Report on Bill Establishing Vehicle Weight Limit Exceptions

Prepared by the Wisconsin Department of Transportation
Appendix To Assembly Bill 678 (LRB 05-3402/1)
Weight Impact Study
As Required by Wis. Stats., s. 13.096

Assembly Substitute Amendment to Assembly Bill 678 (the bill) establishes exceptions to the vehicle weight limits specified in Wis. Stats, Chapter 348 and therefore requires the Department to report findings and information specified in s. 13.096 (3).

The exceptions in the bill include:

1) Increasing the allowable gross vehicle weight for trucks carrying raw forest products with a permit from 90,000 pounds to 98,000 pounds contingent on the use of an additional axle.
2) Expanding the exceptions for transport of raw forest products by adding to the definition of raw forest products "intermediary lumber", thereby allowing this material to be transported at weights up to 98,000 pounds

The bill also includes provisions that will affect the impact of these exceptions or existing exceptions:

- Modifies enforcement provisions, including creating a requirement for any person transporting raw forest products to retain any document identifying the weight of the load for not less than thirty days and to provide such document on possible demand by a prosecutor.
- Increases penalties for violations
- Eliminates the frozen road provision related to raw forest products
- Differentiates the raw forest and fruits and vegetables permit, including a phase out of the existing raw forest permit
- Provides the ability to limit routes for these loads through road and bridge postings, or with regard to state highways, through identification in administrative rule

The department has determined the bill would impact the life expectancy of the highway system and have significant cost implications related to the preservation of the highway infrastructure. The department has developed estimates or developed findings of the impacts related to the State Trunk Highway System, with regard to pavements, structures (bridges), and safety.

As prescribed by s. 13.096, we have sought information from individuals, organizations and local governments that are likely to be affected by the weight limit exceptions. We have used that information in arriving at our findings, and have to the greatest extent possible based this report on that information.

Findings

The Department finds that the exceptions described in this bill will significantly increase public costs due to the cost increase from added impacts to bridges. The department's structures engineers have determined that the additional stresses on state bridges will diminish the service life of bridges and in some cases will exceed the capacity of existing bridges. The department's pavement engineers have determined impacts to pavements are neutral to slightly positive, generally because of the reductions in axle weights from those now allowed under raw forest products permits, as shown in the table incorporated in this report. There are impacts on highway operations and safety, but no conclusion could be drawn within the scope of this study to quantify those impacts. The modifications to enforcement provisions were not found to provide any substantial benefit in terms of increasing compliance with the weight limitations. The degree of noncompliance is important as it is generally acknowledged that impacts of overweight loads increase damage to the infrastructure exponentially as weights increase.

Bridges

The bill would allow weights exceeding the acceptable level of stress on a large number of bridges on the state highway system. The department's bridge engineers reached this determination based on the information the department maintains about the condition and load ratings of its highway bridges. Time was not available to do an in-depth network level analysis of all bridges, nor was specific information available to determine the expected loadings and routings of raw forest products as changed by this bill.

The Department was provided with a report prepared by R. D. Mingo and Associates, at the request of the Coalition Against Bigger Trucks, titled "Summary of Initial Wisconsin Bridge Analysis". Mr. Mingo is a recognized expert in the field of weight impacts on infrastructure. The report concluded nearly 1400 state highway bridges are unable to accommodate truck weights that would be allowed as a result of this bill.

The bill would require action to restrict loads from traveling over bridges that are inadequate to accommodate the load, which would probably require posting signs and providing other information for use in determining whether any reasonable routes were available for the heavier loads. Given the large number of inadequate bridges, replacement or strengthening of bridges, or the need to reconstruct bridges earlier due to additional stress would involve substantial costs. In a worst-case scenario for those state highway bridges between 30 feet and 300 feet in length, replacing bridges that are inadequate to accommodate the heavier loads would cost approximately $1.75 billion dollars. That estimate excludes the costs related to bridges that already are in need of replacement

under existing conditions, and does not include any estimate of costs for bridges with main spans less than 30 feet or longer than 300 feet. The analysis assumes that the bill would allow 98,000 pounds on six axle trucks; as a result, it was not assumed that axle weight and spacing would conform to the federal Bridge Formula Table. (This points to an area of confusion in the bill, as axle weights and spacings are key elements of determining impacts; using the Bridge Formula, a 98,000 pound load would require eight axles spread over 56 feet or nine axles spread over 46 feet; a six axle vehicle, using the Bridge Formula Table, would be limited to no more than 90,000 pounds.)

