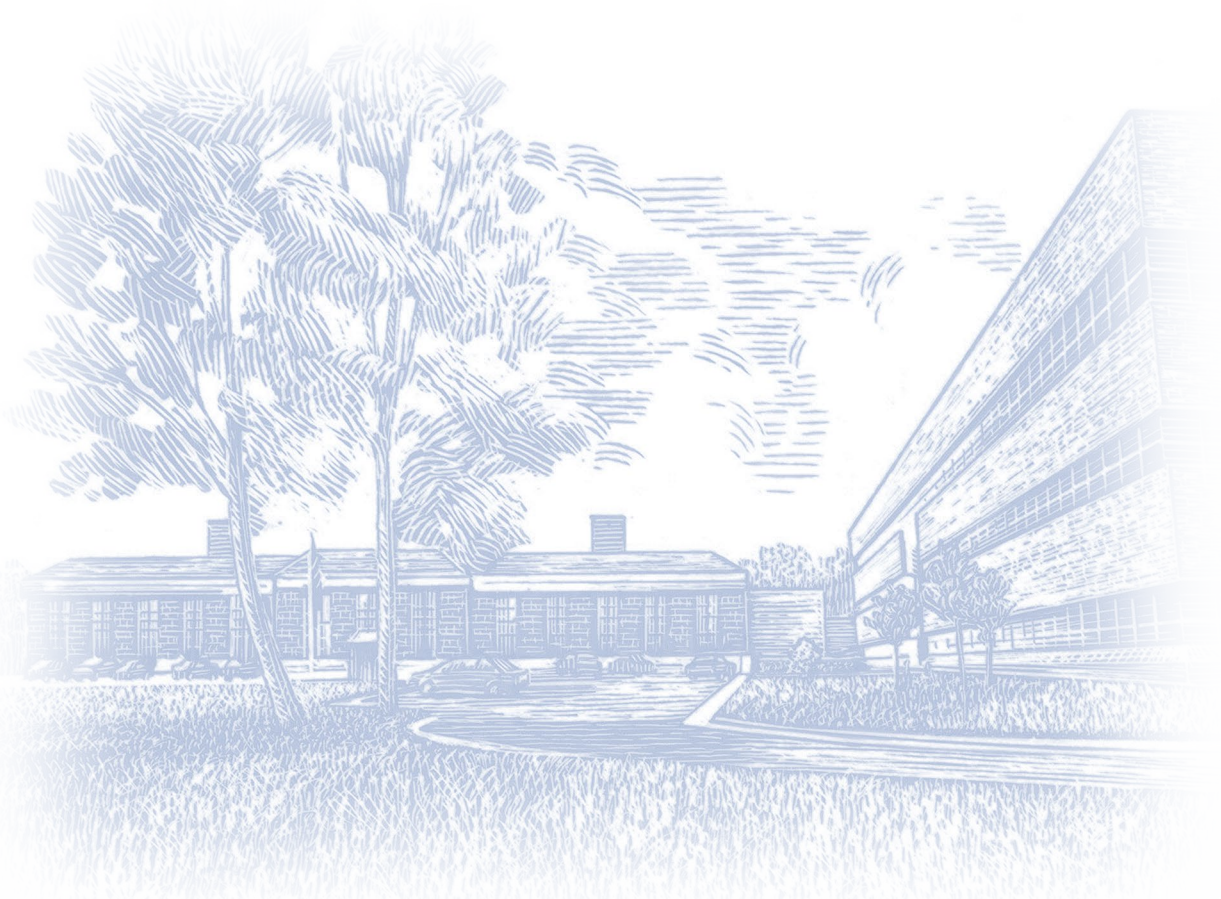# Traffic Research Laboratory Assessment
Summary

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Overview Of Traffic Research Laboratory

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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 test bed and analysis tool-box to facilitate the Federal Highway Administration's (FHWA) Research and Development (R&D) program in Advanced Traffic Management Systems (ATMS).

