

## Responses to Questions from the Texas House of Representatives Select Committee on Transportation Funding

Prepared by the Texas Transportation Institute

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Following testimony presented by Dr. David Ellis of the Texas Transportation Institute (TTI) to the House Select Committee on Transportation Funding in April 2010, The Honorable Eddie Rodriguez, Vice Chair of the Committee, asked TTI in May 2010 to respond to a series of questions regarding transportation funding needs and impacts in Texas. This document provides responses to those questions based on the latest research that TTI has performed in these areas and the latest data available.

The vast majority of transportation economic analyses focus on the accumulated value of the benefits to a state or region from transportation investment. There are few studies, templates or models that delve into the specific issues raised by the Committee; that is, specific impacts on: jobs, business success and individual households. Of course, these are important building blocks in making informed decisions.

Absent traditional processes to guide this fundamental analysis, TTI has used a myriad of sources to assemble credible, meaningful responses to the critical questions posed by the Committee. This process has uncovered a shortcoming in tools available to legislators and transportation professionals in responding quickly to questions like these. TTI recommends identifying research funding to support the work of closing that gap in knowledge in order to better respond to both state leaders and the general public in the future.

TTI is pleased to respond to any questions or comments from Committee members regarding this information.

### The Cost to the Texas Economy

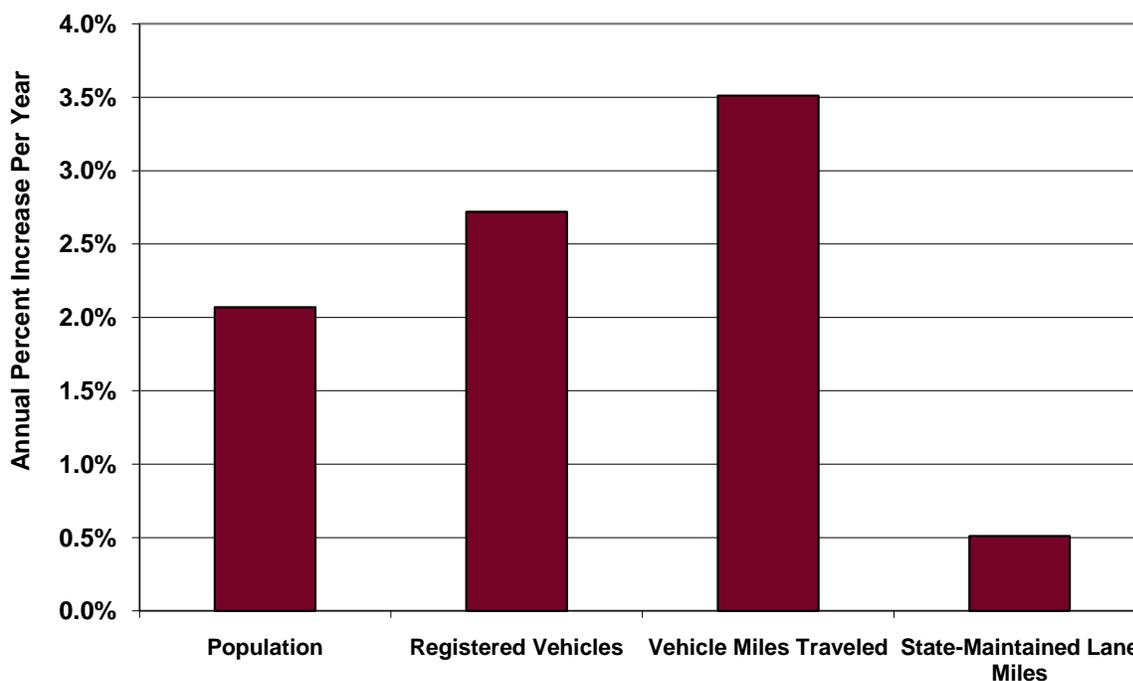
- **Are jobs being lost as a result of not addressing transportation needs in Texas? If so, how many?**
  - **Over the last few years, job losses due to unmet transportation needs are indistinguishable from those due to a slow economy. There are notable anecdotal losses directly attributable to transportation conditions. However, if investments are not made in transportation infrastructure soon, job losses could become systemic.**

Texas competes in national and international markets. Clearly, traffic congestion is not a problem unique to Texas. However, several specific factors place the future of transportation in the state at risk. Given the rate of growth in the state's population, the attendant increase in the number of

vehicles and miles driven, and demand for consumer goods resulting from the larger population—all coupled with a lack of increase in transportation capacity—the risk is that our transportation infrastructure will not be sufficient to maintain the state’s competitive position in the future. Indeed, in many ways, it is our very economic success that has contributed to the mobility issues we face today.

For example, as shown in the exhibit below, over the last 20 years, the Texas population has increased an average of 2 percent per year, the number of vehicles has increased approximately 2.6 percent per year, and the number of annual miles driven has increased 3.5 percent per year—all products of a robust economy. At the same time, however, the number of state-maintained lane-miles has increased 0.5 percent per year. Over the long term, these trends in which the demand on our system continually exceeds our ability to expand the system can begin to have a potentially serious economic effect. One of the potentially serious economic effects is the potential loss of jobs.

**Exhibit 1: Percent Annual Increase: 1970 to 2009**



The size of the labor market a business can draw from is affected by the time it takes a worker to travel to the business. If increased congestion causes commute times to rise beyond a reasonable travel time, the number of workers having access to an organization decreases.<sup>1</sup> The market’s boundary line moves (i.e., shrinks relative to the location of the business), effectively placing many workers outside the employment reach of the organization. The resulting smaller labor market reduces the organization’s ability to find specialized workers and can ultimately lead to a decrease in business productivity.

<sup>1</sup> Weisbrod, Glen, et. al., *Measuring the Economic Costs of Urban Traffic Congestion to Business*. Transportation Research Record, No. 1839, Journal of the Transportation Research Board, 2003, p. 3.

A shrinking labor market also drives up labor costs because employers have to increase wages as an enticement to prospective employees. Increased wages then drive up employer costs and, consequently, the cost of goods and services.

However, if congestion issues are addressed, the labor market's geographical area can expand and enable the company to reach a larger pool of specialized workers. A more specialized worker, in turn, leads to an increase in productivity and possible future expansion.<sup>2</sup>

In 2007, Dell, Inc., made the decision to relocate 360 employees from the Austin, Texas, area to Lebanon, Tennessee, stating that "locating the operation near an existing manufacturing facility . . . allows us to speed the delivery of products to the majority of our customers. We're also closer to our transportation network which saves us logistics costs." That same year, International Paper sold five wood-product mills to Georgia-Pacific, including both its Camden and Corrigan, Texas, facilities.<sup>3</sup> Georgia-Pacific stated that the acquisition would improve its overall production and transportation costs by allowing the company to better serve its growing customer base.<sup>4</sup> As the cost of transportation increases, companies will continue to look to relocate in regions where their customer base can be most efficiently reached. In this case, for Georgia-Pacific, the cost differential was not the labor, raw materials, or equipment and machinery cost. The major difference was transportation cost – being closer to the market.