The report was developed using Wisconsin DOT data for structures. WisDOT structural engineers reviewed the report and concluded the methodology is sound. Internal reviews of the report suggest the impact cost is generally conservative with regard to the impacts on state highway bridges. These costs represent a one-time investment to provide adequate structural capacity for the heavier gross weights. The costs to address structures less than 30 feet or longer than 300 feet would be additional costs and those costs have not been estimated.

There are methods to reduce the total fiscal impact. Requiring that weights and axle spacings adhere to the Federal Bridge Formula would reduce bridge cost impacts, yet the cost impacts are still expected to be substantial. These potential costs related to bridge impacts represent the greatest fiscal concern. There are other alternatives or choices that would allow fiscal impacts to be reduced or spread over time. For examples: costs could be reduced through bridge strengthening strategies short of bridge replacement; or, the number of bridges impacted could be reduced by limiting where the heavier trucks could operate. The bill provides the authority to restrict the number of impacted bridges by posting inadequate bridges or, for state highways, excluding them from permitted routes through administrative rule. Given the large proportion of state bridges that are not adequate for these loads, it may be difficult to find reasonable route from the point of origin to the destination where the heavier loads could be accommodated. No estimates have been made of the added bridge costs from either of these approaches, or any combination of modifications. Costs to post and maintain the postings for a large number of structures would also be significant. Relying solely on administrative rules, without posting signs, to protect state bridges may not be effective and is not an option for local bridges.

The number of bridges that would be inadequate to carry the heavier gross loads on the local road system is assumed to be even greater than the number of bridges on the state system. The costs related to local bridges would be affected by travel patterns, specific bridge conditions, and local posting decisions. No estimate was made of these additional costs by the department. Since the number of local bridges is far higher (about two and a half times more) than the number of state bridges, the potential for increased costs is substantial, even if the only action would be to post those local bridges. The number of county

owned bridges inadequate to carry the additional gross loads was identified in the analysis of WisDOT data by R. D. Mingo and Associates. The report identified 771 bridges, or about one-quarter of all county owned bridges, would become inadequate under this bill. The similar, worst-case estimate to replace these bridges is estimated to be about $400 million.

Pavements

The bill creates impacts that are estimated by the department's pavement engineers to be generally neutral with respect to pavements. The added gross weight that this bill would allow, spread over an additional axle, would be expected to have no additional impact on pavements, and may produce a negligible benefit to pavement due to the reduced wheel loadings from the added axle. Moving from 90,000 pounds on five axles to 98,000 pounds on six axles reduces impacts on pavement by reducing individual wheel loadings. The gross weight increases would also result in fewer truck trips, assuming the total weight of raw forest products transported remains the same. Pavement life is finite and related to the number of trips and the loadings of each trip. Reducing axle loadings with vehicles that also require fewer trips would have a positive benefit on pavements. Similarly, moving from 80,000 pounds on five axles to 98,000 pounds on six axles produces a smaller, rather inconsequential change that still may be beneficial. A more definitive analysis requires more information about the specific configuration of vehicles that would be used, and a conclusion with regard to the axle weights, truck configurations and axle spacings that were highlighted in the bridge analysis. However, determinants of impacts on pavements and axle spacing issues are different for pavements than the factors for bridges.

The predicted positive results for pavements may be reduced by the degree of variation from the permitted weight. Only a general comparison of impacts could be made as the specific routings, pavements affected, and areas of the state affected could not be isolated. Also, the increased number of loads resulting from adding intermediary lumber to the definition of raw forest products, and the broad interpretation of intermediary lumber, prevented a reasonable quantification of the impacts associated with that change.

