Aligning Oversize/Overweight Fees with Agency Costs: Critical Issues

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16. Abstract

This project provides an elementary analysis of issues and a proposed framework for the state to evaluate cost recovery options due to OSOW operations. The authors provide a review of current permitting practices, provide a sampling of fee structures, and outline preliminary trends for OSOW demand in the foreseeable future. The basis for the project is the Midwest States, but the findings incorporate national trends and data as appropriate.

The research team surveyed state DOTs for information on permit fee structures and the respective distribution and allocation of permit revenue. The research team did not attempt to determine roadway, infrastructure, and other impacts of OSOW loads, but rather document studies that attempt to monetize these values and provide observations. A methodology is proposed to generate said costs, but the validation of such methodology was outside the scope of this study. Finally the project report details other considerations, including truck-to-rail diversion potential if permit fees are increased. A series of best practices is provided to help guide the operations of a permitting process.

The research team concludes that permit fees likely cannot recover the costs of issuance, however, in many agencies the permit fee is not designed to be a cost recovery mechanism. This is magnified in the multitrip permitting processes available in most states. The authors do not make a specific recommendation for agencies with respect to permit fee determination. The research team does recommend additional and site specific research to determine the impact and associated cost of pavement damage due to single trip, oversize and overweight movements.

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Executive Summary

As transportation costs rise due to congestion and energy prices, businesses are more aware of the impacts these have on their bottom lines. Many state DOTs report freight prioritization as an agency goal. Trucking is the preferred (and sometimes the only) mode to transport oversized and overweight (OSOW) loads. The OSOW industry is the largest it has ever been when measured by quantities of permits issued. There is a large degree of variation for permits by state including permit issuance, permit fees, agency costs, and infrastructure impacts. This study uses surveys and other research to consider the variations throughout the country and Mid-American Association of State Transportation Officials (MAASTO) region in particular.

Specific industries often drive permitting trends, especially those with favorable legislative provisions. Agriculture and other natural resources make up significant shares of the economy in the Midwest. The energy industry has grown considerably in recent years, particularly renewables like wind and hydraulic fracturing and frac sand mining.

DOTs must balance encouraging commerce and protecting infrastructure. Carrier fees, the amount charge to an individual business to obtain an OSOW permit, and agency costs, the amount incurred by the state government to fulfill and carry out a permit request, are indicative of that balance, or at minimum, its perception. Carrier fees and agency costs were estimated for six typical scenarios for the ten MAASTO states. Fee and cost variations were large across states and scenarios. The largest discrepancies (positive and negative) were in the more complicated scenarios. States with situationally triggered fees (bridge review, movement feasibility fee) covered the agency costs for larger and less frequent loads traveling long distances.

Recommendations for OSOW industry and its regulation include taking initial steps to improve the fee structure across states, recognizing and adapting to trends, and contributing to overall harmonization and uniformity. These changes will positively impact the carriers by reducing the regulatory burden and time required to obtain permits.

Introduction

Background

Increased demand for freight transportation efficiency has dramatically escalated over the past several years. This is due in large part to fluctuating energy costs—#2 Diesel rose from $1 to more than $4 per gallon from 1998 to 2012—and steadily rising consumption by consumers—trucks hauled more than $9 Trillion worth of merchandise in 2007 alone (SC&RA, 2011).

While trucks have traditionally been the most flexible shipping option for freight in the United States, it has also become an appealing option for transporting over-dimensional and overweight loads on state and federal highways. In several states, for the period of 2000-2010, 30 to 50 percent more permits were issued for overweight loads as the decade prior. Most states did experience small declines in permit issuance following the 2008 economic downturn. Even still, over 4.8 million permits were issued for oversize and overweight movements by the states in 2010 (FHWA, 2011). This was 300,000 more permits than issued in 2009 and met pre-recession levels.

Whether it is for non-divisible loads such as wind energy equipment, or traditionally defined divisible loads such as agricultural goods or forest products, oversize and/or overweight loads present an array of impacts on the transportation agency ranging from operational costs (staff labor for permit processing, engineering reviews, trip routing, etc.) to infrastructure and safety concerns (long-term pavement damage, bridge capacity, etc.). These costs and concerns are generally not captured fully by existing permit fees or policies. In fact, in nearly all cases, permit fees and costs associated with processing applications for oversize, over-dimensional, or overweight payloads are not at all related to the actual loaded costs of providing such services.

The federal government regulates commercial motor vehicle weights and dimensions on the Interstate and other national highways that carry the majority of truck travel. These regulations directly affect a number of policy areas including safety, economic productivity, environmental enhancement, energy conservation, and infrastructure preservation. Because truck size and weight limits affect so many different policy areas, they often are quite controversial. To accommodate business and economic development goals, many states have made limited exceptions to size and weight limitations. Many of these exceptions are based on commodities or seasonal (harvest) criteria. In the past several years, states like Wisconsin have attempted to harmonize size and weight regulations only to end up with additional exemptions and complexities as a result of legislative processes.

In general, oversize and overweight (OSOW) permitting and regulation is strictly the responsibility of individual states, and in many cases has been a reactive response to accommodate demand for larger loads and commodities from the trucking industry.

The resulting mix of industry responses and legislative directives can lead to a potential disconnect between permit costs, government policy directions, and public and social costs to the network. This study aimed to address several questions:

- How do oversize/overweight demands vary by region?
- What are current national and regional trends in truck oversize/overweight shipping?
- What are reasonable means to calculate the broad impacts of oversize/overweight shipments at a state and local level?
- How can relative costs be determined for truck oversize/overweight permits?

- What are the economic thresholds at which certain impacts are financially mitigated?

To address these specific questions, the research team turned to recently completed studies. A more detailed literature review is found in Appendix 5 of this report. A study in Texas tried to bring some reasonable estimates to the cost and operation of facilities (Texas Transportation Institute, 1988). A 2011 University of Wisconsin-Milwaukee study analyzed 2007 data and specifically looked at the impact of permit loads on bridges (Zhao & Tabatabai, 2009).

Since the Wisconsin study used Wisconsin permit data, but focused entirely on bridges, it was reviewed by the research team. Its findings, coupled with the proposed framework offered can form the basis for an accurate permit-based fee. The study used Weigh in Motion data and found that the maximum girder responses versus the ratio of the gross vehicle weight with the legal weight calculated using the Federal bridge formula showed less scattering than the gross vehicle weight alone. The authors of this study concluded that a simple yet reasonably accurate permitting fee base should be studied in details to reflect the level of damage overload vehicles may cause to bridges. The consideration should include damage to bridge decks and the related potential damage to durability of the bridges.

In Texas, Walton and others found that permitted loads at 84,000 pounds and slight increases in truck size and weight limits that lead to higher axle weights can have large pavement costs, ranging from $51,160 in the worst-case scenario and $493 in the best-case scenario (Texas Transportation Institute, 1988). The study noted that more axles can result in lower costs or savings dependent on specific scenarios, but no additional work was attempted to correlate the permit costs with the agency costs. While significant research has been completed for infrastructure costs, little comprehensive work exists outside of bridge- and pavement-related research.

Recent state-sponsored truck size and weight studies have primarily focused on the transport economics of proposed configuration changes and various considerations of these changes: safety, infrastructure impacts, truck technology, enforcement, environmental, and traffic congestion. This study specifically addressed permitting approaches and ideology within the context of Midwestern states affiliated with the Mid-America Freight Coalition—Minnesota, Wisconsin, Michigan, Iowa, Illinois, Indiana, Ohio, Kentucky, Missouri, and Kansas—with a backdrop of activities among all U.S. states involved in OSOW shipments. At present, there are no comprehensive studies exploring the connection between the various other policy objectives. New Jersey has initiated a two phase study to explore various permitting best practices, while the states of the Northwest Passage pooled fund (Wisconsin to Washington State) have funded research looking at regional permitting activities.

A comprehensive study by TxDOT in 2012 considered road damage and direct costs from OSOW vehicles (Prozzi et al., 2012). Using payment data, per mile consumption rates were determined for various loads and configurations. The research team concluded that permit fees should be increased to help recover additional costs associated with OSOW operations.

Study Objectives

This project provides a framework, but does not attempt to validate or criticize existing administrative structures, for states and institutions to evaluate cost recovery options due to OSOW operations. The project report provides a review of current permitting practices, fee structures, and outline of OSOW demand in the foreseeable future. The basis for the project is Midwest States (defined as the states of the Mid-America Association of State Transportation Officials (MAASTO)) and includes and incorporates national trends and data as appropriate.

The project advisory committee provided early feedback to focus on a mechanism for understanding and evaluating fee structures and providing best practices information for permitting professionals.

Task Overview

The research team completed the following activities, as described in the original scope of work. These efforts are summarized and discussed in greater detail throughout this final project

1. Review of OSOW demand and permitting trends.
    a. Demand among commodity types and industry sectors.
    b. United States freight trends, including truck-to-rail diversion
2. Research and summarize current OSOW permitting practices.
3. Review of current permit fees and fee structures and agency costs.
    a. Analysis of revenue streams generated from permit fees and respective distribution and allocation of permit revenue.
    b. Analysis of agency costs for evaluating permit applications and issuing permits.
4. Understanding roadway, infrastructure, and other impacts of OSOW loads.
5. Determination of anecdotal thresholds for cost incurred by OSOW truck operations.

Freight Trends in the United States

The nation's 117 million households, 7.4 million business establishments, and 89,500 governmental units are part of an enormous economy that demands the efficient movement of freight (FHWA, 2012). While the U.S. economy has been affected by an economic downturn, it is expected to recover and continue to grow. Long-term economic growth will result in even greater demand for freight transportation.

The value of freight moved is expected to increase faster than the weight, rising from $882 per ton in 2007 to $1,435 per ton in 2040 when controlling for inflation. Exports at $1,826 per ton and imports at $1,455 per ton are significantly higher than domestic shipments at $799 per ton in 2007 (AASHTO, 2007).

The U.S. economy stretches across a continent with links to the world, drawing on natural resources and manufactured products from many locations to serve markets at home and abroad. More freight is moving greater distances as part of far-flung supply chains among distant trading partners.

Freight travels over an extensive network of highways, railroads, waterways, pipelines, and airways in North America. Existing and anticipated increases in the number of freight vehicles, vessels, and other conveyances on both public and private infrastructure are stressing system capacity, increasing maintenance requirements, and threatening system performance.

Federal and state governments are concerned about truck weight because of the damage that heavy trucks can do to roads and bridges. To monitor truck weight, approximately 198 million weighs were made in 2010; about 59 percent were weigh-in motion and 41 percent were static. Considerably less than 1 percent of weighs discover violations.

Table 1: Commercial Vehicle Weight Enforcement Activities: 2005-2010 (AASHTO, 2007)

	2006	2007	2008	2009	2010
All weighs	229,451	217,444	200,419	182,257	98,565
Weigh-in-motion	142,599	132,258	119,826	116,176	118,026
Static weighs[1]	86,852	85,186	80,593	66,081	80,539
Semiportable scales	423	426	358	373	285
Fixed scales	85,900	84,214	79,645	65,182	79,704
Portable scales	529	547	591	525	550
Violations[2]	621	530	555	490	479
Axle weight violations	270	234	249	221	217
Gross weight violations	150	127	120	116	114
Bridge weight violations	202	170	186	153	148
Permits[3]	4,598	4,828	5,216	4,529	4,839
Non-divisible trip permits	3,399	3,743	3,693	3,286	3,510
Non-divisible annual permits	251	332	322	299	303
Divisible trip permits	426	398	490	370	342
Divisible annual permits	522	354	710	574	683

1. Static weights include the total number of vehicles weighed from semiportable, portable, and fixed scales.
2. Violations include those from axle, gross, and bridge formula weight limits.
3. Permits issued are for divisible and non-divisible loads on a trip or on an annual basis, as well as the overwidth movement of a divisible load.

Note: Incomplete data from Washington, DC. (2008), Hawaii (2008, 2009, and 2010), Massachusetts (2010), Michigan (2008), Pennsylvania (2006), and South Dakota (2006 and 2007).

Rail to Truck Diversion

The research team did not find evidence of diversion to other modes of transport based on permitting fees in the literature or in the interviews that were completed during this study. For the most part, there appears to be limited availability for modal shift for these types of loads. This is due to several factors.

Cost ultimately drives demand and modal split. If rates go up for one mode, there will be less demand for that mode and some demand will shift to other modes. However, most experts agree that only a small amount of freight is up for competition. Some studies have indicated that 90 percent of loads are locked into a particular mode due to efficiencies presented by rail or truck. Modal shift traditionally occurs only when there are alternatives readily accessible.

Over-dimensional loads have less portability. Bridge clearances and turning radii often dictate the mode choice for these larger sized loads. Much of the recent discussion has focused on the shift of goods from trucking to rail modes. The argument here is that goods moving by truck could be shifted to rail with an aggressive permitting fee approach. Despite a broad range of rail and maritime options in the Wisconsin markets, most commodities cannot be shifted to other modes because of their handling requirements. For example, fragile and perishable commodities experience a much higher rate of damage on rail than they do on other modes.

When the volume, origin, and destination of freight are considered, fewer modes are effective for shipments. Large volumes of certain commodities are better suited for barge, rail, and ocean-going vessel (and for petroleum products, pipelines) than trucks or airplanes. A principal factor in the movement of commodities is the schedule for delivery. Many goods are moved by express services (one- and/or two-day service), and others are on a critical intermodal schedule; both of which require high levels of reliability.

Ultimately, meeting the customer's needs becomes the biggest challenge to determining mode strategies in OSOW movements. The customer (even if not explicitly, in practice) dictates where and when the commodity will be shipped based on their production, logistics, storage, and other requirements.

Since a customer determines what modes will be used to move their freight, the research team can only speculate about where it would be to a customer's advantage to use rail in place of truck if permits are higher. If a shipper or customer is not located on a rail spur or at a rail terminal, or at a dock along a river, they are forced to use trucking firms for some if not all of the shipment. Because of the extra handling fees this practice may create, moving loads to rail is only practical and/or cost-effective for long-distance hauls (over 500-750 miles.

In addition, the rail industry is moving away from internal regional moves to focus more on the long-haul, single-commodity cargo and/or container traffic between major hubs because those movements have low operating costs, use existing infrastructure, and they generate the highest profits for the rail carriers. Local movements by rail have been delegated to the shortline rail operators. Some studies have indicated that many of these shortline operators are underfinanced and overworked, and their networks are inconsistent and incomplete, requiring access to other railroads (which can be costly and slow) and/or transfer to truck. There is little motivation to consider shifts as result.

Virginia DOT's I-81 corridor study did determine that up to 700 trucks could be diverted per day while also noting that rail capacity on the Norfolk Southern Piedmont rail line to service future base load rail traffic unlikely to impact the lane requirements on I-81. It is the research team's opinion that this shift is likely caused by congestion and improvements on the existing parallel rail route and less to do with the permit costs proposed in the study.

OSOW Demand and Permitting Trends

Due in part to its commodity diversity, the specialized carrier industry has continued to grow over the past several years. The primary trade group in the United States, Specialized Carriers & Rigging Association (SC&RA), has more than 1,300 business members, and recently indicated, “The list of positive drivers leading to the April order spike is long: Healthy freight, increasing trucker profits, pent-up replacement demand, rising used equipment prices, improving credit worthiness, rising prices for new vehicles, and lead times for new equipment that have pushed out to the end of the year” (SC&RA, 2011). The industry has been buoyed by strong performances in a handful of sectors that are reliant on shipping oversize/overweight equipment and materials: wind energy, road/bridge construction, and heavy machinery. In addition, specialty services, including project loadings, have provided the industry with substantial gains in recent years.

Demand by Commodity

Soybeans and Grain Trades

The growing world demand for U.S. soybeans and grains will ensure that exemptions during harvest season will continue to be a common practice. The exemptions to the size and weight policies in several Midwest markets expand to other agricultural products on a case by case basis. For soybeans in particular, strong export demand for U.S. soybeans and declining soybean production estimates for South America brings additional value to farmers.

Wisconsin Act 55 (which is also addressed later in this section) allows for the movement of permitted overweight vehicle combinations that ship agricultural products internationally, including soybeans and grains. Included in the grain trade is a growing market for dried distillers’ grains (DDGs) with 2011 was nearly six times larger than 2003-2004. China remains the leading importer of U.S. DDGs with Mexico and Canada following close behind. Exports now constitute about 22 percent of domestic DDG production and reached a record $1.9 billion in 2011, more than $200 million above the previous record set in 2010 (US Department of Agriculture, 2012).

Storage Tanks and Large Equipment

Larger storage tanks often are transported in custom designed state of the art over the road shipping transporters. These transporters provide the capability of legally transporting nitrogen storage tanks, oversized pressure vessels, other petrochemical tanks, and other industry specific tanks. Often the tolerances allowable for this sort of vessel are too extreme for on-site assembly.

Forest Products

Under Wisconsin Statute 348.27(9m)(a)4, and as defined in 348.01(2)(bt), the Department may issue permits to allow the transportation of “raw forest products” including logs, pilings, posts, poles, cordwood products, wood chips, sawdust, pulpwood, intermediary lumber, fuel wood, and Christmas trees not altered by a manufacturing process off the land, sawmill, or factory from which they are taken.

The forest products industry accounts for approximately 5 percent of the total U.S. manufacturing GDP, producing about $175 billion in products annually. Wisconsin leads the nation in forest product manufacturing capital expenditures, ranks second in annual payroll, and second in total forest products employment, which is growing faster than the national average.

More than 61,000 employees and Wisconsin's forests are the state's largest land cover and by far the state's largest land use.

Demand by Industry

Wind Energy

Wind energy has emerged as a dominant player in the movements of freight on over-dimensional and overweight permits. Wind energy is a source of renewable energy that after it has been constructed, delivered, and installed, does not emit greenhouse gases and reduces the need for more polluting sources of energy such as coal and natural gas. The wind energy industry is rapidly growing in the United States, experiencing an average annual growth rate of 39 percent in the past five years (Bittner & Kleinmaier, 2010). Wind energy manufacturing facilities are being created yearly, with many of them in the Midwest and Great Plains states. With a vast abundance of wind resources in the United States, along with a push from the Obama Administration to increase the percentage of total energy use from wind and other renewable sources, there is great potential for growth in the wind energy industry.

The wind industry is economically beneficial for the Midwest and the United States. Significant resources are dedicated to manufacture, store, transport, and construct wind energy components and farms. Many of these value added processes are realized in local and regional economies (Bittner & Kleinmaier, 2010; SC&RA, 2010). The wind energy industry is a strong source of employment, and as interest and investment in wind energy increases, the number of jobs in the industry should grow. This source of employment is particularly beneficial and pertinent given the economic downturn that the United States is currently experiencing. In an attempt to promote additional growth, and to aid the wind energy business, the production and installation of wind energy projects are eligible for the federal wind production tax credits. The wind production tax credit is a subsidy tax credit given on a per kilowatt-hour basis. Using an impact analysis for planning (IMPLAN) economic analysis tool, wind energy in Wisconsin is projected to be a multi-billion dollar industry creating several thousand jobs in and around wind turbine production, transportation, construction, and maintenance (Energy Center of Wisconsin, 2004).

As the Midwest and Great Plains region experiences growth in wind energy, they will also confront the challenges that accompany it. Local roads do suffer damage, bridges are confronted with loads not previously seen in such quantity, and community traffic flow will be altered. County and municipal planners need cooperative strategies to minimize damage occurring during the construction of wind farms. Local budgets, already limited, are further stressed by these projects and need to return effected communities to their pre-construction conditions with the highest degree of efficiency.

Sand and Hydraulic Fracturing Operations

Hydraulic fracturing, also known as fracking, is used in 90 percent of natural gas wells in the United States. Gas companies drill down and across layers of rock and then pump a pressurized mixture of sand, water and chemicals deep into the earth, creating artificial rock fractures. Sand helps keep the fissures open, allowing gas to travel to the surface. The characteristics of specific sands work better in the process. Many of these better performing sands are found in the upper Midwest region, especially in Wisconsin and Minnesota.

In addition to the sand, other materials, including the mining equipment are subject to permitting operations. While most of the sand is moved by rail, the growth in the industry will encourage additional mining operations further removed from rail terminals.

Currently, there are more than 60 operating sand mining locations in the state with 37 processing facilities.

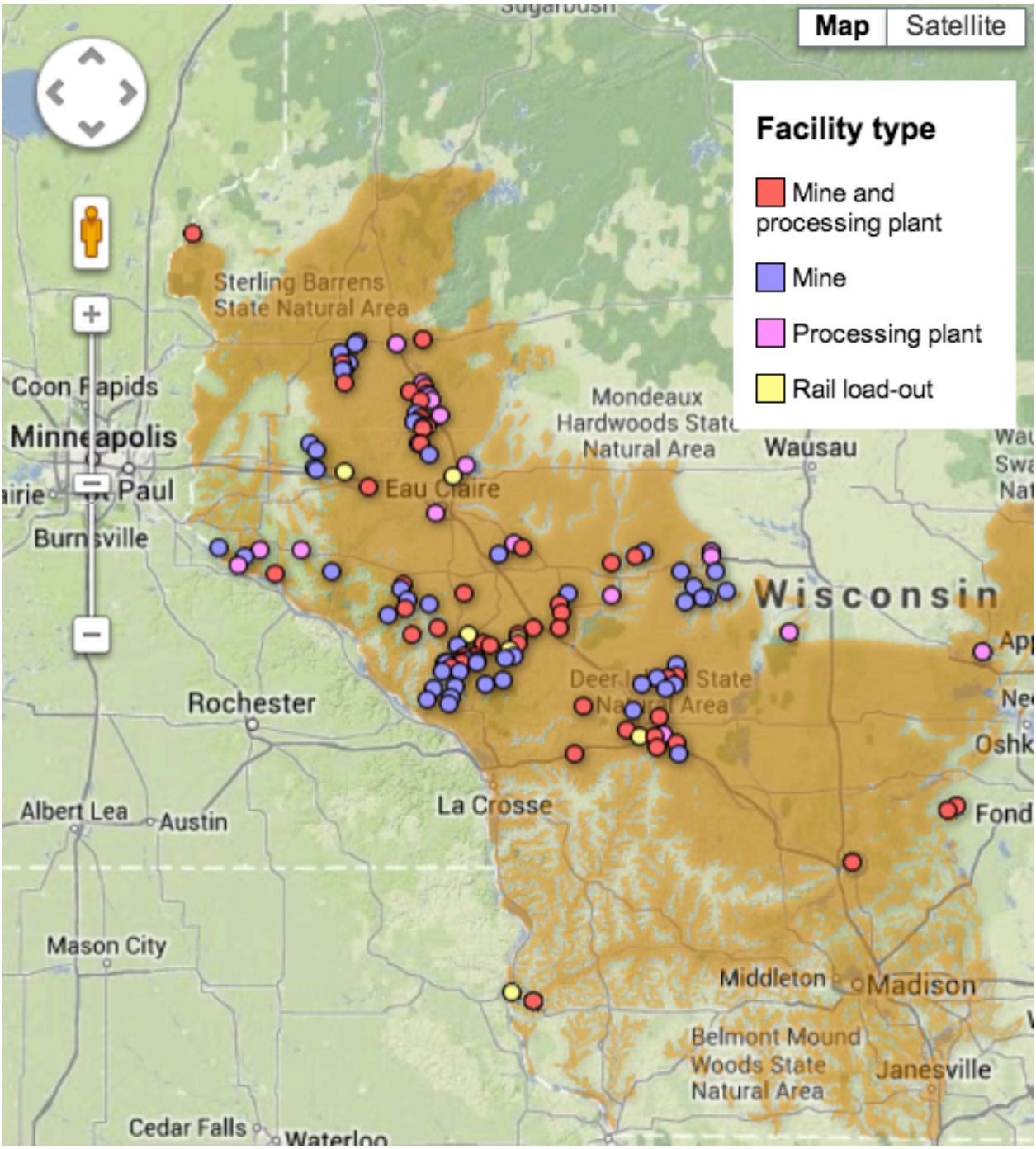


Figure 1: Sandstone Formations in Wisconsin

Road and Bridge Construction

Spawned principally by the American Reinvestment and Recovery Act, road and bridge construction continues to be a primary driver of OSOW movements.

The U.S. highway and street construction industry includes about 11,000 companies with combined annual revenue of about $85 billion. Major companies include divisions of large construction companies such as Bechtel Group, Fluor, Jacobs Engineering, and URS Corporation. The industry is highly fragmented: the 50 largest companies account for about 15 percent of industry revenue (Smith, 2012).

Sealed Ocean Containers

International trade requires containers to be inspected and sealed at the place where they are filled. This sealed container cannot be opened until it is delivered to its export point of delivery. In November 2011, the state of Wisconsin passed Act 55 which allows for the Department of Transportation to issue overweight permits for vehicle combinations that have six or more axles and that are transporting sealed containers for international shipment. Overweight loads cannot exceed 90,000 pounds. This change allows for agricultural products to be inspected and sealed in Wisconsin and provides efficient operations for international exporters.

OSOW Permitting

Current Practices

Survey and Interview Methodology

To understand how different states approach permitting fees, and how the fees are disseminated, officials from all 50 states were contacted to complete a survey regarding oversize/overweight permit revenue streams.

