



Project Summary

Texas Department of Transportation

0-4853: Development of a Texas Congestion Index

Background

In 2003, Governor Rick Perry requested that the Texas Department of Transportation (TxDOT) develop a plan to address the growing congestion problem in the state's largest urban areas. TxDOT joined with metropolitan planning organizations in the eight largest urban regions to develop an innovative procedure for estimating the transportation approaches necessary to achieve locally identified mobility goals.

One element of the plan was the development of a set of congestion performance measures to be used for both analytical and communication purposes. The main performance measure developed is the Texas Congestion Index.

What the Researchers Did

The Texas Congestion Index is a spreadsheet-based technique that uses formulas and constants along with a set of procedures that can be viewed and modified by the user. The index is calculated using regional long-range transportation planning model output statistics and a combination of other processing steps to provide a comprehensive estimate of congestion levels. The regional models produce estimates of the vehicle-miles and vehicle-hours of travel for each roadway link. These links include the major mobility-producing portions of the transportation network for current and future conditions. The models are used to study the effect of both land use changes and transportation network improvements. Scenarios produced in the models provide a significant amount of information that may be used to analyze alternative investment strategies.

The spreadsheet for each metropolitan region uses the planning model structure of counties and development types. The output measures are organized by congestion level to provide more detail about the scope and extent of congestion. The primary measures are calculated for peak travel periods (6 to 9 a.m. and 4 to 7 p.m.), but can be created for other time periods with spreadsheet modifications.

The process steps include the following general elements:

- Freeway, tollway, HOV and principal arterial street travel statistics are grouped by hour of day and according to the type of area (e.g., downtown, urban, suburban, rural).
- Free-flow travel statistics are estimated.
- Recurring travel delay is calculated as the difference between congested travel time and free-flow travel time.
- Incident delay is estimated and added to the recurring delay.
- The delay-reducing effect of the operational treatments is incorporated.
- Truck travel and car travel are separated and the value components applied.
- Congestion statistics are calculated for the peak six hours of the day and expanded to annual performance measures.

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What They Found

The Texas Congestion Index process was used in the 2004 Texas Metropolitan Mobility Plan report to identify the level of transportation needs and costs necessary to accomplish the goal of alleviating serious congestion problems in 2025. The information has a range of uses, but in general the information improves the level of detail and comprehensiveness of reporting on congestion problems and solutions. The information and procedures will continue to evolve with the input and guidance of the participating metropolitan planning organizations and the Texas Department of Transportation.

Congestion levels were studied for the base year—typically 2000—and three scenarios for the future year—typically 2025. All Texas regions show significant increases in congestion over the 25 years. The goal scenarios exhibit very different regional congestion averages. The larger regions typically have higher Texas Congestion Index values due to the small amount of moderately congested roadway in each region. Where the smaller areas have roadway systems with a range of congestion levels, the larger regions have many seriously congested roadways and the average regional congestion statistics show higher values when all seriously congested links are treated.

The most prominent result of the Texas Metropolitan Mobility Plan effort has been cooperation between the eight metropolitan planning organizations and the TxDOT districts and divisions. The groups have many issues in common, and the joint meetings that have taken place since fall 2003 have allowed the agencies to learn from each other. Pooled resources and expertise have been part of a team approach, a much better method of approaching the important and complex issues that will affect not only each region, but the state as well. The technical results are much better, data and analytical procedures used are more consistent, and conclusions send a stronger message to state and local leaders.

What This Means

A mobility performance measure is an important addition to metropolitan transportation planning tools. The Texas Congestion Index spreadsheet can be used to create mobility performance measures for use with regional transportation planning models. The spreadsheet and procedures have been used for regional analysis of needs to assess the cost of alleviating mobility problems. The procedures can be used both in technical analysis of regional options and to assist in communication of findings. The data can be provided at much more detailed levels and may be an additional source of information and analytical tool.

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