The Wisconsin County Highway Association provided information developed from their work with members of the forest products industry that looked at pavement fatigue damage from trucks. The information they provided includes various truck configurations used in the industry and the equivalent single axle loadings (ESALs) for those configurations at certain gross weights. ESALs are a measure of impact to the pavement and accumulated ESALs are primary determinants of pavement life. The pavement life is a product of the design, construction, maintenance, and environmental conditions. The WCHA data demonstrates that for roadways that are not designed for heavier loads, far fewer loadings, or trips, will exceed the pavement's life than for pavements designed

and constructed for heavy loads. Their information is attached as an appendix to this report. This highlights the importance of knowing where the loads would be traveling in order to arrive at meaningful estimates of pavement impacts.

Highway Operations and Safety

The bill would allow for many more trucks to operate with heavier loads. The operational characteristics of trucks change as loads increase in weight. These changes include longer times to get up to speed, longer stopping distances, and reduced maneuverability. These changes increase the potential for conflicts with other vehicles. For a given truck configuration, there is an inverse relationship between gross weight and safety. In addition, there are often additional constraints on where heavier vehicles may safely stop and may result in vehicles impeding traffic when shoulders are inadequate for stopping. These changes in truck characteristics are increasingly important as traffic volumes increase, and the potential for traffic operational conflicts increase.

Conversely, allowing heavier loads on a single truck generates a positive effect of reducing the number of trucks operating on the system, if it is assumed the volume of material to be transported is constant. For example, allowing the gross vehicle weight to increase from 80,000 pounds to 98,000 pounds could generate about a 30% reduction in the number of truck trips, and a change from the currently permitted 90,000 pound gross weight to 98,000 pounds would generate about a 12% reduction, again assuming the total freight remains static. The industry has indicated they would expect to see an increase in raw forest products shipped on trucks should the bill pass. We were unable to establish what increase in product movement would be reasonable to expect. Any growth in forest product harvest or increase in movement of the broadly defined raw forest products would affect the number of truck trips. Increases in truck traffic would be expected to be primarily attributed to improved economics of transporting the forest products on heavier trucks rather than a transition from rail transport to truck transport, as the rail option is limited and controlled by factors the industry has limited ability to control. Changes in truck trips would also have an impact on employment of truck operators, which is not estimated or analyzed for this report.

Operational impacts include the impacts to users of the highway system that will be necessitated to replace or improve bridges. Construction or maintenance work will create user delay or inconvenience and may also reduce safety because of work zone or alternate route conditions. No estimate is made of these impacts for this report.

No conclusion has been reached as to the net impact of the bill on highway safety.

Other specific findings

Additionally, to meet the specific requirements for information to be included in the findings, the department concludes as follows:

(a) The problem addressed by the proposed vehicle weight limit exceptions

It is our understanding the problem addressed by the proposed exceptions is an economic concern of the forest products industry related to competition that is increasingly global, for the cost effective production and delivery of forest products. The industry believes it is disadvantaged by the weight limits now in place. The forest products industry is important to Wisconsin's economy and is especially important to areas primarily in Northern Wisconsin where forestry constitutes, along with related industries, a larger portion of the job base. Industry members also identified a problem to be addressed was the lack of a level playing field for those transporting raw forest products in Wisconsin. This inequity is a result of significant numbers of trucks hauling raw forest products at weights significantly exceeding legal, permitted limits. This situation makes it difficult for responsible operators to compete. This problem is exacerbated by the lack of sufficient enforcement resources to assure effective compliance with weight regulations. The excessive damage that results from the relatively small number of gross overloads has led to an interest in modifying the existing exceptions in order to improve compliance. The level playing field issue within Wisconsin could be addressed by enhanced enforcement mechanisms such as paper enforcement, without changing weight limitations. Paper enforcement alone would not address any interstate or national or global market issues.