The primary point of contact in each state was the transportation budget analyst, though DOT officials were also queried contacted when necessary. These contacts were made by email with follow-up by telephone.

Thirty-two states provided detailed survey responses and complete answers. From this subset of states, an additional 16 were identified for additional interviews. The complete list of questions for the interviews and responses are provided in the appendices of this report. Another CFIRE-led project, completed for the Northwest Passage pooled fund study, provided additional related information. Finally, the research team also separately analyzed basic structures of two multi-state regional permitting programs in the Western and Southern Association of State Highway and Transportation Officials Regions.

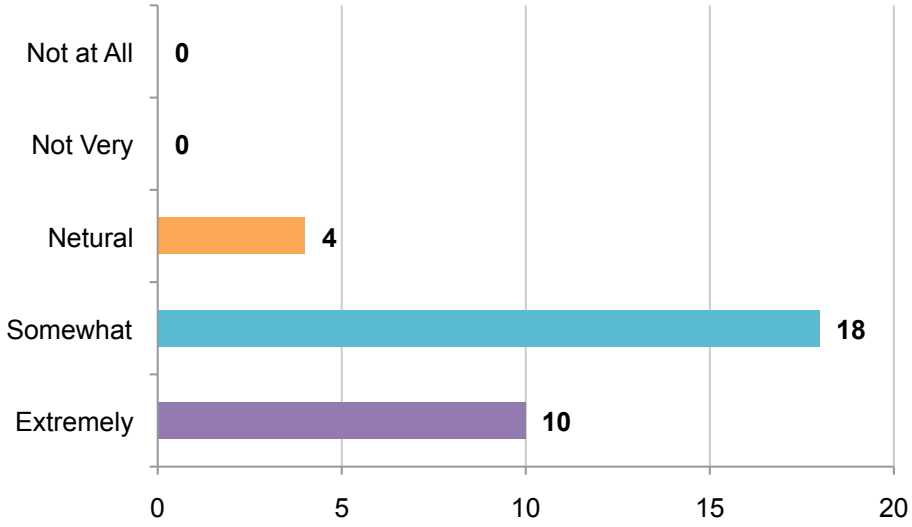


Figure 2: Freight Prioritization in State DOTs

States reported that freight had emerged as a new focus, bringing added attention to the permitting organizations within the state agencies. The focus was generally viewed as positive, even though some survey respondents indicated discomfort with the increased pressure this focus placed on “rushing” permit review.

Survey Questions

- To what fund are oversize/overweight permit fees directed (i.e., is the revenue collected for the general fund, a specific transportation fund, or otherwise)?

- How much total revenue is collected from oversize/overweight permit fees?
- Once collected, how is permit fee revenue distributed, and is it dedicated for a specific purpose?

The detailed interviews included questions on enforcement activities, permitting staff size and duty distribution, recent legislative changes, and variations between state and local jurisdiction policies.

Survey results on the fees and general information are provided in the appendices of this report. The current practices outlined in this chapter are drawn from these interviews.

Current Practices

Enforcement

Only nine of the 16 states interviewed noted that enforcement of existing oversize and overweight regulations is a high priority in their states. The majority of respondents labeled this as a moderate issue in their states.

Permit Review

All states reported that permits can be processed in under two days for routine requests. In most cases, these permits are issued on the same day as they are requested. In many states, this process is available through an online permitting and approval system.

The research team was also interested in developing a better understanding of the human resources dedicated to permit review and approval. Different state agencies have different staffing levels available for permit review and approval. The majority of states have 1-2 people reviewing permits. However, one state (Vermont) noted that up to 6 people sign-off in Vermont for certain loads.

For processing superloads, the average was for 3-4 staff members to review a permit. These typically involved engineering reviews for superloads. The majority of states reported that they can turn around superload permits in 2-3 days. Both Louisiana and Texas noted that some of their permit reviews can take up to 8 weeks depending on the complexity of the situation.

The research team noted that with such a wide variety of permit processes in place, an ability to accurately account for individual time on permit applications is very challenging. In many cases, permits can be issued by a clerk if they meet expected criteria. When a more substantive engineering and routing review is required, the staff costs could easily range into thousands of dollars. Field verification for turning radii, sign removal, and utility reviews also factor in.

The research team recommends setting a sliding scale–as is the case in most states. Some states, however, prohibit segmenting one type of permit from another. In these cases, the ability to collect representative costs is limited by legislation.

Legislative Changes

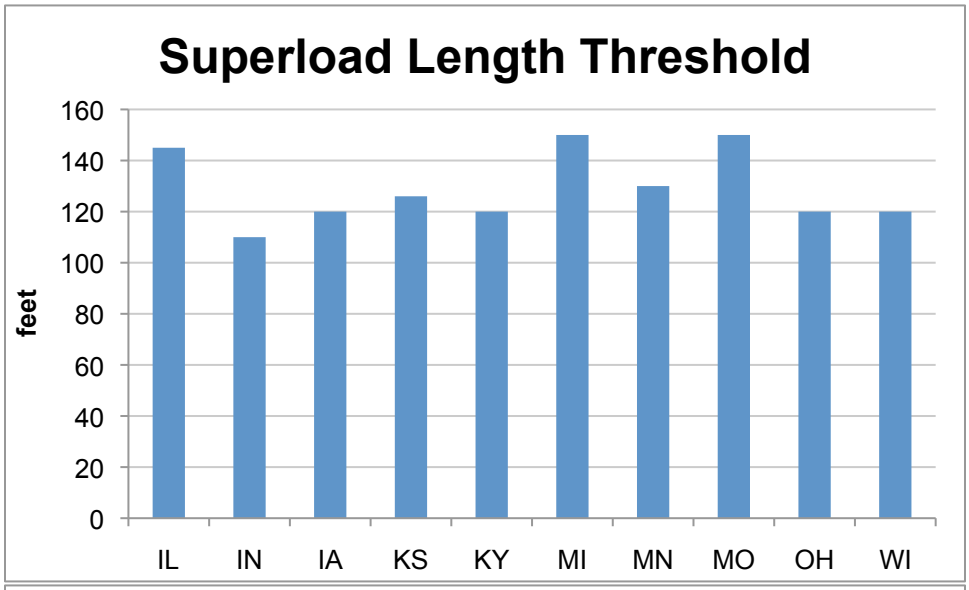
The research team also explored the current state of the industry with respect to legislative activity. In order to enhance business practices, many state legislatures have adopted revised rulings to favor industrial and agricultural competitiveness in their states. In several cases, this has resulted in commodity specific exemptions, modifications to handling of sealed ocean containers, or changes to a state's overall enforcement strategies for OSOW movements. To quantify these activities, and the general impression that states had, the researchers asked to what level states had accommodated OSOW hauling over the past few years. All but one state

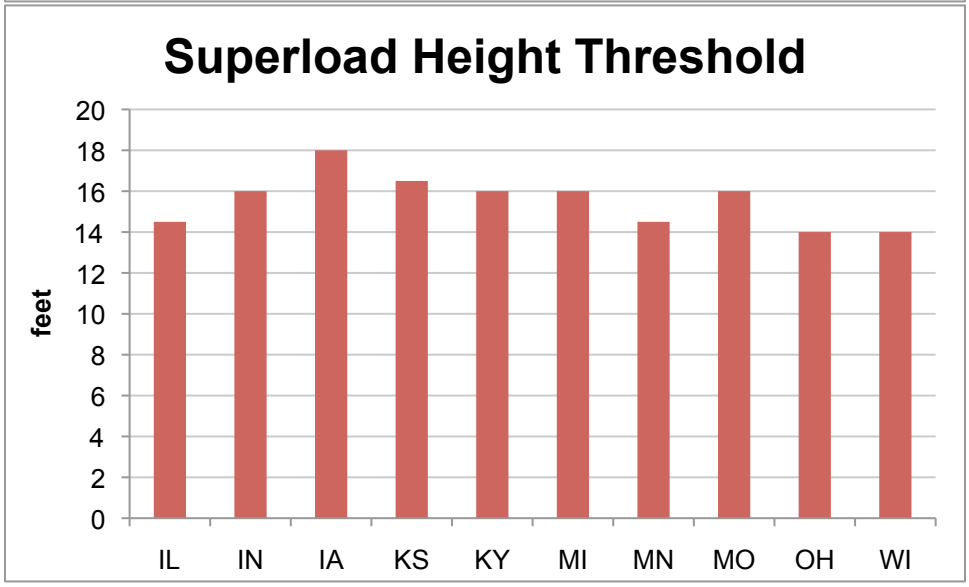
indicated that legislation had been more accommodating to OSOW movements or was neutral in its activity.

New Jersey adopted new rules governing the permit process for OSOW trucks. This rule change required all companies to get their permits online and perform a route analysis as part of the application process. Previously the permit was tied to the truck alone. The change made the permit tied to both the truck and a specific route. The state still approves the route prior to issuing the permit. Violations for movements outside of the specific route are substantial.

Superloads

As discussed earlier, the greatest variation among the states is in the area of defining superload characteristics. Height, length, and width are components for determining superloads. Weight is also considered, but it often varies based on axles and configurations. Figure 3 below highlights the Midwest states and their superload thresholds (Bilal et al., 2010).





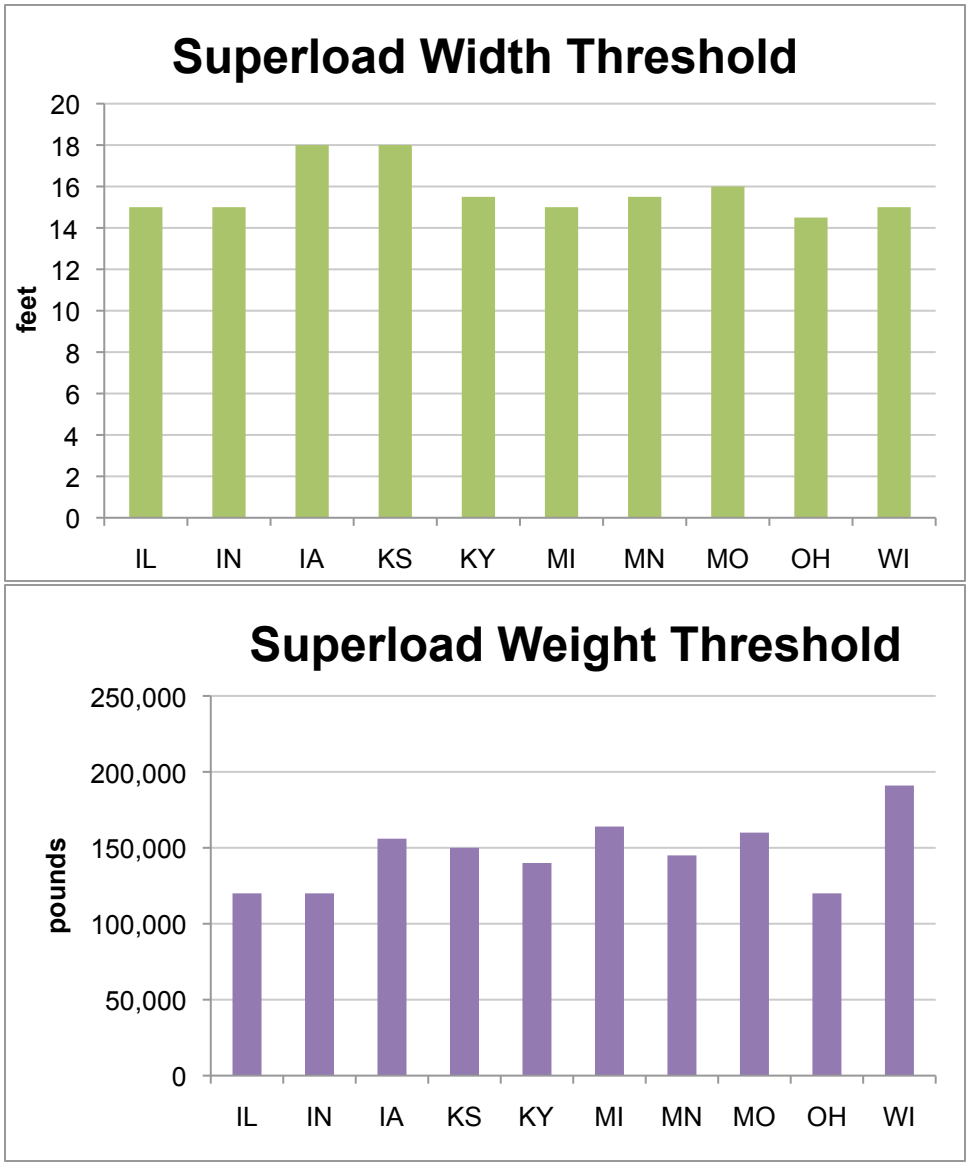


Figure 3: Midwest State Thresholds for Superload permits

State and Local Variations

Depending on the specific commodities favored in a particular state, there is variation over both geography and topology in state permitting practices. In addition, the presence of toll authorities in some states also modifies the use of permits.

Coal hauling in West Virginia, equipment and associated oil production in North Dakota, and agricultural products throughout the Midwest have been treated differently than other loads. As previously mentioned, the emergence of wind energy production has resulted in OSOW loads in rural areas throughout the nation.

The number of oversize and overweight trucks using county roads and bridges in North Dakota's oil rich areas has more than doubled in three years. While counties are collecting millions of dollars in permit fees, most officials say the money isn't enough to repair damages and in many cases is not earmarked for road maintenance.

The MAASTO effort and the Northwest Passage states are taking common approaches to systematically evaluating permit strategies across state boundaries. The research team strongly encourages these continuing efforts.

Cross-Border Cooperation

In 2010, the States of Minnesota and Wisconsin developed a comparison document to outline the major differences between their respective states concerning OSOW movements (MnDOT, 2010).

The two states agreed to develop an open source interface that would allow carriers to apply for permits from several states simultaneously. The states would then process the permits individually and return them to the applicant. As of early 2011, the drawback of this system is that it has not yet been developed; as such, the cost cannot be accurately determined.

In part this is an effort to improve customer services. In larger part, it is an effort to reduce the total cost of state government. The governors of these two states began the initiative and it applies across a range of agencies and state services. One of the areas under review was oversize and overweight truck permitting. The long border shared by Wisconsin and Minnesota and the nature of the highway networks in the two states made permitting an ideal area for cooperation.

The states began by trying to share information and honor permits issued by each state on major North-South routes that serve industries in both states. They are also looking at ways of harmonizing some of the regulations that govern oversize and overweight loads, such as curfews and auxiliary signing.

Wisconsin and Minnesota are attempting to implement a virtual permitting system as well. Conceptually, the shared approach resembles the systems used by vendor Bentley, but it is different in a number of ways. The open-source interface can work with any underlying system. Minnesota has an older Bentley system. Wisconsin has a custom-built system, but uses the Bentley routing software. Each state would have to build the bridge between the virtual permitting interface and their existing systems.

Permit Cost Comparisons

The Northwest Passage states have completed studies looking at the willingness and ability of multi-state OSOW permitting (Witter & Gollnik, 2010). Figure 4 below shows the hypothetical permit costs of the same operations across the states of the Midwest with several assumptions to normalize and compare the data. These costs are placed on the individual carrier.

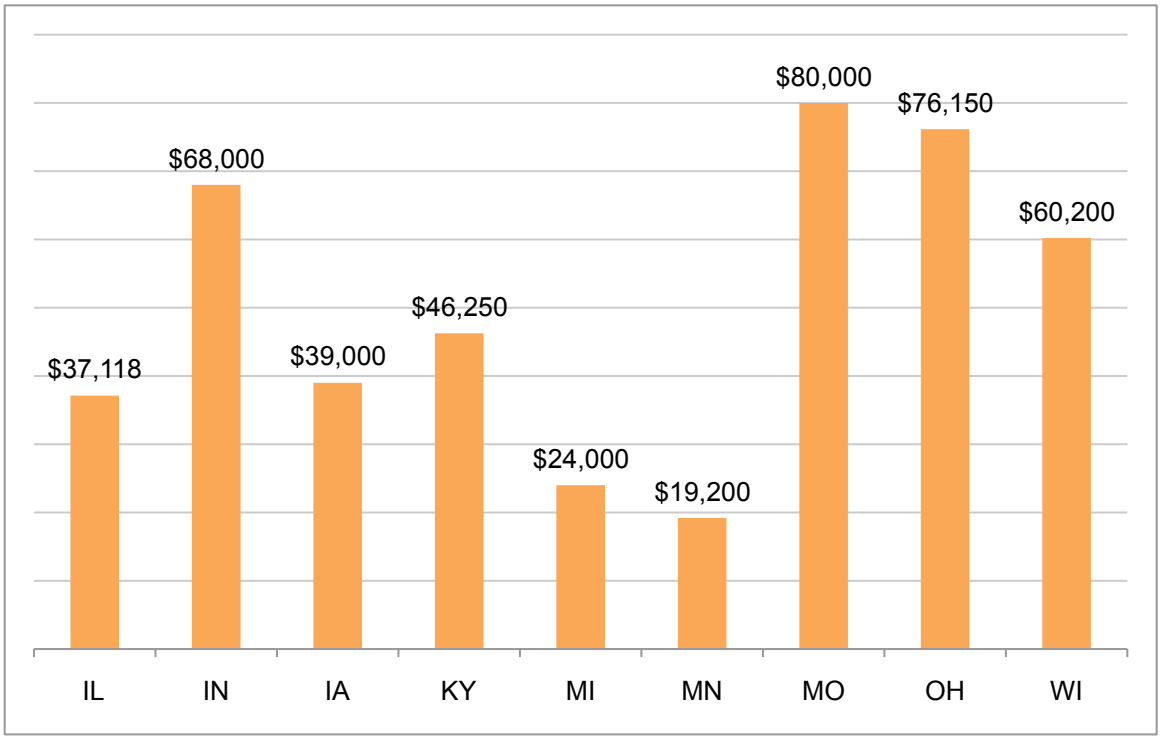


Figure 4: Costs of Representative Trucks in Midwest

Trucking Permit Costs for Overweight and/or Oversize Trucks Across of Midwest States, for a Hypothetical Trucking Company. For example, the trucking company has 30 trucks that are of GVW 100,001–120,000 lbs; length 71–80 ft; width 10–12 ft; and height 13.6–14.16 ft.

Assume that the annual Vehicles Miles Traveled per Truck = 600 Miles and the number of districts crossed during the trip = 5 (for district fees). Assume that the trucking operator pays an annual permit that is equal to the annual blanket permit amount, or where none exists, the annual sum of the single trips made within the year. It is assumed that this trucking company operates in each of the eight Midwest states with the above fleet. The overall yearly cost incurred by the trucker in each state, based on the fee structure of the state.

Carrier Fees and Permit Costs

Purpose and Rationale

Oversize and overweight (OSOW) carriers face particular rules and policies in every state they cross. There are large discrepancies in carrier fees across states. The research team examined carrier permit fees and agency costs for the business activities to process permits for OSOW loads.

Carrier fees are the amount charged to individual businesses in order to obtain a permit, or the agency's revenues. Agency costs include what is incurred by a DOT/state government to fulfill and carry out a permit request such as routing or engineering analysis. This analysis is confined to the states of the Mid-America Association of State Transportation Officials (MAASTO), which include: Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Missouri, Ohio, and Wisconsin. Each state has its own schedule of OSOW permit fees. Since states and their rule-making authorities have different priorities for their motor carrier divisions (maintaining a "business-friendly" perception, covering costs, helping defray infrastructure damage, etc.), the fees vary greatly in type and magnitude.

Some states allocate costs as part of the carrier permit fee. Ohio promulgated its permit fees from a study linking oversize and overweight loads to the economy. This inclusive approach considers many aspects such as impacts to pavement and bridges and how certain rules handle encouraging industry and maintaining infrastructure. Encouraging economic growth and maintaining current infrastructure sometimes run at odds when considering OSOW permitting policies and costs. Setting fees using data as justification seems to be most equitable method.

Data-driven fee schedules or other optimally-set fee schedules are not the norm in the study region. Iowa's $10 per permit fee has been unchanged for 30 years and is among the lowest in the nation. However, the Iowa legislature is currently considering a fee increase. Other states reported not having adjusted their fee systems in 10 or more years.

Agency costs are another consideration. DOTs have little control over their costs in issuing permits in the short term. However, some states have limited the personnel time necessary to issue a permit by using some level of automation to lower costs over the long run.

A relative and absolute comparison of these fees to the costs across states for a variety of hypothetical scenarios will describe the current climate as of March 1, 2013. This comparison involved six permit scenarios selected based on input from state DOT staff.

Scenarios

The scenarios were chosen to reflect a variety of oversize and overweight characteristics that exemplifies a range of carrier fees and agency business processes. The identified hypothetical load scenarios allowed for uniformity in the direct comparison across states. With the hypothetical nature of this exercise, assumptions were required. Carrier fees and agency costs are best estimates from the available information. For each scenario, estimates are made for the carrier fees to obtain the permit and the agency cost to issue the permit. Costs and fees are compared among the ten MAASTO states. Each of the six scenarios is listed below with relevant dimensions and other information necessary to determine the appropriate carrier fees and agency costs.

All scenarios assume a one-way trip of 300 miles in each state that was estimated to take 8 hours. The trip length was selected because it approximates the distance traveled to enter, move across, and exit each one of the MAASTO states. Since availability of blanket permits and

annual trip permits varies based on each state and situation, these types of permits were excluded. Only single trip permits were considered in order to help normalize fees types across states and provide more variability in cost and fee variations.

Trips were assumed to occur as planned, meaning the carrier would not be subject to any fees related to route changes or unforeseen delays. Civilian escorts were not considered as part of this study.

Scenario 1 – Steel Bridge Girder (3’6”W x 140’L x 9’H)

Emphasis: length, weight
Total width: 8’6”
Total length: 160’
Total height: 13’6”
Gross weight: 112,000lbs
6-axle configuration semi-tractor / semi-trailer
Axle spacings: 19’6” – 4’6” – 9’5” – 4’6” – 4’6” = 119’
Axle weights: 12,000lbs – 20,000lbs – 20,000lbs – 20,000lbs – 20,000lbs – 20,000lbs
3 points of articulation

Scenario 2 – Combine Harvester (13'W x 26'L x 13'6”H)

Emphasis: type of load (special category, protected industry)
Total length: 75'
Gross weight: 90,000lbs
40,000lbs farm tractor (50:50 distribution on each axle); 50,000lbs farm machinery on trailer
6-axle configuration semi-tractor / semi-trailer
Axle spacings: 16'5" – 4'7" – 4’7" – 42’ – 4'7" = 72'2”
Group weights: Steer Axle 10,000lbs, Drive Axles 40,000lbs, Trailer weight 40,000lbs
Axle weights: 10,000lbs – 16,000lbs – 16,000lbs – 16,000lbs – 16,000lbs – 16,000lbs
Power unit with trailing unit
1 point of articulation

Scenario 3 – Generator (8'6"W x 38'L x 13'H)

Emphasis: height
Total height: 16'
Gross weight: 132,000lbs
6-axle configuration semi-tractor / semi-trailer
Group weights: Steer Axle 12,000lbs, Tandem Drive Axles 60,000lbs, Trailer weight 60,000lbs
Axle weights: 12,000lbs – 24,000lbs – 24,000lbs – 24,000lbs – 24,000lbs – 24,000lbs
Axle spacings: 16’1” – 4’6” – 38’ – 4’6” – 4’6”
1 point of articulation

Scenario 4 – Mobile Home (box 16'W, roof 17'W x 70'L x 15’H)

Emphasis: height, length, width
Overall length: 110'
Overall height: 15'10"
Overall width: 17’
Gross weight: 80,000lbs
Axle weights: 15,000lbs – 15,000lbs – 10,000lbs – 10,000lbs – 10,000lbs – 10,000lbs
Axle spacings: 16'5" – 4'7" – 4’7" – 42’ – 4'7" – 4’7” = 76'9”
7-axle Configuration toter / towing home on undercarriage

1 point of articulation

Scenario 5: Wind Turbine Blade (8'6"'W x 160'L x 13'6”H)

Emphasis: length
Total length: 185'
Gross weight: 80,000lbs
5-axle configuration semi-tractor / tandem dolleys
Group weights: Steer Axle 12,000lbs, Drive Axles 28,000lbs, Trailer weight 40,000lbs
Axle weights: 10,000lbs – 10,000lbs – 15,000lbs – 15,000lbs – 15,000lbs – 15,000lbs
Power unit with trailing units
2 points of articulation

Scenario 6: Wind Tower Component (15’6”W x 180’L x 15’9”H)

Emphasis: length, width, height, weight (superload)
Total length: 225'
Total Height: 16'6"
Gross Weight: 235,000lbs
13-axle configuration semi-tractor / semi-trailer
Axle weights: 20,000lbs – 20,000lbs – 20,000lbs – 20,000lbs – 20,000lbs – 15,000lbs – 15,000lbs – 15,000lbs – 15,000lbs – 15,000lbs – 20,000lbs – 20,000lbs – 20,000lbs
Steer - Tridem Drive - Tandem Bogey - Single - Tridem
Axle spacings: 13’3” – 5’ – 5’ – 13’4” – 5’9” – 12’4” – 5’9” – 61’5” – 5’9” – 5’9” – 20’ – 5’
3 points of articulation

Methods

The six scenarios were created with the help of state DOT officials at the Wisconsin and Missouri DOTs. The scenarios consist of commonly encountered loads with unique OSOW characteristics. A survey was used to collect the carrier fees and agency costs. At least one state DOT representative from every MAASTO state received the survey and explanation detailing the purpose of the study. Each respondent was asked to provide initial identifying information: name, position/department/division/bureau/section, email, and state. Each scenario was presented with the following questions:

- Does this scenario require a permit in your state?
- Is this scenario eligible for a permit?

