

Mobility Needs Assessment

(Draft August 2008)



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Summary of Recommendations

(Summary of specific recommendations goes here)

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Overview

Over the last three months, the 2030 Committee has heard testimony from citizens, businesses and public officials statewide. Most of the comments received related to Texans’ concerns over current and future transportation mobility. Almost without exception, the concerns expressed regarded the adverse effects of poor mobility on quality of life and economic well being. The 2030 Committee used those expressed concerns as its benchmark in assessing mobility investment needs in Texas.

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Mobility Problems = Billions Lost for Texans

For more than two decades, our state's largest cities have experienced decreased travel mobility that is gradually getting worse. Texas Transportation Institute's (TTI's) *2007 Urban Mobility Report*,¹ which analyzed traffic congestion in 85 urban areas, found that in the nine largest urban areas in Texas, the combined annual congestion cost is almost \$6.2 billion. This cost is derived from measuring travel time delay and excess fuel consumption due to traffic congestion when traveling to and from various destinations such as work, school and leisure activities.

Translated into terms all Texans can understand, a billion dollars alone equates to \$1,000 per day for 2,737 years, 10 months, and 7 days. The Texas population growth expected over the next 20 years will significantly increase the annual congestion cost in cities, as well as spill over into many adjacent rural areas.

Travel Demand > Transportation System Capacity = Decreased Mobility

Decreased mobility can manifest itself in two ways: increasing congestion and/or inadequacy of connecting routes. Both of these problems result in more hours on the road, which translates into more expensive travel in terms of fuel cost, interference with work, and loss of leisure time with family and friends. Mobility is reduced when travel demand is larger than the available capacity of the transportation system.

Figure 1a illustrates some of the components of travel demand and transportation system capacity. Passenger travel demand includes all modes, but primarily represents passenger vehicles and public transportation such as buses. Though truck and freight vehicles share much of the same transportation system as passenger vehicles, it is important to recognize the unique differences in freight mobility. For example, railroads are a critical component of freight travel in Texas. In summary, the ideal scenario, as Figure 1a shows, is when combined passenger and freight travel demand is in balance with the combined capacity of all modes.

Figure 1b shows what happens when travel demand, fueled primarily by population growth, exceeds transportation system capacity. The result of this scenario is longer travel times, greater fuel consumption and increased costs in time lost and money spent on fuel. Rebalancing travel demand and transportation system capacity requires two actions, as shown in **Figure 1c**: managing demand and/or increasing capacity.

Descriptions for three projected scenarios showing potential needs for Texas mobility in metropolitan areas are shown in **Table 1** and discussed later in this chapter. The three projected scenarios for rural areas are described following the discussion of metropolitan scenarios. While the efficacy and cost of resolving each scenario varies widely, a significant investment will be required.

¹ *2007 Urban Mobility Report*, Texas Transportation Institute, The Texas A&M University System, College Station, Texas, 2007.

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Our Challenge

The economic development priority goal in *Securing Our Future*,² the State of Texas strategic plan, calls for our state’s leaders to adequately address transportation needs, including a benchmark of the percent reduction of traffic congestion (using TTI’s Travel Time Index).

The challenge presented to the 2030 Committee is to determine a feasible and justifiable estimate of the investment needed to bring travel demand and transportation system capacity more in balance, factoring into consideration estimated population growth in Texas over the next 20 years.

The purpose of this chapter is to provide Texans with an estimate of the investment required to maintain or improve mobility in Texas through the year 2030. The analyses discussed in this chapter will consider several scenarios and estimate the costs and benefits of each. For clarity, the discussion will focus on the following questions:

1. How do we define or describe “mobility”?
2. What procedures did we use to estimate the investment needed?
3. How did we estimate the benefits from each mobility scenario?