1. The department is charged, for the purposes of this study, with considering whether a hardship exists under the current regulation. A hardship is defined as something that causes or entails suffering or privation. Industry members suggested there may be a relative hardship with regard to those raw forest transporters who conscientiously comply with weight regulations and are then economically harmed by competitors who disregard weight restrictions. There is compelling evidence that overloads are relatively common for raw forest products. The department agrees that the extent of non-compliance with weight limitations can impact competition in the transportation of raw forest products and create inequities. Given the nature of the forest products industry, enforcement in the field is time consuming and not very efficient. Paper enforcement mechanisms have much greater potential to effectively limit weights, reduce damage to public infrastructure, and level the playing field for industry participants. Minnesota has experienced success with a paper enforcement methodology to achieve compliance.

The department did not receive sufficient information to allow any conclusion to be made as to whether current vehicle weight limit and raw forest permit provisions create a hardship to the industry. The study did not develop

information about the economics or competitive pressures that the industry may see as evidence of a hardship. The constraint of reasonable regulation to preserve the public highway infrastructure and highway safety has not been shown to cause economic harm to the industry. These regulations protect the public and the industry from having to shoulder much higher costs, in the form of taxes or user fees, to maintain and preserve highways were higher weights to be allowed that reduced the service life of the infrastructure or increased maintenance costs. The additional infrastructure costs that would be expected, should they be borne by the industry benefiting from those provisions, may be seen as more of a hardship than the current situation.

While the bill does provide a record mechanism that may provide additional information to law enforcement to confirm where raw forest products are being transported at weights higher than allowed under the law, law enforcement personnel have indicated that information would have no significant advantage. Given the limited enforcement capacity and the labor intensive nature of weight enforcement for heavy trucks in areas where portable scales are used for enforcement, compliance levels are expected to remain a concern. The bill does not require, nor are there other laws requiring that loads be weighed, and the record keeping requirement may influence purchasers of raw forest products to rely on measures other than weight. Further, the bill narrowly applies the requirement to purchasers of raw forest products, which could result in gaps in information should the weight record be generated by someone other than the purchaser.

Experience indicates that the ease of evading enforcement and easy access to information about where limited enforcement resources may be deployed creates an environment where those operators seeking to gain an economic advantage by exceeding weight limits are not likely to voluntarily comply. Damage from non-compliant loads is expected to increase should the permitted limits increase without an effective new enforcement approach such as paper enforcement. The bill does provide for increased fines, but they are relatively modest in terms of the potential gain to be derived from exceeding the limitations of the permits. The increases, though sizable in relation to existing fines amounts, are not expected to encourage higher levels of compliance.

Weight limitations are affected by certain national standards and the specific situation in each state with regard to limits that may deviate from the standards applied to Interstate or other highways subject to national limits. Wisconsin has long experienced the impact of differential weight limits, most notably the difference that exists in limits applicable to Michigan. Michigan has a unique set of weight limits that they were allowed to retain under a grandfather provision. This exceptional difference is limited to that one state, and the industry has indicated the economic pressures affecting forestry are much larger in scale with competitive pressures from other nations being more important than this localized border issue. Special provisions exist to ameliorate the border issues

with Michigan, including a border permit that is available for transport within 11 air miles of the border, and a provision allowing Michigan configured vehicles to operate on US Highway 2 from the Upper Peninsula to Ashland. The amendment to the ASA, endorsed by the committee, would continue the border permit. That provision could be improved by clarifying the applicability of the provision to raw forest products only, excluding the broader range of goods that were inadvertently added to the provision through a recent change dealing with unladen vehicles.

2. The costs associated with complying with the current vehicle weight limit and any anticipated savings likely to result from the proposed vehicle weight exception are not known by the department. The existing regulatory limits have been in place for some time so costs related to complying with the long-standing provisions of law are not easy to identify. Savings to the industry from allowing heavier loads could include reduced fuel costs, lower labor costs as the amount transported by one driver would increase, and long term equipment cost savings might be attained, as additional capital investment for reconfigured trucks are factored in, and a smaller truck fleet could be achieved, unless the volume of product moved increased and the fleet size did not contract.

