

## Fiscal Estimate - 2009 Session

Original     
  Updated     
  Corrected     
  Supplemental

<b>LRB Number</b> <b>09-4398/1</b>	<b>Introduction Number</b> <b>AB-0778</b>
<b>Description</b> Weight limitations for vehicles transporting raw forest products	
<b>Fiscal Effect</b>	
<b>State:</b> <input type="checkbox"/> No State Fiscal Effect <input checked="" type="checkbox"/> Indeterminate <input type="checkbox"/> Increase Existing Appropriations <input type="checkbox"/> Increase Existing Revenues <input checked="" type="checkbox"/> Increase Costs - May be possible to absorb within agency's budget <input type="checkbox"/> Decrease Existing Appropriations <input type="checkbox"/> Decrease Existing Revenues <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Create New Appropriations <input type="checkbox"/> Decrease Costs	
<b>Local:</b> <input type="checkbox"/> No Local Government Costs <input checked="" type="checkbox"/> Indeterminate 1. <input type="checkbox"/> Increase Costs      3. <input type="checkbox"/> Increase Revenue <b>5.Types of Local Government Units Affected</b> <input type="checkbox"/> Permissive <input type="checkbox"/> Mandatory <input type="checkbox"/> Permissive <input type="checkbox"/> Mandatory <input type="checkbox"/> Towns <input type="checkbox"/> Village <input type="checkbox"/> Cities 2. <input type="checkbox"/> Decrease Costs      4. <input type="checkbox"/> Decrease Revenue <input type="checkbox"/> Counties <input type="checkbox"/> Others <input type="checkbox"/> Permissive <input type="checkbox"/> Mandatory <input type="checkbox"/> Permissive <input type="checkbox"/> Mandatory <input type="checkbox"/> School Districts <input type="checkbox"/> WTCS Districts	
<b>Fund Sources Affected</b> <b>Affected Ch. 20 Appropriations</b> <input type="checkbox"/> GPR <input type="checkbox"/> FED <input type="checkbox"/> PRO <input type="checkbox"/> PRS <input checked="" type="checkbox"/> SEG <input type="checkbox"/> SEGS 20.395(cq)(cx)(eq)	
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<b>Date</b> 4/13/2010	

**Fiscal Estimate Narratives**  
**DOT 4/13/2010**

LRB Number <b>09-4398/1</b>	Introduction Number <b>AB-0778</b>	Estimate Type <b>Original</b>
<b>Description</b> Weight limitations for vehicles transporting raw forest products		

**Assumptions Used in Arriving at Fiscal Estimate**

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.

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.

SB 562 proposes to add s. 348.27(9m) (a) 4 to the current three sections to which the Reload Option is applicable. If SB 562 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.

SEE ATTACHMENT

#### Effect of Assembly Amendment 1 to the Analysis of Companion Bill 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 Companion Bill 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.

#### Long-Range Fiscal Implications

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.

<i>Mill Location</i>	<i>Time Period</i>	<i>98,020-99,980 pounds</i>	<i>100,000 pounds and above</i>	<i>Total</i>	<i>Highest Weight</i>
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