

Presentation to House Appropriations Subcommittee Committee on Budget Transparency and Reform

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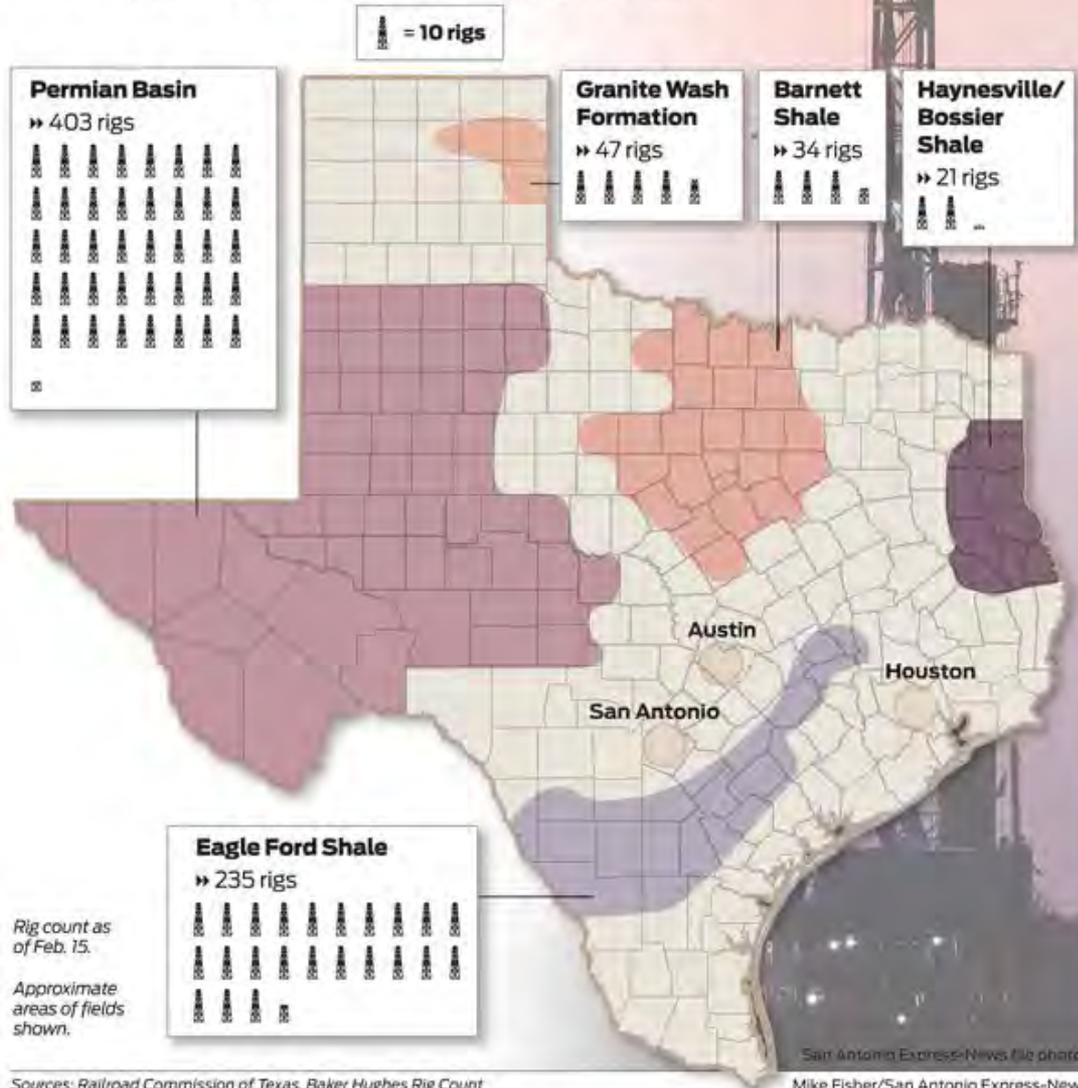
Oil and Gas Development

- Texas recently had 839 drilling rigs operating — nearly half of all rigs in the U.S. and 22.7 percent of rigs worldwide.
- Early estimates for the Cline put the estimated recoverable reserves at 30 billion barrels of oil.
- By comparison, the U.S. Geological Survey estimates the Eagle Ford holds up to 7 billion to 10 billion in recoverable reserves, while the Bakken Shale (North Dakota) could hold as much as 4.3 billion barrels of recoverable oil.