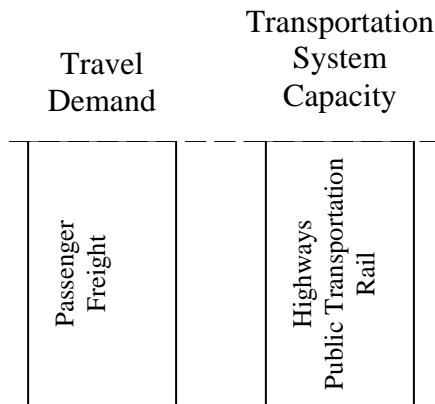


Figure 1a. Demand and Capacity Balanced

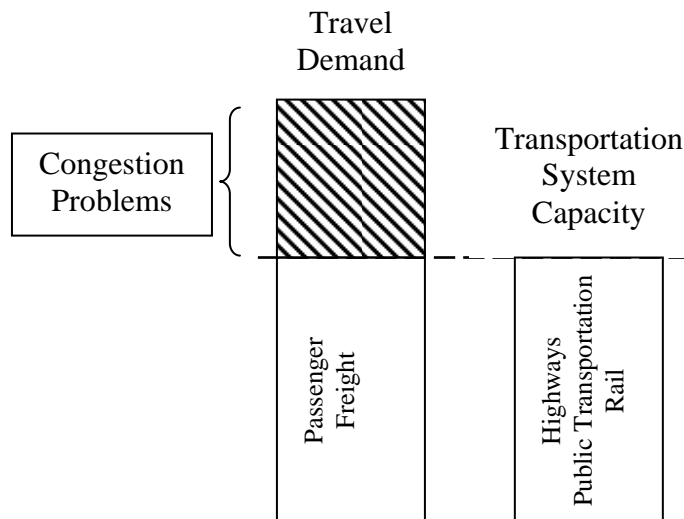


Figure 1b. Demand Significantly Exceeds Capacity

² *Securing Our Future, The Statewide Strategic Planning Elements for Texas State Government, 2009-2013* (March 2008).

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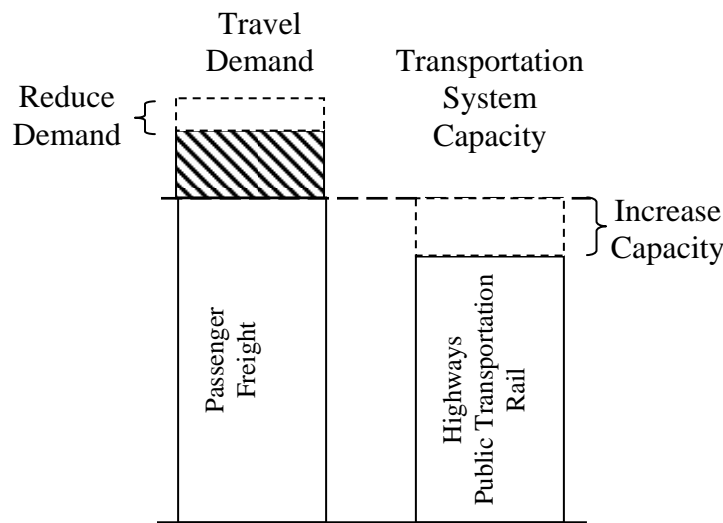


Figure 1c. Strategies for Reducing the Problem

1. How do we define or describe “mobility”?

Mobility may have many definitions, depending on the perspective of the person providing the definition. To the person who lives or works in a metropolitan or urban area of the state, improved mobility would most likely mean “congestion relief.” To Texans who live outside metropolitan areas, improved mobility might mean improved intercity travel (on major corridors or between towns or counties), connections that open strategic economic opportunities, or access to emergency medical care or other services. To businesses that rely on the receipt or delivery of goods, it could mean a combination of urban congestion relief and improved rural connectivity, or it could mean increased availability of non-highway modes such as rail or water.

To provide a meaningful estimate of public investment needed by 2030, it is necessary to adopt two simplifying definitions:

- Congestion relief: For metropolitan and urban areas of the state, we treat improved mobility as “congestion relief,” measured by average speed on freeways and major arterial streets.
- Improved connectivity: For rural areas of the state, we treat improved mobility as a phased implementation of the Texas Trunk System, a network of highways designated in the 1990s to assure maximum availability of four-lane highways statewide. The term “phased implementation” means that segments of the Trunk System where congestion is forecasted by 2030 are assumed to be the initial investments, followed by less congested segments.

