Project Summary

Texas Department of Transportation

0-6095: Longer Combination Vehicles & Road Trains for Texas?

Background

Texas faces a highway funding shortfall and increasing freight demand, which translates to fewer miles of new highway and higher levels of congestion. One solution is to move the additional freight on more productive trucks on key routes on the current highway system. More productive trucks, like Longer Combination Vehicles (LCVs), require changes to current truck size and weight legislation. Federal law does not allow an increase in truck size and weight beyond 80,000 lb GVW, except for under a 1982 grandfather clause in some western states. However, that has not stopped several states from recently gaining permission to operate higher weight trucks under a carefully monitored system. Previous U.S. LCV proposals were negated by concerns over safety, infrastructure impacts, and modal competition from different interest groups. This study examines the case for LCV use in Texas and focuses on key routes, safety issues, pavement impacts, bridge impacts, and industry feedback.

What the Researchers Did

Future Texas freight demands serving metropolitan regions ensure that key corridors will play an important role. El Paso to Dallas, Dallas to San Antonio, San Antonio to Laredo, Dallas to Houston, and San Antonio to McAllen routes were chosen as short-haul (not competing with rail) key routes after discussions with Texas shippers. They also helped select which LCVs would be safe and appropriate for Texas. The first vehicle chosen was a 97K tridem. Next, the standard 53' trailer was used for a Double 53' at a maxed-out weight of 138K. The study also incorporated a Double 53' that would cube out under a 90K limit.

What They Found

Truck safety is, as noted, a highly sensitive issue. However, the 2008 FHWA safety data identified only 117 LCV fatal accidents from 4,066 fatal truck crashes. Heavy truck data from 2009 shows a 20% decrease in fatalities, 20% decrease in crashes, and 21% decrease in crashes—numbers that have never been reached since FMCSA began collecting data. While the economic downturn contributed to this decline, clearly other factors are at work like enforcement, outreach programs, and reductions in truck speeds. While truck accidents remain relatively rare events, data shows LCVs to be safer than standard heavy trucks.

Research Performed by:

Center for Transportation Research (CTR), The University of Texas at Austin

The University of Texas at San Antonio (UTSA)

Research Supervisor:
C. Michael Walton, CTR

Researchers:
Robert Harrison, CTR
Kara Kockelman, CTR
Lisa Loftus-Otway, CTR
Jolanda Prozzi, CTR
Zhanmin Zhang, CTR
Jose Weissman, UTSA

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Pavement analysis was performed to estimate potential LCV impacts on the chosen routes. For rigid pavements, the LCV scenario had no impact on pavement life. For flexible pavements, it improved the pavement life for all but one route. The estimated pavement lives were used in calculating the annualized cost of a thick hot-mix overlay at the end of each cycle. Given the wide variation in overlay costs, a range of $400,000-$1,219,000 per lane-mile was used to calculate the annualized costs. Results showed that between $17.4 million and $53.07 million per year could be saved on overlay cost if LCVs were allowed on the selected Texas routes.

On the route network, 1,713 bridges were analyzed using moment ratios. Research has shown that bridges built post-1980 can support 20% overstress, while older bridges can support 10% overstress. The 90K Double 53' configuration showed no impact on the bridges for both overstress ratios. Using a 10-20% overstress, allowing the 97K Tridem would result in an estimated repair cost of $1.14-$2.8 billion; allowing the 138K Double 53' would result in an estimated repair cost of $1-$1.2 billion. The estimated cost of $190/sq ft of deck area was determined during a recent 2030 Committee TxDOT study.

Not all bridges would be replaced immediately depending on the overstress level. To incorporate this concept in the analysis, a new fatigue approach was developed during project development with the assumption of a 75-year fatigue design life for a bridge. Results for this analysis approach amount to $1.0 billion and $0.8 billion for the 97K Tridem and 138K Double 53' respectively, with no impacts for the 90K Double 53' configuration.

What This Means

A carefully monitored Texas pilot study is recommended with the analyzed vehicle types on the chosen routes for the next step in this research. This would include the following:

- Determine precise routes for origins and destinations.
- Conduct detailed bridge and pavement inspections on these routes.
- Determine adequacy of the geometric characteristics of the routes.
- Specify Performance-Based Standards.
- Collect empirical data on operations of the trucks.

Along with the actual operational statistics, cost information could be gathered through the pilot test to determine the marginal cost created by LCV operations – a major demand from modal competitors. This would allow the merging of data on LCV operations with TxDOT maintenance costs to determine the most feasible, safest and efficient way to permit LCVs in Texas.

For More Information:
Research Engineer - Duncan Stewart, TxDOT, 512-416-4730
Project Director - Duncan Stewart, TxDOT, 512-416-4730
Research Supervisor - C. Michael Walton, CTR, 512-471-1414

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Texas Department of Transportation
Research and Technology Implementation Office
P.O. Box 5080
Austin, Texas 78763-5080
512-416-4730