

MOBILITY MEASUREMENT IN URBAN TRANSPORTATION (MMUT) RESEARCH PROJECT

Project Summary – FY 2010 and Beyond

For more than 20 years, TTI's urban mobility research efforts have developed a comprehensive set of performance measures and the tools to measure and monitor mobility conditions in urban America. For the last 12 years, the study has been a pooled fund effort involving a combination of state departments of transportation, metropolitan planning organizations and the Federal Highway Administration. The analysis procedures and resulting performance measures have been used in multimodal measurement efforts in many U.S. states and in other countries.

Researchers have been encouraged to create a new pooled fund research study. While the products will remain centered on urban mobility issues, the focus of this new pooled fund effort will be on some emerging topical areas. The goals of the proposed research project include:

- Identify and evaluate new sources and providers of mobility data and information. Many new data collection techniques such as cell phone tracking and global position satellite tracking are being used to gather mobility information. There is much to be known, however, about the quality and usefulness of the data collection techniques and the overall quality of the archived data.
- Develop new performance measures that can be used to inform several different technical and non-technical audiences about attributes of arterial street reliability and freight mobility. These new measures are possible because of emerging data sources collected with the latest technologies.
- Assist sponsoring agencies in applications of research products in their operations, planning and performance measurement activities.

The study will focus on mobility and reliability performance measures, data and issues. The new emphasis areas will include freight movement, arterial street mobility issues, emerging mobility data sources, and small metro region mobility concerns. The research staff has been requested to develop applications and provide assistance to many transportation agencies for the many mobility-related products that have been developed in individual areas and states.

Products from the research will meet a variety of needs and will include a variety of printed and electronically accessible reports, data and information pages, applications, and a generally accessible Internet website. Other resources that will be available to sponsors include assistance with implementation of study products, access to presentations summarizing the data and study results for specific states or urban areas.

Requested Funding -- \$25,000 per sponsoring organization

For more information about participating in this pooled-fund study contact:

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**MOBILITY MEASUREMENT IN URBAN TRANSPORTATION
RESEARCH PROJECT
Work Plan – FY 2010
(Annual work tasks to be decided by sponsoring agencies)**

Task 1. Identify and Evaluate Potential Mobility Data Sources

With new data collection technologies becoming available in the transportation market each day, more information is being collected that could benefit mobility performance measurement, operations monitoring and transportation planning. These new and emerging data sources include such technologies as cell phone tracking, global position satellite tracking, and on-board navigation devices. Some issues that arise with this data relate to quality and the potential uses. Many companies are investing private resources and are actively soliciting transportation agencies to utilize their products and services for data collection.

Researchers at TTI have been working with large mobility databases for many years. These researchers have gained a vast amount of knowledge in the collection, analysis and use of data. Much of this expertise has been gained while working on the Mobility Monitoring Program sponsored by the Federal Highway Administration. This project collects archived freeway traffic data from traffic management centers in over thirty urban areas in the U.S. and analyzes it to produce mobility performance measures. Researchers have developed methods to determine the quality of the data and to address missing or poor quality data (which is present in even the best databases). Researchers have also created the methods to turn this information into mobility performance measures. These methods incorporate the attributes of different technologies used to collect this traffic management center data (including single loops, dual loops, and non-intrusive data collection devices such as infrared and automatic vehicle identification technologies). Each technology and deployment strategy affects the performance measures developed for a corridor or region. The expertise in dealing with such issues makes the researchers at TTI qualified to do independent evaluations of the new mobility information.

