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16. Abstract

Between now and 2030, there will be a significant gap, well in excess of $100 million, between the amount of revenue needed to funded infrastructure projects and the amount of revenue available to fund those projects in Texas. At the same time, there is private capital seeking to invest in infrastructure projects. Despite the need for capital on the part of the public sector and the willingness to supply capital on the part of the private sector, to date, there have been only a limited number of public-private partnership projects. This paper seeks to begin a process to construct an environment in which more projects can be funded with private capital to the benefit of both the public and private sectors.

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Strategic Transportation Finance Clearinghouse

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Report 161305-1
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Executive Summary

Often there is a disconnect between public entities at the local level seeking access to private entities seeking to fund infrastructure projects. This condition limits the number of transportation projects that otherwise could be funded with private investment and increases the demand for scarce public funds.

States, metropolitan planning organizations (MPOs), and local city governments continue to struggle to find sufficient funding for transportation projects. At the same time, an increasing amount of private capital is seeking viable transportation projects to fund. A 2011 book, *Road to Renewal* by Richard Geddes, recorded over 30 infrastructure funds prepared to invest in U.S. transportation infrastructure projects with a levered investment potential of $475 billion, while 70 new funds were preparing to enter the transportation infrastructure market.

Despite the opportunity that exists to access private capital and the willingness of public entities to undertake projects, few parties on either side of the potential transaction have participated in actual projects. We believe the reason is because of a knowledge gap between private sector investors who **seek to invest** and the state, regional, and local governments that **seek to fund** transportation projects.

This knowledge gap manifests itself in two ways: (1) investment funds (particularly U.S. investment funds) are relatively new to the transportation arena and are not necessarily familiar with the organizations and planning processes that lead to or constrain project development, and (2) regional and local transportation planning entities are not familiar with the analytical processes and evaluation criteria investment firms use to make judgments relative to project viability or the project characteristics different firms will find attractive. Identifying ways to fill that knowledge gap is the essence of this research project.

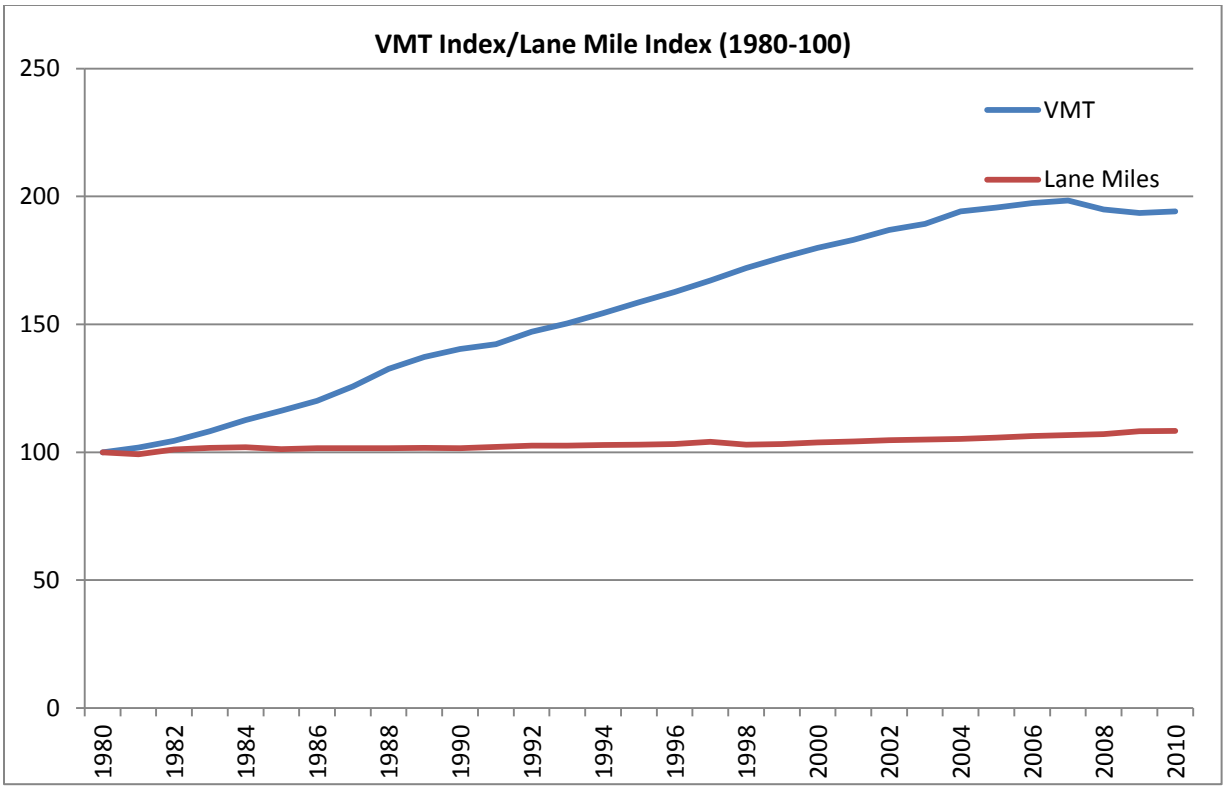
1.0 Background

An identifiable disconnect exists between local public entities seeking access to private capital for transportation projects and private entities seeking to fund infrastructure projects. As transportation needs increase in Texas and across the nation, this disconnect creates an unnecessary barrier, impeding the number of viable transportation projects from securing funding. When private investment is excluded from the transportation industry, the strain on a public transportation system already overwhelmed with demand and inadequate funding is further exacerbated.

This funding gap, which currently amounts to hundreds of millions of dollars in the U.S. and Texas, is certain to increase exponentially in the next decade. In order to formulate a realistic perspective and develop workable, efficient, innovative solutions to the problems facing transportation, it is important to first explore why the current barriers exist between the public and private sectors in regard to transportation funding and infrastructure development exists.

1.1 Current State of the U.S. Transportation System

Understanding the current state of the U.S. transportation system is an essential first step that highlights the urgent need to search out untapped resources, namely the potential of public-private partnerships (PPPs). Contending with the growing demand for transportation infrastructure development and preservation is becoming increasingly difficult for state governments, metropolitan planning organizations (MPOs), and local governments across the nation.