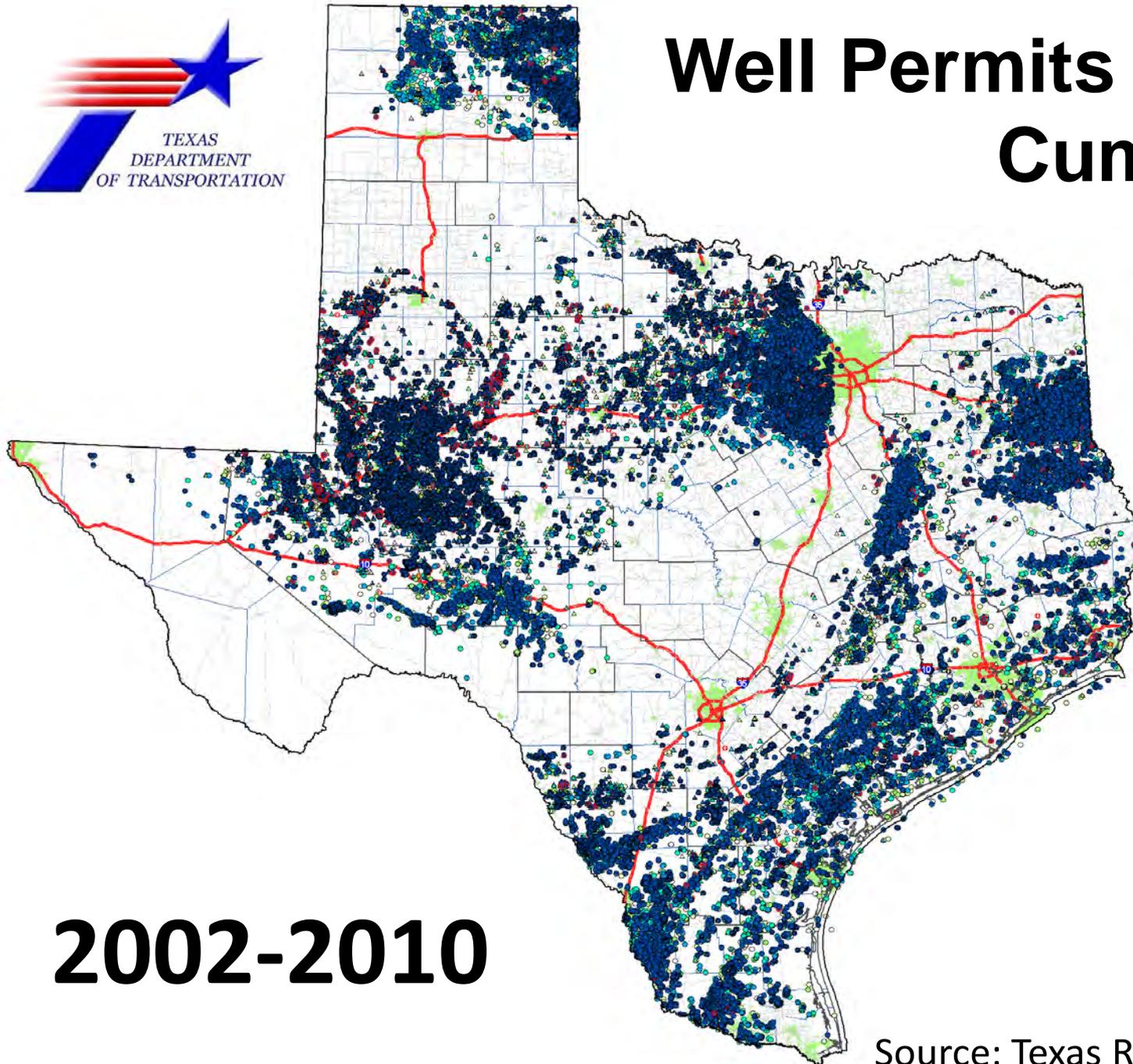
Texas oil and gas fields

Texas has more than one-fifth of the world's drilling rigs operating and five major areas of oil and gas production. The Barnett Shale in North Texas was the first field where horizontal drilling and hydraulic fracturing were used to produce oil and gas from dense shale rock. Since then, drilling and production has ramped up in the Eagle Ford in South Texas, the Haynesville/Bossier Shale in East Texas and the Panhandle's Granite Wash, a tight sandstone. The Permian Basin, a historically prolific area for oil and gas production, has re-emerged as a complex field with drilling in multiple geologic horizons.





Well Permits by Year Cumulative



2002-2010

Source: Texas Railroad Commission



Wind Development

- Texas has 12,000 MW of wind generation, more than double any other state.
- More than +1,500 MW of capacity in wind installations just in 2012.
- Most wind farms are located in areas overlapping oil and gas development.