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These two definitions of improved mobility are important because there are analytical tools and data in place that will allow for consistent, objective estimates statewide (rather than a compilation of regional “wish lists”). Thus, the resulting overall investment required will reflect a statewide estimate based on common assumptions. This document refers to these measures in combination as “general mobility.”

Unfortunately, analytical tools to isolate “freight mobility” and measure it separately in a similar consistent, objective manner are not yet available. Freight mobility is more complex, because it involves both public and private modes, as well as transfer between modes for some shipments. When general mobility is used as a substitute for freight mobility, useful information is likely lost, such as the need for intermodal facilities and the potential for rail investment to accommodate much of the growing freight demand. As transportation research efforts develop such analytical tools in the near future, they will be of great value in assessing freight mobility needs.

For the time frame under consideration here, 2009-2030, it is likely that freight movement by truck will continue to dominate in Texas. Therefore, the estimates of general mobility undertaken for the metropolitan and rural areas of the state are assumed to provide a reasonable approximation of freight mobility as well.

How does this 2030 mobility needs assessment relate to other similar efforts over the last few years?

The 2030 mobility needs assessment supersedes all prior studies. The 2030 study builds on all prior efforts and adds scenarios not previously considered³. Without the contributions of the prior studies, the 2030 effort would not have been possible to accomplish within the short time frame available. All of the authors or contributors from the prior studies have participated in the development of the 2030 needs assessment or have reviewed and concurred in their relevant sections.

What mobility scenarios were considered?

The 2030 Committee considered three scenarios each to describe metropolitan (urban) and rural mobility.

Metropolitan Mobility Scenarios

For the metropolitan and urban areas, the 2030 Committee considered three scenarios. In order of total investment cost to implement the scenarios, high to low, they are:

- Scenario M1: eliminate serious congestion by 2030,
- Scenario M2: prevent congestion from worsening, and
- Scenario M3: continue investing at recent trend levels.

³ Three such assessments include one done by TxDOT, the Governor’s Business Council and a recent study by Cambridge Systematics (under contract to TxDOT). The TxDOT needs value is referenced in the strategic plan available at ftp://ftp.dot.state.tx.us/pub/txdot-info/lao/strategic_plan2007.pdf. The Governor’s Business Council study is available at <http://www.texasgbc.org/Reports3.htm>. The Cambridge Systematics report is available at http://www.txdot.gov/publications/government_and_public_affairs/needs_study_needs.pdf.

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The Texas State Demographer⁴ has published official population projections that show growth of 20 million people by 2030, so mobility investments must account for the travel of existing Texans plus another 20 million Texans. In the face of that projection, any of the scenarios—including simply preventing congestion from worsening—will be expensive.

Table 1. Description of Metropolitan Mobility Scenarios

Mobility Scenario	Description	Resulting Approx. Ave. Peak-Hour Speeds
M1	Eliminate serious congestion	Freeways: 55+ mph Arterials: 35+ mph
M2	Prevent worsening of existing congestion	Freeways 40-50 mph Arterials 20-30 mph
M3	Continue typical investment levels	Freeways 30-40 mph Arterials 15-20 mph

Scenario M1 represents the ideal condition of eliminating serious congestion. While this scenario may be financially beyond reach, it is the goal that previous studies addressed, so for continuity we believe it needs to be included in this study.

Scenario M2 represents what the 2030 Committee believes is the minimum acceptable level of investment. While simply “holding our own” over the next two decades may not be very appealing to Texans, it will be a financial challenge and is critical to our state’s economic competitiveness. Preventing congestion from worsening will be a challenge, because even though state and local governments at all levels have invested heavily over the last 20 years, congestion has still increased. The Travel Time Index shows that the average increase nationwide has been about 250%. To “hold our own” in Texas would mean an increase in transportation investment to prevent worsening of existing congestion.

