



**DEPARTMENTAL  
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Texas  
Department of Transportation  
In cooperation with the  
Federal Highway Administration  
U.S. Department of Transportation

**Research Summary  
Report**

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**ROADWAY CONGESTION IN MAJOR U.S.  
URBANIZED AREAS 1982-1988**

**PROBLEM STATEMENT**

During the past decade, congestion has become commonplace in most urbanized areas throughout the country. These areas use the freeway and principal arterial systems to service the majority of travel requirements; consequently, urban mobility has been adversely affected by traffic growth on these road systems. Congestion and travel delay also continue to rise because of a decline in highway construction stemming from reduced funds, increased construction costs, and public resistance.

**OBJECTIVES**

The Texas Transportation Institute (TTI) conducted study 1131, *Roadway Congestion in Major Urbanized Areas 1982-1988*, in cooperation with the Texas Department of Transportation (TXDOT) and the Federal Highway Administration (FHWA) to present a third-year analysis of a six-year research effort in which researchers focused on quantifying urban mobility in seven Texas and 32 other comparable U.S. areas. The report details the following key topics:

- Measurement of relative mobility in urbanized areas;
- Urbanized area mobility; and
- Economic impact of urban congestion.

**FINDINGS**

**Measurement of Relative Mobility**

This section explains the study's use of the Roadway Congestion Index (RCI), a methodology where the most important indicators of congestion are freeway and principal arterial street daily vehicle-miles of travel (DVMT) per lane-mile. (see equation below)

$$\text{Roadway Congestion Index} = \frac{\left[ \frac{\text{Freeway VMT/Ln.-MI.} \times \text{Freeway VMT}}{13,000 \times \text{Freeway VMT}} \right] + \left[ \frac{\text{Prln. Art. Str. VMT/Ln. MI.} \times \text{Prln. Art. Str. VMT}}{5,000 \times \text{Prln. Art. Str. VMT}} \right]}{1}$$

The RCI methodology does not include considerations of traffic signal operations, freeway designs, freeway system configuration, arterial street continuity, High Occupancy Vehicle (HOV) lanes or the role of transit.

**Urbanized Area Mobility**

This section examines and summarizes urbanized area mileage and travel statistics, roadway congestion index values, and vehicle-hours of de-

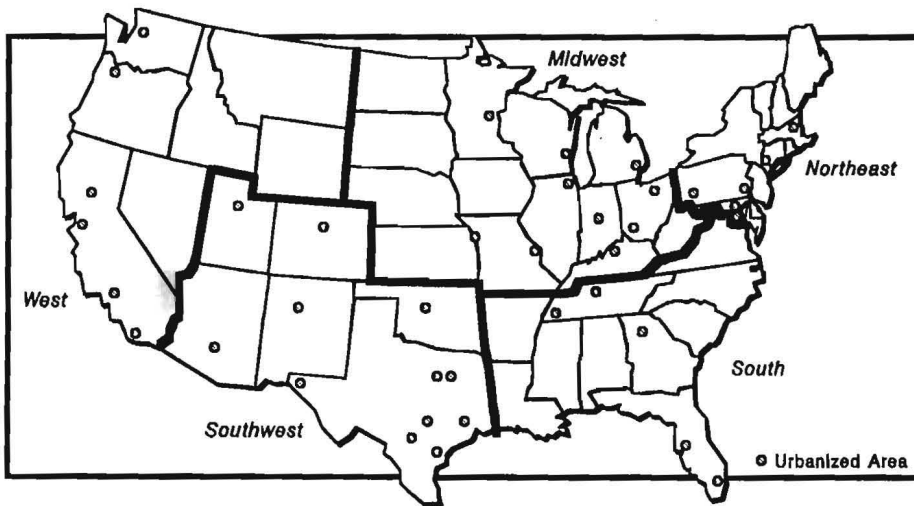


Figure 1: Researchers examined 39 urbanized areas divided into five regions.

*The annual cost of congestion in the 39 areas exceeded \$34 billion in 1988, an average of \$880 million per urbanized area.*

lay for the 39 urbanized areas. The statistics in this section are the result of TTI's analyses of the database compiled for this research study. This database contains information (from federal, state, and local sources) on vehicle travel, urbanized area size, facility mileage, and vehicle travel per lane-mile from 1982 to 1988. The primary source was the FHWA's Highway Performance Monitoring System (HPMS). Mobility within geographic regions (see figure 1), as well as within the individual urbanized areas, was compared on the basis of daily vehicle-miles of travel (DVMT) per lane-mile and travel delay. The following are a few highlights with regard to Texas:

- In Texas, 36% of urban area travel relies on the freeway system; the highest demand on the freeway system for urban mobility is in the Western region (44%).

- The average RCI has increased each year in all regions; yet, the average Texas RCI has decreased since 1986 when it peaked at 0.92. Eighteen of the 39 urbanized areas studied, including Dallas and Houston, have 1988 RCI values in excess or equal to 1.0, the undesirable congestion level. However, some areas, such as Austin, would require only a 5% increase in travel demand to reach undesirable congestion levels.

- The average RCI for Texas cities studied was approximately 9% below the study average. Houston and Dallas were the urban areas in Texas ranked in the top half of the 29 cities studied.

#### Economic Impact of Congestion

This section presents an economic analysis of the impact of congestion based on three factors: travel delay, increased fuel consumption, and increased insurance

premiums. In general, the highest total annual congestion cost occurs in the Northeastern region, with the Western regional average marginally lower. The urbanized areas within these regions also rank high with respect to RCI.

In looking at the 39 areas, the annual cost of congestion exceeded \$34 billion in 1988 or an average of \$880 million per urbanized area. This value represents the "congestion tax" paid by urban area residents and motorists. Ten of the urbanized areas studied were estimated to have annual congestion costs exceeding \$1 billion, with 65% of the cost attributed to travel delay.

## CONCLUSIONS

This study confirms and further quantifies the urban congestion problem in the U.S. It will be useful to transportation professionals as they assess the extent of the problem in individual areas. Knowledge of the situation in different cities and regions across the country can facilitate cooperation and coordination of resources among all levels of public and private sector transportation agencies.

*--Prepared by Kelly West, Science and Technology Writer, Texas Transportation Institute.*

The information in this summary is reported in detail in TTI Research Report 1131-3, "Roadway Congestion in Major Urbanized Areas 1982-1988," James W. Hanks, Jr. and Timothy J. Lomax, July 1990. The contents of the summary do not necessarily reflect the official views or policies of the FHWA or TxDOT.