The respondent was required to answer “yes” to both questions before being allowed to proceed to the subsequent parts of that scenario. The next question asked the types of permit that the scenario was eligible to receive. The respondent was then asked to specify the applicable permit fees and the amount for each type of fee.

9.
Please provide estimated carrier fees and agency costs ($) for the described scenario listed below. Only include direct costs. Exclude software and overhead costs. Estimate internal staff or for hire costs as time required multiplied by the net hourly pay rate.

What are the fees a carrier would be charged for obtaining a permit for a steel bridge girder (scenario 1)?

Base Fee	0
Mileage Fee	0
Overweight Fee	0
Overdimension Fee	0
Load/Commodity Type Fee	0
Engineering or Traffic Review Fee	0
Escort Fee	0
Law Enforcement Fee	0
Other (please explain)	0
Other (please explain)	0
Total	0

10.
What are the internal agency costs required for permitting a steel bridge girder (scenario 1)?

Permit Review	0
Route Check (if permit review explicitly includes route check, enter 0.1)	0
Fee Collection & Processing	0
Enforcement Costs	0
Escort Costs	0
Engineering Review - Pavement	0
Engineering Review - Bridge	0
Regional or District Review - Traffic	0
Other (please explain)	0
Other (please explain)	0
Total	0

Figure 5: MAASTO survey questions show the breakdown of carrier fees and agency costs by type.

The fees were broken down into several fee categories including: base, mileage, overweight, over-dimension, load/commodity type, engineering or traffic review, escort, law enforcement, and other. Finally, the survey asked about internal agency cost types and amounts required to permit the scenario, and the categories included: permit review, route check, fee collection and

processing, enforcement, escort, engineering review–pavement, engineering review–bridge, regional or district review–traffic, and other.

The most important metric for motor carriers from a department perspective is often turnaround time for permit issuing. For example, WisDOT has denoted the number of DMV products per employee hour worked as a performance measure in its performance improvement program scorecard. Typically, other operational data is not explicitly kept or analyzed. This makes acquiring detailed information on direct costs (namely, time spent on each aspect of the permit and the wage rate of the person processing the permit) quite difficult, since executive-level staff are not as concerned with tracking these costs at this level. As a result, standard times and pay rates (including fringe benefits) were assigned to states as necessary. These were established by using composite time estimates across states and pay rates for an employee who would typically handle the responsibility of that aspect of permit issuance.

After the survey, the data was compiled and analyzed. Any missing or ambiguous data was addressed through follow-up phone calls and/or emails with each state's contact person.

Analysis

Carrier fees, agency costs, and law enforcement escort costs were analyzed. Appendix 7 includes the calculations used to determine fees and costs. All numbers are rounded to the nearest dollar figure.

Carrier Fees

Table 2: Carrier Fees

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6
State	Steel Bridge Girder	Combine	Generator	Mobile Home	Wind Turbine Blade	Wind Tower Component
IL	$355	$180	$383	$260	$125	$1,789
IN	$200	$125	$210	$50	$50	$1,365
IA	$10	$10	$10	$10	$10	$10
KS	$20	$20	$20	$20	$20	$50
KY	$60	$60	$60	$60	$60	$60
MI	$50	$50	$50	$15	$15	$50
MN	$72	$15	ineligible	$15	$15	$189
MO	$345	$35	$1,060	$265	$265	$1,260
OH	$135	$135	$207	$135	$65	$825
WI	$55	exempt	$75	$25	ineligible	$235
Range	$345	$170	$1,050	$255	$255	$1,779
Average	$130	$70	$231	$86	$69	$583
Median	$66	$50	$75	$38	$50	$212

Min.	$10	$10	$10	$10	$10	$10
Max.	$355	$180	$1,060	$265	$265	$1,789
Std. Dev.	$122	$58	$315	$95	$77	$635

Iowa has a flat rate fee of $10 for every permit, which is the lowest of the carrier fees for any state. Missouri had the highest fee for the girder, generator, mobile home, and turbine blade of $345, $1,060, $265, and $265, respectively. Illinois charged $180, which was the most for permitting a combine. Ohio had the highest fee for the tower component of $1,425. A large variance exists for carrier fees across scenarios and states, especially as the weight and dimensions reach extreme values. The lowest range was $170 for the agriculture combine, and the highest range was the wind tower component at $1,415.

States that tend to have high fees and costs for a given scenario usually have high fees and costs for the other scenarios. The opposite holds true as well: those states that have low fees and costs in a given scenario have low fees and costs for the others. In other words, a state's costs and fees relative to other states do not change much regardless of the scenario.

This is to be expected with states like Iowa, Kansas, Kentucky, and Michigan that have one or two categories for all permit-required and eligible loads and impose no additional add-on fees. Other states have more complicated fee systems with several criteria-based, supplementary fees. Such variations consistently lead to a wide range for the ten states. The less routine and more oversize the load, the larger the range in carrier fees becomes. As a result, most fees fall near the high and low extremes; few are in the middle.

It would appear that some fees were created to reflect external costs such as pavement damage and possible traffic disruption. States that have long set fees that have not recently been revisited seem to have lower fees that don't incorporate those indirect costs.

Per mile-adjusted carrier fee and agency cost charts can be found Appendix 7.

Agency Costs

Table 3: Agency Costs

State	Scenario 1 Steel Bridge Girder	Scenario 2 Combine	Scenario 3 Generator	Scenario 4 Mobile Home	Scenario 5 Wind Turbine Blade	Scenario 6 Wind Tower Component
IL	$7	$7	$13	$37	$37	$321
IN	$7	$7	$13	$37	$37	$365
IA	$7	$7	$13	$13	$37	$161
KS	$7	$7	$13	$13	$37	$480
KY	$7	$7	$13	$13	$37	$450
MI	$7	$7	$13	$37	$37	$450
MN	$7	$7	ineligible	$37	$37	$450
MO	$20	$20	$50	$150	$150	$300

OH	$7	$7	$13	$37	$37	$450
WI	$40	exempt	$100	$175	ineligible	$450
Range	$33	$13	$87	$162	$113	$319
Average	$12	$8	$27	$55	$50	$388
Median	$7	$7	$13	$37	$37	$450
Median	$7	$7	$13	$37	$37	$450
Min.	$7	$7	$13	$13	$37	$161
Max.	$40	$20	$100	$175	$150	$480
Std. Dev.	$12	$4	$33	$63	$40	$96

Only direct and marginal costs were included in the agency cost calculations. Overhead, upfront, and indirect costs were not considered. Several states are tied for the lowest agency cost in multiple scenarios since the same figures were used for estimating. Iowa and Kentucky have the lowest costs for each of the scenarios. Wisconsin has the highest agency costs for the girder, generator, mobile home, and wind tower component of $40, $100, $175, and $450, respectively. Missouri's $20 and $150 costs are the highest for the combine and wind turbine. Agency costs (excluding escort costs) do not have nearly the discrepancy compared to carrier fees; the largest range is $270 in the wind tower component scenario between Wisconsin at $450 and several states at $180. The smallest range is between Missouri at $20 and every other state at $8 for permitting the combine.

Agency costs are generally more alike across states for each of the scenarios since states must go through a similar process of verifying credentials, checking the route, collecting and processing payment. Automation is becoming more commonplace in MAASTO. Automated systems for routing and/or permitting, whether built in-house or purchased from a vendor do have upfront costs and potentially maintenance and upgrade fees, too. Yet, it is worth mentioning these do create large reductions in the marginal costs of issuing a permit, as well as significant time savings. Self-issue systems for routine OSOW permits are more the exception, as many states still rely on agents to do at least some of the tasks in the permitting process.

Following the administrative and route review, the permit is forwarded for engineering and regional review if necessary. The time and resources taken by the engineering side at a higher pay rate to analyze bridges or traffic make up a significant share of the total agency costs of a permit.

Carrier Fee and Agency Cost Discrepancies

Table 4: Carrier Fees - Agency Costs Differences

State	Scenario 1 Steel Bridge Girder	Scenario 2 Combine	Scenario 3 Generator	Scenario 4 Mobile Home	Scenario 5 Wind Turbine Blade	Scenario 6 Wind Tower Component
IL	$348	$173	$370	$223	$88	$1,468
IN	$193	$118	$197	$13	$13	$1,000

IA	$3	$3	($3)	($3)	($27)	($151)
KS	$13	$13	$7	$7	($17)	($430)
KY	$53	$53	$47	$47	$23	($390)
MI	$43	$43	$37	($22)	($22)	($400)
MN	$65	$8	N/A	($22)	($22)	($261)
MO	$325	$15	$1,010	$115	$115	$960
OH	$128	$128	$194	$98	$28	$375
WI	$15	N/A	($25)	($150)	N/A	($215)

The charts showing the differences between fees and costs provide insight into which states' fees likely cover their costs. The green boxes show when fees are greater than costs, red boxes show when costs are greater than fees, and yellow/beige hue boxes show where fees and costs are nearly the same. The largest variations across states are found in the more complicated scenarios. Predictably, states with situationally triggered fees tend to better cover the agency costs for larger and less frequent loads traveling longer distances.

State Police Escorts

Table 5: Escort Fees

State	Scenario 1 Steel Bridge Girder	Scenario 2 Combine	Scenario 3 Generator	Scenario 4 Mobile Home	Scenario 5 Wind Turbine Blade	Scenario 6 Wind Tower Component
IL	$0	$0	$0	$0	$0	$0
IN	$0	$0	$0	$0	$0	$1,220
IA	$0	$0	$0	$0	$0	$0
KS	$0	$0	$0	$0	$0	$0
KY	$0	$0	$0	$0	$0	$0
MI	$0	$0	$0	$0	$0	$0
MN	$1,270	$0	ineligible	$1,270	$1,903	$1,903
MO	$1,541	$0	$0	$1,541	$1,541	$2,055
OH	$0	$0	$0	$0	$0	$1,044
WI	$0	exempt	$0	$0	ineligible	$1,400
Range	$1,541	$0	$0	$1,541	$1,903	$2,055
Average	$281	$0	$0	$281	$383	$762
Median	$0	$0	$0	$0	$0	$522
Min.	$0	$0	$0	$0	$0	$0

Max.	$1,541	$0	$0	$1,541	$1,903	$2,055
Std. Dev.	$565	$0	$0	$565	$721	$811

The chart shows escort costs for each state and scenario when applicable. Only law enforcement escort costs were included; private escorts were excluded from analysis. The law enforcement fees were separated out, because states treat and organize state patrol/police differently. Some state patrol units are contained within a state's DOT and others are independent.

Recommendations

Analyze, Update, and Simplify Fee Structure Across States

States should consider following Ohio's lead with a study of OSOW impacts on the economy (ODOT, 2009). This approach is encouraged for several reasons, including addressing economic competitiveness and infrastructure damage.

Beyond just economic impacts, using data can help appropriately price fees to address agency costs that consider externalities while still being reasonable to carriers. Since heavier vehicles provide a disproportionate amount of damage, the carrier fees might consider incorporating a portion of the fee to help mitigate infrastructural damage. In other words, a user fee. Other societal costs that occur as a result of congestion and accidents might also be considered in determining fees. Toll ways and turnpikes within the MAASTO region have taken an approach to charge different rates based on the number of axles a vehicle has. This strategy would seem to provide a more equitable system. It is important to consider that commissions and authorities have jurisdictional and decision-making authorities that can more easily increase tolls through boards of directors, instead of elected representatives. The volume of OSOW loads is relatively small compared to other vehicle types, but it could provide useful case study on user fees in an era with decreasing highway funding. Lastly, a data-driven study would provide transparency for fee schedules which are often confusing and have unknown or unspecified justifications.

Carrier fees are not optimally set across the region. Iowa, whose $10 per permit fee has been unchanged for 30 years and is among the lowest in the nation, is currently considering a fee increase. Other states reported not having adjusted their fee systems in 10 or more years. Changing the fee structure is difficult, since it requires legislative action or rule promulgation. Lawmakers might be hesitant to make these changes, especially if their state has underpriced its carrier fees, out of fear of upsetting industry. Transportation officials need to make legislators and policymakers (who are typically unfamiliar with infrastructure issues) aware of the current state of carrier fees and agency costs.

Furthermore, the fee structures are often complicated with multiple fee types that are calculated differently that apply in select situations for dimensions of a certain type. All states use a fixed fee, but in some cases, states use other fee types to supplement the base fee. Minnesota uses an ESAL mile fee, Missouri has a per-ton fee, Illinois uses a categorical weight/dimension and distance matrix. Illinois, Indiana, Ohio, and Wisconsin have a per-ton-mile fee.

One fee in Missouri is a movement feasibility fee imposed on loads with extreme dimensions. This is a flat rate fee of $250 regardless of how many miles traveled. In Ohio, superloads have a 4 cent per-ton-mile fee on the difference between the gross vehicle weight and 60 tons (120,000lbs). Fixed and variable costs fees serve different purposes and have different effects. Under a fixed fee like in Missouri, cost per mile decreases as the trip length increases. Variable fees typically increase linearly as an independent variable increases. The cost per mile is

unaffected regardless of the distance. States should keep these economic concepts in mind when designing fee structures, because the equity of the fees can affect the carriers' behavior.

In Illinois, the wind tower component scenario would have a gross weight fee calculated by gross vehicle weight and distance traveled, an over-dimension application fee determined by the length, and over-dimension fee specified by the distance range group and size category the trip falls under, and an escort fee based on the number of Illinois State Police districts the route traverses. Becoming familiar with one state's fee structure is not a simple task, much less ten states' fee structures. Carriers have cited certain states' fees as a contributing factor in taking routes that bypass states they consider problematic. Even if multistate permits are not currently feasible in the MAASTO region, uniformity and simplification of fees and fee structures would be a noticeable improvement for carriers applying for permits.

Recognize and Adapt to Trends

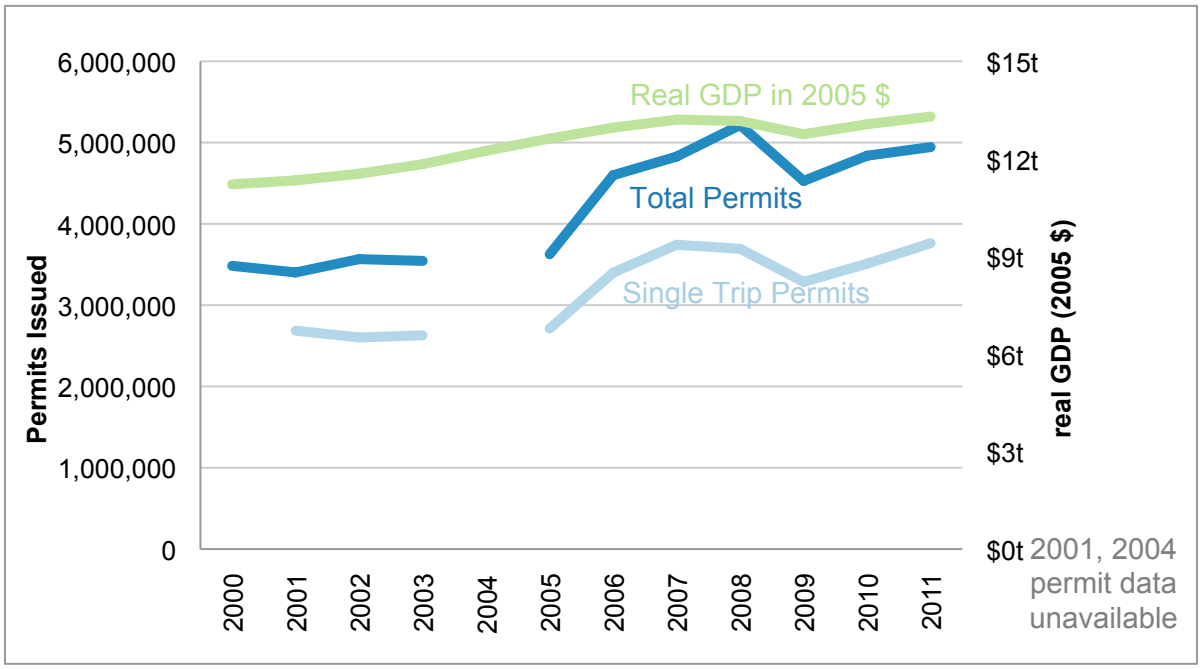


Figure 6: FHWA Freight Facts and Figures 2003-2011 – Total and Non-Divisible Single Trip Permits Issued

3.76 million non-divisible single trip permits were issued in 2011 surpassing the amount from any other year, according to 2012 FHWA Freight Facts and Figures. The trend shown in Figure 6 seems to mirror the national economy when represented in terms of real GDP using 2005 dollars and suggests increasing numbers of permits issued in the future. DOTs (and DORs where applicable) must be ready to handle these increases, which can be exceedingly difficult considering budget cuts seen at the state level.

In addition to higher quantities of loads, the current loads themselves are continually becoming longer, wider, taller, and heavier. Not only does this present logistical challenges in carrying out the move, but it also requires significant preparation. DOTs have reported spending several months developing a plan for specific complicated moves.

Most states are somewhere between completely manually-issued permits and completely automated permits on a continuum and are generally moving towards automation. Permit offices should continue to consider minimizing the amount of time spent on routine permits through investments in automated processes and self-issue systems. This will help allow DOTs to focus

their limited resources and personnel on larger, more involved loads that are increasing in frequency.

Contribute to Overall Industry Harmonization and Uniformity

The OSOW industry and DOTs have committed to improving the overall climate for carriers to do business. This has proved to be a challenge in practice, as states' laws and rules have been established and generally unchanged for decades. Difficulties do not lie in agreeing upon which policies are ideal, but more so in determining the preferred specifics and then gaining impetus to change them.

Carrier fees are essential to this overhaul. Obtaining a permit is one of the first interactions that a carrier has with an agency. Dealing with complicated fee structures and inconsistencies in total fee amounts can be frustrating. Moreover, these challenges can impact a business's bottom line. If carrier fees are more closely aligned with fellow states and total costs, it could significantly improve interactions between public and private entities in the OSOW industry.

The current state of the OS/OW industry is not optimized for the private sector, and the same can be said for permitting fees and costs. In the near term, there is little state DOTs can do to lower direct permitting costs outside of automating processes to decrease personnel hours spent managing the more routine permits. Transportation officials need to address the misalignments of permit fees and agency costs. By making policymakers aware and committing to work with the private sector to create better harmonized fee structures that are equitable while better covering direct and indirect costs of transporting an oversize load, the industry can improve and will benefits will impact many.

Infrastructure Impacts of OSOW Loads

This chapter includes a review of previous research with reference to roadway impact cost analysis, and attempts to correlate commonly regarded cost impact practices with OSOW operations. At the direction of the research project advisory committee, the research team developed a framework for understanding the true costs of said approaches. With this input, the research team attempted to narrow the broad list of potential impact areas

The complexity involved in identifying the individual trip impact on infrastructure is extremely difficult. Studies that have adopted a scientific approach are often not validated by field studies. Industry groups often depict these studies as unreliable and based on preconceived outcomes.

In light of this uncertainty, the research team has adopted a hybrid approach outlined herein that combines the expected outcomes based on laboratory measures with the field verified studies in other areas and on limited routes.

Overview

The U.S. highway system is continuously experiencing heavier and more frequent commercial truck traffic. While the number of OSOW permits issued across the Mississippi Valley region was slightly down in year 2009 compared to 2008, the number issued will still exceed previous averages. Load sizes and weight are increasing across the nation (Bittner, 2009).

The high volume of overweight permit and illegal trucks is disproportionately increasing the damage to the U.S. highway infrastructure system and reducing the service lives of bridges and pavements (Strauss & Semmens, 2006). Overweight trucks also cause a significant and disproportionate amount of damage to pavements. Although legal truck traffic accounts for a large percentage of damage to highway pavement, the percentage of damage caused by overweight permit and illegal trucks is much greater than the expected damage from legal trucks (Strauss & Semmens, 2006).

Thus, it is critical that the state DOT is able to estimate the impact and cost implications of the damage caused by overweight vehicles in order to maintain the safety of the system and develop effective infrastructure management and rehabilitation strategies. In particular, developing a mechanism to evaluate the damage and cost impact of overweight trucks will help Wisconsin DOT manage their permit issuance practices, establish permit policies and procedures, and devise weight enforcement strategies. The objective of this task is to develop models for assessing the cost of damage caused by overweight vehicles to highway pavements and bridges. The research team has followed these steps.

1. Review recently developed methods for assessing the costs of damage to pavements and bridges.
2. Identify the best approaches that would be applicable to Wisconsin infrastructure based on the information available on truck overweight, as well as bridge and pavement types and configuration.
3. Quantify the damages and associated costs due to different categories of heavy trucks (trucks satisfying the legal limits, permitted overweight divisible load vehicles, special hauling vehicles, non-permit trucks violating the legal limits or trucks violating their permit limits).

OSOW Permit Rule

FHWA Regulations

The following are the federally mandated maximum weights for the National System of Interstate and Defense Highways and reasonable access thereto (23 CFR Part 658.17):

1. 80,000 pounds gross vehicle weight
2. 20,000 pound single axle weight
3. 34,000 pound tandem axle weight

Axle spacing is another consideration that must be taken into account when looking at federal weight compliance. To protect bridges, the number and spacing of axles carrying the vehicle load must be calculated. Thus, a bridge weight formula is also applied to commercial vehicles in determining their compliance with federal weight limits. The federal bridge formula applies when the gross weight on two or more consecutive axles exceeds the limitations of the formula, except that two consecutive sets of tandem axles may carry a gross load of 34,000 pounds each if the overall distance between the first and last axle is 36 feet or more.

$$W = 500 \left[\frac{LN}{N-1} + 12N + 36 \right]$$

where W=overall gross weight on any group of two or more consecutive axles to the nearest 500 pounds. L=distance in feet between the extreme of any group of two or more consecutive axles, and N=number of axles in the group under consideration.

The federal government does not issue permits for oversize or overweight vehicles. This is the responsibility of each state.

A key consideration of the process is the definition of non-divisible loads. A non-divisible load is clarified using the following criteria:

> Permits may be issued by the States without regard to the axle, gross, or Federal bridge formula requirements for non-divisible vehicles or loads. Non-divisible is defined as any load or vehicle exceeding applicable length or weight limits which, if separated into smaller loads or vehicles, would compromise the intended use of the vehicle, i.e., make it unable to perform the function for which it was intended; destroy the value of the load or vehicle, i.e., make it unusable for its intended purpose; or, require more than 8 work hours to dismantle using appropriate equipment.

The applicant for a non-divisible load permit has the burden of proof as to the number of work-hours required to dismantle the load.

Divisible loads are designated divisible load permits may be issued by the state based upon historic state "grandfather" rights or Congressional authorization for a state-specific commodity or route movement at a greater size or weight.

State grandfathered rights regarding longer combination vehicles can be found in Appendix C to 23 CFR Part 658-Trucks Over 80,000 Pounds on the Interstate System and Trucks Over STAA Lengths on the National Network (23CFR Part 658, Appendix C).

Over-width Permits

States may grant special use permits to motor vehicles, including manufactured housing, that exceeds the federally specified 102 inch width limitation.

Infrastructure Cost Framework

Using this backdrop to understand the infrastructure-related permitting process, the research team developed the following matrix to identify infrastructure-related costs associated with OSOW movements. This framework can be applied using existing data to estimate costs.

Table 6: Framework to Determine Infrastructure Costs

	Traffic Load	**Infrastructure Impact**	**Cost Estimation**

List of items	▪ Truck configuration
	▪ Traffic volume
	▪ Amount of traffic (VMT)
	▪ Trip route (state highway and above)
		▪ Pavement
		▪ Bridge
		▪ Safety, congestion, environment (out of study scope)
			▪ Agency cost
			  ▪ Construction cost
			  ▪ Rehabilitation cost
			▪ User cost
			  ▪ Delay cost
			  ▪ Vehicle operation cost
			  ▪ (Accident cost)

Data/Tool	▪ Highway Performance Monitoring System (HPMS)
	▪ Vehicle Travel Information Systems (VTRIS)
		▪ Pavement
		  ▪ Mechanistic Empirical Pavement Design Guide (MEPDG)
		  ▪ Highway Cost Allocation Study (HCAS)
		  ▪ National Pavement Cost Model
		▪ Bridge
		  ▪ Federal Bridge Formula
			▪ Pavement
			  ▪ National Pavement Cost Model (NAPCOM)
			  ▪ Highway Cost Allocation Study (HCAS)
			  ▪ Highway Economic Required System (HERS-ST)
			▪ Bridge
			  ▪ Bridge Analysis and Structural Improvement Cost (BASIC)

Comment	Truck configuration such as number of axles and gross vehicle weight need to be provided at an accurate fleet mix to be useful. See the next section for recommended steps.	MEPGD tool may be best suited for project level analysis. A broader impact analysis tool is needed for network-level analysis.	Agency cost and user costs should be separated so that state administrators can understand issues associated with them. The agency will also need to identify personnel and associated systems costs for permit review and issuance.

