



TESTIMONY

Impact of Energy Development Activities on the Texas Transportation Infrastructure

**Testimony Before the
House Committee on Energy Resources**

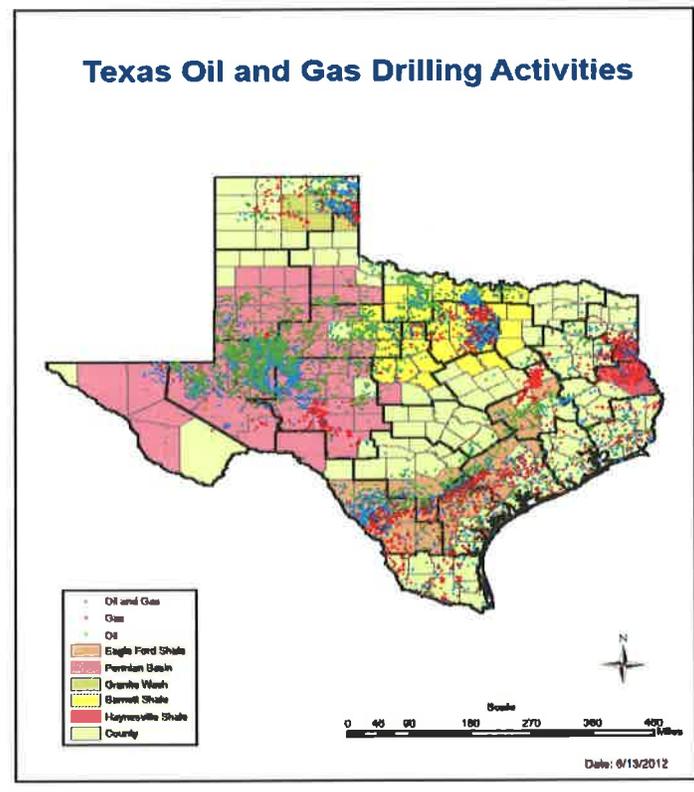
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Introduction

The Texas Department of Transportation (TxDOT) has been asked to address the Committee on Energy Resources' interim charge to *[r]eview current state and federal laws and regulations and make recommendations to encourage additional energy production in Texas. Focus on the impact energy production has on our state's economy.*

At TxDOT, our mission is to work with others to provide safe and reliable transportation solutions for Texas. Our goals include maintaining a safe system, addressing congestion and connecting Texas communities. Working with legislators, other state agencies, local governments and other stakeholders to address the impact of energy development on our state's transportation system is a good example of how we carry out our mission while achieving these goals.

The development of energy resources significantly contributes to the economies of individual communities and the state as a whole. It provides employment for thousands of Texans across the state and is a vital source of often-scarce jobs in economically disadvantaged areas. It helps to generate sales and hotel tax revenue for many local governments, and provides severance taxes and other revenue for the state. In addition to its positive economic impact, however, the development of energy resources significantly affects our transportation infrastructure and challenges the efforts of TxDOT and local governments to ensure the safety of the traveling public and to protect the taxpayers' investment in our state's highways, roads and bridges.



Energy Development Activities Around the State

Although much attention has been focused recently on activity in the Eagle Ford Shale in South Texas, energy development activities have been underway for some time in many other parts of the state, including the Permian Basin and the Barnett, Granite Wash and Haynesville Shale's. The map below shows the extent of oil and gas drilling activities around the state and provides some sense of the corresponding challenge to TxDOT and local governments responsible for maintaining transportation infrastructure.

Challenges for TxDOT and Local Governments

While Texas' energy resources include oil, natural gas, coal, wind, solar, bio-fuels, and nuclear, the production of energy from oil, natural gas and wind has caused the greatest impact on our transportation infrastructure. A great deal of the exploration and production associated with the latter forms of energy occurs in rural areas where most of the roads and bridges were designed for lower volumes of traffic. Production of oil, gas and wind energy, however, requires large numbers of heavy trucks, including many classified as oversize and/or overweight vehicles. Over time, large volumes of heavy truck traffic can damage roads and bridges and significantly reduce their service life. The problem is particularly acute on highways, roads and bridges that are not designed or constructed to accommodate heavy loads or oversize vehicles.



