



## RESEARCH SERVICES

OFFICE OF POLICY ANALYSIS,  
RESEARCH & INNOVATION

## TECHNICAL SUMMARY

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### PROJECT COST:

\$179,752



Most U.S. commercial freight is transported by heavy trucks, which because of their weight have a greater effect on transportation infrastructure than passenger vehicles and light trucks.

# Determining Equitable Vehicle Taxes and Fees Based on Costs to Highway Infrastructure

## What Was the Need?

MnDOT periodically carries out a highway cost allocation (HCA) study to estimate the relative contribution of different classes of vehicles to the costs of building and maintaining the state's highway system. An HCA study also estimates revenues generated by each vehicle class from state fuel and excise taxes and from overweight permit fees. Although fuel taxes and permit fees are determined by the state Legislature, calculation of the cost-to-revenue ratio helps inform MnDOT if changes to current policy could be justified.

MnDOT had not conducted an HCA study in 20 years, and a 2006 truck size and weight study commissioned by MnDOT suggested a need to develop a closer link between overweight permit fees and actual highway maintenance and construction costs. Research was needed to evaluate the pros and cons of different HCA methods and to develop a methodology best suited for conditions in Minnesota.

## What Was Our Goal?

The objective of this project was to evaluate HCA methodologies, use this evaluation to customize the Federal Highway Administration's (FHWA's) HCA tool for Minnesota purposes and perform HCA studies using both the FHWA tool and the Minnesota-centric tools. Researchers also evaluated the best tax structures for equitably collecting revenue and a method for optimizing the pricing of heavy vehicle special permits.

## What Did We Do?

Researchers began by conducting an HCA study using MnDOT data collected between July 2003 and June 2007, determining the costs and revenues attributed to various classes of vehicles. This study was conducted using a generalized HCA study tool created by the FHWA and took into account costs associated with repairing or replacing asphalt and concrete pavements, bridges, grading and drainage structures as well as other types of construction and maintenance.

Researchers also evaluated several taxing methodologies for their equity and efficiency. Equity is concerned with the distribution of benefits and costs to individuals based either on their road usage or on their socioeconomic status. Efficiency is concerned with determining the right pricing mechanisms for special freight permits based on industry demand.

Using the results of this evaluation, researchers developed the Minnesota Highway Cost Allocation Tool, a version of the FHWA's HCA tool that is customized to be consistent with Minnesota's tax structure and data formats. Researchers also developed and tested an auction-based permit system by which a state transportation agency such as MnDOT could learn the demand for special permits and freight companies' willingness to pay for them.

*By conducting highway cost allocation (HCA) studies and improving HCA methodologies, MnDOT helps ensure that vehicle owners of all classes are being fairly assessed through taxes and permit fees for their relative contribution to the costs of state highway construction and maintenance.*

*“This project is one step in an ongoing effort by MnDOT to determine the best way to pay for the future maintenance and construction of Minnesota’s highways.”*

—John Tompkins,  
Freight Project Manager,  
Research and MFAC  
Coordinator, MnDOT  
Office of Freight and  
Commercial Vehicle  
Operations

*“This study allowed MnDOT to identify the pros and cons of different HCA methods, forming the framework for further refining MnDOT’s methodology in a second phase of this project.”*

—Dan Warzala,  
Research Project  
Coordinator, MnDOT  
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HPMS Class	FHWA Class	Description	VMT (10 <sup>6</sup> )
AUTO	2	Automobiles	35620
LT4	3	Light trucks with 2 axles and 4 tires	17277
SU2	5	Single unit, 2-axle 6 tires trucks	1278
SU3	6	Single unit, 3-axle trucks	397
SU4	7	Single unit, 4-or-more-axle trucks	120
CB34	8	Tractor-semitrailer / truck-trailer combinations with 3 or 4 axles	215
CB5	9	Tractor-semitrailer / truck-trailer combinations with 5 axles	1888
CB6	10	Tractor-semitrailer / truck-trailer combinations with 6 or more axles	382
DS5	11	Tractor-double semitrailer combinations with 5 axles	33
DS6	12	Tractor-double semitrailer combinations with 6 axles	7
DS7+	13	Tractor-double semitrailer combinations with 7 or more axles	10
BUS	4	Buses (all types)	155

Minnesota has 12 vehicle classes (not including motorcycles), defined generally by the vehicle’s size, number of axles and number of tires. In this study, class CB5—the most commonly used type of heavy truck—had the worst revenue-to-cost ratio, responsible for 17.48 percent of costs but only 12.17 percent of revenue.

### What Did We Learn?

Using the FHWA’s HCA tool, researchers found that heavy vehicle users are contributing a smaller share of highway revenues than their impact on highway costs would require. Passenger cars and light trucks contribute 81 percent of revenue but are responsible for only 63 percent of MnDOT highway construction and maintenance expenditures. By comparison, one class of heavy trucks contributed only 8 percent of revenue but was responsible for 21 percent of expenditures. The final report includes a calculation of the revenue-to-cost ratio for each vehicle class.

The evaluation of various tax scenarios showed that increasing overweight fees or diesel taxes on vehicles greater than 16,000 pounds by 25 percent had only a small impact on equity for highway users. However, assessing weight-distance fees on vehicles weighing more than 57,000 pounds could significantly improve tax equity. Weight-distance fees charge commercial vehicles a per-mile rate based on their travel distance, registration weight and axle configuration.

The Minnesota-centric HCA tool developed by researchers improves on the FHWA tool’s outdated default parameters and inability to allocate external costs. Researchers recalculated revenue-to-cost ratios for each vehicle class using the Minnesota-centric tool and included a chart comparing these ratios to those calculated using the FHWA tool. These ratios are not equitable between vehicle classes because taxes are not currently collected based on actual road usage, while costs are heavily affected by vehicle miles traveled.

Tests of an auction-based system for the sale of special permits for heavy vehicles showed that a recommended mechanism is easy to implement and would allow MnDOT to learn how much road users would be willing to pay for such permits, resulting in more revenue.

### What’s Next?

A second phase of this project will continue to develop HCA methods and apply them to MnDOT data. MnDOT is planning to schedule information sessions with users to get feedback about project recommendations, including the use of weight-distance fees and the auction-based system for special permit sales.

*This Technical Summary pertains to Report 2012-14, “Highway Cost Allocation and Determination of Heavy Freight Truck Permit Fees,” published July 2012. The full report can be accessed at <http://www.lrrb.org/PDF/201214.pdf>.*