The bill provides for increased fine schedules for violators of the weight allowances under these permits. While those increases would be expected to increase revenues to state and local governments, the amounts would be inconsequential in relation to the public costs incurred. The primary benefit of meaningful fines would be to encourage voluntary compliance with limits in order to avoid damage to the infrastructure, avoid operational or safety concerns, and assist in creating a more level playing field for transportation of raw forest products.

3. The exceptions now in place for raw forest products are evidence of the efforts that have been made to resolve the problem of the economics of moving raw forest products in Wisconsin. The products are now allowed to operate under permits authorizing gross vehicle weights that are 12.5% higher than statutory limits, even though the loads are divisible and would otherwise be limited to no more than 80,000 pounds. In addition, when roads are frozen to limit the likelihood of damage, raw forest products may be transported at higher gross weights, up to 98,000 pounds.

4. The motor carriers transporting these raw forest products have increasingly accurate controls over the weight and weight distribution of the vehicle and the load on the vehicle. Provisions that allowed higher maximum limits for raw forest products were premised in part on the somewhat limited ability to accurately estimate weights of materials loaded in the woods. Over time, technologies have become widely available to weigh during loading operations. The evidence suggests that the target loading weights have moved up to the maximum level provided, which had been intended as a cushion to avoid penalties from

unintentional overloads. In addition, the bill broadens raw forest products to include lumber that easily lends itself to accurate weights and may be rather precisely loaded to meet axle weight limits.

(b) The proposed vehicle weight limit exception include the following changes:

1. Gross weight limitations are proposed to increase from 90,000 pounds allowed under the existing permit for raw forest products to 98,000 pounds. As a result of adding "intermediary lumber" to the definition of raw forest products, the gross weight limitations with regard to that commodity is proposed to increase from 80,000 pounds, as this material is a divisible load that does not qualify for a permit exception currently, to 98,000 pounds.

Should the assumption that Federal Bridge Formula axle weight and spacing limits apply, changes to gross axle and axle combination weight limitations are shown in the table below. The changes relate to weights currently allowed under raw forest permits; those products being added to the definition of raw forest products are not subject to this change, as the axle weights and spacings that had been in place applied to those standard, non permitted, nondivisible loads of intermediary lumber.

Bridge Table B: Permissible gross loads for vehicles in regular operation

based on weight formula W = 500 (LN/N-1 + 12N + 36)

Distance in feet between the extremes of any group of 2 or more consecutive axles

This table presents the current limit for combination of vehicles as the first entry in each cell, and the limit per the federal Bridge Formula Table as the second entry. Generally the amounts currently allowed for raw forest products are 12.5% higher than otherwise allowed under Wisconsin law, with a 90,000 gross limit.

This table does not include amounts allowed for: vehicle not in combination; under Michigan border permits; or, under Wisconsin's frozen road limits.

Axle group spacing	2 axles	3 axles	4 axles	5 axles	6 axles	7 axles	8 axles	9 axles
4 ft	38,300 34,000							
5	38,300 34,000							
6	38,300 34,000							
7	38,300 34,000	41,700 --						
7.5 –8	39,400 34,000	43,400						
8.1-8.4	42,800 34,000	47,300 34,000						
9	43,900 39,000	48,400 42,500						
10	45,000* 40,000	49,000 43,500	54,600 --					
11		50,100 44,000	55,700 --					
12		50,700 45,000	56,300 50,000					
13		51,800 45,500	56,900 50,500	70,400 --				
14		52,400 46,500	58,000 51,500	70,400 --				
15		53,500 47,000	58,500 52,000	70,400 --				