- **How is this number likely to change in 5, 10, and 25 years if we don't address our transportation needs?**
  - **If Texas cannot maintain current mobility levels and, instead, continues to spend at planned levels, an estimated 288,000 jobs could be lost by 2035. Of that total, an estimated 43,000 will be lost in the first five years and over 110,000 will be lost in the first 10 years.**

According to a report by the National Cooperative Highway Research Program (NCHRP), "The U.S. economy is more linked than ever before to an international marketplace that is constantly seeking the most cost-effective manner for transporting goods and services on a global scale."<sup>5</sup> As the economies of other countries grow and become more linked, the competition between those economies will continue to increase: "The relative price of transportation in terms of total production cost will affect the exchange of goods and services; likewise, economic comparative advantages will determine the nature of future transportation needs."<sup>6</sup>

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<sup>2</sup> Prud'homme, Remy, Keynote Speech for the 7<sup>th</sup> Conference on the Development and Planning of Urban Transport in Developing Countries (CODATU VII), New Delhi, February 12, 1996, p. 8.

<sup>3</sup> *Camden, Corrigan Mills to Change Hands*, Polk County Enterprise - December 30, 2006 - January 6, 2007, <http://www.easttexasnews.com/Enterprise/News/Ind/week1/story4.html>.

<sup>4</sup> Ibid.

<sup>5</sup> *Long Range Strategic Issues Facing the Transportation Industry*, ICF International, October 17, 2008, [http://onlinepubs.trb.org/onlinepubs/archive/NotesDocs/NCHRP20-80\(2\)\\_FR.pdf](http://onlinepubs.trb.org/onlinepubs/archive/NotesDocs/NCHRP20-80(2)_FR.pdf).

<sup>6</sup> Ibid.

Companies continue to closely assess the cost of transportation relative to their competitive positions in the marketplace. For example, there are more than 4,000 Walmart and Sam's Club locations in the United States to which suppliers and manufacturers deliver. In an effort to reduce costs, Walmart recently announced that it will be taking over the transportation of all products delivered to its stores.<sup>7</sup> Clearly, if a company of Walmart's size (not to mention its reputation as an intense competitor in the marketplace with respect to price) is willing to make the capital investment necessary to transport all products delivered to its stores, it is an important issue.

One way to look at this issue is to assess what is to be gained from making transportation improvements and, conversely, what is **lost** by not making them. For example, if Texas can manage to keep traffic congestion from getting worse over the next 25 years, it is estimated the state will realize an economic benefit of more than \$1 trillion during that period.<sup>8</sup> Said another way, if the state can keep congestion from getting worse, every \$1 it invests in transportation infrastructure will produce more than \$6 in economic benefit. To the extent the state does not attain that goal, the benefit will be lost—at the cost of jobs, income, and tax revenue.

Specifically as it relates to jobs, the total estimated employment that will be lost by failing to maintain roadways with no greater than the current congestion levels is estimated to be 288,000 jobs by the year 2035. Of that total, 43,000 jobs will be lost during the first five years and over 110,000 jobs by the tenth year. An additional 135,000 jobs are estimated to be lost from year 11 through year 25.<sup>9</sup> Obviously, these estimates can be influenced by many factors, including construction costs, unemployment rates, and the overall performance of the economy. However, if time were to prove them incorrect by a factor of 50 percent, they still provide an indication of the significant effect that traffic congestion can have on economic activity.

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<sup>7</sup> *Transportation Policy Moves Industry Trends*, Gerson Lehrman Group, May 24, 2010, <http://www.glggroup.com/News/Transportation-Policy-Moves-Industry-Trends-48578.html>

<sup>8</sup> *Texas Transportation Needs Summary*, 2030 Committee, February 2009, [http://texas2030committee.tamu.edu/documents/final\\_022609\\_execsummary.pdf](http://texas2030committee.tamu.edu/documents/final_022609_execsummary.pdf)

<sup>9</sup> All estimates of employment impact estimates used in this analysis, unless otherwise credited, are derived from an input-output model originally developed by Data Solutions (Austin, Texas) and for the State Occupational Information Coordinating Committee. The production, employment and income coefficients have been updated over time by the author.

- **With the significant number of engineering and construction jobs tied to transportation, how many of these jobs, specifically, could be in jeopardy if we don't adequately fund our transportation infrastructure in the future?**

- **If Texas cannot maintain current mobility levels, more than 73,000 engineering and construction jobs could be lost over the next 25 years.**

At a national level, in 2007, the Federal Highway Administration (FHWA) estimated that every \$1 billion of federal highway expenditures supported 27,822 jobs.<sup>10</sup> In a December 2009 hearing before the U.S. House of Representatives Committee on Transportation and Infrastructure discussing the economic impact of the Recovery Act, it was reported that every \$1 billion of federal funds invested in infrastructure creates or sustains approximately 34,779 jobs and \$6.2 billion in economic activity.<sup>11</sup>

The total "supported" jobs include:

- new jobs, in which unemployed labor is hired;
- better jobs, in which currently employed workers move into jobs with better compensation and/or full-time positions; and
- sustained jobs, in which current workers are kept on the payroll when they would have likely been furloughed without the expenditure.

If Texas fails to sustain mobility at current levels and, rather, continues to invest following current trends, it is estimated that 73,300 jobs in the construction and engineering sectors of the economy will be lost. This estimate is based on the total number of jobs lost between 2010 and 2035 discussed previously and the percentage of those jobs lost that would be in the roadway construction and engineering sectors.