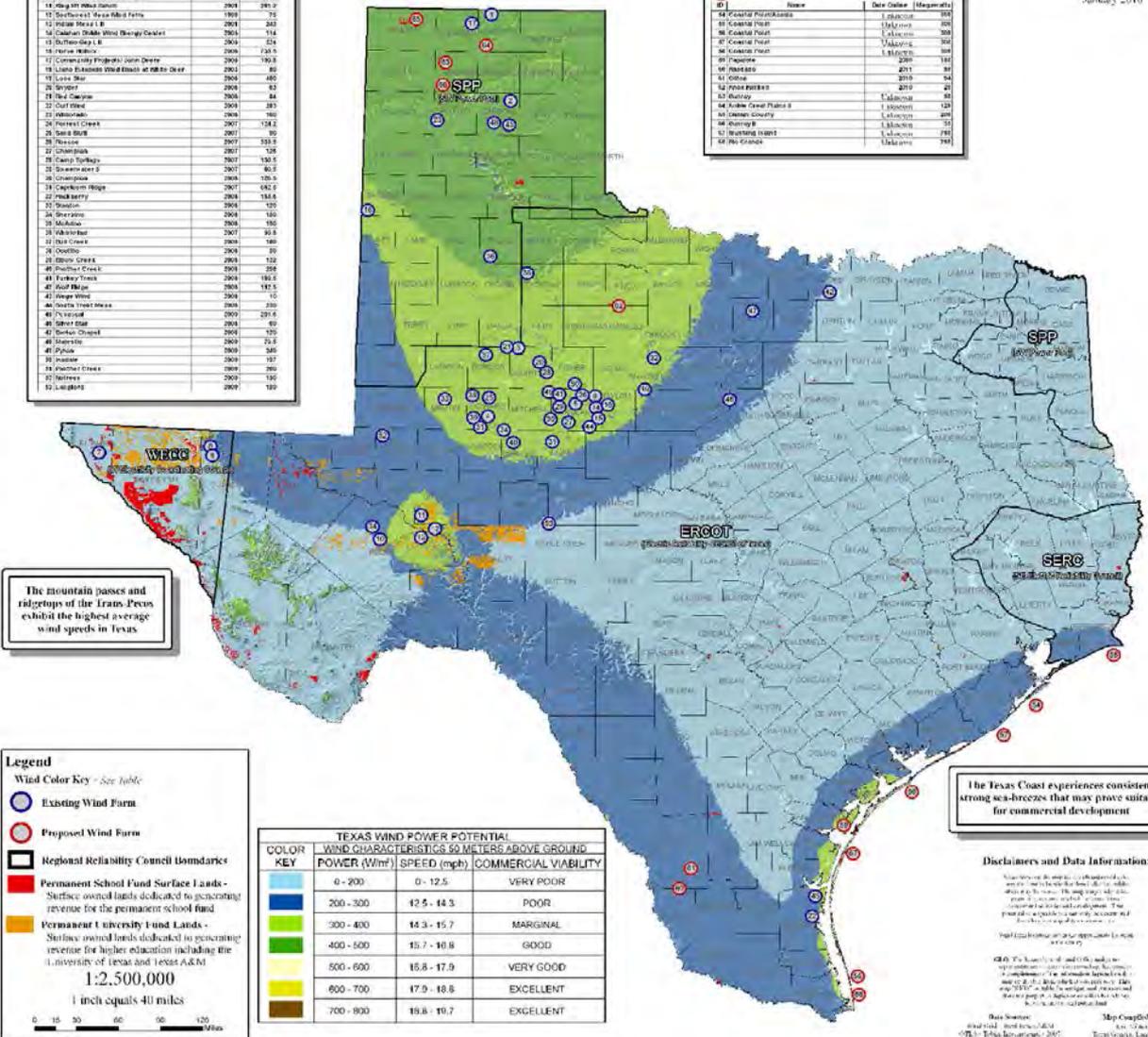


Jerry Patterson, Commissioner
Texas General Land Office
January 2010

Texas Wind Farms

Existing Wind Farms			
ID	Name	Date Online	(Megawatts)
1	Great Plains Windpower	2003	3
2	Golden State	2003	60
3	Green Mt Wind Farm at Brazos	2003	100
4	King Shogun	2003	24.5
5	Showermaker	2003	300.2
6	Franklin	2003	100
7	Rockwell Wind Ranch	2003	8.28
8	Green Mountain Project	2004	33.8
9	Cherokee Mountain Wind Farm	2004	20.5
10	Woodward Hill Wind Ranch I & II	2004	103.2
11	Wing Hill Wind Farm	2004	281.7
12	Northwind Texas Wind Farm	2004	75.5
13	Indian Mesa I & II	2004	243
14	California State Wind Energy Center	2004	114
15	Northridge I & II	2004	214
16	Yuma Valley	2004	140.5
17	Commodity Projects Joint Owner	2004	190.8
18	Chico Executive Wind Ranch at NRE Dev	2004	60
19	Loche Star	2004	480
20	Wagner	2004	43.2
21	Wind Canyon	2004	84
22	Chadwell	2004	280
23	Delaware	2004	160
24	Palmer Creek	2007	124.2
25	Wine Hill	2007	60
26	Parsons	2007	335.8
27	Chalchak	2007	120
28	Cherry Forks	2007	130.5
29	Bowman II	2007	80.3
30	Compton	2008	120.5
31	Caperton Ridge	2007	142.2