16		54,000 48,000	59,100 52,500	70,400 58,000				
17		55,200 48,500	60,200 53,500	71,100 58,500	72,000 --			
18		55,700 49,500	60,900 54,000	72,500 59,000	73,200 --			
19		56,900 50,000	62,000 54,500	73,200 60,000	73,700 --			
20		58,000 51,000	63,000 55,500	74,000 60,500	74,300 66,000			
21		58,800 51,500	63,900 56,000	75,300 61,000	75,300 66,500	82,200 --		
22		59,600 52,500	64,800 56,500	76,200 61,500	76,200 67,000	82,200 --		
23		60,300 53,000	65,700 57,500	77,600 62,500	77,600 68,000	82,700 --		
24		61,100 54,000	66,600 58,000	78,800 63,000	78,800 68,500	83,300 74,000		
25		61,900 54,500	67,500 58,500	79,900 63,500	79,900 69,000	83,900 74,500	90,000 --	
26		62,700 55,500	68,400 59,500	81,000 64,000	81,000 69,500	84,400 75,000	90,000 --	
27		63,600 56,000	69,300 60,000	81,900 65,000	81,900 70,000	85,500 75,500	90,000 --	
28		64,300 57,000	70,200 60,500	82,200 65,500	82,200 71,000	86,100 76,500	90,000 82,000	
29		65,300 57,500	71,100 61,500	82,200 66,000	82,200 71,500	86,700 77,000	90,000 82,500	
30		65,900 58,500	72,000 62,000	82,200 66,500	82,200 72,000	87,200 77,500	90,000 83,000	
31		67,000 59,000	72,000 62,500	82,200 67,500	82,200 72,500	87,800 78,000	90,000 83,500	
32		67,500** 60,000	72,000 63,500	82,200 68,000	82,200 73,000	88,400 78,500	90,000** 84,500	90,000
33			72,000 64,000	82,200 68,500	83,300 74,000	89,500 79,000	85,000	90,500
34			72,600 64,500	82,200 69,000	83,900 74,500	90,000*** 80,000	85,500	91,000
35			73,700 65,500	82,200 70,000	84,400 75,000	80,500	86,000	91,500
36		**ATA**	74,300 **66,000**	82,200 70,500	85,000 75,500	81,000	86,500	92,000
37		**BUMP**	74,900 **66,500**	82,200 71,000	85,500 76,000	81,500	87,000	93,000
38		} } } }	76,000 **67,500**	82,200 72,000	86,700 77,000	82,000	87,500	93,500

39			76,500 68,000	82,200 72,500	87,200 77,500	82,500	88,500	94,000
40			77,100 68,500	82,200 73,000	87,800 78,000	83,500	89,000	94,500
41			78,200 69,500	82,700 73,500	88,400 78,500	84,000	89,500	95,000
42			78,800 70,000	83,900 74,000	88,900 79,000	84,500	90,000	95,500
43			79,400 70,500	84,400 75,000	90,000 80,000	85,000	90,500	96,000
44			80,500 71,500	85,000 75,500	90,000 80,500	85,500	91,000	96,500
45			81,000 72,000	85,500 76,000	90,000 81,000	86,000	91,500	97,500
46			81,600 72,500	86,700 76,500	90,000 81,500	87,000	92,500	98,000
47			82,700 73,500	87,200 77,500	90,000 82,000	87,500	93,000	
48			83,300 74,000	87,800 78,000	90,000 83,000	88,000	93,500	
49			83,900 74,500	88,400 78,500	90,000 83,500	88,500	94,000	
50			85,000 75,500	89,500 79,000	90,000 84,000	89,000	94,500	
51			85,500**** 76,000	90,000**** 80,000	90,000**** 84,500	89,500	95,000	
52			76,500	80,500	85,000	90,500	95,500	
53			77,500	81,000	86,000	91,000	96,500	
54			78,000	81,500	86,500	91,500	97,000	
55			78,500	82,500	87,000	92,000	97,500	
56			79,500	83,000	87,500	92,500	98,000	
57			80,000	83,500	88,000	93,000		
58				84,000	89,000	94,000		
59				85,000	89,500	94,500		
60				85,500	90,000	95,000		