- **How might doing nothing to address our transportation needs affect future decision making by businesses regarding locating in or relocating out of Texas? How many businesses might choose to relocate or locate in other states as a result?**
- **Deteriorating infrastructure and decreasing mobility reduces the ability of Texas to compete, both in terms of product cost and the ability to attract and retain a qualified workforce. When businesses cannot compete, they close or relocate to a place where they can compete.**

When businesses consider relocating or locating to an area, two of the factors they consider are the location relative to their suppliers and customers, and the availability of a qualified labor force.<sup>12</sup>

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<sup>10</sup> *Employment Impacts of Highway Infrastructure Investment*, U.S. Department of Transportation, Federal Highway Administration, March 29, 2010, <http://www.fhwa.dot.gov/policy/otps/pubs/impacts/index.htm>

<sup>11</sup> *The American Recovery and Reinvestment Act of 2009 Transportation and Infrastructure Provisions Implementation Status as of July 16, 2010*, Committee on Transportation and Infrastructure, p. 11,

<http://transportation.house.gov/Media/file/ARRA/20100726/Recovery%20Act%207-26-10%20Report.pdf>

<sup>12</sup> Bochner, Brian, et. al., *Research Report: Guidance on Mitigating Impacts of Large Distribution Centers on Texas Highways*, Texas Transportation Institute 2010.

Urban areas with higher congestion levels may be closer in proximity to an organization's suppliers and customers but can result in higher costs to the company. With increased congestion, businesses see increased transportation costs in the form of extended travel times and higher vehicle operating costs. Extended travel times cause delays in deliveries, which, in turn, may lead to additional vehicles and workers needed to maintain their level of productivity.<sup>13</sup> Alternatively, rural roadways in Texas are not designed to handle high volumes of large trucks. This restricts many businesses and distribution centers to urban areas having higher levels of congestion.<sup>14</sup>

Large manufacturers employ a significant number of people and seek a location that offers a reasonable commute for their labor force. As noted previously, increased congestion reduces the available labor market that is within commuting distance, which can then cause firms to turn to locations with a larger labor-market area.

A number of large manufacturers, such as automobile plants, have supplier parks or co-location sites. Suppliers to the manufacturer might locate near the plant in order to provide the manufacturer with the supplier's product quickly and to share knowledge and skill. The Toyota Tundra plant built in San Antonio in 2003 has such a supplier park.<sup>15</sup> Such facilities can have significant economic impacts. But the concept of location is a double-edged sword. If a large manufacturer chooses to leave the state, these suppliers and the additional jobs they created will follow. In this particular case, transportation was such a major part of Toyota's decision to locate in Texas that, as part of the incentive package offered to the company, the state funded the construction of a second rail spur to the site. Dual-rail freight service was a critical factor in site selection because it allowed for competition among railroads, ultimately reducing Toyota's costs. The Federal Reserve Bank of Dallas estimated an economic impact of the Toyota plant ranging from 7,300 jobs for Bexar County to 16,000 jobs for the state.<sup>16</sup> In August of 2010, Toyota added the production of the Tacoma truck line to this facility, creating an additional 1,000 jobs.<sup>17</sup> Clearly, transportation played a major role.

Another example, on a much smaller but no less important scale, is the case of Hilmar Cheese Company. In 2007, the Hilmar Cheese Company opened a facility in Dalhart, Texas, that processes more than 5 million pounds of milk a day.<sup>18</sup> In order to attract Hilmar to the area, the company was offered a \$45 million incentive package.<sup>19</sup> A significant part of this package provided funds to construct a crucial farm-to-market road spur that would permit trucks to travel to and from the facility efficiently.

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<sup>13</sup>Weisbrod, Glen, et. al., *Measuring the Economic Costs of Urban Traffic Congestion to Business*. Transportation Research Record, No. 1839, Journal of the Transportation Research Board, 2003, p. 3.

<sup>14</sup>Bochner, Brian, et. al., *Research Report: Guidance on Mitigating Impacts of Large Distribution Centers on Texas Highways*, Texas Transportation Institute, January 2010.

<sup>15</sup> Strauss-Wieder, Ann, *Transportation Implications of Emerging Economic Development Trends*, Research Results Digest 327, August 2008, p. 4.

<sup>16</sup> Ibid, p. 20–21.

<sup>17</sup> *Gov. Perry: Toyota Creates Jobs for Texans and Bolsters the Local Economy*, Office of the Governor Rick Perry, August 06, 2010, <http://governor.state.tx.us/news/press-release/14971/>.

<sup>18</sup> Roy, Toree, *Jobs Galore in the Land of Milk and Honey*, Texas Rising, March/April 2009, [http://www.texasahead.org/success\\_stories/business\\_stories/hilmar.html](http://www.texasahead.org/success_stories/business_stories/hilmar.html).

<sup>19</sup> *2030 Committee Texas Transportation Needs Report*, February 2009, p. 57.

According to the Dalhart Chamber of Commerce, the 2007 opening has brought many agricultural and construction-related services to the area, including veterinary services, dairies, dairy-equipment dealers, electricians, and concrete businesses.<sup>20</sup> In August of 2008, Hilmar announced its plans to expand the Dalhart facility, allowing the company to double its Texas production.<sup>21</sup>

As important as transportation is today to the economy, it will become more important in the future. For example, the opening of the widened Panama Canal in 2014 will introduce a new stream of manufactured goods to the Gulf of Mexico and East Coast ports as a result of the very large container ships that will be able to use the new widened and lengthened Panama locks. Ports hoping to attract this new flow of commerce will need to have infrastructure capable of handling large distribution centers and a high volume of container traffic.<sup>22</sup> It seems clear that these ports are preparing to capitalize on the opportunity. South Carolina, for example, is in the process of transforming its Charleston port to be competitive with other East Coast ports. The Port of Savannah, Georgia, is investing \$500 million that will nearly double its container capacity. The Port of Mobile, Alabama, is investing \$600 million in a new container terminal and turning basin. The Port of Gulfport, Mississippi, is undergoing a \$570 million expansion.<sup>23</sup> Further, the State of Mississippi recently signed an agreement with the Panama Canal Authority that will allow for a greater sharing of information and technology. The governor of Mississippi believes this agreement will “lead to increased economic growth, spur international trade and promote the ‘all-water route’ from Asia to the U.S. East and Gulf coasts by way of the Panama Canal.”<sup>24</sup>

But in order to attract these new super ships, ports will also have to develop the land-side roadway infrastructure to accommodate the increased levels of cargo. Texas’ “middle-of-the-country location” has the potential to provide access to markets with decreased delivery time and fuel consumption that enable businesses to reduce their transportation costs.<sup>25</sup> If Texas has not adequately addressed the land-side dimension of its transportation needs (both at its ports and throughout the state), manufacturers will look to other Gulf and East Coast ports, and their recently expanded capacities.

It is difficult to specifically address the question of how many businesses might leave the state or choose to locate in another state as a result of potential transportation-infrastructure deficiencies. As noted previously, Texas competes nationally and internationally for jobs and business. As a result,

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<sup>20</sup> Roy, Toree, *Jobs Galore in the Land of Milk and Honey*, Texas Rising, March/April 2009, [http://www.texasahead.org/success\\_stories/business\\_stories/hilmar.html](http://www.texasahead.org/success_stories/business_stories/hilmar.html).