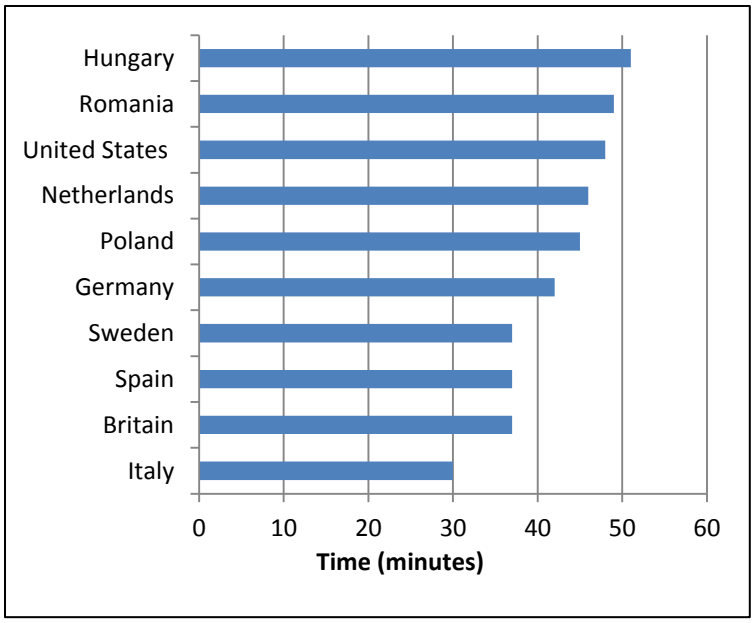
Source: figure adapted from FHWA Highway Statistics Series 2010: HM-260 Public road lane-miles by functional system 1980–2010, VM-202 Vehicle-miles of travel by functional system 1980–2010 (*1*).

Figure 1. Vehicle Miles Traveled and Lane Miles in the United States, 1980–2010.

One of the principal issues facing the U.S. transportation system is the exponential increase in roadway usage in the past several decades. Between the years of 1990 and 2007, the amount of vehicular miles traveled in the United States has doubled (Figure 1). Disproportionately, the amount of lane miles across the country has increased by less than 10 percent (*1*). This major disparity increases congestion on the roadways and contributes to inaccessibility concerns as well as public safety threats. Instead of using the transportation system as a means to ease growth transitions and encourage economic development, it is ultimately being ignored, creating significant problems nationwide.

One symptom of this growth problem can be easily seen in the time Americans spend on the road. In fact, as shown in Figure 2, the average commute time per day in the United States is estimated at 49 minutes, more than the vast majority of European countries including the Netherlands, Poland, Germany, Sweden, Spain, and Britain (*2*). Italy's current commute time is drastically shorter than the average in the United States, at an estimated 32 minutes (*2*). This

added amount of commuting time incurs additional fuel costs, takes a higher toll on the environment, and decreases productivity, i.e., time spent on the road that could be time spent at work. Quality roadways are needed to keep pace with the growing population in order to bring the commute time in the U.S. down to an amount comparable to the other primary world economies.



Sources: chart adapted from European Survey on Working Conditions; U.S. Census Bureau (*2*).

Figure 2. The Road Home: *Average daily commuting time, minutes per day*, Selected countries, latest available year.

Another problem facing the current transportation system is the decaying condition of the infrastructure currently in place. The 2013 Infrastructure Report Card, released by the American Society of Civil Engineers, shows a dismal assessment of our current transportation system. It reported that an estimated 32 percent of highways in the United States are considered to be in poor or mediocre condition, which costs Americans billions of dollars a year (*3*). In addition over 10 percent of the bridges in the United States are classified as structurally deficient (*3*).

The combination of rapid population growth and the current deterioration of transportation infrastructure creates a complex problem. Given these conditions, governments can only focus on maintaining the existing aging infrastructure instead of responding to needs with new, critical

infrastructure. Unfortunately, the United States is far from even being able to maintain the current status quo.

1.1.1 Desperate Need for Funding

As previously discussed, the demand for transportation infrastructure projects is exceedingly high and continuing to grow as our nation's needs grow. Unfortunately, in most places, public funding for transportation is dramatically low, resulting in a standstill in project development and completion. The Congressional Budget Office estimates that another $20 billion needs to be invested annually in order to just maintain the current failing infrastructure (*2*). Not only is the United States not in a position financially to improve the current system, but if immediate action is not taken, the system's current conditions will continue to worsen.

Combined governmental investment in transportation infrastructure currently equals $91 billion, or only 50 percent of the funding needed (*3*). Moreover, the problem is estimated to not only continue, but to worsen. In fact, it is estimated that the federal highway and transit funding gap will total nearly $400 billion in 2010–2015 but will increase to an estimated $2.3 trillion through 2035 (*4*). This exponential increase in unmet transportation needs will have lasting effects, hindering the growth of the U.S. economy. Alternative sources of capital exist in the private sector but are currently excluded from the transportation market. The introduction of these funds could provide immediate aid to the decaying transportation infrastructure and help close the current funding gap.

1.1.2 Untapped Investment Solution

Today, a sizeable amount of private capital seeks viable transportation projects to fund, and the number of interested firms continues to increase. A 2010 report indicated there were over 30 private funds ready to directly invest in U.S. transportation infrastructure projects with a levered investment potential of $475 billion (*1*). Moreover, there are an additional 70 new funds preparing to enter the transportation infrastructure market (*1*). The total amount of investment dedicated to infrastructure has also grown rapidly, tripling from 2006–2009, and continues to rise (*1*). If this trend continues and private funds are invested wisely, an important shift will occur from using almost exclusively public dollars to using a combined, cooperative model with the

private and public sectors. There are several types of partnerships and project delivery methods that exist to bring the public and private sectors together (shown in Appendix A). The introduction of these private funds into the market could revive the industry, drastically improving our current transportation capacity. Now, more than ever, a strong transportation industry is crucial to economic vitality and competition.

1.1.3 Behind the Curve

Despite the opportunity that exists to access private capital and the willingness of public entities to undertake projects, few parties on either side of the potential transaction have participated in actual projects. The U.S. is not alone in looking at ways in which public-private partnerships (PPPs) could be successful; many countries are ahead of the curve in bridging this funding gap in their respective nations. Between 1985 and 2009, the United States funded only 77 U.S. highway PPP projects with an estimated value of $85 billion. The global perspective is entirely different; during that same period, $580 billion was spent on PPPs by other countries (*1*). As shown in Table 1, the use of public-private partnerships on an international scale has become a large market. The leading mode funded by PPPs is largely road transport projects.

Table 1. Worldwide PPP Infrastructure Projects from 1985–2004 by Project Type.

Project Type	Total Planned & Funded Since 1985				Total Funded & Completed by 2004				% Funded & Completed by 2004	
	#	%	$Billion	%	#	%	%Billion	%	% of #	% of $
Road	656	31%	$324.7	37%	359	32%	$157.3	35%	55%	48%
Rail	247	12%	$280.6	32%	107	10%	$143.7	32%	43%	51%
Airport	182	9%	$88.0	10%	67	6%	$49.5	11%	37%	56%
Seaport	142	7%	$39.5	4%	44	4%	$10.6	2%	31%	27%
Water	616	29%	$95.4	11%	391	35%	$62.8	14%	63%	66%
Building	235	12%	$59.2	7%	153	14%	$27.0	6%	60%	46%
Total	**2096**	**100%**	**$887.4**	**100%**	**1121**	**100%**	**450.9**	**100%**	**53%**	**51%**

Source: (*5*).