The intent of the research team in developing this framework was to identify critical issues necessary in order to determine the costs associated with permit issuance. This framework serves as a guide for approximating costs of roadway damage due to loads outside the norm. The framework could be validated with data that is available at the state and federal level. An important caveat: this validation would be criticized by industry groups as not accurately portraying the damage caused by regular passenger vehicles and under-representing the damage that allowable loads have on the infrastructure—particularly that caused by straight trucks.

The research team recommends the following steps for quantifying infrastructure impacts in a defensible and equitable manner. This framework contains seven steps.

1. Identify Truck Configurations Currently in Use

Identify truck configurations currently used, including vehicle configurations, weight, number of axles for OSOW trucks permitted and not permitted.

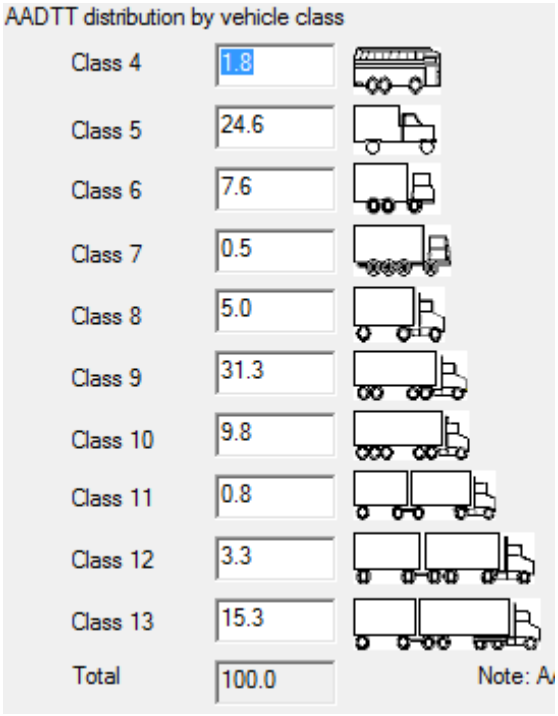


Figure 7: Illustrative Truck Configurations and Characteristics of Typical Vehicles and their Current Uses

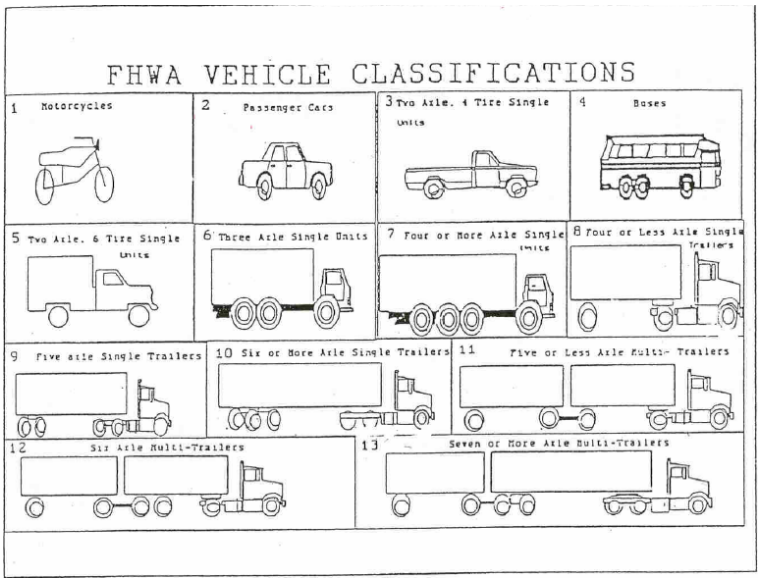


Figure 8: Representative Vehicle Configurations

Figure C.3 Six-Axle Tractor Semitrailer with GVW 90,000 Pounds

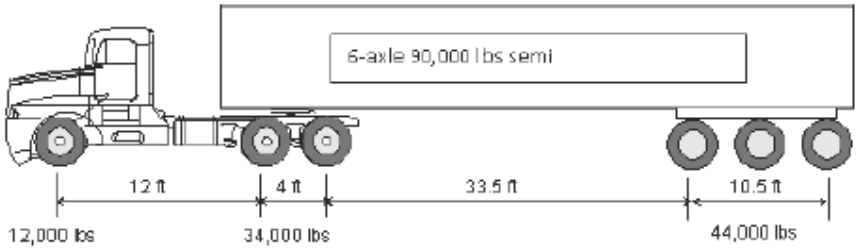


Figure C.4 Six-Axle Tractor Semitrailer with GVW 98,000 Pounds

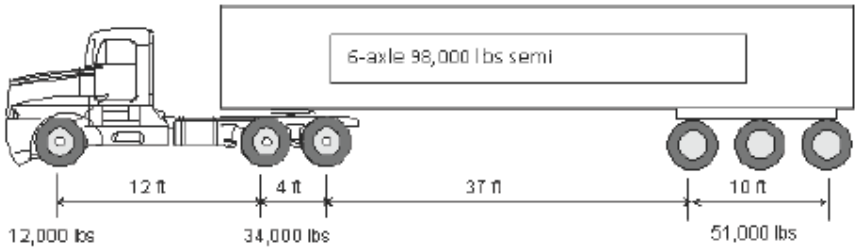


Figure C.5 Seven-Axle Tractor-Trailer Utilizing a Four-Axle Tractor with GVW 97,000 Pounds

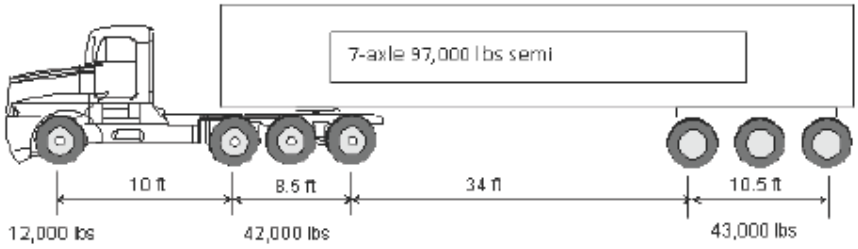


Figure C.9 Six-Axle Straight Truck and Trailer with GVW 98,000 Pounds

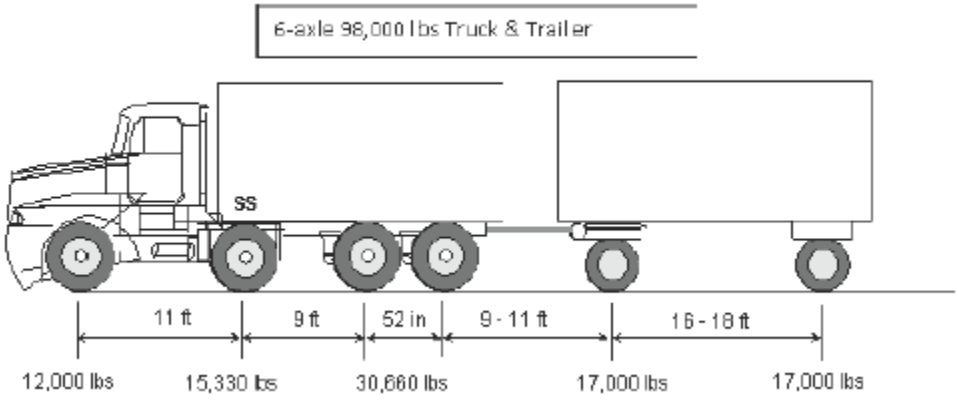


Figure 9: Six Axle Configurations

Figure C.6 Eight-Axle B-Train with GVW 108,000 Pounds

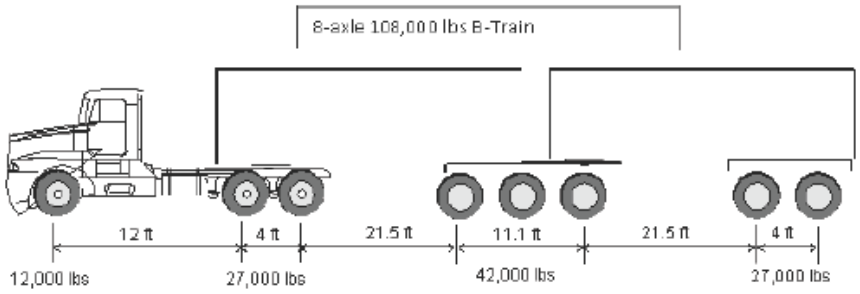


Figure C.7 Seven-Axle Straight Truck with GVW 80,000 Pounds with Self-Steering Axles at Locations 2, 3, and 4

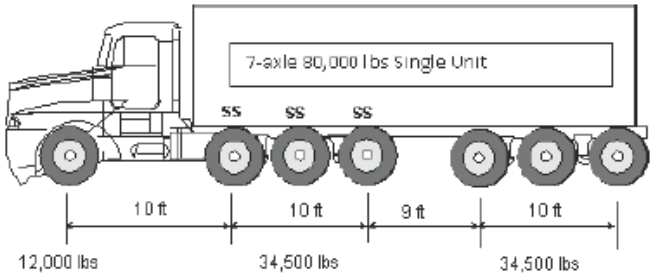


Figure C.8 Seven-Axle Straight Truck with GVW 80,000 Pounds with Self-Steering Axles at Locations 2, 3, 4, and 7

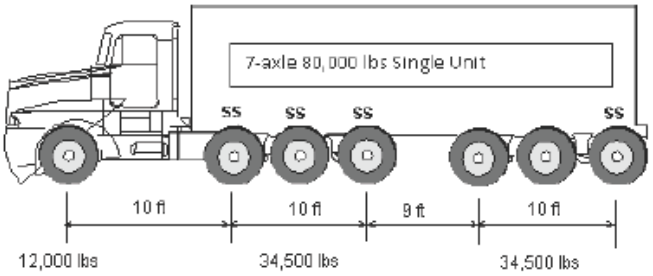


Figure 10: Seven Axle Configurations

2. Calculate ESALs Per Each Vehicle

Calculate the equivalent single axle load (ESALs) using the following table, which is based on previous studies for determining commercial vehicle damage to infrastructure.

Table 7:Equivalent Single Axle Load Calculations

Number	Configurations	Abb.	ESAL	Fed bridge Formula
0 (base)	Five-axle 80,000 pound tractor-semitrailer	5a TST 80	2.4	Y
	Five-axle 80,000 pound tractor-semitrailer	5a TST 90	4.1	

Number	Configurations	Abb.	ESAL	Fed bridge Formula
1	Six-axle 90,000 pound tractor-semitrailer	6a TST 90	2.0	Y
2	Seven-axle 97,000 pound tractor-semitrailer	7a TST 97	2.2	Y
3	Seven-axle 80,000 pound single unit truck	7a SU 80	5.1	Y
4	Eight-axle 108,000 pound double	8a D 108	2.1	Y
5	Six-axle 98,000 pound tractor-semitrailer	6a TST 98	4.2	N
6	Six-axle 98,000 pound straight truck-trailer	6a STT 98	4.4	N

The most common historical approach is to convert damage from wheel loads of various magnitudes and repetitions ("mixed traffic") to damage from an equivalent number of "standard" or "equivalent" loads. The most commonly used equivalent load in the United States is the 18,000 lb (80 kN) equivalent single axle load (normally designated ESAL) (Pavement Interactive, 2009).

Virginia DOT (3) adopted the following method for determining ESAL factors when no actual weigh in motion data or vehicle classification data are available. These factors are used to determine estimated ESAL factors for flexible pavement:

Table 8: ESAL Factors for Flexible Pavement

Vehicle Classification	ESAL factor
Cars/Passenger Vehicles	0.0002
Single Unit Trucks	0.37
Tractor Trailer Trucks	1.28

A similar set of factors are used for rigid pavements:

Table 9: ESAL Factors for Rigid Pavements

Vehicle Classification	ESAL factor
Cars/Passenger Vehicles	0.0003
Single Unit Trucks	0.56
Tractor Trailer Trucks	1.92

In order to apply the calculations, some classification is necessary. The FHWA classifies vehicles in terms of their configuration rather than weight. This type of classification system is more conducive to traffic applications but can be adapted for pavement loading applications. The FHWA *Traffic Monitoring Guide* (TMG) recommends classifying vehicles into 13 different categories. All states currently use this classification scheme or some variation of it for classifying vehicles, although few use it exclusively. States typically aggregate the 13 FHWA categories listed below into a small number of categories (about three to five) for ESAL forecasting and estimating.

Table 10: FHWA Vehicle Classification System

Class	Type	Typical ESALs per Vehicle
1	Motorcycles	Negligible
2	Passenger cars	Negligible
3	Other two-axle, four-tire single unit vehicle	Negligible
4	Buses	0.57
5	Two-Axle, Six-Tire, Single Unit truck	0.26
6	Three-Axle Single Unit Trucks	0.42
7	Four or More Axle Single Unit Trucks	0.42
8	Four or Less Axle Single Trailer Trucks	0.30
9	Five-Axle Single Trailer Trucks	1.20
10	Six or More Axle Single Trailer Trucks	0.93
11	Five or Less Axle Multi-Trailer Trucks	0.82
12	Six-Axle Multi-Trailer Trucks	1.06
13	Seven or More Axle Multi-Trailer Trucks	1.39

Some states have simplified the FHWA classification systems for their own purposes. WSDOT for example, uses a simplified version of FHWA vehicle classification system (MnDOT, 2010).

Table 11: WSDOT Vehicle Classification System

WSDOT Category	FHWA Classes	WSDOT Assumed ESAL per Truck
Single Units	4,5,6,7	0.40
Double Units	8,9,10	1.0
Trains	11,12,13	1.75

Annual ESALs = 365 [0.40 (single units) + 1.00 (double units) + 1.75 (trains)]

Minnesota has developed its own ESAL calculations as well. These numbers are used for county road pavement designs. Their vehicle classification data contains 8 default values. These default values are based upon whether the road is rural or urban and the projected average daily traffic ranges. MnDOT has also developed a Microsoft Excel Spreadsheet for these calculations that could be easily adapted for Wisconsin applications (MnDOT, 2010).

3. Investigate the Total Number of Truck Usage (ESALs) in Each Truck Configuration

For ease, truck configurations and lists are available in national research (Hanwood et al., 2003). These estimates provide the overall number of trucks and truck-miles of travel by truck type and number of axles. For Wisconsin,

Example: 6aTST90: 2000 ESAL mile per payload ton-mile

4. Calculate Incremental Changes in ESALs by OSOW Loads

Calculate the incremental changes in ESALs caused by OSOW loads over the base case. This step will use existing permit information to determine year-to-date changes.

5. Estimate the Costs Associated with an Additional ESAL Mile of Travel

Estimate the cost to highway agencies and other road users associated with an additional ESAL mile of travel.

1. Estimate the impact on additional ESAL (marginal cost for additional ESAL).
2. Calculate the total miles that the OSOW trucks per trip.
3. Estimate the additional cost with additional ESAL.

6. Calculate the Change in Pavement and Bridge Deck Costs

Calculate the change in pavement and bridge deck costs as the product of the change in ESAL miles and the cost per ESAL mile.

The proposed model should provide the number of lanes miles by highway type (flexible and rigid) and functional class highway. The estimate of total lane miles by functional class of highway is combined with pavement rehabilitation unit cost figure.

7. Calculate the Agency Costs Per Transaction

Previous studies have been focused on truck size and weight scenarios, not individual OSOW trucks. These regulatory based studies start from load distributions based on various scenarios

(economic development, commodity growth, etc). As a result, the total VMT should be less than the base case (current VMT). Thus, it is shown that impacts on pavements are negative, in other words, the society can save more money by allowing larger and heavier trucks.

However, this study is not about truck size and weight scenarios, but an effort to estimate the impact agency costs by individual or group of OSOW trucks. Load distribution is not necessary.

Cost Thresholds for OSOW Operations

In order to determine the sensitivity of permit fees and the corresponding compliance rates among carriers, the research team completed interviews with several carriers and state department of transportation or other state permitting personnel. The results of these interviews overwhelmingly indicated that fee increases understandably will alter the decision making processes for carriers.

According to representatives of the heavy hauling industry, in nearly all scenarios, permit fees aligned closely with actual costs outlined above would not be recoverable in the current costs of operations. One hauler noted:

> We are operating right now at incredibly small margins. Between hours of service limitations, escort policies, and increasing competition we cannot extract higher permit fees from our shippers. In especially complex multistate moves, the difference between a few hundred dollars will substantially change our profitability.

Another carrier made similar observations:

> There's no way that we can pass increased costs along unless you're one of the specialized haulers. And the fees and the difficulty of getting a permit often are more hassle than taking a risk and paying a fine. I know that I will need to compete and my costs matter.

A Midwest state official remarked:

> I hear all the time about how responsive we need to be to customers. But at the same time I understand the costs for my staff and for the construction office. I don't think that the industry can be asked to bear all the repair costs when legal loads also do damage.

One carrier interviewed did believe that higher permit fees would be able to be passed on.

> When we take on the work, we incorporate the costs. Our part of the whole package is pretty small. If not getting the equipment on site costs them production time, they'll pay a premium. We're often the only hauler they'll choose because we have the specialty equipment.

The overwhelming majority of responders however did not believe that there was enough evidence to commit a higher fee to specific loads. A trucking executive commented:

> The damage is caused on a per axle basis. We're spreading the loadings out so much that we're well under the equivalent of a 80,000 pound five axle vehicle, let alone some of the dump and straight trucks out there.

A similar theme was evident throughout the industry. During interviews held at the 2011 Mid-America Association State Transportation Officials Subcommittee on Highway Transport, most carriers commented that fees associated with the true costs of operations would not be accepted by the community. Most OSOW carriers point at the regular damage inflicted on the infrastructure by existing traffic (legally loaded trucks, commercial buses, and passenger vehicles) as principal factors in the costs associated with their industry. Without an ability to

adequately assign costs, the industry representatives noted that the charges specific to individual movements are incredibly difficult to justify.

Conclusions

The research team concluded that permit fees do not recover the costs of issuance. However, in all agencies the permit fee was not designed to be a cost-recovery mechanism. Single trip permits are often issued under the actual agency costs of issuing due to automation, but do not capture the ongoing operational or infrastructure damage caused by the overweight loadings. This is magnified in the multi-trip permitting processes available in most states as more damage is caused by the extreme number of loads carried.

DOTs should consider multiple changes to the fee structure that would better reflect agency costs and take into consideration the high infrastructure impacts caused by OSOW loads. In general, harmonization across states will greatly reduce costs and the regulatory burden for carriers.

The authors do not make a specific recommendation for agencies with respect to permit fee determination. A framework is presented to calculate damages based on specific configurations. The research team recommends a future effort to field test and populate the proposed framework following the recommended approach. The research team does recognize additional and site specific research to determine the impact and associated cost of pavement damage due to single trip, oversize and overweight movements.

Agency costs outside of pavement and bridge damage are not well represented in the permit fees charged. In most cases, this is due to particular agency policy decisions; to date, no comprehensive study has been conducted to determine a per transaction cost of doing business. The research team recommends adopting a study to determine a per transaction cost associated with the issuance of each permit in its purview.

Industry outreach is critical to the success of the permitting processes from a statewide point of view. The establishment of regular and routine interactions with the industry representatives will allow for industry buy-in of emerging practices and allows the state agency representatives to better understand and recognize the true costs of regulatory changes to business.

The research team learned through interviews that there is a great deal of concern about overly burdening the carrier community for damage that is caused by legal loadings. Agencies would like to bring some consistent approaches to the processes for issuing permits.

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Appendix 1: Emerging Practices for OSOW Permitting

The objective of this section is to examine oversize/overweight (OS/OW) permitting practices in the United States, with a focus on emerging from other states and agencies. The intent would be to offer observations on existing programs, both in other states and currently being used or considered in Wisconsin. The research team recommendations allow the DOT to select from lessons learned and the experiences of other jurisdictions.

Survey of States

As part of an ongoing project for the New Jersey Department of Transportation, Cambridge Systematics completed a survey on permitting practices across the United States (Titze, 2011). Among the findings of their review of 51 state agencies and permitting organizations:

- 15 states use off the shelf commercially available software
- 30 states use non-commercially available software custom designed for them
- The average number of:
    - Permit Limits was 10
    - Permit Types was 6
    - Permits with Surcharge was 1 per state
    - Incremental Fees averaged 1 per state
    - Incremental Surcharges was 1 per state
- Permit limits beyond the legal limits are predominantly defined by: Weight distribution by axle; Axle spacing/wheelbase; Configuration; and/or by route (as height becomes a prevalent factor)
- Superloads are defined with the most variance among states

The following selected practices focus on selections resulting from interviews, literature reviews, and assessment of current practices in Wisconsin and other states. The membership of the MAASTO Subcommittee on Highway Transport, professional trade organizations, and transportation researchers were consulted to generate the following examples. Where appropriate, citations are provided for additional information.

Adopt Standard Envelope Characteristics for Permitting

Adopting envelope characteristics allows for the greatest ability to efficiently and regularly issue permits. All states use general design vehicles for roadway construction and encouraging consideration of specialty vehicles for over-dimensional transport is gaining popularity in areas with specific commodity needs (like wind energy). Consistent definition for permit vehicles is essential for improving automation and answering specific inquiries as vehicle configurations and sizes are modified.

Often the term “envelope vehicle” is used to define a predetermined and/or pre-cleared size and weight configuration of a vehicle, which may then pass particular common routes. Without this sort of envelope analysis on expected routes or routine routes in the state, the agency must perform a vehicle-route check on each trip requiring additional manpower and time to complete the issuance task. Once in place, efficiency is gained for both the agency and permit applicant.

One of the critical advantages to adopting envelope permitting is that is allows a specific company to operate any load on a properly registered truck owned or leased to that company that meets the envelope characteristics. It helps reduce the number of exemptions that could be required to meet commodity specific requirements and ensures that consistent clearance and weight regulations are met. Texas, Colorado, Arizona, and others use this approach. In addition, southern states have adopted a Multi-State envelope permit. Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, Ohio, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia participate in this program.

Establish Freight Advisory Committee; Engage Stakeholders

States are encouraged to develop freight plans and organize freight advisory committees to give stakeholders input into freight project planning. In states with formalized, regular contact with stakeholders in an organized fashion, significant modifications to operating practices are more readily achieved.[1]

Minnesota has one of the oldest Freight Advisory Committees, dating back to the early 2000s. The objectives of Mn/DOT's committee are to:

- Ensure freight transportation needs are addressed in the planning, investment, and operation of Minnesota's transportation system.
- Establish guidelines to measure and manage the state's freight transportation needs.
- Provide input and direction to MnDOT's freight investment committee on freight transportation policies, needs, and issues.
- Recommend program and research areas for MnDOT follow-up and direction.
- Represent the needs and requirements of freight transportation to the public, elected officials, and other public agencies and organizations.

Wisconsin's Motor Carrier Advisory Committee can serve in this capacity and be better utilized to provide stakeholder input to existing policies. Established in 1987, WisDOT's Motor Carrier Advisory Committee works as an independent form to provide information exchange between WisDOT and the motor carrier industry. MCAC helps the department with program planning and evaluation by advising on the effects department policies and procedures have on the trucking industry (Cantwell, 2000). The research team recommends closely linking the MCAC with the Bureau of Traffic Operations to ensure regular activity and prevent duplication or conflicting messages to the trucking community.

Automation

Automation of all, or part, of the permitting processes has been deployed in many agencies. The carrier community embraces this automation and move to greater online access. Automation also reduces staff efforts allowing for staff time to be devoted to special or unusual requests.

Automated applications integrate bridge, construction, turn movements, roadway characteristics and temporary restrictions – such as lane closure– on the network to safely and accurately route vehicles through the highway system.

[1] A Guidebook for Engaging the Private Sector in Freight Transportation Planning, Publication number FHWA-HEP-09-015, May 2010.

The safe and efficient routing of oversized and overweight vehicles is key to successful management of the highway system. An automated system can streamline workflow processes; improve the safety of vehicle movements, and help preserve transportation infrastructure.

While different vendors were not interviewed on this project, several programs feature complete systems that allows agencies to automatically generate safe travel routes, utilize temporary changes in road conditions in real-time, and log routes for simple tracking–all through web-based applications.

Many agencies use a publically accessible web site with full permitting information and links to related commercial vehicle services/resources, easy access to carrier account information, and often end-to-end permitting service from application to delivery of credentials. If a carrier can print the permit credential to carry in the vehicle, there is a substantial savings to the carrier both in time and money attributed to mailing or visiting agencies in person.

Anecdotal information suggests that permit compliance increases, as seen through increased volume generated upon automating, with the convenience in which a carrier may obtain a permit.

Automated OS/OW permitting processes also can reduce staffing requirements and allowing staff to specialize in the more complex segments of permitting, including routing, superloads, and process of engineering reviews. Reduced paperwork and mailing costs decrease overall agency operational costs.