<sup>21</sup> Lamphere, Tracey, *Enterprise Programs, Grants Help Seal the Deal*, Texas Rising, May/June 2010, <http://www.texasahead.org/texasrising/tr1006/enterprise.html>.

<sup>22</sup> Wilkinson, Jeff, *Charleston Port Traffic Plunges*, The State, February 7, 2010, <http://www.thestate.com/2010/02/07/1145442/charleston-port-traffic-plunges.html>.

<sup>23</sup> Jervis, Rick, *Ports Gear Up for Widened Panama Canal*, USA Today, February 16, 2010, [http://www.usatoday.com/news/nation/2010-02-15-ports-expand-panama-canal\\_N.htm](http://www.usatoday.com/news/nation/2010-02-15-ports-expand-panama-canal_N.htm)

<sup>24</sup> *State Port Signs Agreement with Panama Canal*, Mississippi Business Journal, August 3, 2010, <http://msbusiness.com/blog/2010/08/state-port-signs-agreement-with-panama-canal/>.

<sup>25</sup> Bergdahl, Michael, *Wal-Mart Is a Supply Chain-Driven Company Obsessed with Lowering Costs—Is Yours?*, CSCMP Comment Newsletter, March/April 2008, <http://www.pancanal.com/eng/pr/articles/pdf/wal-mart.html>

the state's competitive position is always relative to that of its competitors. However, referring again to the Ports of Charleston, Savannah, Mobile, and Gulfport, it is clear that the state faces challenges from others who seek the economic opportunity that Texas has historically enjoyed.

- **Will the cost of infrastructure maintenance increase if the infrastructure is not adequately maintained? If so, by how much?**
  - **Yes. Reconstruction costs can be more than three times the cost of 25 years of maintenance. Plus, proper maintenance can extend the life of a roadway by as much as 18 years.**

FHWA estimates that trucks in Texas will more than double the tons of freight they move by 2035.<sup>26</sup> This increase in freight movement will “accelerate deterioration of the aging highway system.”<sup>27</sup> Currently, Texas is spending less than its peer states on maintenance and rehabilitation activities per lane-mile.<sup>28</sup> If Texas spent on average what its peer states did on pavement maintenance per lane-mile, the state would need to double its current maintenance and rehabilitation budget of \$1.2 billion.

According to the *2030 Committee Texas Transportation Needs Report*, “Routine maintenance treatments preserve and extend the life of the pavement, and their impacts on pavement condition are inherent in the pavement deterioration curves.”<sup>29</sup> If routine maintenance activities are not adequately sustained, costs will increase because of the need for more extensive and costly repairs.

For example, currently 87 percent of the state's roadways are in good or better condition. If the state invests only \$1.2 billion per year in maintenance over the next 10 years, the percentage of roads in good or better condition will decline from 87 percent to about 50 percent. If the state reduces its maintenance expenditures to \$325 million per year, the percentage of roadways in good or better condition will be reduced to approximately 30 percent. The cost associated with rebuilding roadways that have deteriorated as a result of underinvestment in maintenance is significantly higher than the cost of maintaining them. The American Association of State Highway and Transportation Officials reports that costs per lane-mile for reconstruction after 25 years can be more than three times the cost of maintenance treatments over the same 25 years, plus the maintenance treatments can extend the life of the roadway another 18 years.<sup>30</sup> Based on a maintenance cost curve developed by the National Center for Pavement Preservation, spending \$1 on pavement preservation before the pavement deteriorates below “fair” condition can eliminate or delay spending \$6 to \$14 on rehabilitation or reconstruction once the pavement reaches very poor condition.<sup>31</sup> The “savings” associated with reduced maintenance is not really a savings at all. In addition to considerably higher road-rehabilitation

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<sup>26</sup> *Freight Shipments To, From, and Within Texas*, U.S. Department of Transportation, Federal Highway Administration, November 18, 2009,

[http://www.ops.fhwa.dot.gov/freight/freight\\_analysis/faf/state\\_info/faf2/tx.htm](http://www.ops.fhwa.dot.gov/freight/freight_analysis/faf/state_info/faf2/tx.htm)

<sup>27</sup> *2030 Committee Texas Transportation Needs Report*, February 2009, p. 7.

<sup>28</sup> *Ibid.*

<sup>29</sup> *2030 Committee Texas Transportation Needs Report*, February 2009, p. 13.

<sup>30</sup> *Rough Roads Ahead*, American Association of State Highway and Transportation Officials, 2009, p. 27.

[http://roughroads.transportation.org/RoughRoads\\_FullReport.pdf](http://roughroads.transportation.org/RoughRoads_FullReport.pdf)

<sup>31</sup> *Ibid.*, p. 28.

costs, other costs manifest themselves in the form of slower speeds, higher vehicle-maintenance costs, and higher costs of goods.

### The Cost to Texas Businesses

- **How much do congestion and deterioration of infrastructure currently cost Texas businesses? If we do nothing to address our transportation needs, how might those costs increase in the future?**
  - **If Texas continues to pursue the current spending trend on roadway infrastructure, the cost to our state's economy from deteriorating mobility versus maintaining our current level of congestion is in excess of \$1.1 trillion over the next 25 years.**

The cost to Texas businesses manifests itself in four ways:

- increased delay,
- increased fuel costs,
- a decrease in business efficiencies, and
- increased business costs.

The increased costs of delay and fuel as a result of congestion are readily apparent. Slower speeds mean more drivers and more trucks burning more fuel in order to make the same amount of stops in a given time period. Furthermore, engines burn fuel less efficiently in slow or stop-and-go traffic than in free-flow conditions.

In the same manner, traffic congestion causes a decrease in business efficiency. In this case, the term "business efficiency" relates to the costs associated with the movement of raw materials to a business and the movement of finished goods to the end consumer. For example, if, because of increased traffic and the subsequent delay, a company has to employ another truck and driver to deliver goods on an established route by a certain time, costs to the business are increased even though the number of units delivered did not increase. For its part, the company must then either raise prices to sustain the current margin or absorb the additional cost. If the company raises prices, its competitive position can be harmed because of the increased product price. If it does not raise prices, its profitability can be harmed.