32	Rockberry	2008	154.6
33	Shannon	2008	120
34	Sherrill	2008	100
35	McIntosh	2008	100
36	Walden	2007	90.8
37	Wind Creek	2008	180
38	Overton	2008	30
39	Edroy Creek	2008	120
40	Whitlock Creek	2008	280
41	Furber Tract	2008	180.8
42	Loop Ridge	2008	187.5
43	Winger Wind	2008	30
44	South West Mesa	2008	200
45	WV Forest	2007	200.5
46	Spur Hill	2008	60
47	Timber Channel	2008	420
48	Lawville	2008	24.8
49	Phlox	2008	340
50	Wagner	2007	197
51	Palmer Creek	2008	260
52	Palmer	2008	130
53	Langston	2007	100

Proposed Wind Farms			
ID	Name	Date Online	(Megawatts)
54	Central Mountains	2008	200
55	Central Point	2008	200
56	Central Point	2008	200
57	Central Point	2008	200
58	Central Point	2008	200
59	Palmer	2008	100
60	Palmer	2008	100
61	Palmer	2008	100
62	Palmer	2008	100
63	Palmer	2008	100
64	Palmer	2008	100
65	Palmer	2008	100
66	Palmer	2008	100
67	Palmer	2008	100
68	Palmer	2008	100
69	Palmer	2008	100
70	Palmer	2008	100
71	Palmer	2008	100
72	Palmer	2008	100
73	Palmer	2008	100
74	Palmer	2008	100
75	Palmer	2008	100
76	Palmer	2008	100
77	Palmer	2008	100
78	Palmer	2008	100
79	Palmer	2008	100
80	Palmer	2008	100