Oil and gas development-related truck traffic on roads and highways in South Texas. (TxDOT photos)

Damaged roads and bridges are a major inconvenience for energy companies and a logistical and financial burden for TxDOT and local governments. More importantly, they are also a safety hazard for motorists. In some cases, severely-damaged county roads can impede or prevent access by school buses and emergency vehicles. Given the extent of energy-development activities around the state, damage to transportation infrastructure is not limited to one route or area. These areas have experienced a sudden explosion of drilling activity, which prevented the department and local governments from gradually ramping up their maintenance and repair efforts.

The need to maintain and repair highways, roads and bridges affected by energy-development activities imposes a financial burden on TxDOT at a time when the department already faces a variety of funding challenges. Those challenges include a motor fuels tax revenue that is disproportionate to the need, diversion of some of that revenue for other purposes and uncertainties about the amount and duration of federal transportation funding.

Additionally, damaged roads are a problem that many cash-strapped counties cannot afford to address with current tax revenues. In an era when rebuilding a paved road can cost more than \$1 million a mile, the annual maintenance and construction budgets for many rural counties' Road and Bridge Departments are likely no more than \$1- \$2 million. That would provide enough money to rebuild about a mile or two of road, but only if the county stopped all other spending for necessities like brush control and the routine maintenance required on their other roads.

TxDOT Energy Sector Task Force

To address the impact of energy development-related activities on Texas' transportation infrastructure, TxDOT recently formed an Energy Sector Task Force comprised of representatives from the department and other state agencies, local governments and a variety of trade associations. In addition to creating partnerships, allowing sister agencies to support the activities of the other agencies involved and sharing information, the task force is working to identify opportunities for innovations to reduce these impacts and to identify potential solutions to common challenges.

The Energy Sector Task Force includes representatives of the following agencies and organizations:

- Texas Department Of Transportation
- Texas Department of Public Safety
- Texas Commission on Environmental Quality
- Railroad Commission of Texas
- Texas Department of Motor Vehicles
- Counties
- Cities
- Texas Oil and Gas Association
- Texas Farm Bureau
- America's Natural Gas Alliance
- Association of Energy Service Companies
- The Wind Coalition
- Texas Independent Producers & Royalty Owners Association
- Texas Motor Transportation Association
- Texas Alliance of Energy Producers

The department continues to add members to the task force as more entities express interest in becoming involved in this important endeavor.

The task force, which has already held two meetings (in April and May, 2012), has been gathering and sharing data intended to quantify the impact of energy-related activities on the state's roadways and bridges. Using that information, the task force will develop long-term funding strategies and innovations – including the use of new technology – to reduce the impact of heavy loads on the infrastructure itself and the financial burden on TxDOT and local governments. A summary of the information the task force has assembled thus far and some information about a few of the initiatives they have begun is provided below.

Energy-Related Impacts on Highways and Roads

Energy development activities have an extremely significant impact on our state's transportation infrastructure. Much of the impact stems from the very large number of individual heavy truck trips required to bring an oil or gas well into production or to erect a wind turbine.

The steps involved in drilling, completing and maintaining on oil or gas well provide a good example.

Process	Duration	Activities Involved
Drilling Process	Approximately 25 days	Pad site preparation Rig mobilization Installation of closed loop mud system Erection of drilling rig Drilling operations Once well is completed, removal of rig
Hydraulic Fracturing		Transporting, injecting and disposing of 3 to 4 million gallons of water, hundreds of tons of very fine sand and other chemicals

Loaded Trucks per Gas Well

Activity	Number of Loaded Trucks
Bring well into production	1,184
Maintain production (Each year)	Up to 353
Refracturing (Every 5 Years)	997

The volume of truck traffic required to bring a single gas well into production is equivalent to the impact of approximately eight million cars. Truck traffic required to maintain a single gas well's production is equivalent to up to an additional two million cars per year.