This relationship was explored in a landmark study done in the mid-1990s for FHWA, in which the rate of return on highway capital as a result of an adequate and well-maintained highway system was estimated to be 16 percent.<sup>32</sup> In other words, for every \$1 invested in the highway network, \$1.16 in benefit is realized. While it has been reported that the rate of return may have declined to 10 percent in the late 1990s as the roadway system matured, there is some speculation that with the advent of just-

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<sup>32</sup> A Summary of "Contributions of Highway Capital to Output and Productivity Growth in the U.S. Economy and Industries", U.S. Department of Transportation, Federal Highway Administration, September 1999, <http://www.fhwa.dot.gov/policy/nadiri2.htm>.

in-time inventory practices, increased trade, and other factors, the rate of return may have started to rise again. For the purposes of this report a rate of return of 12 percent was used.

These factors all potentially contribute to increased costs to do business. Again, many Texas businesses compete internationally. Consequently, they often compete in environments where they could be disadvantaged in terms of labor, taxes and fees, and other costs. The ability to move raw and finished products efficiently has traditionally been an area (along with technology) where U.S. businesses in general, and Texas businesses in particular, have enjoyed a competitive advantage. If that advantage erodes, it will be difficult and expensive to recapture.

Ultimately, the potential costs to the economy are staggering. If Texas continues to pursue the current spending trend on roadway infrastructure, the cost to our state's economy from deteriorating mobility versus maintaining our current level of congestion is in excess of \$1.1 trillion over the next 25 years.<sup>33</sup>

- **Are there indirect costs to businesses that comprise the supply chains? How might they increase?**
  - **Yes. Travel expenses will rise, as will vehicle and operating costs and costs associated with inventory and labor.**

If transportation costs increase, businesses will feel the impact throughout their supply chains. Travel expenses will rise because of increased travel time, as will vehicle and driver operating costs.<sup>34</sup> Many businesses will invest in improving their information technology/transportation management systems to aid in reducing their overall transportation costs.<sup>35</sup>

Processing costs will increase because of increased inventory costs resulting from delivery delays and unreliability. The mere need for more inventory space in order to compensate for a slow and unreliable transportation system can lead companies to add additional space to their current facilities at an added cost to the organization or, in the extreme, to relocate.

Additionally, there are associated market-scale and accessibility costs. A reduced market area decreases demand and ultimately production. This can result in higher unit costs "due to reduced-scale inefficiencies and reduced access to specialized inputs."<sup>36</sup> Businesses will see an increase in the cost of labor as commute times increase and the labor market shrinks. Finally, to recruit a more specialized worker, businesses may find they need to offer more competitive wages as an inducement to attract employees resistant to the more time-consuming commute.

- **How much could the cost of goods increase? How will the additional costs further affect Texas businesses?**

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<sup>33</sup> 2030 Committee Texas Transportation Needs Report, February 2009, p. 49.

<sup>34</sup> Weisbrod, Glen, et. al., *Economic Implications of Congestion*, NCHRP Report 463, 2001, p. 21.

<sup>35</sup> The GMA 2010 Logistics Benchmark Report, p. 8,

[http://www.gmabrands.com/publications/GMA\\_2010\\_Logistics\\_Benchmark\\_Report.pdf](http://www.gmabrands.com/publications/GMA_2010_Logistics_Benchmark_Report.pdf).

<sup>36</sup> Weisbrod, Glen, et. al., *Economic Implications of Congestion*, NCHRP Report 463, 2001, p. 21.

- **From 2005 to 2008, the transportation cost per hundred pounds of goods transported to customers rose from \$2.52 to \$7.41.**
- **\$1 in agricultural products requires 14.2 cents in transportation services, compared with 9.1 cents for manufactured goods and about 8 cents for mining products.**
- **Average logistics cost was 6.75 percent of sales, of which 63 percent is attributable to transportation costs.**

According to the Federal Highway Administration, “Market forces, environmental concerns, rising fuel prices and other factors will increase the cost of moving all goods in the years ahead.”<sup>37</sup> Delays in travel time can vary, creating an added \$25 to \$200 per hour cost based on the product carried.<sup>38</sup>

Transportation costs are perceived at varying levels of importance depending on the industry. For example, \$1 of final demand for agricultural products requires 14.2 cents in transportation services, compared with 9.1 cents for manufactured goods and about 8 cents for mining products. An increase in transportation cost affects lower-margin bulk commodities more than those that have higher margins.<sup>39</sup>

In a 2010 logistics survey report by the Grocery Manufacturers Association and IBM, the average logistics cost was 6.75 percent of sales.<sup>40</sup> This number is down from a steady 6.9 percent in previous years. Of the logistics cost, 63 percent is attributable to transportation costs. While logistics costs have seen an overall reduction as a percentage of sales, freight costs have risen 11 percent since a comparable 2008 survey. This has been achieved only because businesses have sought to cut costs to be competitive by reducing other logistics costs while the transportation component increased.

As an example of the grocery transportation-cost increase, from 2005 to 2008 the cost per hundred pounds of goods transported to customers rose from \$2.52 to \$7.41, and the cost of intra-company transportation per hundred pounds rose from \$1.81 to \$4.08.<sup>41</sup> To cope, companies are developing alternative strategies to transport their goods and offset the rising freight costs. For example, eliminating distribution centers and shipping directly to the customer, optimizing trailer usage, allowing for customer pick-up, and outsourcing to freight companies that operate at higher levels of efficiency are all methods of cost savings employed by companies in order to contain or reduce transportation costs.<sup>42</sup>

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<sup>37</sup> *Freight Story 2008*, U.S. Department of Transportation, Federal Highway Administration, November 2008, [http://ops.fhwa.dot.gov/freight/freight\\_analysis/freight\\_story/](http://ops.fhwa.dot.gov/freight/freight_analysis/freight_story/).

<sup>38</sup> *An Initial Assessment of Freight Bottlenecks on Highways*, FHWA, Cambridge Systematics, Inc., October 2005.

<sup>39</sup> *Freight Story 2008*, U.S. Department of Transportation, Federal Highway Administration, November 2008, [http://ops.fhwa.dot.gov/freight/freight\\_analysis/freight\\_story/](http://ops.fhwa.dot.gov/freight/freight_analysis/freight_story/).

<sup>40</sup> The GMA 2010 Logistics Benchmark Report, p.11, [http://www.gmabrands.com/publications/GMA\\_2010\\_Logistics\\_Benchmark\\_Report.pdf](http://www.gmabrands.com/publications/GMA_2010_Logistics_Benchmark_Report.pdf)

<sup>41</sup> The GMA 2008 Logistics Survey, p.11, <http://www.gmabrands.com/publications/GMALogisticsStudy2008.pdf>.

<sup>42</sup> The GMA 2010 Logistics Benchmark Report, p.10-12, [http://www.gmabrands.com/publications/GMA\\_2010\\_Logistics\\_Benchmark\\_Report.pdf](http://www.gmabrands.com/publications/GMA_2010_Logistics_Benchmark_Report.pdf).