The entry on the first line of each cell represents the maximum gross weight in pounds on a group of axles for a combination of vehicles (tractor and semi-trailer or truck and trailer) hauling under a permit for raw forest products on Class A highways, except Interstate highways. Footnotes for entries on the first line of cells:

* maximum at 10 or more feet between axles
** maximum at 32 or more feet between axles
*** maximum at 34 or more feet between axles
*** maximum at 51 or more feet between axles

The elimination of the existing frozen road provision relating to raw forest products does eliminate some regulatory complexity and has a modest beneficial impact, as the weights allowed under frozen road provisions would remain the same under the new law, gross limit of 98,000 pounds, but the axle weights would be reduced. There could be additional benefit in terms of simplifying the regulations, and providing a relatively small benefit by eliminating the remainder of the frozen road provision that would only affect certain loads of abrasives and salt for highway winter maintenance.

2. Width, height and length limitations are not affected by this bill, except to continue certain provisions related to a designated segment of US Highway 2. While there are no changes in the bill, enactment of the bill could create some future pressure to modify these dimensions in order to allow for meeting axle weight limitations, balancing the larger loads over the axles. This problem has been noted in other states that have made special weight provisions for raw forest products.

3. The changes affect the transportation of raw forest products. Raw forest products include logs, pilings, posts, poles, cordwood products, wood chips, sawdust, pulpwood, fuel wood and Christmas trees not altered by a manufacturing process off the land, sawmill or factory from which they are taken. In addition, the bill adds intermediary lumber to the definition of raw forest products. The bill contains no definition of intermediary lumber and industry sources indicated it was not a term commonly used in the industry. A definition of intermediary lumber is essential for those transporting these products to understand the requirements of law, and is necessary in order to understand the impacts of the proposed change in law. The definition will also be essential for enforcement purposes. It is unclear whether, should the bill pass, intermediary lumber could be transported under both current the current permits for raw forest products, fruits and vegetables, or whether they may only be transported under new raw forest products permits. This study assumes intermediary lumber would only be allowed under the new raw forest products permits.

The department communicated with authors of the proposal to understand the intention related to intermediary lumber. It is our understanding the bill intends to

include not only intermediary lumber, which we had assumed to mean logs which are rough cut to green boards and which are being transported from the saw mill where the boards were cut to a kiln for drying, but also any lumber, finished or not, that is being shipped for use in a subsequent manufacturing process. This broad interpretation significantly alters the definition of raw forest products as used in this law, greatly increasing the amount of product that could be transported at these higher weights. The breath of this provision, allowing a wide range of products made with wood, is expected to create widespread pressure for further expansion of weight limit exceptions to any number of additional commodities or goods.

4. There was not sufficient information to identify what highways, highway routes, or areas of the state would be substantially affected by the proposed exception. Raw forest products may be harvested throughout the state, but the majority of commercial harvest is concentrated in northern Wisconsin. Intermediary lumber may be moved throughout the state between mills and kilns, or virtually any user of finished lumber other than retail. The location of the mills and kilns was not available to us, but was assumed to be generally in the northern portion of the state. We were unable to identify any sources of information about movement of intermediary lumber.

5. Seasonal transportation patterns do exist for movement of raw forest products. These seasonal patterns vary by type of product. For examples, Christmas trees are by nature seasonal, and winter provides frozen ground which is often very helpful in accessing timber stands for logs. It is not clear whether there are any seasonal patterns for intermediary lumber. There were no conclusions drawn as to how the seasonal patterns may influence impacts of this bill, especially as the most significant impacts relate to bridges rather than pavements.

(c) The proposed exception would be expected to be widely used in the raw forest industry. Members of the industry have shown strong interest in the proposed exception and have also indicated that there is a great need to achieve a level playing field where reputable businesses aren't subject to the substantial unfair competition from truckers that disregard the weight limitations in order to create a competitive advantage or improve profitability. In our judgment the proposed exception and related changes to enforcement provisions will not serve to level the playing field. The higher limits and added axle may serve to further expand the range of gross weights actually transported.