The transportation of water used in the hydraulic fracturing process is a source of special concern. In addition to its inherent weight, water transported in a truck sloshes back and forth in the truck tank, which constantly shifts the weight borne by each axle and causes far greater road damage than a load of the same weight that consists of a static material. Moreover, water used in

hydraulic fracturing must be transported twice: the first time to the well prior to use and a second time to a disposal well afterwards.

Impact to the State Highway System

TxDOT contracted with the Center for Transportation Research (CTR) at the University of Texas to determine the impact of energy development-related activities on the service life of interstate highways, US highways, state highways, and Farm to Market highways. The tables below document some of CTR's findings:

Impact of Truck Traffic - Natural Gas Well Operations

Activity	Service Life Reduction
Construction	4% to 53%
Rig Movements	1% to 16%
Saltwater Disposal	1% to 34%
Average Overall Impact	30%

Impact of Truck Traffic - Oil Well Operations

Activity	Service Life Reduction
Construction	1% to 3%
Production	2% to 16%
Average Overall Impact	16%

Not all of the energy-related damage to transportation infrastructure results from oil and gas-related activities. In West Texas, TxDOT officials have noted various problems in connection with wind farm operations, including difficulty coordinating with wind farm developers and safety concerns associated with their work areas due to the large number of haul trucks and the high speeds they operate at.

Typical Truck Traffic Associated with a Single Wind Turbine Site

Activity	Number of Truck Trips
Base Material for Pad	35
Concrete for Pad	223
Service Road	78

NOTE: Estimates do not include other deliveries such as steel, rebar, turbine components, etc.

Highway and Road Damage from Energy-Related Activities

Large volumes of legally-loaded heavy trucks and permitted and un-permitted overweight vehicles damage bridges and reduce pavement life. Pavements are designed to carry the amount of traffic expected to travel that roadway over a specific period of time, usually 20 years, without significant deterioration or damage. Larger than expected volumes of heavy truck traffic, such as is occurring with energy-related activities, consumes the "life" of a pavement in much less time than expected under the original pavement design.

In addition to damaging highways designed to carry normal legal truck loads (80,000 lbs. gross weight), heavy trucks are also traveling over load-zoned roads, which are designed to carry trucks only weighing 58,420 lbs. gross weight. Texas currently has 16,306 miles of load-zoned roads. Overweight vehicles can accelerate the deterioration and reduce the life of load-zoned roads very rapidly, in some cases in a matter of a few days, because of their weaker pavement structures.

Roadway bridge structures are also being impacted by the increase in oversize truck traffic associated with energy-related activities. Many oversize truck loads are taller than the vertical clearances under some of the bridges along Texas' highways. Impacts to these structures by oversize loads cause damage that is very expensive to repair and often causes the impacted bridge to be closed to traffic for significant amounts of time,

TxDOT's Farm to Market highways were not designed to carry the volume of heavy truck traffic associated with energy development activities. Heavy truck traffic can cause many different kinds of road damage, including base failures, rutting, pavement distress, damage to road shoulders and edges and bridge hits. In addition to being costly to repair, road and bridge damage creates safety problems. The photos below show some examples of road damage.

Base Failures



Pavement Distress



Edge Damage



Rutting





Example of bridge hit. (TxDOT photo)

Right of Way and Other Roadside Issues

In addition to road and bridge damage, energy development activities often raise other concerns involving TxDOT's right of way. For example, unauthorized or unpermitted driveways are a concern because they can compromise TxDOT's ability to protect the safety of the roadway. TxDOT inspectors usually identify "illegal" driveways in the course of routine roadway inspections. In most cases, inspectors attempt to work with the parties involved to make "illegal" driveways "legal" by helping them to apply for a permit if the driveway does not create a safety concern. In some situations, inspectors must ask the developers to reconstruct or relocate the driveways when they are placed in unsafe locations.