One industry of specific interest in Texas is agriculture. Agriculture is “the largest user of transportation services in the nation.”<sup>43</sup> The nation’s population is shifting to the southern states, while the production of agricultural crops remains region-specific. According to Michael V. Martin and Richard Bielock of the University of Florida, “On the one hand, concentrated destinations could lead to more efficient economies-of-size shipments. But on the other hand, transportation congestion may increase, which could have serious adverse consequences—in the case of perishable products, added time is added risk. Finally, it is also important to note that agricultural products are relatively low-margin goods in highly competitive environments with the result that a modest increase in delivered price of an agricultural product can significantly impact competitiveness.”<sup>44</sup>

- **What is the impact on business efficiencies, including employment-cost increases, lost employee productivity, and a decrease in the ability to retain employees and attract new employees?**
  - **A California study found that a 1 percent increase in worker production was realized for every 10 percent increase in commuter speed.**
  - **Traffic congestion reduces economic output.**
  - **Traffic congestion reduces a company’s “potential employee” pool.**

As noted, congestion causes an increase in commute time and can cause a company’s labor market to shrink. A smaller labor pool diminishes the organization’s ability to recruit more specialized workers, which ultimately reduces productivity and profitability.<sup>45</sup> In order to retain its specialized workers, and, in turn, its level of productivity, the business may find itself having to increase the wages above those of its competitors. The resulting competitive disadvantage may appear to be labor costs, but in actuality, the labor costs can be a function of a disadvantage in transportation.

Improving transportation speed improves productivity. A study of the San Francisco Bay area found, for example, that a 1 percent increase in worker production was realized for every 10 percent increase in commuting speed.<sup>46</sup> When workers spend more time in the workplace as opposed to traveling to it, efficiency is increased.<sup>47</sup> Further, when workers spend less time commuting, job satisfaction increases, resulting in less employee turnover and lower job-training and recruitment costs.

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<sup>43</sup> Martin, Michael, et. al., *The Agricultural Transportation in Constant Adaptation*, Assessing the Importance of Transportation to Major Industrial Sectors of the U.S. Economy, A National Forum on Agriculture and Transportation Linkages, May 17-18, 2002, Fargo, ND, p. 5,

[http://www.ugpti.org/resources/proceedings/2002\\_forum/](http://www.ugpti.org/resources/proceedings/2002_forum/)

<sup>44</sup> Ibid.

<sup>45</sup> Prud’homme, Remy, Keynote Speech for the 7<sup>th</sup> Conference on the Development and Planning of Urban Transport in Developing Countries (CODATU VII), New Delhi, February 12, 1996, p. 8.

<sup>46</sup> Cervero, Robert, *Efficient Urbanization: Economic Performance and the Shape of the Metropolis*, 2000, p. 16, [http://www.lincolinst.edu/pubs/dl/88\\_CERVEWEB.pdf](http://www.lincolinst.edu/pubs/dl/88_CERVEWEB.pdf).

<sup>47</sup> Ibid.

Another study, again in California, found traffic congestion to be a statistically significant predictor of [economic] output in three of four models built to assess the relationship.<sup>48</sup> It is important to note, however, that the research supported two other points: efforts should be focused on those areas that are most congested and concentrated at least as much on reducing congestion as on building roads. In other words, the research suggested a strategic approach by focusing on the most congested areas and the outcome (reduced congestion), as opposed to the means (building roads).

As noted previously, lack of mobility can affect the size of the labor market from which businesses can draw potential workers. As commute times increase due to slow roadway speeds, the effect is to reduce the distance from the work site that is perceived to be a reasonable commute. From the employer's perspective the potential labor pool is reduced with the potential effect of driving up wages to serve as an incentive to compensate for the potential labor shortage.

A shrinking labor market also drives up labor costs because employers have to increase wages as an enticement to prospective employees. Increased wages then drive up employer costs, and consequently, the cost of goods and services.

Clearly, these effects can be diminished in times of labor surplus (high unemployment rates). But conversely, they can be accentuated in times of economic growth – the very time when businesses are likely attempting to most aggressively grow market share.

- **Specifically, which industries are most impacted by inadequate transportation infrastructure?**
  - **Any businesses relying on a delivery schedule, having large customer markets, or requiring specialized workers are particularly affected by traffic congestion.**

As reported at the Annual Symposium Series on the Transportation, Land Use, Environment Connection at UCLA, “Businesses that thrive in high-density districts like restaurants, tourism centers, or financial centers experience a lower sensitivity to the effects of congestion. Businesses that rely upon reliable delivery schedules or survive by serving large customer markets experience a higher differential sensitivity to congestion.”<sup>49</sup> The organizations that are best equipped to address congestion and rising transportation costs are those that employ a generalized workforce or supply a generalized product—by definition they can have a broader market reach within a smaller market area. Further, if they find themselves at a competitive disadvantage relative to transportation, these businesses can reduce their transportation costs by relocating closer to their customers and labor pool or to less-congested areas.

Conversely, businesses that require a more specialized workforce have a higher probability of remaining within congested areas. However, research also indicates that these companies receive a higher cost savings from reduced transportation costs than those with more flexibility to relocate, so

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<sup>48</sup> Boarnet, Marlon G, *Infrastructure Services and the Productivity of Public Capital: The Case for Streets and Roads*, National Tax Journal, March 1997.

<sup>49</sup> Annual Symposium Series on the Transportation, Land Use, Environment Connection, UCLA Extension Public Policy Program, *Symposium Session 3: The Economic Implications of Traffic Congestion*, UCLA, October 2002, p. 10, <https://www.uclaextension.edu/publicpolicy/r/PDFs/proceedings02.pdf>

while they may initially tend to be more bound to an area because of the availability of a specialized workforce, when the cost of transportation due to congestion becomes critical, they will relocate.<sup>50</sup>

### The Cost to Texans and Texas Households

- **What are the current transportation costs to Texas households?**
  - **Today's cost of transportation for the average Texas household is estimated to be \$9,500 per year.**
  - **The average annual delay cost per commuter is \$928.**
  - **The average annual delay cost per household is \$1,509.**

