

PROJECT SUMMARY REPORT

0-7195: Quantify Bridge and Pavement Consumption Due to Permitted Overweight Vehicles

Background

Recent studies on OS/OW permits identified revenue shortages to cover bridge and pavement maintenance and rehabilitation costs and other shortcomings that needed to be addressed, including: lack of a methodology for periodically adjusting permit fees to account for changes in traffic patterns and higher inflation rates; lack of accurate data and process for calculating annual vehicles-miles-travelled; uncertainty in the identification of routes and number of trips for monthly, quarterly, or annual permits; and the absence of a method to assess off-system bridges and highways. The objective of this project was to develop, recommend, and provide a step-by-step method to periodically update the permit fee structure while addressing the aforementioned shortcomings.

What the Researchers Did

This study evaluated data provided by the Texas Department of Motor Vehicles (TxDMV) contained in the Texas Permitting Routing and Optimization System (TxPROS). This database includes a total of 2,122,616 OW permits spanning the 2018-2023 calendar years. More than one thousand distinct axle configurations were identified.

The next step was the development of a methodology to estimate annual VMT for each permit type. A comprehensive analysis by industry type was conducted for all permits, which helped establish consistency with other state- and federal-level freight movement reports.

Pavement and bridge consumption methodologies were then developed using the concept of equivalent structural consumption, whereby the effect of OW vehicles was estimated by benchmarking against a reference vehicle. Pavement consumption was quantified in terms of equivalent single axle loads (ESALs), while bridge consumption was evaluated using the inventory vehicle.

The final step was to estimate the total revenue associated with OW permits, along with other

funding sources available to the Texas Department of Transportation (TxDOT) to address the impacts of this fleet, and to compare these revenues with the estimated pavement and bridge consumption costs, proposing a permit fee adjustment.

What They Found

The pavement consumption analysis found that rigid pavements exhibit lower sensitivity to increases in axle load. In contrast, flexible pavements exhibited higher and more variable deterioration rates across failure criteria and axle configurations, reflecting their greater sensitivity to load-induced damage.

For the bridge analyses, the results identified the need for improving cross-correlation between the bridge and road alignment data. The results were segregated by highway functional class, to capture the effect of the bridge spacing per mile on the average bridge consumption costs per mile, yielding costs up to ten times higher for Interstate Highways as compared to Farm-to-Market roads.

During the permit fee analysis, particular concerns arose for permit types that allocate a portion of collected

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revenue to counties, such as Ready-Mix Concrete Truck (RMCT) and Timber permits. The revenue is distributed equally among all counties selected by the carrier at the time of issuance, regardless of the actual mileage traveled within each jurisdiction. Thus, selecting a larger number of counties minimize the revenue received by each county. Similarly, the Over-Axle 1547 permit has incremental fees based on the number of counties selected; however, the associated revenue is deposited into the state’s General Revenue Fund rather than being distributed directly to counties, creating a potential disconnect between infrastructure use and revenue allocation.

Additional challenges arose from unrouted permits. While routed permits restrict travel to designated routes and typically prohibit off-system travel, RMCT and Timber permits are actually allowed to unrestricted movement within selected counties. Furthermore, the absence of reported mileage for unrouted permits introduces significant uncertainty in VMT estimates.

What This Means

The study on the impact of permitted OW vehicles to the bridges and pavements of Texas demonstrated that current funding mechanisms are insufficient to offset the maintenance and rehabilitation costs. The proposed cost-recovery rate per mile provides a pathway toward a more equitable allocation of roadway costs. Nevertheless, the following shortcomings should be addressed immediately through additional studies:

- **Lack of vehicle configuration data for unrouted permits.** Annual and quarterly permits are not required to be routed and therefore do not need to provide truck configuration information during the permit-issuing process. The absence of such data prevents accurate evaluation of bridge and pavement consumption rates.

- **Challenges in implementing mileage-based fees.** The mileage-based scenario depends on accurate vehicle-miles-traveled (VMT) data. In practice, collecting such data is not trivial, especially for unrouted permits. As a result, implementation would likely require reliance on estimation rather than precise tracking.

- **System-level mismatch in cost and revenue allocation.** Although this study estimated consumption costs on both on-system and off-system roadways, the proposed permit fee adjustments are based on total permit revenues collected. As such, it do not guarantee alignment between where costs are incurred (state-maintained versus local networks) and where revenues are ultimately allocated.

For More Information

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