2009 AB 778
LRB-4398/1

Report on Bill for Vehicle Weight Limit Exceptions

2009 Senate Bill 562 and 2009 Assembly Bill 778 as Amended

Prepared by the Wisconsin Department of Transportation

Weight Impact Study

(As Required by Wisconsin Statute 13.096)

Analysis by the Legislative Reference Bureau

Under current law, with limited exceptions, no person may operate upon a highway any vehicle or combination of vehicles that exceeds certain statutory weight limits unless the person obtains a permit issued by the Wisconsin Department of Transportation (the department) or a local highway authority. The department may issue annual or consecutive month permits for the transportation of raw forest products in vehicle combinations having a gross weight not exceeding 98,000 pounds if the vehicle combination has six or more axles and meets other criteria (RS permit). A vehicle combination operated under an RS permit is subject to certain operating restrictions, including that it cannot be operated on an interstate highway. "Raw forest products" includes logs, poles, cordwood, wood chips, sawdust, and pulpwood.

Also under current law, the department or a local highway authority may impose special weight limits on highways that, because of weakness of the roadbed due to deterioration or climatic conditions or other special or temporary conditions, would likely be seriously damaged or destroyed in the absence of the special limits. If special weight limits are imposed, the limits must be posted by highway signs along the affected highways. The special weight limits apply regardless of whether a vehicle is being operated under an overweight permit unless the permit expressly authorizes the special weight limits to be exceeded.

Under this bill, each RS permit must expressly authorize the vehicle combination to exceed any special weight limits imposed in connection with the thawing of frozen highways and to be operated at the full allowable weight of up to 98,000.

Under current law, if a vehicle's per-axle weight is over limits prescribed by law by not more than 2,000 pounds and the vehicle's load can be reloaded within the normal load carrying areas to eliminate the excess per-axle weight, the operator may reload up to 2,000 pounds and no forfeiture may be imposed. In lieu of reloading the vehicle, the operator may choose to continue operating the vehicle above the per-axle weight limit and pay a forfeiture of $50 for failure to reload the vehicle.

This bill affords the same opportunity to reload up to 2,000 pounds, or pay a forfeiture of $50 for failure to reload, for a vehicle combination being operated under an RS permit if the vehicle combination exceeds, by not more than 2,000 pounds, any per-axle weight limit specified in the RS permit.

Background

Since SB-562 and AB-778 establish exceptions to the vehicle weight limits specified in Wisconsin Statutes Chapter 348, the department is required to report findings and information specified under Wisconsin Statute 13.096. As prescribed by the statute, the department has sought information from individuals, organizations and local governments likely to be affected by the proposed weight limit exceptions. The department has used that information in arriving at our findings, and based this report on that information.

Findings regarding 2009 SB-562 and 2009 AB-778 as Amended

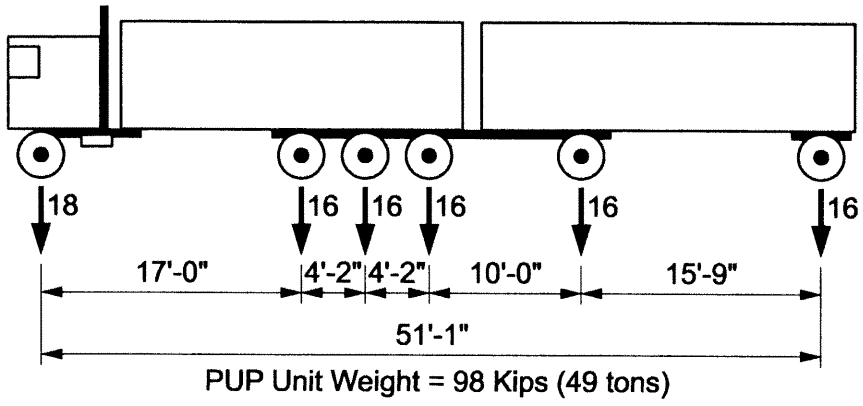
The bill as written allows for 98,000 pounds log trucks to operate essentially year round, and specifically during spring thaw. It also provides 98,000 pound trucks that are overloaded on some axles with the opportunity to continue to operate in this improperly loaded condition for a nominal fine. The findings in this report suggest that this bill would be detrimental to pavements and bridges if the 98,000 pound trucks are allowed to operate during spring thaw and if the trucks are allowed to run while improperly loaded.