The mountain passes and ridgtops of the Trans Pecos exhibit the highest average wind speeds in Texas

The Texas Coast experiences consistent, strong sea-breezes that may prove suitable for commercial development

Legend

Wind Color Key - See table

- Existing Wind Farm
- Proposed Wind Farm
- Regional Reliability Council Boundaries
- Permanent School Fund Surface Lands - Surface owned lands dedicated to generating revenue for the permanent school fund
- Permanent University Fund Lands - Surface owned lands dedicated to generating revenue for higher education including the University of Texas and Texas A&M

1:2,500,000
1 inch equals 40 miles

TEXAS WIND POWER POTENTIAL: WIND CHARACTERISTICS 50 METERS ABOVE GROUND			
COLOR KEY	POWER (W/m ²)	SPEED (mph)	COMMERCIAL VIABILITY
Light Blue	0 - 200	0 - 12.5	VERY POOR
Blue	200 - 300	12.5 - 14.3	POOR
Light Green	300 - 400	14.3 - 15.7	MARGINAL
Green	400 - 500	15.7 - 16.8	GOOD
Yellow-Green	500 - 600	16.8 - 17.9	VERY GOOD
Yellow	600 - 700	17.9 - 18.8	EXCELLENT
Brown	700 - 800	18.8 - 19.7	EXCELLENT

Disclaimers and Data Information:

This map is an approximation of wind power potential based on historical data and is not a guarantee of wind power availability. The map is intended for informational purposes only and should not be used for commercial development without further study.

Map Created by: Jerry Patterson, Commissioner
Texas General Land Office
January 2010

1940 – 1950 era tractor trailer.....



FM roads were designed for this vehicle.....

2010 era tractor trailer.....



FM roads now must carry these vehicles....



Increased Traffic - Safety Concerns





Traffic Impacts





Loaded Trucks Per Gas Well

- 1,184 loaded trucks to bring one gas well into Production, plus
- 353 loaded trucks per year to maintain, plus
- 997 loaded trucks every 5 Years to re-frac the well

This is equivalent to roughly 8 Million cars plus an additional 2 Million cars per year to maintain

Pavement Consumption Analysis

- The empirical Load Equivalency Factor (LEF)
- $LEF = \left(\frac{Axle\ Load}{18,000} \right)^{4.2}$
- A 90,000 lbs. truck (12.5% increase in weight) equates to a minimum of 156% in pavement loading



Impacts to the System

Research has determined that the service life on IH, US, SH, and FM highways is reduced:

- Due to truck traffic associated with natural gas well operations alone between:
 - 1% and 16% for rig movements
 - 1% and 34% for the saltwater disposal traffic
 - 4% and 53% for construction traffic
 - Overall Impact (Average) 30%



Impacts to the System (Continued...)

- Due to truck traffic associated with crude oil well operations alone between:
 - 1% and 3% for construction traffic
 - 2% and 16% for the production traffic
 - Overall impact (Average) 16%



Estimated Annual Impacts

- Original Estimate for FM System: \$890 million
 - Additional 20% for heavier trucks
 - Additional 15% for higher road material prices
 - Very conservative: well over \$1 billion annually
- Extrapolating to local roads
 - Similar number of lane miles
 - Lower original design requirements
 - Estimated impacts well over \$1 billion annually



Case Study

- Dimmit County
 - FM 2688 (12.61 Miles)
 - FM 1916 (3.01 Miles)
- Reactive vs. Proactive
 - Reactive: roads are fixed or maintained after damage has occurred.
 - Proactive: maintains roads before damage is done to preserve the quality of the road.