There are a number of ways to look at the household cost of transportation. For example, the American Automobile Association estimates the cost of automobile ownership at \$0.477 per mile for a midsize sedan. That cost figure includes fuel, maintenance, depreciation, tires, and insurance. The average Texas household with 1.7 vehicles,<sup>51</sup> traveling 12,000 miles per vehicle, would incur a transportation cost of approximately \$9,500 ( $\$0.47 \times 1.7 \times 12,000$ ). That cost, however, is limited to the vehicle. We each, whether consciously or not, place a value on our time. The average delay cost per commuter is \$928. On a household basis, the average annual cost of delay is estimated to be \$1,509. A portion of this delay cost is the excess fuel (more than \$150) that is burned because of slower speeds and stop-and-go traffic, but the balance of the delay cost is the value of our personal time.<sup>52</sup>

- **If we do nothing to address our transportation needs, how might these costs increase in terms of additional commute times due to congestion, increases in fuel consumption (excluding rising prices), increased personal costs such as time away from family and social activities, and decreased productivity?**
  - **Delay cost in 25 years will exceed \$3,300 per person and \$5,400 per household.**
  - **By 2035, delay will cause the average commuter to spend almost 140 hours stuck in traffic compared to 38 hours in 2010.**
  - **In 2035, Texans, in total, will burn almost 7 million gallons of extra fuel because of traffic delays.**

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<sup>50</sup> Ibid.

<sup>51</sup> U.S. Census Bureau, Census 2000.

<sup>52</sup> The annual tax cost of owning a vehicle (registration fees and fuel taxes) is approximately \$180 per year (12,000 miles divided by 20 miles per gallon multiplied by \$0.20 per gallon plus the vehicle registration fee), while other ownership costs account for \$9,320.

➤ **Rough roads increase annual vehicle operating costs in Texas by \$336 per vehicle.**

Currently, the total cost of traffic congestion (in terms of delay and excess fuel) in the state's metro and urban areas is estimated to be more than \$10 billion per year. Of that cost, all but an estimated \$370 million is in the state's major metropolitan areas—Houston, Dallas-Ft. Worth, Austin, San Antonio, El Paso, Corpus Christi, the Rio Grande Valley, and Lubbock. Given the current spending trend on roadway maintenance and new capacity, by 2035, the cost of traffic congestion will increase to \$63 billion statewide, with all but \$1.4 billion in our state's major metro areas.

On an individual level, currently traffic congestion costs the average Texas commuter \$928 per year. If the current trend continues, in 25 years the cost will be an estimated \$3,389 per year, with more than \$300 simply the cost of excess fuel (at the current price) burned while drivers are stuck in traffic. Said another way, currently the average Texas consumer spends an estimated 38 hours stuck in traffic. In 25 years, given the current population and congestion trend, that will increase to more than 139 hours per year—or more than a three-week vacation each year—spent stuck in traffic. In reality, however, it's likely that the state's economic growth will suffer *prior* to reaching this level of congestion.

Exhibits 2 through 5 show estimates of total annual congestion cost, annual delay per commuter, annual congestion cost per commuter, and annual congestion cost per household by metro and urban area, respectively.

**Exhibit 2: Projected Annual Congestion Cost (in Millions of Dollars) in Texas' Metro and Urban Areas, 2010 through 2035.**

Metro Areas	2010	2015	2020	2025	2035
Austin	\$691	\$726	\$818	\$1,152	\$2,569
Corpus Christi	\$124	\$224	\$325	\$518	\$956
Dallas-Ft. Worth	\$4,372	\$6,236	\$8,702	\$12,936	\$24,605
El Paso	\$107	\$183	\$341	\$435	\$729
Hidalgo	\$79	\$121	\$156	\$254	\$368
Houston	\$4,428	\$6,547	\$9,011	\$13,867	\$28,067
Lubbock	\$47	\$69	\$90	\$98	\$115
San Antonio	\$554	\$1,253	\$2,032	\$2,610	\$3,738
<b>METRO TOTAL</b>	<b>\$10,402</b>	<b>\$15,359</b>	<b>\$21,476</b>	<b>\$31,869</b>	<b>\$61,147</b>
<b>Urban Areas</b>					
Abilene	\$3	\$4	\$5	\$5	\$7
Amarillo	\$17	\$18	\$18	\$19	\$21
Beaumont	\$78	\$85	\$92	\$107	\$123
Brownsville	\$16	\$25	\$38	\$63	\$129
Bryan-College Station	\$23	\$34	\$47	\$73	\$130
Harlingen	\$16	\$25	\$34	\$52	\$100
Killeen-Temple	\$25	\$37	\$54	\$81	\$147
Laredo	\$43	\$74	\$109	\$178	\$389
Longview	\$40	\$61	\$85	\$95	\$119
Midland-Odessa	\$23	\$31	\$29	\$38	\$51
San Angelo	\$3	\$2	\$2	\$3	\$3
Sherman-Denison	\$4	\$6	\$9	\$12	\$21
Texarkana	\$17	\$17	\$21	\$27	\$49
Tyler	\$41	\$57	\$72	\$47	\$71
Victoria	\$14	\$14	\$17	\$21	\$29
Waco	\$5	\$4	\$4	\$5	\$12
Wichita Falls	\$6	\$8	\$10	\$13	\$18
<b>URBAN TOTAL</b>	<b>\$373</b>	<b>\$502</b>	<b>\$646</b>	<b>\$840</b>	<b>\$1,421</b>
<b>TOTAL</b>	<b>\$10,775</b>	<b>\$15,861</b>	<b>\$21,122</b>	<b>\$32,710</b>	<b>\$62,568</b>

**Exhibit 3: Projected Annual Delay per Commuter (in Hours) in Texas' Metro and Urban Areas, 2010 through 2035.**

Metro Areas	2010	2015	2020	2025	2035
Austin	33	30	31	38	71
Corpus Christi	16	27	37	55	91
Dallas-Ft. Worth	50	67	85	116	184
El Paso	14	21	36	44	64
Hidalgo	8	11	13	19	30
Houston	53	66	77	109	188
Lubbock	16	22	29	30	33
San Antonio	21	44	67	83	110
<b>METRO AVERAGE</b>	<b>44</b>	<b>55</b>	<b>69</b>	<b>94</b>	<b>156</b>
Urban Areas	2010	2015	2020	2025	2035
Abilene	2	2	2	2	3
Amarillo	3	3	3	3	3
Beaumont	14	14	15	17	19
Brownsville	5	7	10	15	26
Bryan-College Station	9	12	16	24	39
Harlingen	8	12	15	21	35
Killeen-Temple	6	8	11	15	24
Laredo	10	15	20	28	49
Longview	22	31	39	42	49
Midland-Odessa	6	8	7	9	12
San Angelo	1	1	1	1	1
Sherman-Denison	2	3	4	6	10
Texarkana	10	10	12	14	23
Tyler	20	24	28	17	23
Victoria	9	9	10	11	14
Waco	4	3	3	4	9
Wichita Falls	3	3	4	5	7
<b>URBAN AVERAGE</b>	<b>8</b>	<b>10</b>	<b>12</b>	<b>15</b>	<b>23</b>
<b>TOTAL</b>	<b>38</b>	<b>49</b>	<b>61</b>	<b>84</b>	<b>139</b>