Automation of the processes related to permit generation, however, can prove costly. Texas's program was launched in August 2011 at a cost of $1.6 million. Texas gives truckers right of way with automated permit, mapping system.[2] However, automated efforts typically return their investment quickly. Texas has generated 24 percent more revenue at lower staff costs. Colorado had similar results and successes.[3]

Link Permit Fees to Infrastructure Improvements

No states have been able to adopt a consistent approach to link infrastructure damage related to oversize and overweight loadings with permit fees charges. The aforementioned Virginia study has been discounted in many states as being overly broad. In some cases, individual negotiations have occurred between industry haulers and local jurisdictions. For example, the State of Alaska has negotiated direct payments from industry groups to cover road repairs on specific routes that are damaged by overweight movements.[4] Many wind energy installations pay similar impact fees to the local community using before and after survey data.[5]

Many states, however, do not have any mechanism in place to make sure that permit fees or payments in lieu of taxes remain dedicated to highway improvements. Failure to link the two items highlights the arbitrary nature of permit fees and the challenges with moving to a more industry based fee approach. Uniformity in processes becomes a challenge for multi-state

[2] Government Computing News, October 2012
[3] Nord, M, and Hovey G. Load Rating and Permit Vehicle Routing, Transportation Research Board http://onlinepubs.trb.org/onlinepubs/circulars/circ498/v2_K05.pdf
[4] Alaska Department of Transportation. http://dot.alaska.gov.
[5] Illinois: Mayberry Daniels, Wind farm backers still negotiating road deals, The News Gazette, September 2011; Oklahoma: Todd, Jeff, Wind law and negotiations from a landowner's perspective, Oklahoma Bar Association, September 2010

loads.[6] The research team recommends that fees charged be linked directly to notable infrastructure spending to gain support in the industry and to accelerate adoption.

Continue Regular Regional Meetings for MAASTO SCOHT

Most states are increasing their regular communications between various permitting agencies. The Mid-America Association of State Highway and Transportation Officials (MAASTO) provides an opportunity for regular meetings and discussions across a range of industry stakeholders and interested parties. This meeting also provides an opportunity for networking to address common problems. The customer focused approach, including roles for industry, state, and researchers, evident in the 2009 and 2011 meetings has been well received by the industry and has improved the relationships between carriers and DOT or permitting officials.

Other examples where this type of arrangement works include the Commercial Vehicle Freight Forum of the Intelligent Transportation Systems Alliance, the Intermodal Freight Technology Working Group established by the FHWA and the Intermodal Association of North America. The TRB Committee on Transportation Asset Management and the AASHTO Subcommittee also have regular joint meetings and monthly teleconferences between leadership to keep abreast of current activities and head off potential issues. Kansas established a single point of contact arrangement in partnership with industry and several responsible state agencies.[7]

Ramp and Lane Closure System Information

Wisconsin's web-based system used to track closures and restrictions on Wisconsin state highways is a leading example of using information technology to improve OSOW routing. The system integrates historical traffic flow data and capacity information to calculate available closure thresholds, thereby resulting in better information available not only for the vehicle driver, but also to provide automated routing in a constantly shifting environment. The system, developed by researchers at the University of Wisconsin-Madison in partnership with the Wisconsin DOT, represents a best practice for other agencies to consider.[8]

Other examples of these types of systems are in place in state 511 systems. Washington state uses updated information as part of its commercial vehicle program.[9]

Publish and Maintain Review Schedules

One of the most frequently cited complaints among permit seekers is a lack of certainty in when permits are issued. Most routine permits are issued nearly instantly but some take more complicated reviews. Agencies should adopt regular review schedules and allow for status tracking. Several northeastern states have adopted permit tracking systems that provide information for queries.

Texas established an intranet based Permits Report through its TxPROS system.[10] The system can show progress on permits and provides real-time information helpful to managers as they respond to inquiries. It also helps provide a customer focus to the Permit process.

The Kansas Trucking Connection also provides a permit report procedure. CFIRE has prepared a Wisconsin Guide to Trucking that could serve as a base format for this type of information.

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[6] OSOW Best Practices: Permitting, Design, and Cross-State Coordination. http://midamericafreight.org/wp-content/uploads/MAFC_AM_OSOW_Issues.pdf.
[7] Truckin' Through Kansas. http://www.kcc.state.ks.us/trans/ktc_handbook.pdf.
[8] Transportal: Closures: http://transportal.cee.wisc.edu/closures.
[9] Washington DOT Freight Mobility Plan, http://www.wsdot.wa.gov/Freight/freightmobilityplan.
[10] TxPROS. http://www.txdmv.gov/motor_carrier/overweight_permit/txpros.htm.

Track Permit Revenue and Publicize the Results

The State of North Dakota has received a great deal of attention over the past year with record numbers of permits issued as the state continues production of oil and natural gasses. The permit revenue statistics and associated information is used as part of a larger discussion on the proper investment in infrastructure. The discussions resulting from these permit issuances directly affects the agency's ability to maintain certain highways. The tracking and publication allows public discourse on the costs of providing infrastructure to support continued economic development.[11]

Communication with legislatures becomes increasingly important for exploring re-investments in the system compared to permit revenue. In North Dakota, the state will spend double what was expected on highway maintenance in oil-producing regions. This nearly $1 billion in roadway expenditure is offset only mildly by revenue from permits that more than doubled during since 2009, from $5 million to $10.6 million.[12]

Routing Efficiencies

Seamless handoffs between states or other jurisdictions are an essential piece of efficient permit movements. In most cases, the multistate permit approaches will address these boundary crossings. The models presented by the Northwest Passage studies and the WASHTO and SASHTO organizations allow for improved multistate communications.

The previously mentioned Multi-State permits in the Southeast and some bilateral agreements between states like Wisconsin and Minnesota also allow for routing efficiency. More formalization of multi-state permits can enhance the entire operation.

Embrace Social Media

While not directly related to permit fees, the customer service aspects that social media allows are not inconsequential to the overall success of a permitting program. State DOTs in Kansas and Washington state have used social media, including Twitter and Facebook, as a customer relations tool. Through liberal use of Twitter, problems can be addressed relatively quickly if issues arise.

Performance Measures

All 52 AASHTO members use some form of performance measurement across various aspects of DOT activities. Some are statutorily required while others are used as a management too. Generally any movement towards automation provides the added benefit of reporting performance and tracking capabilities. Texas established an intranet based permits report. The system can show progress on permits and provides real-time information helpful to managers. Reports can be generated to run regularly and management has the option to run other queries for specific reports.

This adoption of performance based programming also benefits agencies as they can use permit system data for other commercial vehicle activity. Among the programs that can be fed are safety programs such as Motor Carrier Safety Assurance Program (MCSAP). Additionally, analysis of permits issued, weights, loads, and configurations may be useful for agency planning efforts and maintenance and safety performance targets.

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[11] Bismark Tribune (2012). ND on record pace for overweight truck permits. Bismark, North Dakota.
[12] McPherson, J. (2012). Overweight Trucks Take Toll on ND Oil Patch Roads. Fuelfix.com. http://fuelfix.com/blog/2012/06/15/overweight-trucks-take-toll-on-nd-oil-patch-roads. Accessed: June 2012.

The Cambridge study held that state agencies are consistently measuring volume of permits generated by permit type, but with a range of frequency monitoring, including volume by day, month, and year. PennDOT has the most comprehensive tracking and reporting metrics which includes additional breakdown of distribution of income by permit type monthly and yearly as well as tracking of construction delays by each individual district.

Appendix 2: Revenue Survey Responses by State

Alabama

- In Alabama, oversize/overweight permit fees are distributed into what is known as the Public Road and Bridge Fund. This Fund is used to provide federal matching funds and whatever is left after the match requirement is used for other state projects.
- In FY2009 the Alabama Department of Transportation collected $3,368,990 from oversize/overweight permits. The Department has budgeted collections of $3,500,000 in FY2010.
- To my knowledge, the oversize/overweight fees just go into this general pot of money and there are no specific restrictions on how it may be spent.

Alaska

- The revenue is channeled to the general fund operating budget via the state accounting system
    - Total revenue is reported as a component of total receipts received by the Measurement Standards and Commercial Vehicle Enforcement Division of the State of Alaska Department of Transportation and Public Facilities
- On average about $1.2 million is collected annually from oversize/overweight permits
- The permit fee revenue can be used for any general fund expenditure
    - The State of Alaska Constitution prohibits the dedication of revenue for a specific purpose

Arkansas

- Fines are remitted by the cities and counties to the Dept. of Finance & Administration - Administration of Justice Fund Section (a division of DFA - Administrative Services). I have attached the sheet that is remitted monthly by the cities and counties.
    - Penalties for overweight/over length trucks are governed by Arkansas Code Annotated 27-35-201 et seq.
- Total fee revenue collected for fiscal year 2009 was $1,179,604.40.
- Funds that are collected are remitted to the State Highway and Transportation Department Fund. This is the general operating fund for the Arkansas Highway and Transportation Department and combines revenues for motor fuel and vehicle taxes, federal revenues, dedicated users fees, and other sources of funding for the Department.
    - The AHTD is constitutionally independent of the Executive branch (Amendment 42 of the Arkansas Constitution).

Connecticut

- The oversize/overweight permit fees are deposited into the Special Transportation Fund under the "license, permits, and fees" revenue item.
- During FY 2009, approximately $2.7 million was collected from the permit fees.
- Once collected the revenue is available in the Special Transportation Fund which supports the operations of the Department of Transportation, the Department of Motor Vehicles, and Debt Service on Special Tax Obligation bonds issued for Transportation projects. The fees are not dedicated to a specific purpose in the fund itself.

Delaware

- All oversize/overweight permit fee revenues are collected and deposited into a designated cash management account within the Transportation Trust Fund (TTF), these revenues are considered Pledged Revenues and are governed by the Trust Agreement and bond covenants.
- CY 2009 A total of $1,150,501 was collected, which includes $256,421 for tolls (SR1 and I95) CY 2008 - $1,485,974 (tolls $339,790) CY 2007 - $1,637,176 (tolls $341,329) CY 2006 - $1,733,080 (tolls $401,700)

- Per our Trust Agreement, these revenues, along with other pledged revenues, are swept into a general revenue fund and distributed on a monthly basis to pay 1/12 of the annual debt-service obligation, 1/12 of the annual operating budget and any remaining funds are then deposited into the capital account to be used for authorized state capital expenditures.

Florida

- The revenues received from the issuance of the permit fees are deposited into the State Transportation Trust Fund
- The net revenues generated from the issuance of overweight/over-dimensional permit fees to truckers doing business in the State of Florida for the previous 3 years are as follows:
  - FY 2006/07: $8,055,323.00
  - FY 2007/08: 8,021,820.85
  - FY 2008/09: 7,256,939.00
- The revenues shall be used to repair & maintain the road in the State of Florida.

Georgia

- The funding goes into the Department's operating account and is used to cover expenses associated with the Permit program and weigh station. Title 32 Highways, Bridges, and Ferries §32-6-28 Excess weight and dimension permits.
  (5) d. Notwithstanding any provisions of Code Section 48-2-17 to the contrary, all fees collected in accordance with this Code section shall be paid to the treasure of the department to help defray the expense of enforcing the limitations set forth in this article and may also be used for public maintenance purposes in addition to any sums appropriated therefor to the department.
- FY '09 OPU Revenue = $6,951,680.78
- The revenue is distributed between the Oversize Permit office and the GA Department of Public Safety (MCCD) per agreed upon MOU. For FY 2009 GDOT retained $1,700,000.00 and the balance was sent to the DPS.

Illinois

- Revenues from Oversize/Overweight Permit fees are deposited into the Road Fund. Pursuant to 625 ILCS 5/Chapter 15
- In Fiscal Year 2009, over $18.6 million was collected from this fee source.
- The purpose of the fees is to help defray the cost of damage to the roadways by oversize/overweight loads.

Kentucky

- Fees for oversize/overweight carriers fall into two broad categories for the purposes of fee collection and distribution:
- The vast majority of these fees are collected from carriers that pay for either an annual or per-trip permit to move general goods that are oversize/overweight on any roadway in Kentucky. These fees are collected in accordance with Kentucky Revised Statutes KRS 189.270-189.272 and vary depending on the type of goods being transported and the actual size and weight of the load.
- For fiscal years (July-June) 2007, 2008, and 2009, the amounts collected for these types of loads were $7,063,871.88, $7,310,335.03, and $7,036,703.68 respectively.
- These fees are deposited to the Commonwealth's Road Fund, which is a constitutionally established fund dedicated to general transportation needs. There are no restrictions on the use of these funds.
- The Cabinet also collects overweight fees from carriers that transport coal on a network of roads designated by the Cabinet as extended-weight coal haul roads. These fees are collected in accordance with KRS 177.9771 and vary depending on the number of axles

and weight of the vehicle. These fees are also deposited to the Commonwealth's Road Fund, but are designated "Energy Recovery Road Funds," and their use is highly restricted.

- The amounts collected under this type of permit for fiscal years 2007, 2008, and 2009 were $842,239.03, $774,379.14, and $832,652.91 respectively.
- Sixty percent of the funds are credited to the Department of Highways for the exclusive purpose of constructing, maintaining, or repairing the portions of the coal haul network that are maintained by the state.
- Forty percent of the funds are distributed to the fiscal court of the county in which the coal is transported, based on each county's share of mileage of the total coal haul road network and each county's share of tonnage of coal moved on the network. The county fiscal court must use these funds to construct, maintain, or repair the county maintained portion of the coal haul network.

Maine

- Maine deposits fees for oversize/overweight permits into the Highway Fund.
- The Highway Fund is used to account for revenue derived from excise taxes and license and other fees relating to the registration, operation, and use of vehicles on public highways and from fuel used for the propulsion of these vehicles, with fuel taxes representing roughly two-thirds of Highway Fund revenue. Pursuant to the Constitution of Maine, Article IX, Section 19, this revenue must be used for highway related activities. This revenue is expended primarily within the Departments of Transportation, Public Safety and the Secretary of State (Bureau of Motor Vehicles).
- The amounts budgeted for oversize/overweight permits for state fiscal years 2009-10 and 2010-11 are $707,776 each year. The actual amounts collected for the two previous fiscal years were-- FY 2007-08: $986,088; FY 2008-09: $843,915.
- In Maine there is no specific distribution of these particular fees. Once collected the fees are deposited into the Highway Fund as undedicated revenue. Through the budget process the Legislature allocates the Highway Fund to various Departments/Agencies for highway related activities.

Maryland

- Revenue from Hauling Permits is received by SHA, deposited in the Transportation Trust Fund (TTF).
- Revenue received from Hauling Permits amounted to $10.5M in FY 07, $11.8M in FY 08, and $10.1M in FY 09.
- Hauling Permit revenue is not dedicated to any specific purpose. All revenues of the TTF are dedicated to paying debt service on the Department's bond obligations. After that, revenues are used for any transportation purpose.

Michigan

- OS/OW fees for permits issued by the Michigan Department of Transportation are directed to the State Trunkline Fund which funds the operations of the Michigan Department of Transportation. Local Units may also levy os/ow permit fees for permits issues to operate on roads under their jurisdiction.
- Revenue varies from year to year based on the number and type of permits issued. Revenue for 2010 is estimated at $5 million.
- OS/OW fees are used exclusively for transportation purposes.

Minnesota

- Oversize/overweight permit fees are deposited as non-dedicated receipts into the state trunk highway fund.
- Permit fee revenue totals approximately $3 million per year

- Once deposited, the fees become part of the larger fund balance, and are appropriated in the same manner as other fund resources.

Mississippi

- These fees are collected by MDOT's Law Enforcement Division and deposited monthly into the State Highway Fund.
- MDOT receives between $12 and $14 million annually in Oversize, Overweight permit fees. ($14.5 million in FY2009)
- This revenue source is combined with Fuel tax, Tag Fees, and other state source special fund revenue for the Construction and Maintenance of highways.

Missouri

- Revenue is deposited into the State Road Fund.
- $7,836,786.60 in revenue was collected
- Revenue is dedicated to the State Road Fund.

Montana

- Fees collected are deposited into one of two transportation funds: a constitutionally restricted fund and a non-constitutionally restricted fund.
- Approximately $4.6 million annually is collected. The funds in which these fees are deposited are used to fund services provided by the Montana Department of Transportation (construction, maintenance, and administration of the state's transportation network) as well as transportation-related activities in other agencies (i.e. Highway Patrol in the Department of Justice).

New Mexico

- 100% of revenues for OS/OW are placed into our DOT main Road Fund.
- $5 M in FY 08, $4.5M in FY09, $4 M in FY 10. (Fiscal Years – July to June).
- Revenues are placed in the Road Fund for general, un-earmarked use.

North Carolina

- Oversize/overweight permit fees are deposited into the Highway Fund.
- For fiscal year ending June 30, 2009, $5,755,377 was collected. The estimated budget was $6,690,000. Fiscal year to date through November 30, 2009, $$2,213,229 has been collected. The estimated budget for the current fiscal year is $6,210,000.
- Once collected and deposited into the Highway Fund, the funds are used to support the overall transportation budget funded by the Highway Fund as approved by the General Assembly. The funds are not dedicated for a specific purpose.

North Dakota

- The oversize/overweight permit fees are deposited in Fund 200, Highway Fund, which is a specific transportation fund of the ND Dept of Transportation.
- For state fiscal year 2009 the total amount of oversize/overweight fees collected was $5,622,870.
- ND Executive Budget Recommendations and the ND Legislature determine the level of spending from the Highway Fund. To the best of my knowledge these fees are used for maintenance of ND highways.

South Carolina

- OS/OW fees go into the State Highway Fund.
- Collections average $2.8 million annually.
- The fees are deposited in the State Highway Fund to be used for the maintenance of roads and bridges in South Carolina.

South Dakota

- The fee revenue is deposited in the state highway fund.
- State Fiscal Year 2009 (Jul.1, 2008 to Jun. 30, 2009) $3,489,822; State Fiscal Year 2008 (Jul.1, 2007 to Jun. 30, 2008) $3,258,684; State Fiscal Year 2007 (Jul.1, 2006 to Jun. 30, 2007) $2,830,527

- The revenue is not dedicated for a specific purpose, it is spent on the construction, maintenance and supervision of highways and bridges in this state and for administrative costs necessary to perform such duties.

Utah

- These funds are distributed to the Transportation Fund.
- Our records indicate that the Motor Carrier Division collected $8,234,595 for Oversize and Oversize/Overweight permit fees during FY 09.
- The funds are distributed to the Transportation Fund. The Department of Transportation then distributes 30% of the revenue to the counties as part of their B & C Road funds. The remaining stays in the Transportation fund.

Virginia

- First I would like to make the distinction between hauling permits and overload permits.
- Overload Permits: The owner of any motor vehicle may obtain an extension of single axle, tandem axle and gross weight by purchasing an overload permit. The permit extends the single axle weight limit of 20,000 pounds, tandem axle weight limit of 34,000 pounds and gross weight limit based upon axle spacing and the number of axles. Interstate travel is restricted to 80,000 pounds and overload permits can not be combined with hauling permits.
- In FY09, DMV collected $3.134 million in overload permit fees.
- All overload permit monies are distributed to Virginia Department of Transportation.
- Monies are deposited in the Highway Maintenance and Operating Fund and are used exclusively for road maintenance.
- Hauling Permits: are issued for oversized and overweight vehicles and are only available to vehicle owners and operators when: no other form of transportation is available, AND the load cannot be reduced to meet legal limits. The hauling permit program is administered by DMV.
- Hauling permit fees totaled $2.407 million in FY09.
- All monies collected are distributed to DMV's operating fund and are used to fund DMV's operations.

West Virginia

- Fees are deposited into the State Road Fund, which is a fund constitutionally dedicated to highway maintenance and construction and associated administrative costs.
- Approximately $6 million per fiscal year.
- Fee revenue is not dedicated for a specific purpose. When it is deposited into the State Road Fund, it just becomes part of fund equity, which can be used for any highway purpose.
- Other fees that are deposited into the State Road Fund include Motor Fuel Excise Tax, various vehicle and driver registrations and licenses, and the sales tax on vehicle purchases.

Wyoming

- Revenue is collected for the Wyoming State Highway Fund
- In our last fiscal year 2009, October 1st 2008 through September 30 2009 the department collected $10,867,738 in oversized and overweight permit fees.
- Wyoming's Constitution requires all highway user fees to be used for the construction, maintenance, and traffic supervision of Wyoming's highways, roads and streets.

Alabama

- In Alabama, oversize/overweight permit fees are distributed into what is known as the Public Road and Bridge Fund. This Fund is used to provide federal matching funds and whatever is left after the match requirement is used for other state projects.

- In FY2009 the Alabama Department of Transportation collected $3,368,990 from oversize/overweight permits. The Department has budgeted collections of $3,500,000 in FY2010.
- To my knowledge, the oversize/overweight fees just go into this general pot of money and there are no specific restrictions on how it may be spent.

Source:
Justin Bogie
Legislative Analyst
Legislative Fiscal Office
Suite 620 Alabama State House
Montgomery, AL 36130
Voice 334-242-7972
Fax 334-242-4708

Alaska

- The revenue is channeled to the general fund operating budget via the state accounting system
    - Total revenue is reported as a component of total receipts received by the Measurement Standards and Commercial Vehicle Enforcement Division of the State of Alaska Department of Transportation and Public Facilities
- On average about $1.2 million is collected annually from oversize/overweight permits
- The permit fee revenue can be used for any general fund expenditure
    - The State of Alaska Constitution prohibits the dedication of revenue for a specific purpose

Source:
Michael Crabb
Budget Analyst, Office of Management and Budget
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FAX: 907.465.2090
mike.crabb@alaska.gov

Arkansas

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    - The AHTD is constitutionally independent of the Executive branch (Amendment 42 of the Arkansas Constitution).

Source:
Brandon Sharp
State Budget Manager
DFA-Office of Budget

(501) 682-5387
brandon.sharp@dfa.arkansas.gov

California

- I have forwarded your inquiry to my colleagues that cover transportation financing in our office who can better assist in answering your questions.

  Source:
  Russia Chavis
  Russia.Chavis@LAO.CA.GOV

Connecticut

- The oversize/overweight permit fees are deposited into the Special Transportation Fund under the "license, permits, and fees" revenue item.
- During FY 2009, approximately $2.7 million was collected from the permit fees.
- Once collected the revenue is available in the Special Transportation Fund which supports the operations of the Department of Transportation, the Department of Motor Vehicles, and Debt Service on Special Tax Obligation bonds issued for Transportation projects. The fees are not dedicated to a specific purpose in the fund itself.

  Source:
  RW Hammersley
  OPM
  418-6297
  cell: 860/490-2712

Delaware

- All oversize/overweight permit fee revenues are collected and deposited into a designated cash management account within the Transportation Trust Fund (TTF), these revenues are considered Pledged Revenues and are governed by the Trust Agreement and bond covenants.
- CY 2009 A total of $1,150,501 was collected, which includes $256,421 for tolls (SR1 and I95) CY 2008 - $1,485,974 (tolls $339,790) CY 2007 - $1,637,176 (tolls $341,329) CY 2006 - $1,733,080 (tolls $401,700)
- Per our Trust Agreement, these revenues, along with other pledged revenues, are swept into a general revenue fund and distributed on a monthly basis to pay 1/12 of the annual debt-service obligation, 1/12 of the annual operating budget and any remaining funds are then deposited into the capital account to be used for authorized state capital expenditures.

  Source:
  Mike Matthews OMB
  mike.matthews@state.de.us

Florida

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- The net revenues generated from the issuance of overweight/over-dimensional permit fees to truckers doing business in the State of Florida for the previous 3 years are as follows:
  - FY 2006/07: $8,055,323.00
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  - FY 2008/09: 7,256,939.00
- The revenues shall be used to repair & maintain the road in the State of Florida.

  Source:
  Keith Walls
  FDOT Budget Office
  Phone# 850.414.4435

Fax# 850.414.4854
E-Mail: Keith.Walls@dot.state.fl.us

Georgia

- The funding goes into the Department's operating account and is used to cover expenses associated with the Permit program and weigh station. Title 32 Highways, Bridges, and Ferries §32-6-28 Excess weight and dimension permits.
  (5) d. Notwithstanding any provisions of Code Section 48-2-17 to the contrary, all fees collected in accordance with this Code section shall be paid to the treasure of the department to help defray the expense of enforcing the limitations set forth in this article and may also be used for public maintenance purposes in addition to any sums appropriated therefor to the department.
- FY '09 OPU Revenue = $6,951,680.78
- The revenue is distributed between the Oversize Permit office and the GA Department of Public Safety (MCCD) per agreed upon MOU. For FY 2009 GDOT retained $1,700,000.00 and the balance was sent to the DPS.
  Source:
  Office of Constituency Services
  Georgia DOT

Illinois

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- In Fiscal Year 2009, over $18.6 million was collected from this fee source.
- The purpose of the fees is to help defray the cost of damage to the roadways by oversize/overweight loads.