The United States has remained a minimal player in the market, with countries such as Australia, France, Japan, Spain, Portugal, and the United Kingdom leading the way (*1*). With a number of private firms waiting in the wings to leverage a potential investment of $450 billion in U.S. transportation projects, the opportunity exists for the United States to take a larger role and become the global leader in developing successful PPPs. The central obstacle preventing the United States from becoming a global PPPs leader is the current knowledge gap that exists

among both private sector investors who seek to invest and the state, regional, and local governmental entities seeking to fund transportation projects.

1.1.4 Uncovering the Knowledge Gap

This knowledge gap prevents successful partnerships from existing for two fundamental reasons. First, investment funds, particularly U.S. investment funds, are relatively new to the transportation arena and are unfamiliar with the organizations and planning process that can lead or constrain policy development. They would enter an investment world that looks entirely unlike the one in which they are used to securing deals and completing projects. Individuals used to working in the private sector may find the public sector to be heavily bureaucratic and bogged down in extraneous processes. The tendency is for private sector individuals to move onto other private investments with which they are more familiar.

Conversely, the knowledge gap exists and is perpetuated by the reality that regional and local transportation planning entities are not familiar with the analytical process and evaluation criteria investment firms use. Public sector organizations have little appreciation or insight into the judgments the private sector makes relative to project viability or with the diverse project characteristics that different firms will find attractive. This disconnect prevents public sector entities from discerning and acting upon good opportunities with private sector investors. The ability to communicate between these two sectors will promote mutual understanding and will aid in closing this knowledge gap.

1.1.5 Bridging the Gap

Other market sectors have successfully bridged the gap between public and private sector to form lasting, profitable partnerships. By working together, both sectors can capitalize on combined strengths while minimizing weaknesses as both sectors bring valuable assets to decision making and project implementation.

Table 2. On-Time Performance of Highway PPPs in New South Wales, Australia.

Project	Opened	Scheduled Opening	Time Saved
M4	May 1992	February 1993	9 months
M5	August 1992	February 1994	18 months
Sydney Harbour Tunnel	August 1992	August 1992	On time
M2	May 1998	November 1997	6 months
Eastern Distributor	December 1999	August 2000	8 months
Cross City Tunnel	August 2005	October 2005	2 months
Westlink M7	December 2005	August 2006	8 month
Lane Cove Tunnel	March 2007	May 2007	2 months
Total time saved			**53 months**

Source: chart adapted from table 10 of (*6*).

Combining the speed and efficiency of the private sector with the experience, transparency, and accountability of the public sector creates an ideal situation for mutually beneficial projects to succeed in the marketplace. One tangible example of these two sectors working well together to improve project delivery is illustrated by Australia's two decades of experience. According to one study, titled *Performance of PPPs and Traditional Procurement in Australia*, traditional projects typically were completed at an estimated 24 percent behind schedule, while PPPs were generally completed before schedule, saving time and money while improving the conditions of the transportation system (Table 2) (*1*).

The two sectors have a long-standing history in the United States of effectively working together to fund major capital projects including water systems, sports stadiums, and local roadway systems using general obligation bond debt packages. However, non-traditional and innovative funding solutions exist, giving PPPs more options and greater opportunities. PPP contracts contain an array of variables offering changeable degrees of private involvement in each phase of infrastructure projects including, but not limited to, designing, building, operating, maintaining, and financing. Options for contractual agreements between the public and private sector are expansive, allowing for flexibility and control, and increasing the likelihood of success.

While there are many examples of public-private partnerships in transportation overseas, U.S. experience is more limited. A few innovative public-private partnership infrastructure projects include the Chicago Environmental and Transportation Efficiency Program (CREATE), the South Bay Expressway in San Diego, California, the Foley Beach Express in Foley, Alabama,

and the Reno Transportation Rail Access Corridor in Reno, Nevada (*7*). A more systematic and sustained effort to matching the strengths of the public and private sectors will likely help provide a significant boost to new PPP funding for U.S. transportation projects.

2.0 The Problem

2.1 A Texas Perspective

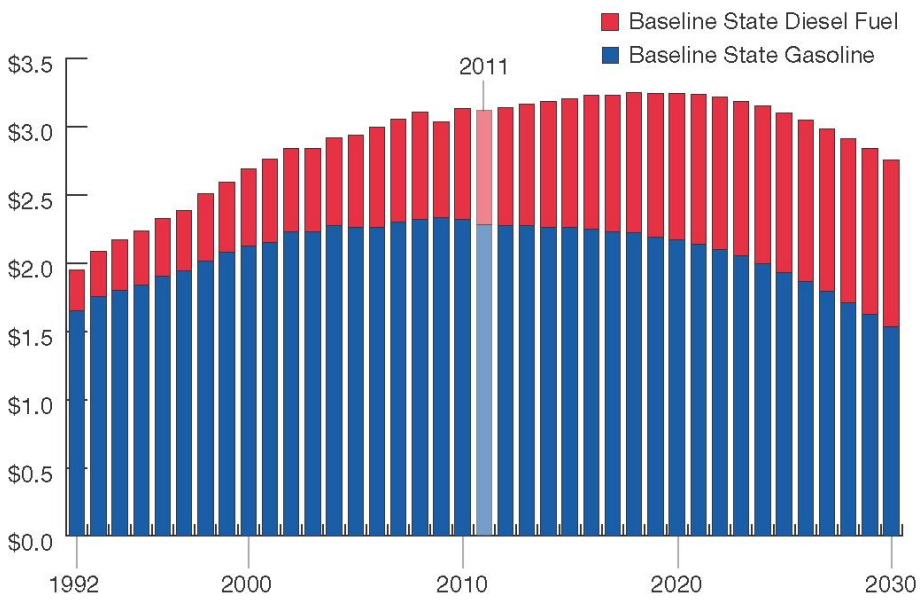
2.1.1 The Challenge Facing Texans

The trends facing the U.S. have also played out in most states across the country, but nowhere are these macro trends more evident than in Texas. Texas has experienced more than 40 years of strong economic growth. Strategic transportation investments have played a significant role in enabling Texans to live and work where they choose and efficiently transport goods to markets and manufacturers. Unfortunately, transportation investments have not kept pace with the state's growth. Subdivisions, office buildings, schools, and other travel destinations are often built without sufficient facilities to accommodate the travel created by these developments. Increasing traffic problems in rush hours, and even in the middle of the day in some cities, are only one symptom of the investment gap. Factors impacting the quality of Texas transportation include:

- **Burgeoning population and job growth**—The 15 million new Texans projected to arrive over the next 25 years means Texans will need to make more transportation investments.
- **More freight being moved**—Freight traffic is expected to grow at twice the rate of passenger vehicle traffic as the Texas economy grows over the next 25 years. Trucks and trains in rural and urban corridors are a key part of the economy and must travel on reliable timetables. If freight does not move efficiently in Texas, the state will lose jobs to areas where freight moves more easily.
- **Road preservation concerns**—It is cheaper to keep roads in good condition than to fix them after they deteriorate. Maintaining transportation facilities is similar to maintaining a vehicle; it is easier and cheaper to change the oil and filter than to burn out the motor and then replace it. The projections show that many road miles will require costly rebuilding even if the best efforts are made to preserve them through the most cost-effective maintenance programs.
- **Increased time and costs for system improvement**—Waiting until transportation problems escalate will mean higher costs for transportation system improvements. Major transportation projects can take years to plan, design, and build.

- **Deficient bridges**—Most Texas bridges that are deficient do not collapse completely. Instead, they have weight restrictions placed on them. Increasingly restrictive weight limits are inconvenient to the traveling public and result in increased costs for freight and commercial vehicles.
- **Significant erosion in traditional funding**—Income from traditional transportation funding sources (taxes and fees) is no longer sufficient to keep pace with current and projected highway construction and maintenance cost increases.
- **Recent one-time funding infusions breed complacency**—Recent one-time funding infusions from a variety of sources have enabled road and bridge conditions to be maintained, even while traditional funding sources have declined. Urban traffic congestion grew during the last decade; it recently declined with the economic recession but is on the rise again. The one-time funding infusions make it too easy to overlook the problems certain to face Texas in the near future.

Adding to funding and growth challenges, today's more fuel-efficient vehicles pay lower fuel taxes per mile than when the tax rates were set almost two decades ago. While they offer benefits such as leaving a smaller carbon footprint and allowing Texans to travel farther per gallon, increasingly fuel-efficient cars and trucks generate less income from motor fuel taxes to fund the rising demands on Texas roadways. As Figure 3 shows, Texans will not be able to count on ever-increasing fuel tax revenues as they have in the past.



Source: chart adapted from Texas Comptroller of Public Accounts and TxDOT TRENDS Models (*8*).

Figure 3. Motor Fuel Revenue (Billions of $2010).

2.1.2 Texas Transportation Action Principles

To some extent the principles for an improved transportation finance system are already being developed. A committee on the future of Texas transportation, the 2030 Committee, was formed in 2008 and issued a set of findings on the subject. The Committee believes that the responsibility of choosing individual transportation projects belongs with local and state officials who have access to the expertise and necessary information, and are in touch with prevailing public opinion. Nonetheless, the Committee believes that certain principles should guide investments in the state's transportation programs. It used these principles to identify methods to select transportation projects (without choosing individual projects), establish appropriate funding levels, and ensure accountability with Texans:

- First and foremost, preserve Texas' existing substantial investment in transportation infrastructure.
- Ensure Texas is getting bang-for-the-buck in using its transportation system.
- Involve transportation users and employers in transportation solutions.
- Attack problems and seize opportunities.
- Display results and support accountability.

- Require users to pay for services they consume.
- Make timely decisions about transportation investment levels enhancing funding flexibility and preserving traditional tax based solutions.

Adding more PPP funding opportunities to this mix of solutions is entirely in line with these principles, and a potential key component of the financing and management solutions that will keep the Texas transportation system competitive now and in the future.

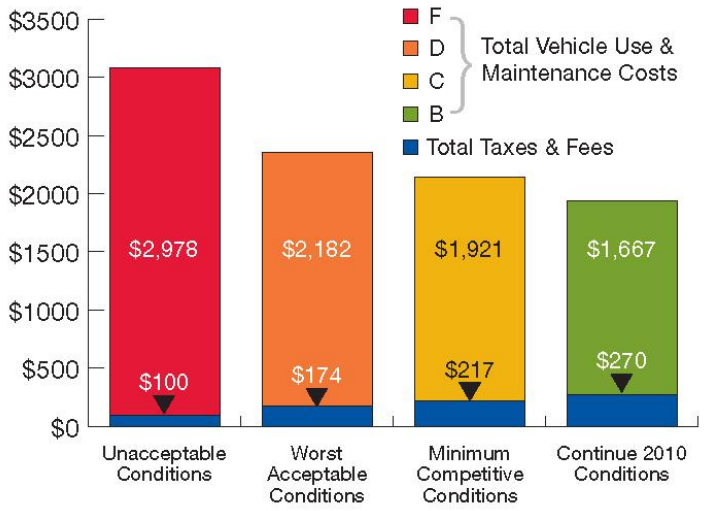
2.1.3 Four Transportation Scenarios—Texas' Alternative Futures

The Committee studied four transportation quality scenarios for pavement and bridge conditions and urban and rural system performance to illustrate the choices that Texans face between now and 2035. A letter grade was assigned to each scenario ranging from F to B. The strategies range from doing nothing new to implementing enough programs and projects to maintain conditions as they are now. *The Committee did not assign a letter grade of A to any scenario due to the significant funding required to achieve this level of quality for the transportation system.*

- **GRADE F: Unacceptable Conditions**—The current policies, planning processes, and funding schemes would continue under this scenario.
- **GRADE D: Worst Acceptable Conditions**—Investments would be made to maintain programs to reduce the amount of roads and bridges that will require expensive rebuilding.
- **GRADE C: Minimum Competitive Conditions**—Texas' infrastructure and congestion levels would remain in a condition equal to or better than its peer states or metropolitan regions.
- **GRADE B: Continue 2010 Conditions**—The conditions experienced in 2010 would be maintained throughout the period from 2011 to 2035.

Figure 4 summarizes the significant decreases in vehicle use and maintenance costs associated with relatively modest tax and fee increases. The estimates illustrate the significant value of increasing the state's investment in transportation improvements. The effects on personal travel as detailed in the scenario results are totaled. Fees and taxes paid by commercial trucks are also

included, along with the increased vehicle maintenance and operating expenses, travel time, fuel, and delay costs as a result of the unacceptable conditions.



Source: figure adapted from *2030 Committee Report,* Executive Summary (*9*).

