ENERGY-SECTOR BRIEF

Maintenance Division, Pavement Asset Management

14-1: TxDOT/TTI Joint Effort to Address Roadway Damage Resulting from Energy Development

While the energy sector is having a dramatic positive impact on the Texas and U.S. economies, a downside is apparent. Our transportation system has experienced accelerated pavement degradation, increases in fatality rates, increases in congestion, and increases in hazardous materials hauling.

The Texas Department of Transportation (TxDOT) has joined efforts with the Texas A&M Transportation Institute (TTI) to support the districts and supply decision-making information. The efforts of this group, along with other pertinent information, are documented on the TxDOT Maintenance Division (MNT) SharePoint site at: https://txdot.sharepoint.com/sites/division-mnt/SitePages/Home.aspx.

Background

The rapid development of the state's oil and gas resources has required and continues to require large volumes of relatively heavily loaded trucks per well developed. About 900 oil/gas drilling rigs (about half of all rigs in the U.S.) operate in the state of Texas. Estimates of truck traffic for well development and early production range from 1,000 to 4,000 loaded trucks per well. The truck traffic generated from these operations is significant and has impacted TxDOT's roadway network.

One of the major issues facing TxDOT maintenance forces is the repair of this road network. The maintenance and repair of this roadway system has required an ever increasing amount of TxDOT's financial resources and available workforce. Repair costs for state and local government roadways have been estimated at $2 billion per year. If financial resources are not available to repair the roadways, the cost to the energy development industry due to rough roads (equipment damage and lower operating speeds) is expected to be in the $1.5 to 3.5 billion range annually.

Maintenance costs on FM roads impacted by oil/gas development and production traffic have increased in some areas of the state from about $500 to $1,500 per mile prior to impacts to $35,000 to $45,000 after development started. It is forecasted that approximately $500,000 million will be expended on oil/gas impacted roadways in each of the next three years.

The Challenge

From 12,000 to 24,000 oil and gas wells were permitted each year in Texas during the last decade. The development of the state's oil and gas reserves has provided a significant economic impact to the state and nation and is expected to continue at the same rate for over a decade into the future.

Recent studies estimate the economic impact on 10 counties in West Texas (Permian Basin) at nearly $14.5 billion for the year 2012. The industry supported 21,450 full time jobs, paid $1 billion in wages and salaries, and generated almost $472 million in state revenues and $447 million in local government revenue.

The South Texas (Eagle Ford Shale) impact on 14 counties is estimated at $61 billion and created 89,000 jobs. The economic impact of the oil industry is not only associated with the counties identified in these studies but exists into most other areas of the state. It is imperative that the state continue to support the development of this very important sector of the Texas economy.

While the energy sector is having a dramatic positive impact on the Texas and U.S. economies, a downside is apparent. Our transportation system has experienced accelerated pavement degradation, increases in fatality rates, increases in congestion, and increases in hazardous materials hauling. Concerns with air quality, water quality, and social issues including housing, schools, water supplies, and law enforcement exist. The work effort described in this brief is only associated with roadway maintenance and rehabilitation.

TxDOT-TTI Joint Effort

TxDOT and TTI initiated an Interagency Contract (IAC) to address pavement deterioration issues associated with the development of oil and gas reserves in Texas. This IAC is due to conclude August 2016, depending on funding allocated. An overview of this joint effort is provided below. The purpose of this joint effort is to provide support to the districts and to supply management information to TxDOT Administration (Figure 1).

The TxDOT Maintenance Division (Pavement Asset Management) and an interdisciplinary research team at TTI have collaborated to work on this joint effort. This group will be expected to accomplish the following:

1. Record and summarize field experiences.
2. Investigate and analyze information.
3. Stimulate interaction within and between districts.
4. Provide district support.
5. Document.

Examples of documents and work available are discussed below.

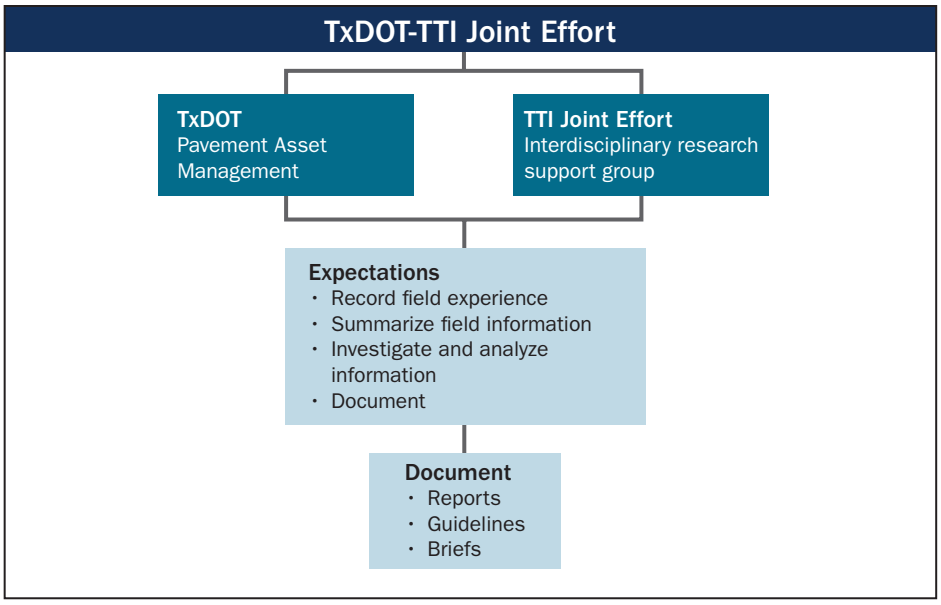

Figure 1. TxDOT-TTI Joint Effort

TTI/TxDOT Interagency Contract

District visits and workshops have been used to define district practices associated with oil/gas development and production (Tasks 1.0 and 6.0). An approach to define traffic volumes and loads has been defined and partially executed (Task 2.0). As part of this effort, the oil/gas industry drillers, completion companies, and operating companies have been interviewed, GIS maps have been prepared to describe the location of drilling and production operations, and the literature has been reviewed.

Analyses have been performed to define shoulder width and structural section requirements (Task 3.0). Support to districts for specific projects has been provided on several projects (Task 4.0). Studies to define the performance of repaired roadways has been initiated (Task 5.0). Efforts will be made to project traffic and damage of roadways as a function of future drilling activity (Task 7.0).

Documents

Three types of documents have been prepared to provide information to the districts and to describe the research and information gathering efforts (Tasks 3.0 and 6.0). **Reports** provide detailed information associated with the information gathering and research efforts. **Guidelines** have been prepared that summarizes the information gathered and work performed into a format that can be conveniently used by the districts at the project level. **Briefs** have been prepared to provide a quick read document that provides useful information that can be used on a rotating basis by the operational group(s) in the district. Examples of these three types of documents follow.

TTI/TxDOT Interagency Contract

Task 1: Identify and summarize current maintenance and rehabilitation practices.

Task 2: Characterize traffic associated with energy sector regions.

- More accurately assess volume, classification, and load.
- Attempt traffic predictions in energy sector regions.

Task 3: Develop a framework for identifying economical maintenance and rehabilitation decisions.

Task 4: Specific project support.

- Evaluate roadways of interest to validate design, construction, and maintenance decisions.
- Assist districts with evaluations and designs for energy sector roadways.

Task 5: Assess the performance of rehabilitation and maintenance decisions.

Task 6: Conduct additional information exchange workshops.

Task 7: Identify areas of future impact.

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