  Source:

  Kristi Lantz
  Budget Analyst
  Governor's Office of Management & Budget
  (217) 558-1327
  kristi.lantz@illinois.gov

Kentucky

- Fees for oversize/overweight carriers fall into two broad categories for the purposes of fee collection and distribution:
- The vast majority of these fees are collected from carriers that pay for either an annual or per-trip permit to move general goods that are oversize/overweight on any roadway in Kentucky. These fees are collected in accordance with Kentucky Revised Statutes KRS 189.270-189.272 and vary depending on the type of goods being transported and the actual size and weight of the load.
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- These fees are deposited to the Commonwealth's Road Fund, which is a constitutionally established fund dedicated to general transportation needs. There are no restrictions on the use of these funds.
- The Cabinet also collects overweight fees from carriers that transport coal on a network of roads designated by the Cabinet as extended-weight coal haul roads. These fees are collected in accordance with KRS 177.9771 and vary depending on the number of axles and weight of the vehicle. These fees are also deposited to the Commonwealth's Road

Fund, but are designated "Energy Recovery Road Funds," and their use is highly restricted.

- The amounts collected under this type of permit for fiscal years 2007, 2008, and 2009 were $842,239.03, $774,379.14, and $832,652.91 respectively.
- Sixty percent of the funds are credited to the Department of Highways for the exclusive purpose of constructing, maintaining, or repairing the portions of the coal haul network that are maintained by the state.
- Forty percent of the funds are distributed to the fiscal court of the county in which the coal is transported, based on each county's share of mileage of the total coal haul road network and each county's share of tonnage of coal moved on the network. The county fiscal court must use these funds to construct, maintain, or repair the county maintained portion of the coal haul network.

Source:
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(502) 564-4550 x.3158

Maine

- Maine deposits fees for oversize/overweight permits into the Highway Fund.
- The Highway Fund is used to account for revenue derived from excise taxes and license and other fees relating to the registration, operation, and use of vehicles on public highways and from fuel used for the propulsion of these vehicles, with fuel taxes representing roughly two-thirds of Highway Fund revenue. Pursuant to the Constitution of Maine, Article IX, Section 19, this revenue must be used for highway related activities. This revenue is expended primarily within the Departments of Transportation, Public Safety and the Secretary of State (Bureau of Motor Vehicles).
- The amounts budgeted for oversize/overweight permits for state fiscal years 2009-10 and 2010-11 are $707,776 each year. The actual amounts collected for the two previous fiscal years were-- FY 2007-08: $986,088; FY 2008-09: $843,915.
- In Maine there is no specific distribution of these particular fees. Once collected the fees are deposited into the Highway Fund as undedicated revenue. Through the budget process the Legislature allocates the Highway Fund to various Departments/Agencies for highway related activities.

Source:
Thomas H. Cusick
Senior Budget Analyst
Thomas.H.Cusick@maine.gov

Maryland

- Revenue from Hauling Permits is received by SHA, deposited in the Transportation Trust Fund (TTF).
- Revenue received from Hauling Permits amounted to $10.5M in FY 07, $11.8M in FY 08, and $10.1M in FY 09.
- Hauling Permit revenue is not dedicated to any specific purpose. All revenues of the TTF are dedicated to paying debt service on the Department's bond obligations. After that, revenues are used for any transportation purpose.

Source:
Elizabeth Helmer
Assist. Director for Budget

ehelmer@mdot.state.md.us

Michigan

- OS/OW fees for permits issued by the Michigan Department of Transportation are directed to the State Trunkline Fund which funds the operations of the Michigan Department of Transportation. Local Units may also levy os/ow permit fees for permits issues to operate on roads under their jurisdiction.
- Revenue varies from year to year based on the number and type of permits issued. Revenue for 2010 is estimated at $5 million.
- OS/OW fees are used exclusively for transportation purposes.

Source:
Matt Delong
DeLongM@michigan.gov

Minnesota

- Oversize/overweight permit fees are deposited as non-dedicated receipts into the state trunk highway fund.
- Permit fee revenue totals approximately $3 million per year
- Once deposited, the fees become part of the larger fund balance, and are appropriated in the same manner as other fund resources.

Source:
Keith Bogut
Keith.Bogut@state.mn.us

Mississippi

- These fees are collected by MDOT's Law Enforcement Division and deposited monthly into the State Highway Fund.
- MDOT receives between $12 and $14 million annually in Oversize, Overweight permit fees. ($14.5 million in FY2009)
- This revenue source is combined with Fuel tax, Tag Fees, and other state source special fund revenue for the Construction and Maintenance of highways.

Source:
Byron Flood
Budget Director
MS Department of Transportation

Missouri

- Revenue is deposited into the State Road Fund.
- $7,836,786.60 in revenue was collected
- Revenue is dedicated to the State Road Fund.

Source:
Kristina M. Cannon
Budget Analyst
OA/Budget & Planning
Phone: (573) 751-9303
Fax: (573) 751-9347
e-mail: Kristina.Cannon@oa.mo.gov

Montana

- Fees collected are deposited into one of two transportation funds: a constitutionally restricted fund and a non-constitutionally restricted fund.
- Approximately $4.6 million annually is collected
- The funds in which these fees are deposited are used to fund services provided by the Montana Department of Transportation (construction, maintenance, and administration

of the state's transportation network) as well as transportation-related activities in other agencies (i.e. Highway Patrol in the Department of Justice).
Source:
James Chamberlain
Executive Budget Analyst
Governor's Budget Office
(406) 444-1338
jchamberlain@mt.gov

New Mexico

- 100% of revenues for OS/OW are placed into our DOT main Road Fund.
- $5 M in FY 08, $4.5M in FY09, $4 M in FY 10. (Fiscal Years – July to June).
- Revenues are placed in the Road Fund for general, un-earmarked use.

Source:
Bill Mueller
Chief Economist
NMDOT
505-827-5522

North Carolina

- Oversize/overweight permit fees are deposited into the Highway Fund.
- For fiscal year ending June 30, 2009, $5,755,377 was collected. The estimated budget was $6,690,000. Fiscal year to date through November 30, 2009, $$2,213,229 has been collected. The estimated budget for the current fiscal year is $6,210,000.
- Once collected and deposited into the Highway Fund, the funds are used to support the overall transportation budget funded by the Highway Fund as approved by the General Assembly. The funds are not dedicated for a specific purpose.

Source:
Mercidee Benton
Associate State Budget Officer
(919) 807-4767

North Dakota

- The oversize/overweight permit fees are deposited in Fund 200, Highway Fund, which is a specific transportation fund of the ND Dept of Transportation.
- For state fiscal year 2009 the total amount of oversize/overweight fees collected was $5,622,870.
- ND Executive Budget Recommendations and the ND Legislature determine the level of spending from the Highway Fund. To the best of my knowledge these fees are used for maintenance of ND highways.

Source:
Capt. David A. Kleppe
dkleppe@nd.gov

South Carolina

- OS/OW fees go into the State Highway Fund.
- Collections average $2.8 million annually.
- The fees are deposited in the State Highway Fund to be used for the maintenance of roads and bridges in South Carolina.

Source:
K. Earle Powell
Fiscal Impact Manager/State Budget Analyst
Office of State Budget
1201 Main St, Ste 870
Columbia SC 29201

803-734-2286

South Dakota

- The fee revenue is deposited in the state highway fund.
- State Fiscal Year 2009 (Jul.1, 2008 to Jun. 30, 2009) $3,489,822; State Fiscal Year 2008 (Jul.1, 2007 to Jun. 30, 2008) $3,258,684; State Fiscal Year 2007 (Jul.1, 2006 to Jun. 30, 2007) $2,830,527
- The revenue is not dedicated for a specific purpose, it is spent on the construction, maintenance and supervision of highways and bridges in this state and for administrative costs necessary to perform such duties.

Source:
Joshua Larson
Budget Analyst
Bureau of Finance and Management
phone: 605-773-4151
email: josh.larson@state.sd.us

Utah

- These funds are distributed to the Transportation Fund.
- Our records indicate that the Motor Carrier Division collected $8,234,595 for Oversize and Oversize/Overweight permit fees during FY 09.
- The funds are distributed to the Transportation Fund. The Department of Transportation then distributes 30% of the revenue to the counties as part of their B & C Road funds. The remaining stays in the Transportation fund.

Source:
Kimberlee Willette
Policy and Budget Analyst
Governor's Office of Planning and Budget
(801) 538-1592 office
(801) 243-4553 cell
kawillette@utah.gov

Virginia

- First I would like to make the distinction between hauling permits and overload permits.
- Overload Permits: The owner of any motor vehicle may obtain an extension of single axle, tandem axle and gross weight by purchasing an overload permit. The permit extends the single axle weight limit of 20,000 pounds, tandem axle weight limit of 34,000 pounds and gross weight limit based upon axle spacing and the number of axles. Interstate travel is restricted to 80,000 pounds and overload permits can not be combined with hauling permits.
- In FY09, DMV collected $3.134 million in overload permit fees.
- All overload permit monies are distributed to Virginia Department of Transportation.
- Monies are deposited in the Highway Maintenance and Operating Fund and are used exclusively for road maintenance.
- Hauling Permits: are issued for oversized and overweight vehicles and are only available to vehicle owners and operators when: no other form of transportation is available, AND the load cannot be reduced to meet legal limits. The hauling permit program is administered by DMV.
- Hauling permit fees totaled $2.407 million in FY09.
- All monies collected are distributed to DMV's operating fund and are used to fund DMV's operations.

Source:
John Gruber, Director
Financial Analysis and Reconciliation

Department of Motor Vehicles
(804) 367-6335

West Virginia

- Fees are deposited into the State Road Fund, which is a fund constitutionally dedicated to highway maintenance and construction and associated administrative costs.
- Approximately $6 million per fiscal year.
- Fee revenue is not dedicated for a specific purpose. When it is deposited into the State Road Fund, it just becomes part of fund equity, which can be used for any highway purpose.
- Other fees that are deposited into the State Road Fund include Motor Fuel Excise Tax, various vehicle and driver registrations and licenses, and the sales tax on vehicle purchases.

Source:
Alice Taylor
Director
WVDOT Budget Division
Alice.C.Taylor@wv.gov

Wyoming

- Revenue is collected for the Wyoming State Highway Fund
- In our last fiscal year 2009, October 1st 2008 through September 30 2009 the department collected $10,867,738 in oversized and overweight permit fees.
- Wyoming's Constitution requires all highway user fees to be used for the construction, maintenance, and traffic supervision of Wyoming's highways, roads and streets.

Source:
Kevin Hibbard
Budget Officer
Wyoming Department of Transportation
5300 Bishop Blvd.
Cheyenne Wyoming 82009
Tele: 307.777.4026

Appendix 3: Revenue Survey Interview Questions

The following questions were used for interviews with state DOTs.

- How many single trip OS/OW permits were issued in 2009?
- How many Annual OS/OW permits were issued in 2009?
- What is the priority level for the enforcement of illegally Oversize/overweight vehicles in your state?
- How many citations are issued yearly for illegally oversize/overweight vehicles?
- Describe the severity of illegal oversize/overweight vehicle issues in your state.
- How many people review an application for an oversize/overweight permit?
- How long does it take to process a routine (non-superload) permit?
- How long does it take to process a superload permit?
- What percent of permit applications are denied?
- What are the primary reasons for denial of a permit?
- Is routing of Oversize/overweight trucks a routine process?
- Does your state have automated truck routing capacity?
- When does routing become a non-routine process?
- How is the routing process affected by construction projects?
- Which commodities/industries request the highest number of Oversize/overweight permits?
- Assuming the economy recovers, what level of increase do you predict for Oversize/overweight permit requests compared to pre-recession permit request levels?
- In terms of legislative policy, how has legislative activity accommodated oversize/overweight trucking?
- Do you have any examples of legislation that has been pertinent (beneficial or detrimental) to Oversize/overweight trucking?

Research team members were allowed to ask additional questions and follow up for specific information.

Appendix 4: Detailed Responses by State

State	Single trip OS/OW permits (2009)	Annual OS/OW permits (2009)	priority level for the enforcement of illegally Oversize/overweight vehicles	citations issued yearly for illegally Oversize/overweight vehicles	describe the illegal Oversize/overweight vehicle issue in your state	How many people review an application for an Oversize/overweight permit?	How long does it take to process a routine (non-superload) permit?	How long does it take to process a superload permit?	What percent of permit applications are denied?
Arkansas	203,336	32	High	Unknown at this time.	Large	Generally one to two unless the load exceeds 180,000 lbs then a bridge engineer reviews the request	1 day or less	Normally completed in one day or less	unknown at this time would require additional research
Colorado	33,830	9,853	High	approx. 1,600	Moderate problem	One person for a 'basic' single trip or annual permit. At least three people and likely many more people for a 'Special/Superload' permit.	1 day or less	Depending on load size/wgt and route of travel - usually 3 - 7 days. Some loads may be longer.	Approx 2%
Florida	56,228	31,026	High	Approximately 8,000 in 2009 for permitted vehicles and 54,000 for "legal" overweight vehicles	Moderate	1-2 for routine applications and 3-4 for non-routine (superload) applications	1 day or less	3-5 days on average unless there are extenuating circumstances such as sophisticated analysis or bridge strengthening	Less than 1%. Usually, we are able to work with the customer to find alternate routing or reduce the size of the load
Georgia	118,554	15,561	High	38,844	Moderate	1 to 2	1 day or less	3 days	na
Idaho	21,938	9,472	High	211	Moderate	Do not require written applications, information is taken over the phone. Sometimes and analysis is needed from bridge before permit is issued.	1 day or less	1- 3 days if required to go to bridge for analysis	Do not track
Louisiana	oversize= 116,181 oversize/overweight =98,376	annual oversize/over weight=939 annual overweight off road (cranes, etc.) equipment=26 0	High		Large	1 to 2 depending on the overall dimensions	1 day or less	our superloads are in excess of 232,000 pounds and takes 6 to 8 weeks	not many, some may have to be reconfigured from the original config. submitted or rerouted around bridges that wil not pass
New Jersey	73,250 oversize and 9,250 overweight	1,750 Annual Ocean Borne Containers only	Low	na	Large	anywhere from 1 - 3 people	1 day or less	3-5 days	20% not able to be issued automatically by the system (but approx. 10% denied)
Nevada	FFY09: 2927 LCV; 4267 ODV	FFY09: 27799 ODV					1 day or less	30 days +;	
South Dakota	>60,000	>6,000	High	na	small	Autopermitting via internet	1 day or less	Typically less than 2 days	na
Texas	423,820	Annual – 38,173 · Other "time" permits (monthly, quarterly, etc) – 49,838	Medium	30,199	Moderate	For general permits, 1 Permit Specialist unless there's a routing issue, etc. By mid-2011, aprox 60% will be auto issue	1 day or less	3 - 8 weeks, depending on size/weight, distance, # of bridges. Our superloads start at 254k.	None. We work with carriers to get them where they need to go (but they may have to go "the long way").
Utah			High		small	There are 4 people assigned to adjudicate superload permits. A normal oversize/overweight permit is not reviewed (105' l, 14'6" w, 14' h 10' roh/foh upto 125,000 lbs non-divisible weight).	1 day or less	Most superload permits are reviewed within 30 minutes, extreme superload permitsd can take a day or two.	
Vermont	21,498	6,941	High	531	small	Depends on the type of permit. Generally 1 person reviews and issues the annual and single trip permits. If the load is over 15' wide or more, 100' long, 14' high or more and in excess of 150,000 pounds, an engineering survey is required which can be reviewed by up to 6 people.	1 day or less	The Department requires up to 10 working days, howeverthe turn around time is generally 2 - 3 days.	No single trip is denied. We will work with the hauler on any re-routing that needs to be done and also make suggestions such as adding additional axles,
Wyoming	102,000	2,700	Medium	1,400	small	One. If the load requires a bridge analysis two.	1 day or less	95% of the time less than an hour. Exceptionally large or heavy loads two to three days.	0.01
West Virginia	83256	1288	Low		Moderate	One, if it passes the computer bridge analysis - two, if it does not pass.	1 day or less	Normally, two or three days.	Don't really know; best guess is two or three percent.

State	What are the primary reasons for denial of a permit?	Is routing of Oversize/overweight trucks a routine process?	Does your state have automated truck routing capacity?	When does routing become a non-routine process?	How is the routing process affected by construction projects?	Which commodities/industries request the highest number of Oversize/overweight permits?	Assuming the economy recovers, what level of increase do you predict for Oversize/overweight permit requests compared to pre-recession permit request levels?	In terms of legislative policy, how has it accommodated Oversize/overweight trucking?	Do you have any examples of legislation that has been pertinent (beneficial or detrimental) to Oversize/overweight trucking?
Arkansas	number of axles, spacings, and road restrictions due to construction and/or over-height issues	no	yes	na	alternative routes are utulized	CMV's utulized in the exploration of natural gas, construction equipment, manufactured homes	Small increase	Has accommodated/been beneficial to trucking	na
Colorado	Over axle limits or GVW limits; legal load; too heavy or too wide for route; credit card declined	Yes	no	When a construction project or road closure is on the 'routine' route.	OSOW vehicles/loads are routed on alternate highways or on city/county roadways.	Without a comprehensive review Many permits are issued to energy related industries (oil/gas, electric, wind source) and, of recent, the aggregate type companes.	Moderate increase	Has accommodated/been beneficial to trucking	Colorado offers a Non-Interstate Divisible load permit. 2. The permitting fees have increased since they were initially put into law IN 1893. 3. Cranes can haul counterweights, shackles, etc. providing they were manufactured as part of the unit.
Florida	The weight of the vehicle configuration exceeds the load capacity for structure(s) on route	Yes	No	Vehicles > 199,000 lbs. or > 16' wide or travelling at night	Generally, when loads exceed 16' in width, we contact our local district offices to determine any impacts	Construction/Industrial Equipment	Moderate	Has accommodated/been beneficial to trucking	Recently, statute was changed to allow legal weight vehicles to increase their gross weight by 10% when operating off the interstate highway system
Georgia	SUPERLOADS OR HOUSE MOVES	Yes	Yes	LOCAL ROADS/SUPERLOADS	TIR - TRAFFIC INTURPUTION DATA AUTOMATICALLY FED TO ROUTING SOFTWARE	OTHER, CONST EQUIP, MANUFACTURED HOMES	substantial increase	nuetral	CERTIFIED VEHICLE ESCORT PILOT CAR PROGRAM PASSED, EFFECTIVE 01/11
Idaho	Too heavy or too heigh for requested route	Yes	No	When they are too heavy or high for the route of travel.	Construction may require loads to detour greatly from the requested route and require additional pilot cars.	Do not track	Small	Nuetral	increasing the raod use fees has been benificial. Permitting is governed mostly by rules and not legislation.
Louisiana	weight too concentrated on the axles	Yes	No	we have static routes that can make is possible to automate the permit-- supervisor approval is required for over 14'8" high, 14' wide and over 108,000 pounds	we must observe the restrictions for the construction zones	oilfield, crane industry	Moderate	Has accommodated/been beneficial to trucking	
New Jersey	cannot find an acceptable route for the given load	Yes	Yes	When our on-line permitting system cannot find the hauler an acceptable route; then it comes to the state for manual review.	We have a Restriction Manager built in to our process which keeps tract of all lane closures and detours which is checked against the requested route.	Construction Equipment	Moderate Increase	Has not accommodated trucking	New Rules have recently been adopted in New Jersey under NJSA 14:18 governing the permit process for OS/OW trucks. This rule change require all companies to get their permits online now and perform a route analysis. previously the permit was just tied to the truck. Now the permit is tied to both the truck and a specific route which must be pre approved.
Nevada								nuetral	
South Dakota	na	Yes	Yes	Special considerations required.	Automatically handled by permit manager		na	na	na
Texas	We may deny or require mediation for a particular route based on permanent or temporary restrictions or bridge analysis	yes	yes	Automated routing currently in testing and will go live mid-2011. Loads over 200k have additional rqrmnts.	Obviously makes routing more difficult. TxPROS (automated routing) will provide real-time construction info.	"General" permits account for 60% - construction & other equip, machinery, manufacturing, energy/utilities	Moderate	nuetral	specific exemptions and more "time" permits; increased fees, stronger administrative enforcement
Utah		Yes	No						
Vermont	Original denials are generaly due to unsafe structures or requested route not handling the weight and/or load configuration.	Yes	No	When the load reaches the superload category. Any load that is 15' wide or more, 100' or more long, 14' high or more and in excess of 150,000 pounds, an engineering survey.	The permit office is notified of construction around the state and what restrictions are in place for that construction zone. Loads that can not pass throught a construction zone are re-routed.	Milk, Forest Products, Quarry, Mobile Homes	small	Has accommodated/been beneficial to trucking	Increasing length to 75'. Participating in a pilot project through FMCSA which allows increased weight on the interstate for all products. This pilot ends in December 2010.
Wyoming	To heavy for the specific configuration	yes	no	Vertical clearance for loads over 16' high; loads over 14' wide during construction season, and lengths over 130' may become an issue due to other re-routes.	Greatly	Unknown	small	nuetral	na
West Virginia	Too much weight and/or size for the routes requested.	Yes	Yes	When it fails the bridge analysis.	Construction does often keep big loads from moving or moving on requested routes, particularly in Summer.	construction equipment, gas drilling, cranes (probably in that order).	Moderate increase	nuetral	Legislation has benefitted coal haulers (higher weight limits for coal in some areas)

Appendix 5: Infrastructure Impacts Literature Review

Many studies have been undertaken to attempt to categorize OSOW costs on the infrastructure. These studies are included here to provide basis for the research team's efforts.

Bilal, et. al., performed a comprehensive analysis of truck permitting literature in A Synthesis of Overweight Truck Permitting (2010). Their analysis determined that while the upper thresholds (dimensions and weights) for legal trucking operation are generally the same for each state, those for extra legal dimensions and weights vary considerably across the states.

Estimated Damage and Cost to Recover

Estimated Cost of Overweight Vehicle Damage (Straus and Semmens, 2006, TRB #06-0959)

U.S. State	Estimated Cost of Damage
Indiana	Rural - $1 million per lane per mile Urban – over $1 million per mile due to property costs
Maryland	$36 million per year due to overweight dump trucks
Montana	$700,000
South Dakota	More than $1.1 million in six county bridge replacement in the last two years.
Vermont	More than $ 1,000,000
Alaska, Arizona, Arkansas, Colorado, Delaware, Georgia, Illinois, Louisiana, Missouri, Nebraska, North Dakota, Ohio, Oklahoma, Oregon, Tennessee, Utah, Washington, Wisconsin	Not estimated

Minnesota also studied the impact of husbandry and farming equipment on the infrastructure. Based on a literature review, Phares, Wipf, and Ceylan (2004) suggest that heavy agricultural vehicles cause detrimental impacts to Minnesota pavements and bridges. Phares et. Al, also supplemented their literature analysis with quantitative data as part of this study.

The research team found performance characteristics of both rigid and flexible pavements are adversely affected by overweight implements of husbandry. Several studies with various agricultural vehicles showed that pavement life, in terms of the serviceability level of the pavement, rapidly decreases due to deterioration of the pavement which is manifested as cracking and rutting (permanent deformations). These findings are based on using field-measured metrics that are commonly used to determine damage levels relative to the design condition. This approach showed that implements can introduce damage levels of several hundred times that of the design condition. In addition to the heavy weight of the agricultural

vehicles, their wide wheel spacing and slow moving characteristics further exacerbate the damage occurring to roadway systems.

Two structural performance measures were identified in the study for evaluating the impact of agricultural vehicles on bridges: bending and punching. Structural metrics were quantified for a variety of agricultural vehicles, and these values were compared with the design vehicle that is specified for the safe and serviceable design of bridges. The majority of the agricultural vehicles investigated create more extreme structural performance conditions on bridges than do the design vehicles when considering bending behavior. Only several of the agricultural vehicles exceeded design vehicle structural performance conditions based on punching.

The conclusion of this study validates the years of close observation of highway and bridge engineers that these heavy loads can cause potential problems in terms of both safety to the traveling public and added costs to the maintenance of the local system of highway infrastructure. It appears that the metric currently used to limit the weight of farm implements is not sufficient at predicting the potential for inducing damage to infrastructure.

Case Study	Gross Vehicle Weight (GVW)		
	80,000 lb.	100,000 lb.	120,000 lb.
Scenario 1	FHWA Type 9		
Scenario 2		FHWA Type 9	
Scenario 2a		FHWY Type 10	
Scenario 3			FHWA Type 9
Scenario 3a			FHWY Type 10

The main objectives of this research are to:

1. Estimate the additional rehabilitation costs to roads damaged by heavy sugarcane trucks.
2. Develop truck-axle configuration which produce less pavement damage by permitted overweight trucks.

This study concentrates on determining the overlay costs on highways that DOT is responsible for constructing, rehabilitating, and maintaining.

Steps

1. Data from all sugar mills, summary table containing listing of each highway route, parish road, or street etc.
2. Pavement cross section data and traffic data secured for each control section, parish road or street. The data include the type and thickness of surface (hot mix asphalt, concrete, or surface treatment), type and thickness of base (gravel or soil cement bases were the most typical), and estimated or most recent average daily traffic data (the number of automobiles and trucks per day over each road section).
3. Sections were divided into three groups of ADT (with structural number, pavement strength etc.)