Bridges

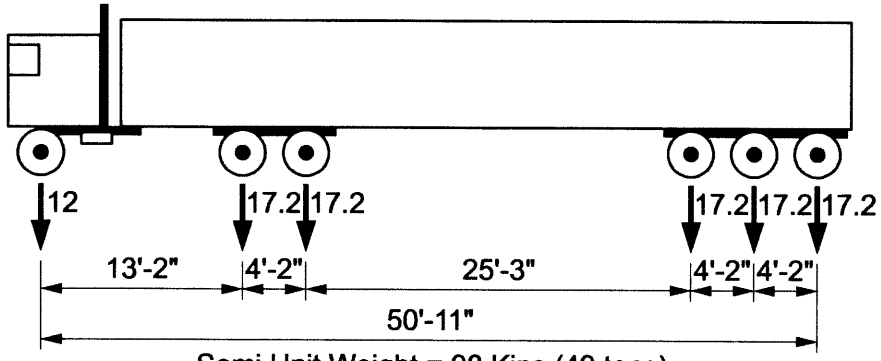
The challenge of this bill to the WisDOT Bureau of Structures was to provide a systematic way to evaluate the effect of adding 2 kips (1 kip = 1000 lbs) per axle to the vehicles authorized by permit to transport raw forest products at 90,000 pounds on five axles and up to 98,000 pounds on six axles.

These two vehicles are attached below:

Indicated concentrations
are axle loads in kips.



PUP Unit Weight = 98 Kips (49 tons)



Semi Unit Weight = 98 Kips (49 tons)

The department developed these two vehicles as representative lumber hauling vehicles. These vehicles were utilized to follow a systematic process to evaluate the 98,000 pound truck for 2005 Act 167. This analysis resulted in the department posting 57 bridges (state system) in 2006. These posted bridges are based on a snapshot in time (2006). Since that date a number of those 57 bridges may have been replaced or other bridges may be posted. Local units of government also posted many bridges over the last few years as a result of Act 167.

Before looking into the structural analysis, a simple approximation of how the provision allowing reloading of up to 2,000 pounds per axle could affect the percent increase of weight on certain sections of these trucks. This is described below for both vehicles using a maximum 2,000 pound per axle variance:

PUP: The portion of the truck would increase by 12.5 percent if all three axles are increased by 2 Kips and the trailer axles are reduced by 3 Kips.

Semi: The effect would be an 11.6 percent by increasing the tandem or the tri-axle. This shifts the effect in the truck and changes the magnitudes of the loads in the truck.

The reloading provision, to the extent that individual axle weights may be corrected in the field, is expected to have a large effect on the stresses imposed on bridges and will result in an increase in the number of posted bridges. The department did an extensive analysis (over 5,000 bridges) of this bill utilizing primarily state owned bridges. The analysis looked at the impact of allowing certain axles to increase by 2 Kips while leaving the Gross Vehicle Weight (GVW) constant. The department used the Chapter 45 process from the "Wisconsin Bridge Manual" to rate the bridges.

The analysis indicates that nine additional state structures will need to be posted. Each of these structures would have to be looked at in much closer detail before calculating the appropriate posting sign. It is not known at this time what the impact to local bridges would be.

Pavements

The pavement design area completed a general impact analysis of this proposal. A very detailed and definitive analysis was not possible due to the lack of proposal details. Completion of this in-depth analysis would require more detailed information about the proposed roadways affected and the total number of anticipated trips. This information is not available at the present time.

Of greatest importance is the inability to model the decreased spring soil strengths that are key factors in estimating the additional deterioration to pavements that would occur from changing the law such that larger numbers of heavier loads would be moved during the thaw period, and by increasing the gross vehicle loads during that vulnerable period. The complexities of the many different soil types and roadway subbases that have differing levels of stability during the thaw period prevent a definitive estimate of the additional pavement impacts from this proposal.

There has been considerable research done on the subject of pavement strength reduction due to spring thaw. Minnesota Department of Transportation has completed some of this work. Minnesota's research on this topic yields some very informative aspects of reduced load carrying capacity of a pavement in the spring during thaw and the resultant increase in damage. For example they report that "The damage that occurs during each day in the spring is about 5 times greater than the damage that occurs during each day in summer." (1). They also state in another report that "for the same loads and traffic volumes, about 10 percent of the total annual damage occurs each week during spring". Based on a spring thaw period of 7 to 8 weeks, the damage done to the highway during this time period equals 70 to 80% of the total damage done during the year. (2).