Examples of driveway-related problems. Left: Damage to culvert resulting from trucks driving over it. Center and right: Despite sign prohibiting left turns, tire tracks document that many drivers ignore that prohibition. (TxDOT photos. Fort Worth District)

Other right of way issues associated with energy development activities include problems with drainage structures, or culverts. In some cases, as a short cut, energy company crews run temporary pipelines through culverts without the department's knowledge or permission. When it rains, this unauthorized practice can lead to flooding of roadways and adjoining properties and cause other drainage problems.

Bridge Widths

Although they are designed to handle the weight of vehicles associated with energy development activities, many bridges on the state highway system are not wide enough to safely accommodate drilling rigs, other oversize loads or larger volumes of truck traffic. The department has identified more than one thousand such bridges in parts of the state where energy development activities are occurring.

Bridges with Roadway Widths Less than 24' in Oil and Gas Producing Areas

Geologic Region	Number of Structures	Estimated Replacement Cost
Barnett Shale	448	\$126,007,120
Eagle Ford Shale	290	\$83,003,847
Granite Wash Shale	45	\$11,377,236
Haynesville/Bossier Shale	151	\$35,966,656
Permian Basin	192	\$61,912,893
Total Estimated Replacement Cost	1126	\$318,267,752

NOTE: Costs based on replacing structure with one of the same length and a deck width of 32'.

High Cost of Deferred Maintenance

Research and experience has shown that taking proactive approaches to addressing roadway impacts is a much more cost-effective approach to maintaining the infrastructure, reducing overall repair and maintenance costs by approximately 700%. Proactive maintenance strategies include reconstructing or resurfacing a road to preserve it before damage occurs. This could be referred to as "armoring" the road to prepare for high-volume heavy truck traffic. Conversely, a reactive strategy refers to maintaining or repairing the road after damage has occurred.

Reactive vs. Proactive Maintenance Costs Over 20 Years Example: 12.6 mile length of FM 2688 in Dimmitt County

Number of Additional Well Permits	Reactive Cost	Proactive Cost
0	\$13,756,000	\$2,004,536
1	\$19,271,448	\$2,004,536
5	\$23,303,952	\$4,654,149
10	\$27,452,880	\$5,723,553

Commercial Vehicle Permit and Enforcement Issues

In addition to their impact on highways, roads and bridges, the large number of trucks involved in energy development activities requires significant law enforcement and regulatory efforts to enforce traffic safety and commercial motor vehicle laws and regulations. Those efforts include ensuring that trucks and other commercial vehicles obtain any permits they are required to have and that they comply with the corresponding permit requirements.

Like their counterparts that transport loads for other industries, operators of trucks that transport energy development-related equipment and supplies often obtain so-called “2060” permits from the Texas Department of Motor Vehicles. A “2060” permit enables its holder to exceed the customary legal axle or overall vehicle weight limits. In practical terms, this means that an 80,000 lb. vehicle with a “2060” permit can operate on load zone roads typically posted for 58,420 lbs. limits. Moreover, while a “2060” permit can cost as little as \$255 per year (see table below), the amount of road damage a truck with such a permit can cause is essentially unlimited.

State Law Governing “2060/1547” Over Axle/Over Gross Weight Tolerance Permits

Applicable Statute	Description	Permit/Fee	Required Bond	Allocation of Permit Revenue
Texas Transportation Code §§623.011 - 623.019 (excluding §623-017) (Formerly TVCS 6701d-11, Sec 5B)	Authorizes issuance of annual permit to vehicles transporting loads that can be reasonably dismantled to exceed gross weight and axle tolerances. Allows travel on state and county roads, excluding Interstate and Defense highways. Additionally, these vehicles may not exceed load-zoned road or bridge postings.	\$75.00 base fee plus \$5.00 administrative fee plus the following sliding scale fee based on number of counties selected: 1 – 5 counties \$175 6 – 20 counties \$250 21 – 40 counties \$450 41 – 60 counties \$625 61 – 80 counties \$800 81 – 100 counties \$900 101 – 254 counties \$1,000	Applicant must obtain surety bond to be eligible for permit.	\$50 of base fee distributed to GR; \$25 of base fee to HWY Fund. \$5 admin fee to HWY Fund. Sliding scale fee: 1-5: \$125 to GR & \$50 to HWY. 6-20: \$125 to GR & \$125 to HWY. 21-40: \$345 to GR & \$105 to HWY. 41-60: \$545 to GR & \$60 to HWY. 61-80: \$785 to GR & \$15 to HWY. 81-100: all to GR. 101-254: all to GR.