4. Detailed analysis to determine the cost of pavement overlay required to carry the normal traffic load plus the sugarcane tonnage under three different GVW scenarios using 2 different vehicles.
5. The axle loads were evaluated for each control section using GVW.
    a. Each GVW was split into axle loads. Ex. 80,000 lb. (Steering axle load = 12,000 lb. Tractor tandem axle load = 34,000 lb. Semi-trailer tandem axle load = 34,000 lb. Total Load = 80,000 lb.
    b. For each axle load and type, the load equivalence factor (LEF) was determined from the American Association of State Highway and Transportation Officials 1986 pavement design guide and a truck factor determined by summing the individual load equivalence factors.
    c. The average empty weight each truck estimated.
    d. The payload per vehicle was determined
    e. The number of trucks required to carry the sugarcane harvest transported over each control section was determined.
6. Additional traffic volume and stream calculations
7. Using a calculation procedure included in the 1986 AASHTO Pavement Design Guide overlay thickness required to carry the traffic stream indentified. Three different types of overlay periods.
    a. Overlay periods of eight years, typical for roads with intermediate to high ADTs and with significant percentages of trucks.
    b. Overlay periods of twenty years, typical for roads with low ADTs and with low percentages of trucks. These roads are often constructed or reconstructed using standard sections consisting of 8.5-in. of soil cement with 3.5-in. of hot mix asphalt surfacing.
    c. Overlay periods of fifteen years, typical of concrete pavements overlaid with hot mix asphalt. These pavements do not require structural overlays but experience reflection cracking at joints and cracks. As a result, these pavements get very rough and require overlays about every 15 years to smooth them out.
8. The thickness of each overlay determined and the time when the overlay is required, the resent worth of each overlay is determined using an interest rate of five percent per year

Permit rule applied in Wisconsin

(http://www.dot.wisconsin.gov/business/carriers/osowgeneral.htm)

A permit is typically required if vehicle dimension exceed

Dimensions	US	
Width	8 feet, 6 inches	2.591 m
Height	13 feet, 6 inches	4.115 m
Length – (Single vehicle and load)	40 feet	12.192 m
Length – (Combination of 2 vehicles)	65 feet	19.812 m
Length – (Truck / tractor and semi trailer)	75/65 feet	22.86/19.812 m

Weight

Axles	Weight	
Any one wheel or wheels supporting on end of an axle	11,000 lbs	4.99 ton
Truck tractor steering axle	13,000 lbs	5.897 ton
Single axle	20,000 lbs	9.072 ton
Tandem axles	34,000 lbs	15.422 ton
Maximum gross vehicle weights on all axles	80,000 lbs	36.287 ton

Only eight states were able to provide an estimate of how much over the limit overweight truck were Average Estimated Number of pounds (lbs.) over the legal limit as reported by mobile enforcement units (Straus and Semmens, 2006, TRB #06-0959)

State	Average
Utah	10,000
Wisconsin	6,500
Illinois	“6,000 over”
Montana	4,500
Alaska	4,000
North Dakota	3,000 – 8,000
Oregon	“For calendar year 2004 the overall average violation was 2,278 pounds”
Texas	“Data is not available; but usually exceeds the weight allowance by a minimum of 1,000 lbs. before enforcement action is initiated”
Arizona, Arkansas. Colorado, Delaware, Indiana, Maryland, Missouri, Ohio, Tennessee, Vermont	Unknown

Impact on Infrastructure

FHWA study (FHWA Comprehensive study)

(http://www.fhwa.dot.gov/policy/otps/truck/finalreport.htm)

Scope: The analysis is concerned with the incremental change in pavement costs caused by the scenario vehicles relative to the damage caused by the current fleet. Since there is no reason to expect these wheels, tire pressure, and suspension parameters to differ between the various existing and proposed configurations, these factors are not critical in estimating pavement impact of OSOW load (TS&W study, FHWA 2000)

Impact Areas are listed in the FHWA Comprehensive study. This study used a variety of methods to develop information concerning potential impacts of OSOW. In addition to an extensive outreach process, an internal review process involving all interested elements within the USDOT was instituted to assure that the full range of perspectives was considered in the study.

The effects of the alternative TS&W policies are presented in terms of each scenario's impact on various areas of interest:

- Freight Diversion and Mode Share
- Shipper Costs and Rail Industry Competiveness
- Safety and Traffic Operations

This information becomes important because the great concern from the public is that there is no reliable historical data on new travel patterns and their associated impacts on:

- Pavement Preservation
- Bridge Preservation
- Roadway Geometry
- Environmental Quality and Energy Consumption

Pavements

Factors to impact on pavement: 1) **axle loadings, spacing within axle groups** (tandem or tridem) 2) vehicle suspensions, tire pressure, and tire type. The secondary impacts are relatively small.

Traffic: magnitude, spacing and frequency of axle loads. Axle load and frequency information have been estimated based on Vehicle-miles-of-travel (VMT) information for various classes of highway vehicles, which includes the number of axles, from the 1997 Highway Cost Allocation (HCA) study.

Pavement and subbase data: FHWA Highway Performance Monitoring System (HPMS)

Pavement Life Consumption:

1) Axle load: a fourth (or third) power relationship between axle load and pavement deterioration
2) number of axles (axle spacing): the more axles, less impact on pavement

Pavement analysis did not use the theoretical load equivalency factor (LEF) but rather used distress models that take into account differences in pavement type and thickness and environmental factors.

Axle limits: spread-tandem axle (20,000 lbs on each of the two axles), closed-tandem axle (34,000 lbs on each)

Two steps have been recommended to quantify the impact on pavement.

1) relationship between axle loads, axle spacing and pavement deterioration
2) Development of pavement impact cost estimates based on the pavement cost model used for the study.

The National Pavement Cost Model (NAPCOM) is used to estimate potential pavement impacts. NAPCOM was applied to generate 1) lane-miles of failed pavement in the base case and 2) lane-mile of failed pavement under the test scenario. Each case, the failed pavement were translated into pavement costs.

Pavement impacts

Pavement deterioration model: NAPCOM relies on 11 pavement distress models to estimate when pavement restoration will be required.

Flexible pavement

1) Traffic-related Pavement Serviceability Rating (PSR) loss
2) Expansive-clay-related PSR loss
3) Fatigue cracking
4) Thermal cracking
5) Rutting
6) Loss of skid resistance

Rigid pavement

1) Traffic-related PSR loss
2) Faulting
3) Loss of skid resistance
4) Fatigue cracking
5) Spalling
6) Soil-induced swelling and depression

Cost Calculations

The estimate of total failed lane miles by functional class of highway is combined with pavement rehabilitation unit cost figures by functional class of highway to create an estimate of the impact on pavement rehabilitation costs.

The pavement cost can be estimated by three factors

1) Pavement deterioration models
2) Estimated total failed lane miles by functional class of highway
3) Pavement rehabilitation unit cost.

Bridges

The FHWA comprehensive study estimates changes in costs to correct structural bridge deficiencies that could result from TS&W policy changes. Not consider functional obsolescence since factors that affect functional obsolescence are largely independent of truck size and weight limits. Impacts are based on each group of axles on a truck and the distances between axle groups. The number of axles in each group is less important than the distance between adjacent groups. The longer the spacing between two axle groups, the less the impact. The bridge impact analysis considers both simple and continuous span bridges.

Federal Bridge Formula (FBF): limit loads and groups of axles, based on consideration of stresses on simple span bridges. While axle load (live load) and the weight of the span components (dead loads) are important for the shorter bridges, axle spacing is important for the longer bridges.

Ratings to show that bridges were structurally adequate to handle heavier truck load

- Operating rating: 75% of the yield stress
- Inventory rating: 55% of the yield stress

- FHWA study: overstress criteria (30% overstress for H-15 bridge designs and 5% overstress for HS-20 bridge designs)

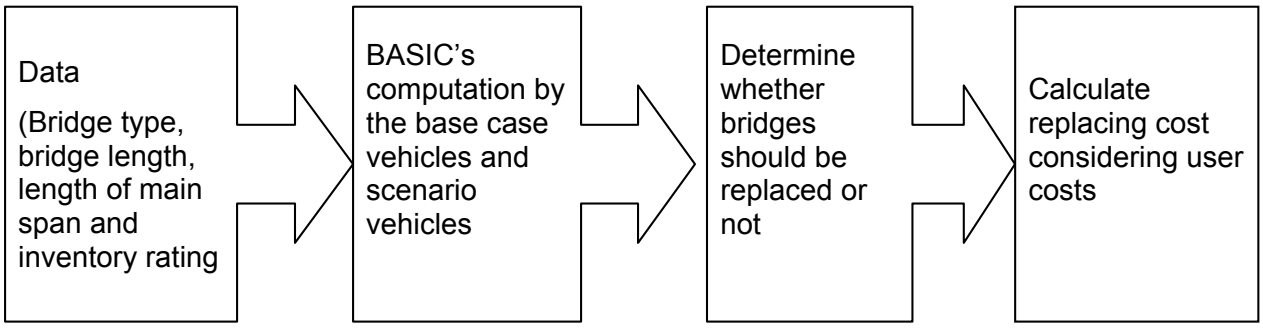
The Bridge Analysis and Structural Improvement Cost (BASIC) model is used to estimate bridge impacts

- It uses only data available in the NBI and a table of live load / dead load ratios.
- It determines which bridges are overstressed by comparing the computed moment of the scenario to the computed moment of the rating vehicle.
- Once it determines the bridges required replacement, BASIC estimates the replacement cost based on reported unit bridge costs for each state.

In bridge analysis, only impact is a function of a loading condition and not an accumulation of loads as is the case for pavements. Most damages from fatigue to bridge components in inexpensively corrected. Further consideration is the impact of truck size and weight scenarios on bridge deck costs. But no direct relationships between truck traffic, axle loads, and bridge deck deterioration.

1) BASIC requires data on the bridge type, bridge length, length of main span, and inventory rating providing the safe-load carrying capacity of the bridge.
2) BASIC computes the bending moment for the rating vehicle, the base case vehicles and the scenario vehicles based on both the live and dead loads. (seven or eight truck configurations are analyzed for each scenario)
3) Based on overstress levels, determine whether bridges should be replaced or not.
4) Replacing cost is estimated and summed up considering user costs.

Analytical Approach for Estimating Impacts on Bridges



Assumption: Because there was no basis for estimating how many bridges might be strengthened rather than being replaced, or what the cost to strengthen various types of bridges might be, so it was assumed that all bridges would have to be replaced. Cost estimation may be overestimated because States usually has more options than replacement. They can be postponing replacement, strengthen deficient bridges, post bridges that were not required to carry large volume of large vehicles

Louisiana DOT Study

http://www.ltrc.lsu.edu/pdf/2008/fr_425.pdf

Louisiana DOT study: Three different gross vehicle weight (GVW) scenarios were selected for the study including 80,000 lb., 100,000 lb., and 120,000 lb.

Methodology: 1986 AASHTO Design Guide

Differences in the life of an overlay were calculated for different GVW scenarios and overlay thickness and cost were determined for a 20 year analysis period. Results indicate that the

damage from each sugarcane truck with a GVW of 100,000 lb. to pavement overlay is at about $2,072/year and the bridge fatigue cost is about $3,500/year. Therefore, the current sugarcane trucks permit fee of $100 per year is not adequate and should be increased to recover these costs.

Wisconsin Truck Size and Weight Study

2007 AB 238 required the Department of Transportation to conduct a comprehensive study to review the system of motor vehicle weight limits on Wisconsin's highways and bridges. State DOT's goal for TSW study

1) Safe vehicle operation
2) Preservation of the state's investment in highway and bridge infrastructure

Considerations that were presented.

- Industry Challenges and Considerations
- Pavement Considerations
- Bridge Considerations
- Highway Safety Considerations: large trucks have had a slightly lower fatal crash rate
    - Commercial vehicles are frequently operated on Interstates as opposed to local road.
    - Commercial vehicles are involved in long haul traveling with minimal lane shifts or turning movement.
    - More experienced and trained drivers

Research: 1) current size and weight laws of Wisconsin 2) compared laws with surrounding states 3) reviewed trends in vehicles technology 4) examine the safety performance of trucks operating in State.

Study has reviewed the impacts (benefits and costs) associated with different truck configurations. A total 6 truck configurations were considered and five evaluation criteria were employed to assess the impacts and additional environmental impacts including energy. The impacts from each truck configurations were compared to the base case, without change of truck size and weight.

Considered Truck Configurations

Number	Configurations	Abb.	Fed bridge Formula
0 (base)	Five-axle 80,000 pound tractor-semitrailer	5a TST 80	Y
1	Six-axle 90,000 pound tractor-semitrailer	6a TST 90	Y
2	Seven-axle 97,000 pound tractor-semitrailer	7a TST 97	Y
3	Seven-axle 80,000 pound single unit truck	7a SU 80	Y
4	Eight-axle 108,000 pound double	8a D 108	Y
5	Six-axle 98,000 pound tractor-semitrailer	6a TST 98	N
6	Six-axle 98,000 pound straight truck-trailer	6a STT 98	N

Considered evaluation criteria:

1) transport savings: increased size and weight lead productivity increase (more freight with fewer trucks, savings for driver, repair, fuel, tire, overhead cost)
2) Safety cost savings: reduce vehicle mile traveled (VMT) lead reduce potential chance for heavy vehicle to be involved in accidents. But we need more study on this
3) Congestions cost savings: fewer trucks, less delay
4) Pavement cost savings: lower ESAL impacts provided by distributing truck weight over additional axles.
5) Bridge costs: bridge replacement, repair, or upgrade. This study does not reflect bridges in local routes, and not structures less than 20 feet. Only consider the bridge replacement cost associated with the candidate configuration vehicles' impacts on bridges.
6) Energy and environment

Pavement and Bridge Decks

The life of a pavement is related to the **magnitude and frequency of heavy axle loads**, expressed by equivalent single-axle load (ESAL). Any truck axle configuration and weight can be converted to this common unit of measures.

"A conventional five-axle tractor-semitrailer operating at 80,000 pounds gross vehicle weight (GVW) is equivalent to about 2.4 ESALs. If the weight of this vehicle were increased to 90,000 pounds (a 12.5 percent increase), its ESAL value goes up to 4.1 (a 70.8 percent increase), because pavement damage increases at a geometric rate with weight increases. However, a six-axle tractor-semitrailer at 90,000 pounds has an ESAL value of only 2.0, because its weight is distributed over six axles instead of five. An added pavement benefit of the 90,000-pound six-axle truck is that fewer trips are required to carry the same amount of payload, resulting in almost 30 percent fewer ESAL miles per payload ton-mile."

Steps to estimate the pavement cost per ESAL mile

Steps	Description
1	Estimate cost to highway agencies and other road users associated with an additional ESAL mile of travel for various types of highways and highway conditions
2	Estimate ESALs as a function of operating weight for Base Case and Scenario trucks
3	Calculate the change in ESAL miles due to freight shifting from Base Case to Scenario trucks
4	Calculate the change in pavement and bridge deck costs as the production of 1) the change in ESAL miles and 2) cost per ESAL mile

Assumptions:

1. Pavement-related expenditures by highway agencies would be adjusted upward or downward so that the pavement conditions experienced by road users will not be affected by the Scenario (agencies would not leave pavement deteriorated)
2. Agency costs for pavements will be the same under the Base Case and the Scenario, so that all pavement impacts are incident on road users. (not much investment for different scenarios)

Data source:

- Agency cost impacts: ESAL-miles by highway system compiled from Wisconsin VTRIS (Vehicle Travel Information System) and HPMS (Highway Performance Monitoring System) data
- Average resurfacing costs per lane mile by highway type: FHWA Highway Economic Requirements Model (HERS)
- Bridge deck replacement costs and information regarding average time between pavement resurfacing from HPMS

Impacts of pavement by OSOW may be categorized by two

1) Physical structure (influencing posting, rehabilitation or replacement)
2) Inconvenience to the users (user cost)

- Deteriorating pavement will increase vehicle repair costs, increase fuel consumption, decrease riding quality. Thus, the relationship among pavement condition, speed of vehicles and vehicle operation cost (VOC) will provide information about cost to other road users of an addition ESALs.

Bridge Reconstruction, Rehabilitation, and Posting Costs

Bridge rating criteria - Two design manual: “Standard Specification for Highway Bridges (H or HS25 (90,000lbs))” and “LRFD Bridge Design Specification (HL93)”

Three additional ratings to define the ability of a bridge to carry a specific vehicle load: inventory rating, operating rating, and max vehicle weight (rating factor)

Study steps for Structural analysis

Step	Description
1	Obtain data from WisDOT BOS with max weight, length etc.
2	sort bridges by structural configurations (slab bridges, pre-stressed girder, structural steel , others)
3	data management (matrix with structural configuration, year built, simple or continuous span, max length, design rating etc)
4	Evaluate the proposed truck configuration using the BOS SEP system
5	Evaluate the SEP bridge analysis individually
6	Determine bridges for posting or replacement 6.1 define worst case 6.2 number of bridges requiring posting 6.3 cost of posting 6.4 map 6.5 bridge requiring replacement (comparing to inventory rating) 6.6 estimate annual agency costs for replacing (deck area and average unit cost)

7	Spreadsheet including bridge locations and configurations
8	Determine bridge types requiring additional investigation

Safety

Marginal safety risk associated with each of the proposed configuration changes.

Step	Description
1	Estimate crash rates and unit costs by highway system, truck type, operating weight
2	Apply crash rates and unit costs

Congestion

Step	Description
1	Estimate the additional costs to users by traffic volume increase
2	Estimate passenger car equivalent (PCE) factors
3	Estimate additional costs to users

Energy and the Environment

Energy consumption and emissions for the new truck configurations

Step	Description
1	Obtain the impacts of scenarios on fuel consumption
2	Calculate scenario impacts on CO2, PM and NO

Alabama study

D.H Timm et al (2008), Highway Pavement Damage and Cost Due to Routine Permitted Axles, *Airfield and Highway Pavements-Efficient Pavements Supporting Transportation's Future,* proceeding of the 2008 Airfield and Highway Pavement Conference, Washington.

Timm held that while the weight limits are relatively consistent among states, so-called "routine permitting" programs are highly state-specific. Despite the general understanding that overloaded trucks can cause significant pavement damage, the fee structure has historically not been damage-based, but rather set by state legislatures. According to the Truck Size and Weight Study, the associated permitting fees are usually established to recover the administration costs of the permitting program itself.

This investigation evaluated the impact of routine permitting on flexible and rigid pavement deterioration using the Mechanistic Empirical Pavement Design Guide (MEPDG). Life Cycle Cost Analysis (LCCA) was also conducted to estimate increased pavement costs due to permitting of heavier loads.

TxDOT Study: Effect of Truck Size and Weight on Highway Infrastructure and Operations

TxDOT study indicated that the reducing restrictions in truck size and weight would reduce pavement costs – by 1.6 or 1.2 percent. There are two fundamental reasons why switching to a heavier truck with additional axles can leave pavement damage about the same or slightly reduced. First, allowing heavier truck increases the payload per truck, so fewer trips are required to achieve the same freight task. Second, heavier trucks distribute their weight over a larger number of axles. Because pavement damage increases sharply with axle weight, the reduced weight per axle of the heavier trucks means less pavement damage.

This study also introduced the “Fourth power rule”: pavement damage increases exponentially with axle weight to a power of four.

There is uncertainty however in this study. The effects of axle spacing on pavement damage are complex and the evidence presented on the relative performance of tandem and tridem axles is not clear-cut.

Additional axles on a truck can substantially reduce pavement damage while the stress to bridges depends more on the truck’s total load than on the number of axles.

Pavements

1. The pavement damage from vehicle traffic depends mainly on the number of axle passes over the pavement axle weights

   The fundamental cause of pavement failure is the application of a tire contact pressure that exceeds the load carrying capacity of the pavement. The tire contact pressure (or the next best indicator, axle load) is important to the minimization of damage. To the trucking industry, this means that the gross vehicle weight is almost unlimited by the pavement structure. This means that tire contact pressure can be reduced by increasing the number of axles, the number of tires, or by using low inflation pressure tires.

2. The relationship appears to approximate an exponential function and the power of the exponent is about 4 as a rule.

   AASHTO subsequently derived a load equivalency factor (LEF) that varies by axle configuration and axle weight. The load equivalent factor expresses the pavement damage relative to that from an 18,000 lb single axle. Analysis of the variation in these factors by axle weight led to the fourth-power rule, which is actually a rough generalization. When a study derives separate load equivalency factors for more than one measure of road damage, the power of the exponent will often be quite sensitive to the choice of measure. OECE (1988) cited a French study in which the exponent turned out to have a power of about 2 in relation to fatigue cracking and about 8 in relation to rutting. In addition, the power of the exponent can also differ between types of pavement. OECD (1988) concluded from its review of international evidence that while the fourth-power rule was reasonable generalization for flexible pavement, the exponent for rigid pavement was greater than 11.

3. The effects of axle spacing on pavement damage: flexible – longer spacing, less damage, rigid: not sensitive for spacing

   Interpretation of LEF: for a flexible pavement with a PSI of 2.5 and an SN of 4.0, the LEF for a 36,000 lb tandem axle is 1.38; this means that one pass of the tandem axle over the pavement would cause the same deterioration in pavement condition as would 1.38 passes of a single 18,000 lb axle. Thus, distributing a 36,000 lb load over a tandem axle instead of

two single axles will reduce pavement damage per mile traveled by the equivalent of 0.62 passes of a single 18,000 lb axle (0.62=2-1.38). For the tridem axle, the LEF was 1.66.

For rigid pavement, the OECD concluded that damage to rigid pavements depends much more on load per axle component than on the spacing of components.

4. Truck speed

   An increase in truck speed tends to have mixed effects on pavements.

5. Pavement cost per mile traveled by a heavy vehicle varies greatly between pavements

   According to estimates in the Comprehensive Truck Size and Weight study, a 5-axle tractor semitrailer typically causes about 9 cents in pavement damage per mile of travel on rural Interstate Highways, compared with $5.90 per mile of travel on rural local road. In part, such a variation simply reflects that light-duty roads are more vulnerable to heavy vehicles than are sturdier roads. As the traffic loading for which a road is designed (as measured by the number of ESALs) increases, the required pavement thickness also increases but in much smaller proportion. For example, a 10 percent increases in ESALs can be accommodated by 1.5 percent increase in pavement thickness.

6. Increases in TS&W limits that lead to higher axle weights can have quite large pavement costs
7. Increases to TS&W limits that encourage the use of trucks with more axles do not necessarily lead to higher pavement costs; they can even produce savings in pavement costs.

Bridge

1. The Federal Bridge Formula is in need of revision

   The TRB (1990) study noted that formula grants additional weight to vehicles that have more axles, even though “bridge stress is affected more by the total amount of load than by the number of axles”. More weight is allowed to long combination truck to exceed 80,000lb while it is unnecessarily restrictive when applied to some short trucks.

2. The infrastructure costs of increasing truck size and weight limits tends to consist mainly of costs for bridges.

   Unlike pavement study, the study entails large costs for replacing bridges that would be unable to safely accommodate the increased vehicle weights. The estimated effects on annual infrastructure costs were an increase of $10 million for pavements, compared with $680 million for bridges, assuming that all safety-deficient bridges would be replaced. Of the bridges costs, $510 million stemmed from the replacement costs, $150 million from upgrading the design loads for new bridges, and only $20 million from fatigue costs from existing bridges that would not be replaced. The evidence also suggests that the costs to society of bridge replacement are mainly in disruption of traffic while is underway. About 80% of consisted of the inconvenience costs to motorists of traffic delays generated by the bridge work; the costs of the bridge work itself accounted for only 20%. Possibly, the studies have exaggerated the bridge costs of increase to TS&W limit by assuming that bridges have to be replaced when they cannot safely accommodate the increase in weights. An alternative that warrants further investigation is that the bridges could be strengthened.

Kansas DOT: Estimating Highway Pavement Damage Costs Attributed to Truck Traffic

Bai, Shrock and others in 2009 (http://www2.ku.edu/~iri/publications/HighwayDamageCosts.pdf) concluded that there is a need to estimate the highway damage caused by regional industries so that the causal relations between the highway maintenance costs and industries can be better understood. The researchers noted that because of data limitations, this study could not estimate the net costs of pavement damage caused by a specific industry's truck traffic.

Heavy-vehicle impact on pavement damage

Pavement distress associated with heavy vehicles can be categorized as fatigue cracking and rutting. On rigid pavement, damage include transverse cracking, corner breaking, and cracking on the wheel paths. Several authors have looked at these pavement failures.

Authors	Contents
Owusu-Ababio et al. (2005)	WisDOT: overload truck were main factors leading early failure. They developed a design guide.
Phares et al. (2004)	Mn/DOT: synthesized literatures, deterioration information & quantitative data. For bridges, bending and punching are important.
Mrad et al. (1998)	Suspension type, characteristics, tire type, truck configuration
Sebaaly et al. (2002)	Different types of vehicles cause different types of damage. Axle weight and configuration
Freeman et al. (2005)	The cost of damage attributed only to the net increase in allowable limits.
Rebert et al. (2005)	Suggest method to quantify impact and increasing the permit fees to sufficiently cover the additional pavement costs

Pavement damage cost studies

Studies have found that trucks place heavy loads on pavement, which leads to significant road damage therefore resulting in increased highway maintenance costs nationwide.