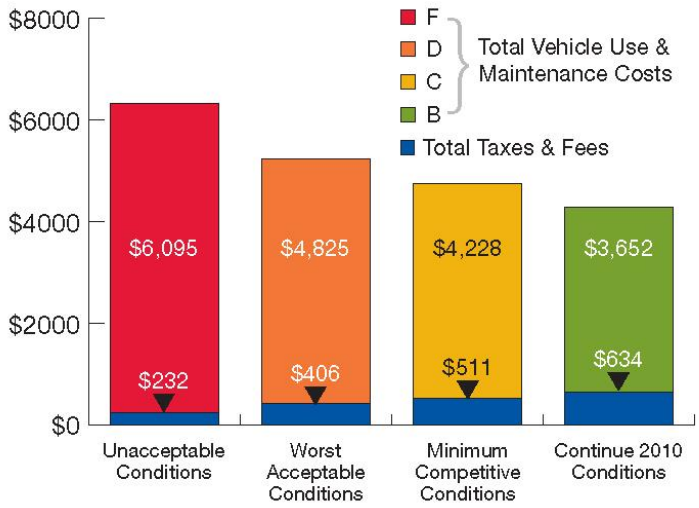
Figure 4. Statewide Total Transportation Costs between 2011 and 2035 (Billions of $2010).

2.1.4 How Will Texans Pay for Transportation?

Under the three improvement scenarios with passing grades, Texans realize savings in projected household costs by investing more in transportation funding. Texas' businesses also see benefits from smoother pavements, better bridges, and reduced congestion. As with Figure 4, the vehicle use and maintenance costs include items such as extra travel time and fuel due to traffic congestion, or closed bridges or increased vehicle maintenance costs due to rough roads for each of the transportation quality scenarios.

- **GRADE F:** Between now and 2035, the average Texas household will pay an estimated $232 per year in taxes and fees for transportation if there are **no** changes to policies or funding levels. This includes fuel taxes, vehicle registration fees, tolls, and other fees for construction and maintenance of the transportation system. They will also pay almost $6,100 per year for extra travel time associated with traffic congestion and detours around deficient bridges, increased fuel purchases due to longer trips and stop-and-go traffic, and additional vehicle maintenance expenses due to rough roads.

- **GRADE D:** An additional $174 per year paid in taxes and fees per household returns $1,270 per year in savings of congestion and vehicle operating and maintenance costs. Pavement conditions will be much better, and congestion will grow more slowly.
- **GRADE C:** An additional $279 per household each year will return more than $1,860 per household in savings each year. Conditions will ensure Texas cities and rural areas are economically competitive with peer states.
- **GRADE B:** An additional $402 per household each year is required to keep conditions as they were in 2010, but that investment returns $2,440 per household in benefits each year.



Source: figure adapted from *2030 Committee Report,* Executive Summary (*9*).

Figure 5. Average Annual Household Transportation Costs, 2011 to 2035 ($2010).

2.1.5 Total Scenario Costs and Deficits

The State of Texas has made some significant policy changes related to meeting the state's highway funding gap. Proposition 12, Proposition 14, and Texas HJR 1 (contingent on voter approval in 2014) have all been passed to address the knowledge gap. A summary of each of these bills and resolutions are included in Appendix B.

Table 3 shows the total amount anticipated to be added to the anticipated funding deficit through 2030 from each of those initiatives. Unfortunately these additional dollars, while closing the gap,

do not eliminate the deficit altogether with the exception of the least desirable funding scenario. Under all other funding scenarios a significant gap still remains. The recently passed legislative options for PPP represent a great opportunity to close the remaining revenue deficit.

Table 3. Statewide Total Implementation Costs for Scenarios (Billions of $2010).

Period	System Element	Scenarios			
		F Unacceptable Conditions	D Worst Acceptable Conditions	C Minimum Competitive Conditions	B Continue 2010 Conditions
2011 to 2015	Pavement	$5.8	$10.6	$10.8	$14.5
	Bridge	$2.3	$2.7	$2.7	$2.9
	Mobility	$18.1	$16.5	$32.4	30.6
	Rural	$0.0	$0.8	$1.5	$1.6
	Total	**$26.2**	**$30.6**	**$47.4**	**$49.6**
2016 to 2019	Pavement	$5.1	$10.1	$10.3	$13.6
	Bridge	$1.8	$2.2	$2.2	$2.4
	Mobility	$13.7	$15.3	$17.3	$27.5
	Rural	$0.0	$0.7	$1.2	$1.3
	Total	**$20.6**	**$28.3**	**$31.0**	**$44.8**
2020 to 2035	Pavement	$9.9	$39.5	$40.3	$46.8
	Bridge	$7.3	$8.6	$8.6	$9.4
	Mobility	$36.0	$64.2	$85.5	$114.5
	Rural	$0.0	$2.7	$4.7	$5.1
	Total	**$53.2**	**$115.0**	**$139.1**	**$175.8**
2011 to 2035	**Grand Total**	**$100**	**$174**	**$217**	**$270**
Prop 12, Prop 14, TMF Bonds[a]		$17	$17	$17	$17
Transfer from Economic Stabilization Fund[b]		$18	$18	$18	$18
2011 to 2035	**Surplus/Deficit Beyond Current Funding[c]**	**Surplus of $35**	**Deficit of $139**	**Deficit of $182**	**Deficit of $235**

Source: chart adapted from *2030 Committee Report*, Executive Summary (*9*).

[a] Prop 12 $5 billon plus Prop 14 $6 billion plus Texas Mobility Fund $6 billion equals a total of $17 billion.

[b] $1.2 billion from 2015 to 2035 equals a total of $18 billion.

[c] Calculated for Scenario F by adding $17 and $18 billion to the Grand Total as this is the base scenario. Calculations for Scenarios D, C, and B subtract $17 and $18 billion from the Grand Total.

As shown in Table 3, total revenue available for pavement and bridge maintenance plus additional capacity is expected to be $100 billion from 2011 to 2035. With the addition of Prop 12, Prop 14, the Texas Mobility Fund bonds, and the proposed transfer from the Economic

Stabilization Fund the deficit is decreased, however, still unacceptable. Below is a list of each bond and the Economic Stabilization Fund and detail of its funding:

- **Prop 12 (general obligation bond projects) –** For a total balance of $5 billion these funds include: $1.4 billion to each of the 25 districts apart of TxDOT; $600 million to the 25 MPOs; $200 million for improvements in statewide highway connectivity; $500 million allocated to bridges, and $300 million for the Houston, Dallas-Fort Worth, Austin, and San Antonio regions (*10*).
- **Prop 14 (revenue-backed bond) –** In 2003, the Texas Legislature and Texas voters passed House Joint Resolution (H.J.R.) 28, which granted the Commission the authority to authorize TxDOT to issue $3 billion in bonds backed by the State Highway Fund. A minimum of $600 million was to be spent on safety improvement projects. The 80th Texas legislature increased the bonding capacity to $6 billion with a maximum annual issuance of $1.5 billion. A minimum of $1.2 billion must be dedicated to safety projects (*11*).
- **Texas Mobility Fund –** Established in 2001 after approval by voters to provide a way of financing the construction, reconstruction, acquisition (including design and costs of acquisition of rights-of-way), and expansion of state highways. TMF can also be used in the payment the costs of constructing publicly-owned toll roads and other public transportation projects. The maximum maturity for bonds in this program is 30 years (*12*).
- **Economic Stabilization (Rainy Day) Fund –** Passed in November 1988 as an amendment to the Texas Constitution for the funds to be used in the event of an economic downturn. The funds are derived from oil and gas tax revenue, in which 75 percent will go to the Rainy Day fund if the revenue collected exceeds the 1987 amount, and once the state's budget is passed, any remaining money is transferred to the fund. This fund accrues interest. If approved by voters in November 2014, $1.2 billion each year from this fund will go toward transportation starting in 2015 (*13*).