Aside from the seasonally specific impacts, a general analysis was completed, using some basic assumptions described below. This analysis supports the conclusions reached in previous work by the department with regard to the importance of axle weights and spacing and the potential, in certain circumstances and with proper criteria for the vehicle configuration and loading to increase gross vehicle weights without having negative

impacts on pavements. However, the proposal now under consideration is not about that general case, but rather the special circumstance of loadings during the thaw period. *Careful review of this analysis is warranted, since the cumulative impact of this proposal is highly dependent on the analysis assumptions used.*

The analysis was completed for two different scenarios:

1. The total number of loads of 80,000 pounds GVW (5-axle) or 98,000 pounds GVW (6-axle) vehicles remains constant (the total amount of product moved increases, due to the heavier-loaded trucks).
2. The total amount of product carried remains constant (fewer 98,000 pound loads needed to move the total amount of product).

Basic assumptions used for both scenarios:

- Current 80,000 pound GVW truck rate is 100 trucks per day. This number of trucks is for illustrative purposes and to compare relative changes; it does not reflect an estimation of the total or differential truck trips related to the influence of the proposed change in law.
- Fifty days of spring thaw conditions per year.
- The estimated Equivalent Single Axle Loads (ESAL) for roadways is 1 million, over a 20 year design life. (50,000 ESALs per year.)
- A 80,000 pound GVW truck carries 46,000 pounds of load, while a 98,000 pound GVW truck carries 62,000 pounds of load.

Scenario 1 - Assumes a constant number of loads:

Current (80,000 pound GVW)	Proposed (98,000 pound GVW)
100 trucks/day (5-axle)	100 trucks/day (6-axle)
2.47 ESALs[3] per truck	2.84 ESALs per truck
247 ESALs per day	284 ESALs per day

Scenario 1 identifies 37 additional ESALs per day. Assuming 50 days for the spring thaw, this equates to an increase of 1,850 ESALs during the spring thaw period. The 1,850 additional ESALs for 98,000 pound GVW trucks is a 3.7% increase over the annual 50,000 ESAL rate. This translates to reducing the expected pavement life from 20 years to 19.3 years.

Scenario 2 - Assumes the total amount of product moved is constant:

Current (80,000 pound GVW)	Proposed (98,000 pound GVW)
100 trucks/day (5-axle)	75 trucks/day (6-axle)
2.47 ESALs per truck	2.84 ESALs per truck
247 ESALs per day	213

Scenario 2 identifies 34 less ESALS per day. Assuming 50 days for the spring thaw, this equates to 1,700 less ESALs during the spring thaw period. The 1,700 fewer ESALs for

98,000 pound GVW trucks is a 3.4% decrease over the annual 50,000 ESAL rate. This translates to an increase in the expected pavement life from 20 years to 20.7 years.

When investigating the potential pavement effects of the proposed bill, there are two other factors that must also be taken into account, including seasonal influences and load distribution influences. The support of the pavement structure is heavily dependent on the soil underneath it. During the period of spring thaw, this soil is in a saturated condition, which results in a material that provides less support than at other times of the year. Therefore any additional ESAL loads during the thaw season will have a greater detrimental impact on pavement life and performance than at other times during the year. The "AASHTO Guide for Design of Pavement Structures (1993)" states that the strength of the soils during the thaw weakening period may be as little as 20-50% of the normal strength. The Guide also states "Periods of thawing are among the most critical phases in the annual cycle of environmental changes affecting pavements in seasonal frost areas." It also goes on to state "In areas of deep frost penetration, the period of complete thawing of thicker pavement structures in the spring is usually the most damaging type of thaw period because it affects the roadbed as well as the sub base and base layers."

An additional influencing factor involves the distribution of load among an individual truck's axles. ESAL calculations are dependent on how the individual trucks axles are loaded. Axle load variances will result in changes to the ESAL factors.

The presented analyses, based on the assumptions given, indicate that the potential pavement impacts of this proposal are highly dependent on the assumptions used. Results indicate that the pavement impacts could range from a 0.7 year reduction to a 0.7 year increase in pavement life.

It was not possible to model the decreased spring soil strengths in the two analyses, but it is apparent that any additional ESALs during this spring thaw period will significantly compound any detrimental pavement impacts presented above.

References and Notes:

1. Spring Load Restrictions, Technical Fact Sheet. Published by Minnesota Department of Transportation's Materials and Road Research Section.
2. Ovik, J. M., Siekmeier, J. A., and Van Deusen, D. A., "Improved Spring Load Restriction Guidelines Using Mechanistic Analysis", Minnesota Department of Transportation, page 61.
3. All ESAL calculations in this analysis are based on the axle load equivalency factors in Appendix D of *AASHTO Guide for Design of Pavement Structures, 1993.*

Highway Operations and Safety

Under the current provisions of s. 348.21(2) (b), commonly referred to as the "Reload Option", no forfeiture may be imposed if a vehicle's axle or axle group weight exceeds what is allowed by law by not more than 2,000 pounds and the vehicle's load can be "reloaded" within the normal load carrying area of the vehicle so that all axle or axle groups are within the statutory limits. This subsection also provides the option that a vehicle which is not reloaded may continue to operate on the highway, but a forfeiture of $50.00 ($200.50 with associated costs) shall be imposed for failure to reload.