Researchers will evaluate data sources at the request of the pooled fund committee. This evaluation will:

- Review the type of technology used to collect the data—this might include a discussion of how a technology such as cell phone tracking works
- Analyze the overall quality of the data—examine the validity of the stored data based on data quality procedures and “ground truth”
- Determine any holes or gaps in the data—there may be missing days or gaps in the coverage within the database that might not be apparent when looking at a large, aggregated data set. These gaps might change the methods used to analyze the data or the applications of the data.
- Recommend appropriate methodology and performance measures to utilize the data

Task 2. Develop New Mobility Performance Measures for Arterial Streets

Transportation patterns and urban congestion solutions continue to change. Among the significant evolutionary trends is the concern about rising congestion levels in smaller metropolitan regions. Congestion and mobility measures have traditionally been focused on larger urban areas where much of the national congestion delay is located. The emphasis in these large areas has been on freeway congestion and operations improvements due to their importance in the regional transportation system. As the freeways have become more congested, a greater burden is being placed on the surface streets. This task of the mobility research program will concentrate on surface street congestion analysis techniques and performance measures that relate congestion issues on the surface street system.

Unlike its freeway counterpart, traffic movement on the surface streets is dictated by the number of traffic control devices and access points along the roadway. Much is known about the causes and effects of congestion on the freeways. It is much harder to estimate these congestion causes and effects on the arterial streets as motorists have more options to enter and leave each street. Additionally, some of the smaller cities in the U.S. do not have congestion problems on their freeways as traffic levels are not great enough to cause congestion on a daily basis. They do, however, have congestion on their streets, or at least have traffic levels great enough during peak times that they have to adjust the signal timings to allow for increased demand. Surface street congestion has been estimated in previous mobility research and in studies for the Highway Capacity Manual and simulation models. Mobility issues on streets and in smaller communities, however, warrant additional research in the area of performance measures that illustrate reliability and congestion issues and the effect of possible solution strategies. This task will develop a methodology and the necessary performance measures to calculate mobility and reliability statistics specific to an arterial street system. Additionally, the recommendations will be made as to the types and amount of data collection that is necessary to establish mobility monitoring on the arterial streets.

Task 3. Develop New Mobility Performance Measures for Freight Travel

Significant efforts have resulted in improved knowledge about the effects of congestion on the motoring public. Despite the emphasis on freeway passenger travel and congestion, little is known about the effect of congestion on urban freight movement. This task of the mobility research program will focus on performance measures that relate congestion problems in the freight industry to public agency investment strategies.

The freight industry continues to face challenges when trying to transport goods on the increasingly congested transportation system. While a tractor-trailer may occupy the capacity of two to three passenger vehicles on a roadway, the cost of that commercial vehicle in congestion may be a dozen times greater than those passenger vehicles. With the emergence of a global economy and just-in-time manufacturing, more freight is being moved on our transportation system and the projections are for a doubling of freight volume in twenty years. Research is needed to develop a framework to report freight mobility which includes the difficult task of including information about commodities being carried and to determine existing and potential data sources for the analysis.

Task 4. Applications of Mobility Measurement Techniques

There are many examples of products from the Urban Mobility Study being applied at the national, regional and local level. This has occurred in many of the pooled fund sponsoring agencies. This task will apply several mobility analysis techniques and performance measurements to assist transportation professionals across the U.S.

Researchers will create spreadsheets utilizing the mobility performance measurement methodology that has been created in previous work. These spreadsheets can make use of three different types of data:

- Link-based data (from Highway Performance Monitoring System or other state/local roadway inventory databases)
- Archived data (from automated, continuous-operation data collection systems)
- Planning model data (outputs from long-range planning models)

The spreadsheets will be developed for use in the analysis of corridors, sub-areas, entire urban areas, or the state level. Additionally, all of the spreadsheets can demonstrate the benefits derived from certain operational treatments. These spreadsheets provide a great deal of computing potential for original applications, but more generic versions of these spreadsheets will be designed and made available via website for use in other areas and for more diverse purposes.

Researchers will also create a spreadsheet-based tool to analyze the effects of projected improvements by state departments of transportation (DOT). These studies can be performed at the state level, the regional level or DOT district level or for other areas where the necessary data exists. Future congestion levels could be determined by modeling existing financially-constrained plans or by examining vision-oriented plans based on expanded or innovative funding scenarios.