The other states and cities that are considered economic competitors of Texas and its cities will be facing challenges of increased congestion as well. If Texas is simply able to prevent congestion from worsening, the state and Texas cities would compare favorably to other locations across the country, which the committee presumes would bode well for Texas economically.

Scenario M3 continues transportation system investment based on recent trend levels, which would be associated with current and predictable funding sources. The committee recognizes that changes at the federal level may be inevitable, but this scenario represents something of a “base case” against which to measure other options. This is consistent with financially constrained metropolitan and urban transportation plans.

⁴ Population projections for the State of Texas are available at <http://txsdc.utsa.edu/tpepp/2006projections/>.

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Rural Mobility Scenarios

For the rural areas, the 2030 Committee also considered three scenarios. The scenarios are described below from the most aggressive mobility and connectivity target to the most conservative. The analysis used multiple techniques to identify sections that needed treatment, but segregated treated sections from untreated roads at each step to eliminate “double-counting” of needs.

Scenario R1: Aggressive Connectivity and Congestion Relief – This scenario targets congested roads and the population center connectivity system. Roadways that will have traffic volume in 2030 above the congestion thresholds were identified. Lanes were added in increments of two (one in each direction) until the volume per lane was below the threshold. In addition, two levels of road addition were applied to sections of the Texas Trunk System road network. The Trunk System is composed of important regional and interregional connector routes. These roads ensure that every town with a population above 20,000, marine ports and points of entry will be served by a major designated highway. Two lanes were added to any Trunk System road that had volumes in excess of half the congestion standard. In addition, any Trunk System road that was only two lanes wide received two additional lanes, so that all Trunk System roads were at least four lanes wide.

Scenario R2: Basic Congestion Relief and Connectivity – Roadways that were estimated to be congested in 2030 were identified and lanes added to reduce the volume per lane below the threshold levels. Texas Trunk System roads with volumes above 50% of the congestion threshold for that road type received two additional lanes.

Scenario R3: Basic Congestion Relief – Roadways that were estimated to be congested in 2030 were identified and lanes added to reduce the volume per lane below the threshold levels.

In subsequent sections of this chapter, we will describe the estimated investment costs and resulting economic benefits of implementing each scenario.

What types of mobility improvements did the committee consider?

Many Texans would first think of building more highways or adding more lanes to existing highways as the primary way to improve mobility. Highway improvements will no doubt be a very large part of future mobility improvements, but there are numerous other approaches that will certainly play key roles. There are several forms of public transportation options that will be critical to future passenger mobility: bus rapid transit, light rail and commuter rail, for example. In addition, future mobility improvements will likely include incentives to reduce travel demand by telecommuting, flexible schedules or delaying discretionary trips to off-peak times of day.

The 2030 Committee has neither the ability nor the authority to estimate what mix of mobility improvements is ideal statewide or for any individual community. Decisions such as these are delegated by law and policy to the local and regional transportation entities. As a result, one of the challenges the committee faced was: “If we don’t know how much of each type of mobility

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improvement is appropriate, how can we assemble anything approaching a reasonable estimate of total investment required?”

Because the tools and data for long-range highway planning are much more advanced than for any other mode, because the highway-based modes for passenger and freight travel are likely to continue to dominate for most of the next two decades, and because the committee desired a consistent and objective methodology that could be applied statewide, the committee chose to have the technical team use the highway planning methodology to estimate the total investment needed. This approach likely produces a conservative (low) estimate for each mobility scenario.

In no way should this approach suggest that the committee is recommending thousands of miles of highways or that highways are the best or only tools for improving mobility. It is merely a reliable, consistent measurement tool to aid in estimating the total amount of investment needed – in all modes – if we want to improve mobility. In the following section of this chapter, the methods used will be explained in more detail.