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 maintains 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.

Key Strengths and Observations

- The TReL's Team leader, Travel Management team, Raj Ghaman, has excellent ties to the transportation industry. These personal relationships help TReL identify research deployment opportunities with public agencies and private organizations.
- The TReL staff, including contract personnel, is highly skilled, dedicated and motivated.
- Many of the TReL research products have been well received and used by the industry (e.g., QuickZone, IDAS and CORSIM).
- The researcher community has judged a number of TReL products a success, and initial deployments are in process (RT-TRACS, DTA).
- ACS Lite is being developed in a nontraditional approach by partnering with industry for more rapid development. This strategy could become a model for future developments of this nature.
- There is management support for TReL within the TFHRC organization.
- The relationship between TReL and the Joint Program Office and Travel Management is more positive than it was 5 to 7 years ago.
- The construction and use of the TReL local intersection for research in safety and mobility is a constructive step in broadening the lab's focus beyond a roadway efficiency emphasis.
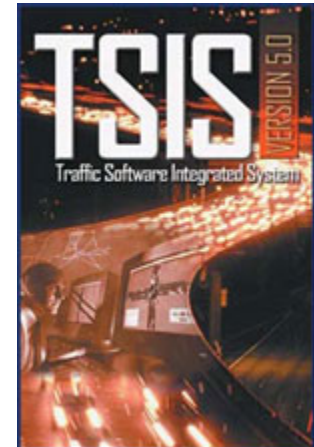
Key Recommendations

- Turner Fairbank and the ITS Joint Program Office management should be partners with TReL leadership and strong advocates in the development of the strategic plan.
- Incorporate other relevant ITS technologies into the TReL program to expand its focus beyond roadway control technologies, especially traffic signals. This issue should be addressed in the TReL. Strategic Plan.
- Obtain additional funding for the longer-term research program supported by the TReL.
- A TReL Strategic Plan should be developed that clarifies the types of research activities the lab should pursue.
- Better define the role of the TReL in regard to providing technical support, and conducting both applied research and long-term high-risk research.

Status of Current and Planned Activities

- A Task force was identified and used as a resource for developing a Strategic Plan. The Task Force included the lab assessment review panel and the Offices of Operations, Safety and the ITS JPO. Input from the Task Force has been incorporated into a new draft Plan.
- A list of strategic goals in the Plan focuses on areas where the unique capabilities of the TReL can support the ITS Tier I & II initiatives. The Plan was circulated to the multi-modal task force created to help develop the Plan to help them understand where the Lab could support their programs and garner their support when it comes time for funding.

- The final draft is complete. The Plan focuses on how the TReL can advance the Agency's Mobility and Safety strategic goals through research that supports the new ITS Tier I initiatives. The Plan discusses how the TReL can support the
    - Mobility/Productivity goal through research on:
        - Integrated Corridor Management
        - Road Weather Management
    - TReL support for the Safety goal through research on:
        - Cooperative Intersection Collision Avoidance System
    - TReL support for Advance and Long Term Research through work on:
        - Supporting Vehicle Infrastructure Integration (VII)
        - Next Generation Surface transportation Management and Operations
        - Mobility Applications for VII
- The role of the lab has been outlined in the Strategic Plan, as follows:
    - To conduct ITS/Operations investigations, develop solutions, refine concepts and facilitate the transfer of R&D products from the laboratory to the field.
    - To fulfill the research, development, testing and evaluation initiatives in support of the ITS/Operations R&D program.
    - To advance the state-of-the-art and the state-of-the-practice in ITS/Operations through the use of an advanced Traffic Research Laboratory.
- Fiber optic communication has been installed to connect the TReL to the Intelligent Intersection allowing the lab to connect directly to the intersection's advanced controllers and variety of detectors. The tower for the new weather station is in place and RWIS equipment will be linked to a computer in the TReL when it arrives and is installed. Simulated DSRC communications is operational to test and support vehicle infrastructure integration.

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