The estimated funding gaps for the other three scenarios before the potential bonds and funds will range from $74 billion to $170 billion from 2011 to 2035, and represent deficit levels unlikely to be met by existing state revenue sources.

2.2 Recent Legislative Action in Texas

Legislative action has been taken in Texas to enable the use of PPPs for surface transportation funding. Since 2009, several bills have been proposed, but only a few enacted. Table B-1 of Appendix B gives a detailed description of each bill proposing PPPs. While this activity has created a starting point for the use of PPP as a part of the revenue solution, actual application of PPPs to project funding scenarios has been slow to develop. Determining what opportunities exist to make PPPs more easily accessed as a significant revenue option in solving transportation funding deficits is the purpose of the research effort outlined below.

3.0 Approach and Methodology

3.1 Objectives of Study

In light of the preceding discussion this study is focused on finding alternative solutions for addressing the transportation finance gap and specifically seeks to:

- Identify issues that serve as impediments to the development of a robust relationship between local transportation entities and private sector finance.
- Form a Strategic Transportation Finance Clearinghouse (STFC), through a member-driven research and education program, to foster a stronger relationship between local transportation entities and the finance sector.
- Members of the STFC will meet annually to decide on a mutually-agreed upon research agenda for the following year that addresses transportation finance issues critical to the members. Over time, this research agenda will provide an experientially-based common body of knowledge regarding privately financed/owned transportation infrastructure projects in the U.S.

Further, the STFC will, as part of the annual meeting, bring together state, regional, and local government officials, investment funds, contractors, and owners/operators to discuss new and emerging issues in transportation finance and contracting. Finally, the STFC will develop and maintain a website that will publish internal research and also contain a web portal to transportation finance research, news, and information on privately finance/owned/operated transportation efforts worldwide.

3.2 Methodology/Work Plan

To ensure that study identifies and helps drive specific market-based solutions, a work plan has been developed consisting of the following five tasks:

- **Task 1**: Develop profiles of likely clearinghouse members.
  - Develop a list of potential clearinghouse members from the private sector. Primary targets will include investment bankers and bond underwriters.
  - Develop a list of potential public sector participants. Primary targets will include MPOs.

- **Task 2:** Hold introductory meetings with public and private entities.
  - Meet with private sector participants to explain the concept of the clearinghouse, and review issues that would impede the development of a more robust transportation finance market, as well as issues in which there is an interest for research and gauge their interest in participating in the clearinghouse. (Note: The Carlyle Group has already expressed interest and agreed to meet.)
  - Meet with public sector participants with the same objectives as outlined above.
- **Task 3:** With the results of the meeting discussed in Task 2 completed:
  - A formal plan for the establishment of the STFC will be created and funds solicited to support the clearinghouse.
  - A website will be designed announcing the formation of the clearinghouse.
  - The time and place of the annual meeting will be announced.
- **Task 4:** Develop a preliminary research agenda for the first year of operation of the clearinghouse.
- **Task 5:** Write a research report that documents the issues identified as the primary impediments to more frequent and robust partnerships between local public transportation entities and the private finance sector. As a part of that report, a research agenda for the initial year of the clearinghouse will be produced that addresses the primary issues that have been identified.
  - A formal plan for the establishment of the STFC will be created and funds solicited to support the clearinghouse.
  - A website will be designed announcing the formation of the clearinghouse.

4.0 Results to Date

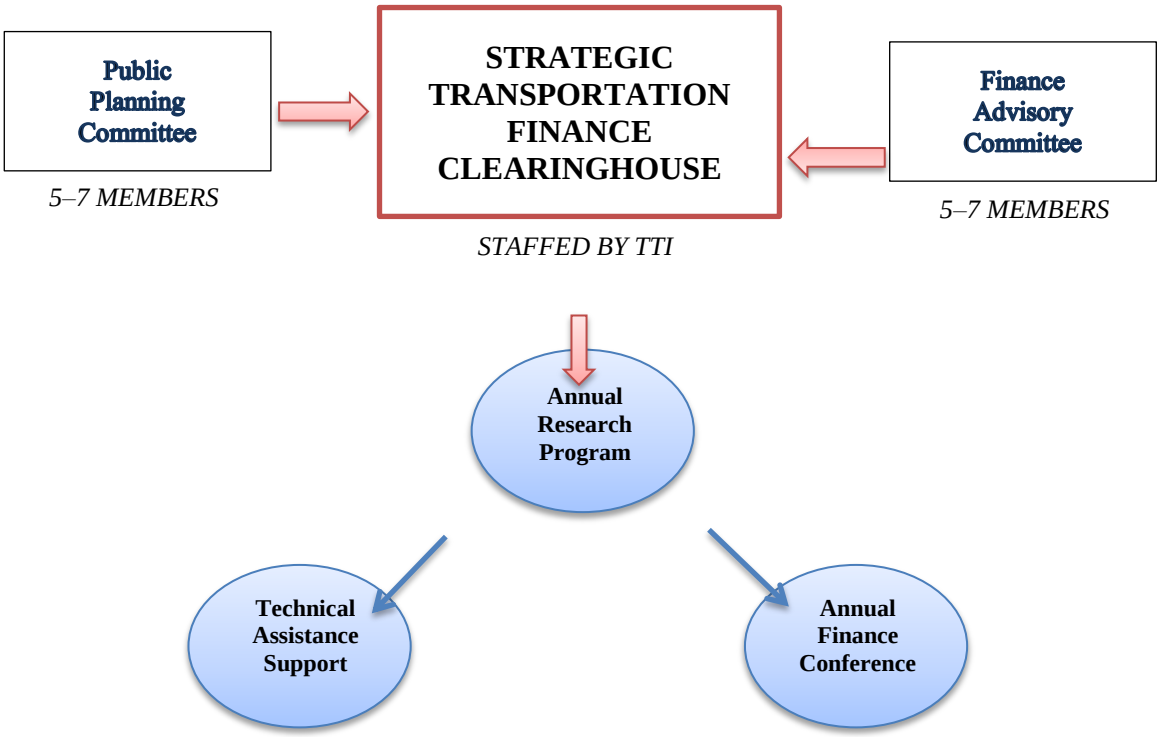
Using the research methodology outlined, TTI has conducted some preliminary research and has progressed on several fronts, including:

- **Task 1:** Develop profiles of likely clearinghouse members.
  - *A preliminary list of the types of organization representatives for a clearinghouse has been identified and additional names are being suggested. To date about 10 meetings have been held to better refine the ultimate list of candidates.* While the exact number of final members have not been determined it is clear that there is strong interest from the private sector as well as the public sector
  - *A full list will be completed and a preferred list of candidates should be appointed in 2014.*
- **Task 2:** Hold introductory meetings with public and private entities.
  - Meeting with private and public sector participants are underway to explain the concept of the clearinghouse and solicit input for the research agenda as well as ideas for the steering committee. *To date, four representatives from the financial community and three MPO representatives have been contacted.*
  - *In addition, several associations have been contacted to discuss the concept for the Exchange.* Among the organizations contacted to date are: AIG Capital, Longbow Partners, Carlyle Group, and several metro MPOs.
  - *The TTI team also will undertake outreach programs using public forums to discuss PPP opportunities. Planned forums include:*
    - In October 2013, the lead researcher for this project provided a key note speech on Texas transportation finance options to over 100 statewide leaders in economic development in San Antonio.
    - In February 2014, the TTI lead researcher gave a keynote address at the Bond Buyer's 18th Annual Public Finance Conference to discuss the role of PPP in transportation finance.
    - Additional focus groups are planned i with a written review and evaluation of all these meetings to be completed by the end of 2014.

- Overall the response has been enthusiastic both in terms of the problem and the need for an organized structured solution to better address specific solutions.

- **Task 3:** Formalize Exchange Structure.
  - *A formal plan for the establishment of the STFC will be created by the end of this year*. The plan will include the research agenda, the roles of the Exchange, and a specific program of work for 2014. *It is anticipated that a website will be launched no later than the end of the first quarter of 2014 to include updates on project opportunities and successful project examples*. Meetings for the role out of specific solutions will begin in 2014, and will continue into 2015.
- **Task 4:** Develop a preliminary research agenda.
  - *The research agenda plan is underway and will generally address the following items:*
    - Development and review of best practices in PPP transportation finance options in and out of Texas.
    - Communications with both private and public stake holders to determine barriers and opportunities to create successful PPP funding opportunities.
    - A catalogue and analysis of the types of projects that are good candidates for PPP solutions. Along with a review of the critical factors that would ensure successful outcomes (more projects being funded).
- **Task 5:** Prepare a research report.
  - *The final outline for the report will be finalized in 2014.*
  - As a part of the research report, TTI will propose a permanent organizational entity charged with addressing the knowledge gap referenced throughout this report. It will be similar in structure to other TTI pooled research studies that encourage public and private partners to establish an on-going research agenda to help continue the effort to determine the best ways to make PPPs an effective part of the Texas transportation finance solution. This annual research program will include a mutually agreed upon research agenda (renewable each year) to determine options for successful uses of PPP.
  - *In addition, by increasing the transparency of funding opportunities, TTI will be able to develop new partnerships between buyers and sellers.*

- Finally, a series of annual conferences (at least one statewide and one national) will be attended by TTI technical staff to share best practices, success stories, and impediments to the use of PPP's for transportation finance. Figure 6 illustrates a proposed structure for the Strategic Transportation Clearinghouse.



Source: TTI.

Figure 6. Proposed Structure for Strategic Transportation Clearinghouse.

5.0 Preliminary Conclusions: A Necessary Shift in Thinking

A major change in thinking needs to occur in order to make the transition to alternative forms of transportation finance including the use of PPPs more seamless and effective. Specifically, the transportation system in the United States and Texas needs to be more customer-oriented.

Motorists need to identify themselves as customers in the industry instead of passive users. Three ways to help encourage this transition include charging drivers by usage, charging more for customers who use the transportation system when it is most valuable (during peak times of demand), and depending on private investment tools in order to help fund major projects. Consumers need to view transportation utilization with the same perspective as other commodities, such as electricity or water.

Noted transportation expert Charles Brooks stresses that "strengthening the public/private partnership through open collaboration, best practices, and shared research and development will help accelerate the innovation we need to meet our challenges. It's not a nice-to-have: It's an imperative if you want to be competitive in the U.S. and abroad" (*14*). New and emerging trends in roadway infrastructure finance including PPPs, privately owned roadways, and any number of different combinations of ownership and finance have created a new environment for both the public and private sectors. Addressing the knowledge gap between the public and private sectors will allow for increased funding and a necessary shift in perspective, subsequently improving the transportation system in the United States.

Texans will pay more in transportation costs over the next several years. The choice is clear: do nothing to address transportation challenges facing Texas—resulting in stop-and-go traffic, lost family and work time, and economic loss—or avoid further system degradation and substantial increases in vehicle use and maintenance costs through an increased investment in transportation funding.

The remainder of this study and the report that follows will help improve the understanding and critical role that PPP can play in keeping the Texas transportation system more competitive in the near and long term.

Appendix A: Public-Private Partnership in Detail

The concept of public-private partnership brings about several different types of project deliveries and agreements. Table A-1 describes each type of partnership in detail and what sort of project would best match the agreement.

Table A-1. Major Types of Public-Private Partnerships.

Type	Description
Private Contract Fee Services	The most common form of private sector involvement in surface transportation. This includes contract planning and environmental studies, facility and right-of-way maintenance, and operations, including the operation of transportation management centers and ITS services.
Alternative Project Delivery	See Table B-2 for a listing of project delivery approaches. These approaches benefit as they save on time and cost, use new technology, and obtain more innovative, higher quality projects with reduced risks.
Multimodal Partnerships	Include modes such as park and ride lots, express lanes with Bus Rapid Transit services, airport transit extensions, or truck/rail transfer facilities. Whether a multimodal partnership is a PPP depends on if the private sector is involved in the design, construction, operation, maintenance, finance, and management of the project.
Joint Development	The partnership of surface transportation agencies and private developers to capture a portion of the increased value from enhanced accessibility provided by the transportation project. Economic-development based partnerships provide access to additional capital and revenue.
Long-Term Lease or Concession Agreements	Typically involve the long-term lease of publicly financed transportation facilities to a private sector concessionaire for a period of time in exchange for the right to collect generated revenue. During the concession period, the concessionaire may be responsible for financing, developing, and delivering the project, as well as facility operation and maintenance.