2. What procedures did we use to estimate the investment needed?

For consistency among the scenarios, the investment required for each of the mobility scenarios was analyzed by looking at available capacity and simulating increased capacity until congestion was eliminated. As noted earlier in this chapter, there are two definitions for congestion mitigation in metro/urban and rural areas. For metropolitan areas the principal goal was congestion relief, and for rural areas the goal was augmented with connectivity needs.

How were metro and urban area needs estimated?

The technical team from TTI worked with the metropolitan planning organizations (MPOs) throughout Texas to gather data for estimating needs in the metropolitan areas. MPOs have a working travel demand computer model that supports their long-range planning efforts. With a few exceptions, these computer models are consistent among all the MPOs. Using the results from individual MPO travel demand models and demographic data for each MPO, TTI ran its own congestion reduction utility model. This model enabled TTI to estimate additional capacity needed to eliminate congestion for each MPO and each mobility scenario, based on that MPO's forecasted population. Once the forecasted amount of congestion in each metro and urban area was estimated, TTI calculated the cost of eliminating that congestion (in 2008 dollars).

For example, **Scenario M1** calls for “eliminating serious congestion,” which, in technical terms, means any location where the total peak-hour demand is greater than existing highway capacity. In traveler terms, serious congestion means traffic moving at 35 mph or less on freeways and 20 mph or less on arterials. TTI calculated the additional capacity needed to match the forecasted demand, which would raise the travel speeds to about 50-60 mph. For each scenario, the total amount of additional roadway capacity required was multiplied by average unit construction costs by roadway type, area type and region to produce a total dollar estimate. Finally, those estimates were accumulated for all 25 MPOs to produce the metro and urban portions of the needs assessment.

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For **Scenario M2**, TTI reran the congestion reduction utility model described above, but this time to reflect congestion levels typical in current conditions. To prevent congestion from worsening, the additional capacity must match the forecasted growth in traffic for each MPO. This result was then converted to total investment using current average actual costs of construction.

Finally, TTI used the additional capacity associated with the continuation of the recent trends investment to produce 2030 mobility estimates for **Scenario M3**.

Table 2 shows the level of investment needed for each of the three metropolitan mobility scenarios.

Table 2. Estimated Metropolitan Investment Needed by Mobility Scenario

Mobility Scenario	Additional Travel Capacity Equivalent Needed Statewide (lane-miles)*	Investment Required to Achieve Mobility Goal by 2030
M1	45,210	\$236 billion
M2	In progress	In progress
M3	30,094	\$146 billion

** NOTE: Neither the 2030 Committee nor the technical team from TTI is suggesting that constructing additional highway lane-miles is the solution in any part of the state. This is simply a tool for approximating the level of investment needed, regardless of the form of the solution. The actual mix of solutions will vary across all of the MPOs.*

How were rural needs estimated?

For the non-urban areas, the technical team used a similar methodology to that used for metropolitan areas. **Scenario R1** is the ideal—elimination of non-urban congestion and widening of the remainder of the Texas Trunk System to at least four lanes, so the team calculated the amount of additional needed to reach that goal. For **Scenarios R2** and **R3**, TTI used year 2030 travel volume forecasts and calculated the amount of highway capacity needed to address the congestion projected for that scenario. For each scenario, the total amount of additional roadway capacity required was multiplied by average unit construction costs by roadway type, area type and region to produce a total dollar estimate.

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Table 3. Estimated Rural Investment Needed by Mobility Scenario

Mobility Scenario	Additional Travel Capacity Equivalent Needed Statewide (lane-miles)*	Investment Required to Achieve Mobility Goal by 2030
R1	17,164	\$21 billion
R2	14,237	
R3	8,452	\$4 billion

** NOTE: Neither the 2030 Committee nor the technical team from TTI is suggesting that constructing additional highway lane-miles is the solution in any part of the state. This is simply a tool for approximating the level of investment needed, regardless of the form of the solution. The actual mix of solutions will vary across all of the MPOs.*

3. How did we estimate the benefits from each mobility scenario?

(Economic analysis pending committee decisions on mobility scenarios)