**Exhibit 4: Projected Annual Congestion Cost per Commuter, 2010 through 2035.**

Metro Areas	2010	2015	2020	2025	2035
Austin	\$792	\$724	\$736	\$921	\$1,712
Corpus Christi	\$477	\$809	\$1,116	\$1,653	\$2,719
Dallas-Ft. Worth	\$1,116	\$1,498	\$1,916	\$2,601	\$4,143
El Paso	\$244	\$369	\$624	\$758	\$1,111
Hidalgo	\$186	\$252	\$295	\$431	\$699
Houston	\$1,269	\$1,730	\$2,028	\$2,857	\$4,948
Lubbock	\$383	\$536	\$685	\$727	\$802
San Antonio	\$536	\$1,118	\$1,701	\$2,111	\$2,804
<b>METRO AVERAGE</b>	<b>\$1,056</b>	<b>\$1,341</b>	<b>\$1,679</b>	<b>\$2,289</b>	<b>\$3,793</b>
<b>URBAN AREAS</b>					
Urban Areas	2010	2015	2020	2025	2035
Abilene	\$48	\$56	\$64	\$74	\$89
Amarillo	\$115	\$117	\$118	\$118	\$120
Beaumont	\$376	\$386	\$397	\$453	\$505
Brownsville	\$117	\$162	\$226	\$342	\$603
Bryan-College Station	\$252	\$347	\$452	\$667	\$1,079
Harlingen	\$186	\$267	\$348	\$494	\$813
Killeen-Temple	\$140	\$188	\$250	\$354	\$568
Laredo	\$311	\$460	\$613	\$877	\$1,537
Longview	\$614	\$855	\$1,100	\$1,182	\$1,357
Midland-Odessa	\$166	\$213	\$199	\$249	\$323
San Angelo	\$42	\$37	\$36	\$39	\$43
Sherman-Denison	\$60	\$97	\$131	\$187	\$288
Texarkana	\$340	\$328	\$398	\$471	\$778
Tyler	\$504	\$610	\$707	\$432	\$584
Victoria	\$288	\$279	\$304	\$368	\$464
Waco	\$40	\$29	\$30	\$41	\$87
Wichita Falls	\$67	\$87	\$107	\$145	\$187
<b>URBAN AVERAGE</b>	<b>\$211</b>	<b>\$264</b>	<b>\$321</b>	<b>\$399</b>	<b>\$607</b>
<b>TOTAL</b>	<b>\$928</b>	<b>\$1,188</b>	<b>\$1,494</b>	<b>\$2,041</b>	<b>\$3,389</b>

**Exhibit 5: Projected Annual Congestion Cost per Household, 2010 through 2035.**

Metro Areas	2010	2015	2020	2025	2035
Austin	\$1,108	\$1,013	\$1,019	\$1,275	\$2,369
Corpus	\$708	\$1,201	\$1,649	\$2,443	\$4,019
Dallas-Ft. Worth	\$1,987	\$2,523	\$3,197	\$4,340	\$6,914
El Paso	\$416	\$630	\$1,054	\$1,280	\$1,877
Hidalgo	\$350	\$474	\$549	\$803	\$1,301
Houston	\$2,509	\$2,934	\$3,379	\$4,762	\$8,247
Lubbock	\$517	\$724	\$922	\$979	\$1,080
San Antonio	\$854	\$1,782	\$2,693	\$3,343	\$4,439
<b>METRO AVERAGE</b>	<b>\$1,738</b>	<b>\$2,209</b>	<b>\$2,736</b>	<b>\$3,729</b>	<b>\$6,174</b>
<b>URBAN AREAS</b>					
Urban Areas	2010	2015	2020	2025	2035
Abilene	\$63	\$74	\$85	\$98	\$118
Amarillo	\$171	\$174	\$175	\$175	\$479
Beaumont	\$519	\$533	\$546	\$622	\$694
Brownsville	\$239	\$331	\$456	\$691	\$1,218
Bryan-College Station	\$355	\$489	\$633	\$934	\$1,512
Harlingen	\$348	\$500	\$649	\$921	\$1,514
Killeen-Temple	\$216	\$290	\$383	\$542	\$871
Laredo	\$637	\$940	\$1,239	\$1,772	\$3,109
Longview	\$945	\$1,316	\$1,680	\$1,806	\$2,074
Mid-Odessa	\$249	\$320	\$297	\$373	\$482
San Angelo	\$57	\$51	\$48	\$53	\$58
Sher-Denison	\$84	\$137	\$184	\$262	\$404
Texarkana	\$487	\$470	\$569	\$673	\$1,111
Tyler	\$730	\$883	\$1,013	\$620	\$837
Victoria	\$431	\$417	\$453	\$548	\$690
Waco	\$58	\$42	\$44	\$61	\$128
Wichita Falls	\$88	\$115	\$141	\$191	\$247
<b>URBAN AVERAGE</b>	<b>\$323</b>	<b>\$405</b>	<b>\$491</b>	<b>\$614</b>	<b>\$939</b>
<b>TOTAL</b>	<b>\$1,509</b>	<b>\$1,937</b>	<b>\$2,414</b>	<b>\$3,299</b>	<b>\$5,480</b>

There are social costs as well. As commuters face longer drives to work, they leave their homes earlier in the morning and return later at night. The other activities commonly normal to American family life become more difficult. Driving in excessively congested conditions leads to more stress, and ultimately our quality of life suffers as a result. While these social costs are difficult to quantify, they are no less important.

Finally, there are significant costs to individuals and households associated with the additional operating costs due to rough, poorly maintained roadways. Driving on rough roads accelerates vehicle depreciation, reduces fuel efficiency, and damages tires and suspension. The American Association of State Highway and Transportation Officials and the Road Information Program estimate the increased vehicle operating costs due to rough roads in Texas is \$336 per vehicle, the 15<sup>th</sup> highest-ranked state. Generally, larger vehicles have a greater increase in operating costs due to rough roads.<sup>53</sup>

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<sup>53</sup> *Rough Roads Ahead*, American Association of State Highway and Transportation Officials, 2009, p. 27, [http://roughroads.transportation.org/RoughRoads\\_FullReport.pdf](http://roughroads.transportation.org/RoughRoads_FullReport.pdf).