Source: table adapted from U.S. Department of Transportation Federal Highway Administration, *Case Studies of Transportation Public-Private Partnerships around the World (5)*.

Moving even deeper, within each public-private partnership, there are many design-build delivery approaches. Table A-2 outlines each approach and which type of project would be best suited for the approach.

Table A-2. Project Delivery Approaches.

Approach	Description
Design-Bid-Build (DBB)	Traditional project delivery form. Design and construction are awarded separately to the private sector engineering and contracting firms. Two-phase delivery process: phase one for design and phase two for construction. Once the design phase is complete, the project sponsor separately contracts with a private construction firm through a competitive bidding process. The project sponsor is responsible for the financing, operation, and maintenance of the facility and assumes any risk. The benefits of DBB are: (1) division of work by design and construction, (2) reduced potential for collusion between the design and construction firms during project delivery process, and (3) ability of local firms to compete for contracts that are smaller in scale.
Construction Manager-at-Risk (CM@Risk)	Construction Manager at Risk (CM@Risk) includes construction management services throughout the preconstruction and construction phases. The construction manager is under a separate contract during the design phase to minimize risk of all parties. In CM@Risk, the CM is selected based on qualifications, not price, by the client to provide constructability, technology, pricing, and sequencing analysis. The CM then becomes the design-build contractor when a price is agreed on. The benefits of CM@Risk are: (1) collaboration of the client, designer, and CM to ensure a design that will meet requirements, (2) continual progress of project during price negotiations, (3) optimal teaming through negotiation with all firms rather than selecting from limited number as under DB, (4) high level of direct client involvement, and (5) reduced project risk through the identification of design errors before the construction phase.
Design-Build (DB)	Combines the design and construction phases into one, fixed-fee contract. The design-builder who may be one company or a team of companies, not the project sponsor, assumes all risks. DB contracts are awarded on basis of best value for price, duration, and qualifications. DB is an established project delivery process for major capital projects in public and private sectors in many countries. The benefits of DB include: (1) time savings through elimination of the bidding process, (2) cost savings as a result of communication between design, engineering, and construction agencies, (3) shared risks among the public and private sectors, and (4) improved quality through the involvement of the design team in project development.
Design-Build with a Warranty (DB-W)	The design builder guarantees to meet material, workmanship, and performance measures for a period of time (5–20 years) after the project has been completed. Benefits of DB-W include: (1) additional risk to design builder and (2) reducing the project sponsor's need for inspection during delivery.
Design-Build-Operate-Maintain (DBOM)	The contractor is responsible for the design, construction, operation, and maintenance of the facility for a period of time, and meeting all standards. Benefits of DBOM include incentives for a higher quality plan as the design builder is responsible for the project for a period of time after construction.

Approach	Description
Design-Build-Finance-Operate (DBFO)	A similar delivery method to DBOM with the addition of the contractor holding responsibility of most of the project financing. The benefits are similar to DBOM and also include the transfer of the financial risks to the design builder during the contract period. While the project sponsor retains ownership of the facility, the DBFO attracts private financing that can be repaid with revenues from project operation.
Build-Operate-Transfer (BOT)/Build-Transfer-Operate (BTO)	BOT is similar to DBFO as the contract team is responsible for facility design, construction, and operation for a specified time. The BOT differs by retaining facility ownership as well as the operating revenue risk and any surplus operating revenues. The BTO allows asset transfer to occur after construction with the private provider continuing to operate the facility under the contract. Benefits of BOT and BTO include increased incentives for delivery of higher quality projects as the contractor is responsible for the operation after construction for a period of time.
Build-Own-Operate (BOO)/ Build-Own-Operate-Transfer (BOOT)	A BOO approach gives the contractor the responsibility of the design, construction, operation, and maintenance of the facility, and they assume all risks associated with the project. BOOT allows asset transfer to occur after a specified operating period when the private provider transfers the ownership of to a public agency.

Source: table adapted from *(5)*.

Critical Success Factors for Public Private Partnerships Focused on Transportation Infrastructure

As part of the preliminary review of secondary sources and studies for this report, TTI staff has compiled a list of critical success factors that lead to more successful outcomes when PPP projects are undertaken. As part of this study methodology, TTI will attempt to update and expand on this list with a particular emphasis on U.S. and Texas specific project success metrics. The following table summarizes key factors summarized in recent national and international studies.

Table A-3. PPP Success Factors.

Factor	Sub Factors
Stakeholder Consultation, Support, and Communication	• *Clear identification of opportunities* • Technical support to find best projects • Clear review of financial alternatives • Stable legislative environment
Economic Viability/Market Conditions	• *Overall market conditions/benefits* • *Sufficient profitability to attract investors* • Long-term availability of suppliers needed
Financial Environment	• *Sound financial analysis* • Predictable risk scenarios • Appropriate recapture methods and systems
Technical and Operating	• *Strong capable project team* • Effective project delivery structure • Good relationship between partners

Source: table adapted from (*6,15*).

Appendix B: Legislative Action in Texas

Legislative action in the State of Texas has been taken to enable the use of public-private partnerships for surface transportation. Several bills in the last five years have been proposed, but only a handful has been enacted. Table B-1 shows the bills that have been passed for public-private partnerships, which set in place the opportunity for innovative transportation funding in the future.

Table B-1. Transportation Funding Legislation in Texas.

Bill	Sponsor (Rep)	Year	Topic	Summary	Status
SB 1048	Mike Jackson	2011	Public Private Partnerships	Allows concession agreements for PPPs for ferry, mass transit, vehicle parking, or port facilities (among others). Excludes financing, design, construction, maintenance, or operation of a highway in the state highway system.	Enacted
SB 1420	Linda Harper-Brown	2011	Design-build, public private partnerships, tolling	TxDOT sunset bill extending TxDOT for four years. Limits TxDOT's PPP authority to certain specified projects only. Extends the expiration of most PPP authority to Aug. 31, 2015. Requires TxDOT to report to the Texas Transportation Commission on PPP project not later than Dec. 1, 2012. Addresses determination of financial terms for proposed TxDOT toll projects in which a private entity has a financial interest in the project's performance. Addresses design-build and PPP authority for other authorities in the state.	Enacted
SB 19	Robert Nichols	2011	Public Private Partnerships, tolling	Would allow toll projects to be owned by a local toll project entity in perpetuity. Establishes a process for toll development. Creates a first right of refusal guarantee for local toll entities to build future toll projects. If the local toll project entity turns down that right, the right then transfers to the department. Would allow regional authorities to enter into tolling agreements.	Enacted

Source: table adapted from (*16*).

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