FM 2688 : Reactive vs. Proactive in 20 Years

<u>Scenarios</u>	<u>Reactive Cost</u>	<u>Proactive Cost</u>
0 more	\$13,756,000	\$2,004,536
1 more	\$19,271,448	\$2,004,536
5 more	\$23,303,952	\$4,654,149
10 more	\$27,452,880	\$5,723,553

Note: Scenarios refer to the additional numbers of well permits assumed



FM 1916 : Reactive vs. Proactive in 20 Years

<u>Scenarios</u>	<u>Reactive Cost</u>	<u>Proactive Cost</u>
0 more	\$1,750,545	\$492,778
1 more	\$1,750,545	\$492,778
5 more	\$1,750,545	\$1,110,943
10 more	\$1,750,545	\$1,366,209

Note: Scenarios refer to the additional numbers of well permits assumed



Impact on Infrastructure



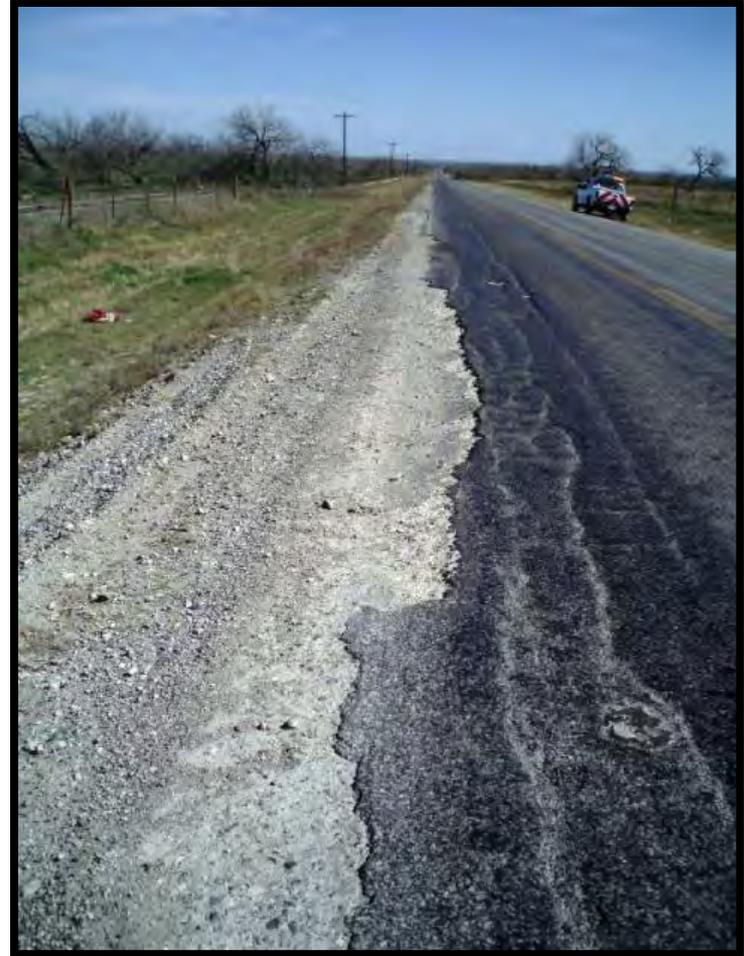


Roadway Damage





Roadway Damage





Roadway Damage





Bridge Impacts/Restrictions





ROW Issues



Safety/Environmental Concerns





2012 Crash Data

Barnett Shale (25 Counties):

On-System Fatal Crashes = 15%

On-System Total Crashes = 19%

Eagle Ford Shale (23 Counties):

On-System Fatal Crashes = 8%

On-System Total Crashes = 5%

Granite Wash (6 Counties):

On-System Fatal Crashes = 1%

On-System Total Crashes = .3%

Haynesville/Bossier Shale (10 Counties):

On-System Fatal Crashes = 4%

On-System Total Crashes = 3%

Permian Basin (58 Counties):

On-System Fatal Crashes = 10%

On-System Total Crashes = 6%

Leading causes of crashes according to law enforcement were failure to control speed and driver inattention.



BE SAFE. DRIVE SMART

- TxDOT is partnering with oil and gas companies, the Texas Department of Public Safety and communities across in the energy sectors to promote roadway safety.
- The campaign will include safety messages on TV, radio, billboards and gas pumps in the area.
- The new *Be Safe. Drive Smart.* campaign urges all drivers to take the following basic safety precautions: buckle up; drive a safe speed; pass carefully; always stop at red lights and stop signs; and avoid using cell phones while driving.