The Reload Option is not applicable to all overweight situations. It is applicable only to those vehicles operating under the provisions of s. 348.15(3) Class A highway weights, s. 348.16 Class B highway weights and s. 348.175 the "Frozen Road" declaration. The Reload Option is not applicable to overweight situations where the vehicle is operating under an overweight permit issued under s. 348.26 Single Trip Permits or s. 348.27 Annual, Consecutive Month or Multiple Trip Permits.

AB 778 proposes to add s. 348.27(9m) (a) 4 to the current three sections to which the Reload Option is applicable. If AB 778 is passed with this change, the 98,000 pound raw forest products overweight permit as authorized in s. 348.27(9m)(a)4, will become the first overweight permit that provides for the Reload Option.

Mill Location	*Time Period*	*98,020-99,980 pounds*	*100,000 pounds and above*	*Total*	*Highest Weight*
Louisiana-Pacific Hayward	September 2009	152	49	201	104,340 pounds
Louisiana-Pacific Hayward	October 2009	201	87	288	104,280 pounds
Louisiana-Pacific Hayward	December 2009	384	155	539	106,260 pounds
Louisiana-Pacific Hayward	February 2010	629	272	901	108,640 pounds
Packaging Corporation Of America Tomahawk	February 15 - March 17 2010	183	240	423	117,240 pounds
Biewer Lumber Prentice	February 01- February 28 2010	241	201	442	113,500 pounds
Biewer Lumber Prentice	March 01- March 16 2010	77	54	131	113,200 pounds

Other specific findings

Additionally, to meet the specific requirements for information to be included in the findings, the department has contacted stakeholders to obtain feedback on issues prescribed in Wisconsin Statute 13.096. Input was provided to the department by:

- Ashland County, Bayfield County, Florence County, Forest County, Iron County, Marinette County and Vilas County
- Great Lakes Timber Professionals Association
- Midwest Forest Products Company
- Wisconsin County Highways Association
- Wisconsin Motor Carriers Association
- Wisconsin Paper Council
- Wisconsin Towns Association

(a) The problem addressed by the proposed vehicle weight limit exception.
The forest products industry indicates that the bill will help them save time and money by allowing 98,000 pound loads throughout the year, including the spring thaw period. In the past the RS permits are suspended during the spring thaw, which usually occurs mid-March through mid-May each year. Being able to transport larger loads during the spring thaw will decrease transportation costs per ton moved. The industry also welcomes the flexibility that the bill provides in regard to reloading cargo or paying a minimal fine if the overweight truck is not reloaded.

Many government officials view the bill differently, indicating concern about the need to protect roadway pavements during the spring thaw, when they are at their most vulnerable to deterioration.

(a1) Whether the current vehicle weight limit creates a hardship, and if so, the degree of the hardship.
The timber industry said that having to reduce permitted loads from 98,000 pounds to 80,000 pounds during the spring thaw period increases their transportation costs. Hardships are especially felt by those haulers that added an extra axle to their vehicles and cannot use them during spring thaw. Many government officials suggest that the current weight limit exceptions already contribute to additional deterioration of pavements and bridges, and the bill will hasten this deterioration. They mentioned the need to protect roads during the spring thaw by limiting truck weights.

(a2) The costs associated with complying with the current vehicle weight limit and any anticipated savings likely to result from the proposed vehicle weight limit exception.
One timber industry representative noted that the weight limits put a huge amount of added stress on their drivers since they get used to loading vehicles in one configuration and then have to change to lower weight requirements during a portion of the year. One example is that trucks at 80,000 pounds as opposed to 98,000 pounds cost the carriers $160 per trip and average loss is three trips at $480 per day per truck. Government officials looked at the question differently, mentioning the need to maintain and improve roadways based on the damage from heavier trucks.

The timber industry anticipates savings from reduced fuel costs and the need for fewer trips. Government officials predicted that the bill will greatly increase costs to the taxpayer by requiring much more pavement maintenance.

(a3) Whether any other efforts have been made to resolve the problem addressed by the proposed vehicle weight limit exception.

Most people mentioned that legislation modifying the weight restrictions is the only option for increasing permissible loads. One person said that if there are several days of a sustained freeze during the designated spring thaw period, Marinette County allows truckers to move logs and equipment before 7:00 am.