Given their relatively small numbers of officers, their many responsibilities and the staggering number of trucks involved, the DPS and other law enforcement agencies responsible for commercial vehicle enforcement face daunting challenges. For example, in the Barnett Shale during 2009, DPS only had two Commercial Vehicle Enforcement officers for all the roads in Johnson, Hood, and Somervell Counties. About 50% of the trucks they pulled over were typically 2000 to 5000 lbs. overweight. Other potential safety or traffic enforcement problems associated with commercial vehicles include:

- Night movement of drilling rigs and other oversize loads

- Unpermitted movements of rigs and other oversize loads
- Movement of oversize and/or overweight loads over load-zoned bridges.
- Many trucks and trailers registered in other states.

TxDOT Initiatives to Address Safety Issues

Speed Limits: In May 2012, the Texas Transportation Commission approved a minute order reducing speed limits on approximately 417 miles of highways to improve traffic safety in areas affected by energy-development activities.

Signs and Traffic Signals: In a coordinated effort involving many of its districts, TxDOT has been installing additional warning signs and traffic signals – including many portable units – to improve safety in areas where energy-development activities occur.



Left: Portable dynamic message sign warns motorists. Right: Speed trailer reminds motorists to observe speed limit.

TxDOT Cooperation with Texas Department of Public Safety

In addition to serving on the Energy Sector Task Force, the Texas Department of Public Safety (DPS) has been a strong partner in TxDOT's efforts to address traffic safety and commercial vehicle enforcement issues associated with energy development activities. In some cases, DPS enforcement efforts have raised concerns about the safety of their troopers and the public. For example, if a DPS trooper stops a truck for a violation, there is often no safe place to pull the vehicle over. Similarly, if the truck fails a roadside inspection and must be impounded, in many cases there is no area available to do so.

TxDOT is working closely with the DPS to assist them in locating appropriate areas to safely conduct inspections. For example, the photo below shows a DPS trooper inspecting commercial vehicles in Karnes County on a pad constructed by TxDOT's Corpus Christi district.



DPS trooper inspects trucks on a pad TxDOT constructed in Karnes County.

Recent TxDOT Funding for Energy-Related Safety Projects

On April 26, 2012, the Texas Transportation Commission approved \$40 million for maintenance and safety improvement projects related to the energy industry's activities. The projects were selected to address critical safety needs, including narrow roadways where traffic volumes and crash rates had significantly increased.

Additional Funding to Address Critical Safety Needs: Barnett Shale and Eagle Ford Shale

TxDOT District	Affected Counties	Funds Allocated
Corpus Christi	Bee, Carnes, Live Oak, Jim Wells	\$10,363,415
Dallas	Denton, Ellis	\$2,462,160
Fort Worth	Johnson, Palo Pinto, Parker, Tarrant, Wise	\$9,640,843
Laredo	Dimmit, LaSalle	\$10,357,710
San Antonio	Atascosa	\$2,601,019
Yoakum	Dewitt	\$4,232,000
	TOTAL ALLOCATION	\$39,657,147.00

TxDOT obtained the \$40 million from several federal program categories (i.e., National Highway System, Interstate Maintenance, Surface Transportation Program and Equity Bonus funds). We did so to address immediate and critical safety needs. At this time, the Transportation Commission has no plans for additional allocations, as the department has not established a funding program to specifically address impacts from energy development activities. However, TxDOT continues to consider opportunities to address these needs along with other statewide priorities.