Authors	Contents
Boile et al. (2001)	Available methods for estimating maintenance cost - Highway allocation study, estimation of pavement deterioration
Martin et al. (2002)	Maintenance cost vs. heavy vehicle-road use Data model estimating portion of load related road wear based on deterioration prediction. Used fourth rule
Hajek (1998)	Process: 1) new traffic stream 2) allocate streams to highway system 3) assess cost impact → unit cost of providing pavement structure for

	additional ESAL
Tolliver et al. (1994)	Procedure: 1) maximum feasible life in years 2) determine pavement life with standard measurement of ESALs 3) calculate the loss of PSR 4) calculate an average cost per ESAL 5) calculate the avoidable road damage

A mature pavement management system (PMS) includes three key components: data collection, deterioration prediction, and cost analysis.

1) Data collection: inventory, history, condition survey, traffic, database
2) Pavement deterioration prediction: Bayesian models, probabilistic models, empirical models, mechanistic-empirical model, mechanical model
3) Cost analysis: highway cost allocation study (HCAS) conducted by USDOT as well as several state DOTs. User cost need to be considered in this study.

These four researchers attempted to allocate pavement damage using marginal cost models. Each presents slightly different scenarios, attempting to calculate the marginal pavement cost of truck damage, which is defined as a unit cost of providing pavement structure for one additional passage of a unit truckload (expressed as equivalent single axle load).

Below is a composite outline of these procedures.

Phase 1 – identification of new traffic streams

- Determine the change in the total number of equivalent single axle load – kilometers (ESAL-km) for 20 year analysis period.
- The magnitude of pavement damage caused by traffic loads was assessed using the concept of axle load equivalency factor (LEF).
    1) 25 vehicle classes, 2) projection of truck fleet in each class for 20 year → 20*25 matrix, 3) an estimation was made of the vehicle kilometers of travel for each vehicle class and the year of the analysis period

Phase 2 – allocation of new traffic streams to highway system

- 20 representative categories, allocate the total change in ESAL-km to each representative category based on its typical exposure.

Phase 3 – Cost impact of new traffic streams on pavement network

- Convert the changes in ESAL-km allocated to the 20 representative categories into the changes in pavement costs (marginal cost for entire pavement network, all 20 years of the analysis period, and all four scenarios

Marginal cost method

1) A typical initial pavement structure for each representative category (20 road categories)
2) Pavement maintenance and rehabilitation strategies for 60-year analysis period for each representation category.
3) Total cost by using unit item costs and they are increased by 25 % to include overheads.
4) Present worth
5) Equivalent Uniform Annual Cost

Highway Class	Typical Traffic Load Measured by Annual ESALs	Marginal Pavement Cost per ESAL		Marginal Pavement Cost per Average 5-Axle Truck	
		New Pavement	In-Service Pavement	New Pavement	In-Service Pavement
Urban Freeway	625,000	0.0025	0.0013	0.004	0.002
Major Arterial	300,000	0.0092	0.0047	0.014	0.007
Minor Arterial	85,000	0.0158	0.0082	0.024	0.012
Collector	30,000	0.0401	0.0206	0.060	0.031
Local	1,500	0.5968	0.3070	0.895	0.461

Appendix 6: Multistate Permitting Agreements

OVERSIZE AND OVERWEIGHT PERMIT LAWS AND REGULATIONS

(from https://perba.dotd.louisiana.gov/wsRegulations.nsf/9beb57371783ec6386256f3b004c7ef9/87b030226903f91086256f63004e41ff?OpenDocument&Highlight=2,trailers)

Types of Permits
Multi-State Permit Agreement

MULTI-STATE PERMIT AGREEMENT – SASHTO STATES:

The purpose of this agreement is to provide a routine uniform mechanism for processing multi-state permits for certain oversize and/or overweight vehicle combinations traveling between member states. SASHTO member states include: Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, Ohio, Oklahoma, South Carolina, Tennessee, Texas, Virginia and West Virginia.

This process will apply only to what is to be called the envelope vehicle which is transporting non-divisible loads. The end result is to ease the administrative burdens of member states and the trucking industry that move oversize/overweight vehicles and loads across state borders. Each state will continue to issue its own permits and to receive full payment for each permit issued under this Agreement, supported by a permit agent.

The permit agent will be the central mechanism for administering and processing a multi-state oversize/overweight truck permit under this Agreement. The permit agent may be an independent service agency or a motor carrier agreeing to and capable of successfully performing the duties of a permit agent as provided for in the Multi-State Agreement.

In recognition of the assistance of such services to be provided by a permit agent, member states will give priority to multi-state permit requests received.

The advantage of this process is seen in the combining of each of the permits for the states being traveled onto one form. This will reduce the transmission costs and provide for one contact to obtain permits for travel through all states that are a part of this Agreement.

In addition, the Agreement also provides for a common set of safety regulation for escort vehicles, as well as, equipment requirements.
An oversize Multi-State Permit fee is $10.00 for ten days. An overweight Multi-State

Permit fee for Louisiana is taken from Addendum A-2 or A-3. The overweight fees for each member state are applied to the total cost of the overweight permit.

For the purpose of this Agreement, an envelope vehicle is defined as a truck tractor/trailer or manufactured housing combination not exceeding the following maximum limitations:

Maximum Dimensions for Envelope Vehicle	
Length	**100 feet 0 inches** (combination overall length including all overhang) *51 feet minimum outer axle measurement
Height	**13 feet 6 inches** (overall height)
Width	**14 feet 0 inches** (overall width including all overhang)
Maximum Weight Allowed	
Overall Gross Vehicle Weight …… 120,000 Pounds	
Steering Axle ……..12,000 Pounds	
Single Axle ……..… 20,000 Pounds	
Tandem Axle ……..…… 40,000 Pounds	
Axle Group (3 or more) ……..…… 60,000 Pounds	

A permit issued under this agreement will be valid for a single trip not to exceed ten (10) calendar days. These permits may be obtained from the Truck Permit Office or the Louisiana Truck Center.

MULTI-STATE PERMIT AGREEMENT – WASHTO STATES:

The purpose of this agreement is to provide a routine uniform mechanism for processing multi-state permits for certain oversize and/or overweight vehicle combinations traveling between member states. WASHTO member states include: Arizona, Colorado, Idaho, Louisiana, Montana, New Mexico, Oklahoma, Oregon, Texas, Utah, and Washington.

This agreement shall authorize each Member Jurisdiction to issue regional permits allowing operation in any other Member Jurisdiction of vehicles of the following non-reducible maximum dimensions:

Maximum Dimensions for Envelope Vehicle
600 pounds per inch of tire width

21,500 pounds per axle
43,000 pounds per tandem axle
53,000 pounds per tridum (wheelbase more than 8 ft. but not more than 13 ft.)
160,000 pounds gross weight
In no case may the gross weight exceed the sum of the permitted axle, tandem axle, group axle weights or the weight specified by the permit, whichever is less.
Have a minimum of five axles
The weight on any group of axles shall be determined by the weight table attached hereto as Appendix A. Other provisions of this section shall also apply; the lesser of these weights shall be the determining factor.
Maximum Dimensions for Envelope Vehicle
110 feet overall length
14 feet 0 inches in width
14 feet 0 inches in height

This agreement also covers the permitting of divisible loads moved by longer combination vehicles (LCVs). The permitted movement of an LCV will be subject to the parameters established by each member jurisdiction wishing to participate in this permitting process and set forth in the Regional permit Desk Guide. The signing of this agreement does not automatically commit the jurisdiction to either permitting LCVs or allowing their use within the boundaries of the jurisdiction.

The cost of the permit is the sum of the individual state fees.

Appendix 7: Carrier Fees and Permit Costs Scenario Data

Scenario 1

Total	Type	Subtotal		
Illinois				
$355	Fees	$125	Combined mileage and overlength	Overdimension Category E (160'L) at 300mi
		$50	Application	Additional overdimension (160'L)
		$180	Combined mileage and overweight	Overweight Category I
$7	Costs	$7	Permit review	$18.81/hr + 42.77% fringe = $26.87/hr * 15mins
Indiana				
$200	Fees	$20	Base	Base
		$180	Combined mileage and overweight	Overweight Fee (112,000lbs: $0.60/mi * 300mi)
$7	Costs	$7	Permit review	$18.81/hr + 42.77% fringe = $26.87/hr * 15mins
Iowa				
$10	Fees	$10	Base	All permits
$7	Costs	$7	Permit review	$18.81/hr + 42.77% fringe = $26.87/hr * 15mins
Kansas				
$20	Fees	$20	Base	Standard Permit
$7	Costs	$7	Permit review	$18.81/hr + 42.77% fringe = $26.87/hr * 15mins
Kentucky				
$60	Fees	$60	Base	All permits
$7	Costs	$7	Permit review	$18.81/hr + 42.77% fringe = $26.87/hr * 15mins

Total	Type	Subtotal		
Michigan				
$50	Fees	$50	Overweight	Overweight permit (112,000lbs)
$7	Costs	$7	Permit review	$18.81/hr + 42.77% fringe = $26.87/hr * 15mins
Minnesota				
$72	Fees	$15	Base	Single Trip Permit
		$57	Combined axle spacing and overweight	Damage Assessment Fee w/ 2 axles 4'6" spacing at 40,000lbs and 3 axles 9' spacing at 60,000lbs ($0.18/mi + $0.19/mi) * 300mi
$7	Costs	$7	Permit review	$18.81/hr + 42.77% fringe = $26.87/hr * 15mins
$1,270	Escort	$1,270	State Patrol	$79.28/hr * 8hr * 2 troopers
Missouri				
$345	Fees	$15	Base	Single Trip Permit
		$250	Movement Feasibility	Movement Feasibility (160'L)
		$80	Overweight	112,000lbs-80,000lbs / 10,000lbs * $20
$20	Costs	$20	Permit review	$20/hr * 1hr
$1,541	Escort	$1,541	State Police Fee	$48.57/hr * 8hr * 3 officers + $110/vehicle * 3 vehicles + 3% admin fee
Ohio				
$135	Fees	$10	Base	Application
		$125	Overweight	Routine permit (112,000lbs)
$7	Costs	$7	Permit review	$18.81/hr + 42.77% fringe = $26.87/hr * 15mins
Wisconsin				
$55	Fees	$55	Overweight	Overweight permit (112,000lbs)

Total	Type	Subtotal		
$40	Costs	$40	Permit review	

Scenario 2

Total	Type	Subtotal		
Illinois				
$180	Fees	$180	Combined mileage and overweight	Overweight Category L (5 axles and 90,000lbs gross weight)
$7	Costs	$7	Permit review	$18.81/hr + 42.77% fringe = $26.87/hr * 15mins
Indiana				
$125	Fees	$20	Base	Base
		$105	Combined mileage and overweight	Overweight Fee (90,000lbs: $0.35/mi * 300mi)
$7	Costs	$7	Permit review	$18.81/hr + 42.77% fringe = $26.87/hr * 15mins
Iowa				
$10	Fees	$10	Base	All permits
$7	Costs	$7	Permit review	$18.81/hr + 42.77% fringe = $26.87/hr * 15mins
Kansas				
$20	Fees	$20	Base	Standard Permit
$7	Costs	$7	Permit review	$18.81/hr + 42.77% fringe = $26.87/hr * 15mins
Kentucky				
$60	Fees	$60	Base	All permits
$7	Costs	$7	Permit review	$18.81/hr + 42.77% fringe = $26.87/hr * 15mins
Michigan				

Total	Type	Subtotal		
$50	Fees	$50	Overweight (90,000lbs)	
$7	Costs	$7	Permit review	$18.81/hr + 42.77% fringe = $26.87/hr * 15mins
			Minnesota	
$15	Fees	$15	Base	Single Trip Permit
$7	Costs	$7	Permit review	$18.81/hr + 42.77% fringe = $26.87/hr * 15mins
			Missouri	
$35	Fees	$15	Base	Single Trip Permit
		$20	Overweight	Movement Feasibility (160'L)
$20	Costs	$20	Permit review	$20/hr * 1hr
			Ohio	
$135	Fees	$10	Base	Application
		$125	Overweight	Routine permit (90,000lbs)
$7	Costs	$7	Permit review	$18.81/hr + 42.77% fringe = $26.87/hr * 15mins
			Wisconsin	

Scenario 3

Total	Type	Subtotal		
			Illinois	
$383	Fees	$60	Combined mileage and overheight	Overdimension Category D (16'H) at 300mi
		$323	Combined mileage and overweight	Overweight (6 axles and 132,000lbs) at 300mi

Total	Type	Subtotal		
$13	Costs	$13	Permit review	$18.81/hr + 42.77% fringe = $26.87/hr * 30mins
Indiana				
$210	Fees	$20	Base	Base
		$10	Other	Executive Fee
		$180	Combined mileage and overweight	Overweight 132,000lbs ($0.60/mi * 300mi)
$13	Costs	$13	Permit review	$18.81/hr + 42.77% fringe = $26.87/hr * 30mins
Iowa				
$10	Fees	$10	Base	All permits
$13	Costs	$13	Permit review	$18.81/hr + 42.77% fringe = $26.87/hr * 30mins
Kansas				
$20	Fees	$20	Base	Standard Permit
$13	Costs	$13	Permit review	$18.81/hr + 42.77% fringe = $26.87/hr * 30mins
Kentucky				
$60	Fees	$60	Base	All permits
$13	Costs	$13	Permit review	$18.81/hr + 42.77% fringe = $26.87/hr * 30mins
Michigan				
$50	Fees	$50	Overweight	Overweight permit (112,000lbs)
$13	Costs	$13	Permit review	$18.81/hr + 42.77% fringe = $26.87/hr * 30mins
Minnesota				
Missouri				

Total	Type	Subtotal		
$1,060	Fees	$15	Base	Single Trip Permit
		$120	Overweight	132,000lbs-80,000lbs / 10,000lbs * $20
		$500	Combined mileage and overweight	Mileage Fee
		$425	Bridge engineering review	Bridge Analysis (16'H)
$50	Costs	$20	Permit review	$20/hr * 1hr
		$30	Bridge engineering review	$30/hr * 1hr
Ohio				
$207	Fees	$10	Base	Application
		$125	Overdimension	Superload (16'6"W, 15'10"H)
		$72	Combined mileage and overweight	Ton Mile (132,000lbs - 120,000lbs / 2,000 * $0.04 * 300mi)
$13	Costs	$13	Permit review	$18.81/hr + 42.77% fringe = $26.87/hr * 30mins
Wisconsin				
$75	Fees	$75	Overheight	15'10"H
$100	Costs	$100	Permit review	

Scenario 4

Total	Type	Subtotal		
Illinois				
$260	Fees	$60	Combined mileage and overlength	Overdimension Category D (mobile home > 85') at 300 mi
		$200	Engineering/Traffic Review	Additional overdimension (160'L)
$37	Costs	$13	Permit review	$18.81/hr + 42.77% fringe = $26.87/hr * 30mins
		$24	Bridge Engineering Review	$33.71/hr + 42.77% fringe = $48.13/hr * 30mins

Total	Type	Subtotal		
Indiana				
$50	Fees	$40	Overlength	Oversize only superload
		$10	Other	Executive Fee
$37	Costs	$13	Permit review	$18.81/hr + 42.77% fringe = $26.87/hr * 30mins
		$24	Bridge Engineering Review	$33.71/hr + 42.77% fringe = $48.13/hr * 30mins
Iowa				
$10	Fees	$10	Base	All permits
$13	Costs	$13	Permit review	$18.81/hr + 42.77% fringe = $26.87/hr * 30mins
Kansas				
$20	Fees	$20	Base	Standard Permit
$13	Costs	$13	Permit review	$18.81/hr + 42.77% fringe = $26.87/hr * 30mins
Kentucky				
$60	Fees	$60	Base	All permits
$13	Costs	$13	Permit review	$18.81/hr + 42.77% fringe = $26.87/hr * 30mins
Michigan				
$15	Fees	$15	Overheight	Overdimension Permit
$37	Costs	$13	Permit review	$18.81/hr + 42.77% fringe = $26.87/hr * 30mins
		$24	Bridge Engineering Review	$33.71/hr + 42.77% fringe = $48.13/hr * 30mins
Minnesota				
$15	Fees	$15	Base	Single Trip Permit

Total	Type	Subtotal		
$37	Costs	$13	Permit review	$18.81/hr + 42.77% fringe = $26.87/hr * 30mins
		$24	Bridge Engineering Review	$33.71/hr + 42.77% fringe = $48.13/hr * 30mins
$1,270	Escort	$1,270	State Patrol	$79.28/hr * 8hr * 2 troopers
	Missouri			
$265	Fees	$15	Base	Single Trip Permit
		$250	Movement Feasibility	Movement Feasibility (16'6"W)
$150	Costs	$60	Permit review	$20/hr * 3hr
		$90	Bridge Engineering Review	$30/hr * 3hr
$1,541	Escort	$1,541	State Police Fee	$48.57/hr * 8hr * 3 officers + $110/vehicle * 3 vehicles + 3% admin fee
	Ohio			
$135	Fees	$10	Base	Application
		$125	Overdimension	Superload Permit (16'6"W, 15'10"H)
$37	Costs	$13	Permit review	$18.81/hr + 42.77% fringe = $26.87/hr * 30mins
		$24	Bridge Engineering Review	$33.71/hr + 42.77% fringe = $48.13/hr * 30mins
	Wisconsin			
$25	Fees	$25	Overdimension	Overwidth and Overheight
$175	Costs	$25	Permit review	
		$150	Regional Review	

Scenario 5

Total	Type	Subtotal
	Illinois	

Total	Type	Subtotal		
$125	Fees	$125	Combined mileage and overlength	Overdimension Category E (185'L) at 300mi
$37	Costs	$13	Permit review	$18.81/hr + 42.77% fringe = $26.87/hr * 30mins
		$24	Bridge Engineering Review	$33.71/hr + 42.77% fringe = $48.13/hr * 30mins
Indiana				
$50	Fees	$40	Overlength	Oversize only superload permit
		$10	Other	Executive Fee
$37	Costs	$13	Permit review	$18.81/hr + 42.77% fringe = $26.87/hr * 30mins
		$24	Bridge Engineering Review	$33.71/hr + 42.77% fringe = $48.13/hr * 30mins
Iowa				
$10	Fees	$10	Base	All permits
$37	Costs	$13	Permit review	$18.81/hr + 42.77% fringe = $26.87/hr * 30mins
		$24	Bridge Engineering Review	$33.71/hr + 42.77% fringe = $48.13/hr * 30mins
Kansas				
$20	Fees	$20	Base	Standard Permit
$37	Costs	$13	Permit review	$18.81/hr + 42.77% fringe = $26.87/hr * 30mins
		$24	Bridge Engineering Review	$33.71/hr + 42.77% fringe = $48.13/hr * 30mins
Kentucky				
$60	Fees	$60	Base	All permits
$37	Costs	$13	Permit review	$18.81/hr + 42.77% fringe = $26.87/hr * 30mins
		$24	Bridge Engineering Review	$33.71/hr + 42.77% fringe = $48.13/hr * 30mins
Michigan				

Total	Type	Subtotal		
$15	Fees	$15	Overlength	Overdimension Permit
$37	Costs	$13	Permit review	$18.81/hr + 42.77% fringe = $26.87/hr * 30mins
		$24	Bridge Engineering Review	$33.71/hr + 42.77% fringe = $48.13/hr * 30mins
Minnesota				
$15	Fees	$15	Base	Single Trip Permit
$37	Costs	$13	Permit review	$18.81/hr + 42.77% fringe = $26.87/hr * 30mins
		$24	Bridge Engineering Review	$33.71/hr + 42.77% fringe = $48.13/hr * 30mins
$1,903	Escort	$1,903	State Patrol	$79.28/hr * 8hr * 3 troopers
Missouri				
$265	Fees	$15	Base	Single Trip Permit
		$250	Movement Feasibility	Movement Feasibility (160'L)
$150	Costs	$60	Permit review	$20/hr * 3hr
		$90	Bridge Engineering Review	$30/hr * 3hr
$1,541	Escort	$1,541	State Police Fee	$48.57/hr * 8hr * 3 officers + $110/vehicle * 3 vehicles + 3% admin fee
Ohio				
$65	Fees	$10	Base	Application
		$55	Overdimension	Oversize only superload permit
$37	Costs	$13	Permit review	$18.81/hr + 42.77% fringe = $26.87/hr * 30mins
		$24	Bridge Engineering Review	$33.71/hr + 42.77% fringe = $48.13/hr * 30mins
Wisconsin				

Scenario 6

Total	Type	Subtotal		
	Illinois			
$1,789	Fees	$50	Application	Additional overdimension application fee
		$125	Combined mileage and overlength	Overdimension Category E (225'L)
		$814	Combined mileage and overweight	Gross weight fee (235,000lbs - 80,000lbs *$0.035 * 300mi / 2000mi)
		$800	Other	Police Escort Notification Fee (10 police districts * $80/districts)
$321	Costs	$161	Permit review	$18.81/hr + 42.77% fringe = $26.87/hr * 6hr
		$160	Bridge Engineering Review	$40/hr * 4hr
$1,440	Escort	$1,440	State Police	$60/car/hr * 3 cars * 8hr
	Indiana			
$1,365	Fees	$30	Base	Base
		$10	Other	Executive Fee
		$25	Movement Feasibility	Design Review Fee
		$300	Combined mileage and overweight	Overweight Fee ($1/mi * 300mi)
		$1,000	Engineering/Traffic Review	Bridge Analysis Fee ($10/bridge * 100 bridges)
$365	Costs	$161	Permit review	$18.81/hr + 42.77% fringe = $26.87/hr * 6hr
		$150	Bridge Engineering Review	$30/hr * 5hr
		$54	Route Check	$18.81/hr + 42.77% fringe = $26.87/hr * 2hr
$1,220	Escort	$1,220	State Police	$34/hr * 8hr * 4 officers + $0.44/mi * 300mi
	Iowa			
$10	Fees	$10	Base	All permits
$161	Costs	$161	Permit review	$18.81/hr + 42.77% fringe = $26.87/hr * 6hr
	Kansas			

Total	Type	Subtotal		
$50	Fees	$50	Overweight	Superload Permit
$480	Costs	$161	Permit review	$18.81/hr + 42.77% fringe = $26.87/hr * 6hr
		$30	Route Check	$30/hr * 1hr
		$289	Bridge Engineering Review	$33.71/hr + 42.77% fringe = $48.13/hr * 6hr
Kentucky				
$60	Fees	$60	Base	All permits
$450	Costs	$161	Permit review	$18.81/hr + 42.77% fringe = $26.87/hr * 6hr
		$289	Bridge Engineering Review	$33.71/hr + 42.77% fringe = $48.13/hr * 6hr
Michigan				
$50	Fees	$50	Overweight	Overweight permit
$450	Costs	$161	Permit review	$18.81/hr + 42.77% fringe = $26.87/hr * 6hr
		$289	Bridge Engineering Review	$33.71/hr + 42.77% fringe = $48.13/hr * 6hr
Minnesota				
$189	Fees	$15	Base	Single Trip Permit
		$174	Combined Axle Spacing and overweight	Damage Assessment Fee w/ tridem at 60,000lbs, tandem at 35,000lbs, tridem at 50,000lbs, tandem at 40,000lbs ($0.19/mi +$0.12/mi + $0.09/mi + $0.18/mi) * 300mi
$450	Costs	$161	Permit review	$18.81/hr + 42.77% fringe = $26.87/hr * 6hr
		$289	Bridge Engineering Review	$33.71/hr + 42.77% fringe = $48.13/hr * 6hr
$1,270	Escort	$1,270	State Patrol	$79.28/hr * 8hr * 2 troopers
Missouri				
$1,760	Fees	$15	Base	Single Trip Permit

Total	Type	Subtotal		
		$320	Overweight	Overweight Permit (235,000lbs - 80,000lbs / 10,000lbs * 20)
		$925	Bridge Engineering Review	Bridge Analysis Fee (16'H)
		$500	Combined mileage and overweight	
$300	Costs	$120	Permit review	$20/hr * 6hr
		$180	Bridge Engineering Review	$30/hr * 6hr
$2,055	Escort	$2,055	State Police Fee	$48.57/hr * 8hr * 4 officers + $110/vehicle * 4 vehicles + 3% admin fee
Ohio				
$825	Fees	$10	Base	Application
		$125	Overdimension	Superload Permit (16'6"W, 15'10"H)
		$690	Combined mileage and overweight	Ton Mile Fee (235,000lbs - 120,000lbs / 2,000 * $0.04 * 300mi)
$450	Costs	$161	Permit review	$18.81/hr + 42.77% fringe = $26.87/hr * 6hr
		$289	Bridge Engineering Review	$33.71/hr + 42.77% fringe = $48.13/hr * 6hr
Wisconsin				
$235	Fees	$195	Overdimension	$105 + (235,000lbs - 150,000lbs / 1,000lbs * $10)
		$40	Permit review	Engineering Review Fee
$450	Costs	$100	Permit review	
		$50	Bridge Engineering Review	Bridge Review Cost
		$300	District Review	
$1,400	Escort	$1,400	State Patrol Fee	

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