(a4) The degree of control by motor carriers over the weight and weight distribution of the vehicle or load.

A timber industry representative mentioned a high degree of control over weights. He said that all trucks are running air-ride with an air gauge that is accurate to within 200-300 pounds. He said that if someone is operating overweight, they do so knowingly.

Government officials said that the only way to control weight limits is through postings and adequate law enforcement.

(b) A description of the proposed vehicle weight limit exception, including any changes on all of the following: (b1) Gross weight limitations and gross axle and axle combination weight limitations. (b2) Width, height and length limitations.

A timber industry representative states the proposed vehicle exception will increase payloads, reduce ESALS, and reduce the number of loads. Further they feel the reduced trips will decrease the wear on roads as well as reduce emissions and fuel consumption. The only change to the vehicle would be the addition of one axle to a five axle configuration to bring it up to six axle. It is likely, up to 90 percent chance, that more carriers would commit to this conversion. Some felt the industry right now is struggling and will not make the change. Others feel there is an overinflated view of what it will do for the industry because it is too difficult to work in the woods and maintain the equipment.

Local government officials fear the industry will exceed weights on local roads at the most vulnerable time of the year. They are also concerned about an increase in larger trucks on the road.

(b3) The transportation of particular commodities.

The industry feels the bill will allow more trucks to operate more efficiently year round resulting in more product being shipped with fewer trips. The industry feels there will be productivity gains in staging for loads and reduce costs and time in the woods. It will reduce overall transportation and material costs.

Local government officials feel the industry will have carte blanche to use roads without interference and thus do whatever they want. Increased production will come with added

public infrastructure costs and a perception of limited ability to constrain those that operate in excess of posted limits.

(b4) Any highway, highway route or area of the state substantially affected by the proposed vehicle weight limit exception.

As initially introduced, the legislation would affect all roads except Interstate highways. Amendment 1 to AB-778 limits the bill to only state trunk highways and connecting highways. The amended Assembly Bill would limit applicability to State highways, but all state highways regardless of the adequacy of the pavement or soil conditions to support these loads during the Spring thaw period.

(b5) Seasonal transportation patterns.

The timber industry said there would be less overall trips during spring thaw since the trucks will be carrying more weight. Currently very little raw forest product is moved during the weight restriction period of Spring thaw as the load limits affect the economics of transporting these products during this time of year. This seasonal pattern is important in removing heavy loads during the period when roads are most susceptible to damage from heavy loads. Local governments feel this will open up all roads during the most vulnerable time of the year. The Assembly Amendment would presumably reduce concerns for vulnerable local roads, but could unduly impact state highways to the extent that practices are changed to stage loads along state highways that would then be moved, at the much heavier gross weights, during the period when those weights would be restricted from the local road system.

(c) Any other special considerations concerning the proposed vehicle weight limit exception, such as the frequency of use of the proposed exception, the support and involvement of businesses, industries and local authorities affected by the proposed exception.

The timber industry feels the bill will have a positive effect on the industry as more carriers will be able to operate more efficiently throughout the year. For example, eight less trips per day would reportedly reduce fuel consumption by 190 gallons of fuel. Mill owners are also said to benefit as well. Local government officials feel this will have a greater impact on the taxpayer to cover the increased maintenance costs.

The industry feels the exception will be used frequently. Local governments feel that other industries are watching this bill in order to ask for an exception for their commodity (i.e. gravel haulers).

Effect of Assembly Amendment 1 to the Analysis of AB-778

Amendment 1 adds sanctions to a person operating under the permit who does not comply with the permit requirements. Amendment 1 does not impact the analysis of the report.

Effect of Assembly Amendment 2 to the Analysis of AB-778
Amendment 2 limits the bill to only state trunk highways and connecting highways. Connecting highways are under the maintenance authority of local municipalities, which could result in more revenues being shifted to locals to address the costs associated with increased maintenance and replacement costs projected in this report.

Conclusion

While there is not a definitive identifiable incremental cost for accelerated pavement deterioration or bridge costs, it is clear that the greatest period of damage to pavements is precisely during the vulnerable spring thaw period and additional weight during this period will reduce pavement longevity. Bridge costs are increased as a result of the provision that allows for reloading at the time of an enforcement stop in order to meet axle weight restrictions. The provision removes the important incentive to comply with axle weight limits that are critical to determining the impact of loads on bridges. Enforcement capacity is limited. The nominal fees in cases where mis-loads are cited and the carrier elects to pay the fine rather than adjust the load would not be sufficient to encourage compliance or to avoid the reduction in pavement life and accelerated bridge maintenance and replacement costs.