TxDOT districts that received funding to address Critical Safety Needs will begin work on those projects this summer, as contracts are signed and executed to repair and widen some roads and improve intersections on others. Ultimately, both the traveling public and the energy industry will benefit from the projects funded.

TxDOT and Other State Funding Assistance for County Roads

Under state law, TxDOT's primary responsibility is to construct and maintain the state highway system. Although the department is not responsible for city and county roads, it provides millions of dollars of financial assistance for county roads each year. Much of that funding is listed in the table below.

TxDOT Financial Assistance for County Roads 1989 - 2009
(Amounts in millions)

Year	Local Government Assistance Program	Off-System Bridge Program	Expenditures for Transferred County Roads
1989		\$ 22.8	\$ 20.1
1990		\$ 20.0	\$ 22.1
1991		\$ 12.3	\$ 18.5
1992		\$ 18.4	\$ 36.4
1993		\$ 16.2	\$ 13.1
1994		\$ 14.3	\$ 23.1
1995		\$ 23.9	\$ 24.4
1996	\$ 7.0	\$ 19.0	\$ 21.0
1997	\$ 5.0	\$ 20.8	\$ 19.1
1998	\$13.3	\$ 23.5	\$ 37.4
1999	\$13.5	\$ 30.1	\$ 4.5
2000	\$ 9.7	\$ 23.4	\$ 17.5
2001	\$ 8.9	\$ 41.8	\$ 25.0
2002	\$10.2	\$ 28.6	\$ 27.6
2003	\$ 7.6	\$ 32.3	\$ 25.1
2004	\$10.7	\$ 45.6	\$ 22.7
2005	\$ 9.2	\$ 38.1	\$ 35.0
2006	\$ 6.0	\$ 52.0	\$ 3.9
2007	\$ 6.0	\$ 54.1	\$ 6.2
2008	\$ 6.0	\$ 46.4	\$ 24.9
2009	\$6.0	\$ 49.1	\$ 0.7
Total	\$ 119.1	\$ 632.7	\$ 428.3

The General Appropriations Act for fiscal years 1996-1997 established TxDOT's Local Government Assistance Program, which was codified in 1997 as Section 201.706, Transportation Code. Under the program, TxDOT is required to provide a total of at least \$6 million per fiscal year to Texas' counties. TxDOT also administers the federal Bridge Replacement and Rehabilitation Program, which provides funding for off-system bridges.

Other sources of state funding for county roads include Vehicle Registration Fees, the Optional Road and Bridge Fee, 2060 Permit Fees and Lateral Road and Bridge funds.

Public Awareness Campaign

As part of our efforts to improve safety and increase public involvement, TxDOT and other agencies, including the Texas Railroad Commission and the Department of Public Safety, will host “Open Houses” across the state to inform local officials and community residents about safety initiatives and other measures to maintain and preserve transportation infrastructure.

The inaugural open house is scheduled for July 2, 2012 in Cleburne, Texas.

Also, as part of public outreach, TxDOT has launched an interactive website at www.roadstexasenergy.com and will use Facebook, Twitter and podcasts to keep the public up-to-date on Energy Sector Task Force activities.

Industry Donations to Offset TxDOT Costs

TxDOT has statutory authority to accept donations under Texas Transportation Code, §201.206.

Sec. 201.206. DONATIONS AND CONTRIBUTIONS. For the purpose of carrying out its functions and duties, the department may accept, from any source, a donation or contribution in any form, including realty, personalty [sic], money, materials, or services.

Added by Acts 1997, 75th Leg., Ch. 1171, Sec. 1.08, eff. Sept. 1, 1997.

TxDOT is internally reviewing its procedures in an effort to streamline the donation process.

Conclusion

TxDOT appreciates the opportunity to address the Committee on Energy Resources regarding its interim charge on the impact of energy production on the state’s transportation infrastructure. We look forward to working with the committee in the future to address this important issue.

Acknowledgement

Texas Department of Transportation appreciates the research performed and data produced by the Texas Transportation Institute and the Center for Transportation Research.