Trucks hauling under a raw forest products permit would increase gross weights by 8,000 pounds. Axle loadings would not increase, remaining limited to 18,000 pounds per axle. However, since the bill would greatly expand the applicability to include intermediary lumber, the number of loads being transported at weights above 80,000 pounds would increase significantly. The data we collected indicated there would be over 20,000 additional truck trips exceeding 80,000

pounds just for hardwoods under the more restrictive definition of intermediary lumber, which we had assumed to mean logs which are rough cut to green boards and which are being transported from the saw mill where the boards were cut to a kiln for drying. The number of additional loads for the broad definition of intermediary lumber and also for softwoods transported to a kiln would be expected to greatly increase the number of truck trips over 80,000 pounds, which is the general limitation on divisible loads and the limitation adhered to by the federal government in order to preserve the investment the Interstate system.

Conclusion

The impact of this bill on bridges is substantial. The potential costs suggest a need for further refinement of the legislative intent and may benefit from further study of the range of benefits and costs associated with such a change. Information about the economics of the industry and impacts of this change on the industry's future as well as the feasibility of approaches to constrain cost impacts would be useful in better assessing the public benefits and costs of allowing increased weights.

It is expected that public costs will increase as a result of this bill. Further clarity or refinement of important details related to the specific definition of raw forest products, amounts of freight impacted and the routes (origins and destinations) for that freight, and expectations with regard to axle weights and spacings would affect the analysis. The issues and inter-relationships between economic impacts, truck configurations, expected compliance levels and enforcement constraints, and impacts on the public infrastructure, operational and safety issues, suggest that it may be appropriate to establish a special study, task force, or Legislative Council study to move forward any initiative to address these weight issues.

Appendix to Weight Impact Study

Supplemental information Supplied by Wisconsin County Highway Association depicting typical truck configurations, typical pavement cross sections, and the impacts of those configurations on various pavements.

Slide 1

RAW FOREST TRUCK CONFIGURATIONS

Vehicles in Combination	Max. Gross Weight	Truck ESAL Factor
A 	90 k	3.76
B 	98 k	2.85
C 	98 k	3.11
D 	90 k	4.38
Single Vehicles		
E 	72 k	2.66
F 	82 k	2.53

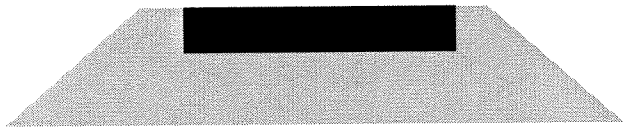
Slide 2

COUNTY HIGHWAY PAVEMENT STRUCTURES

Structure 1

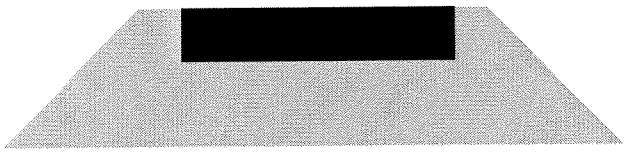
3" HMA / 9" Base (SN = 2.58)

Structure 2



4" HMA / 12" Base (SN = 3.44)

Structure 3



5" HMA / 15" Base (SN = 4.30)

Slide 3

Truck Impacts

(Pavement Fatigue Damage ~ Accumulated ESAL's)

Accumulated ESAL's

# of Trips	Truck A	Truck B	Truck C	Truck D	Truck E	Truck F
1	4	3	3	4	3	3
2	8	6	6	9	5	5
3	11	9	9	13	8	8
4	15	11	12	18	11	10
5	19	14	16	22	13	13
6	23	17	19	26	16	15
7	26	20	22	31	19	18
8	30	23	25	35	21	20
9	34	26	28	39	24	23
10	38	29	31	44	27	25
20	75	57	62	88	53	51
30	113	86	93	131	80	76
40	150	114	124	175	106	101
50	188	143	156	219	133	127
60	226	171	187	263	160	152
70	263	200	218	307	186	177
80	301	228	249	350	213	202
90	338	257	280	394	239	228
100	376	285	311	438	266	253
125	470	356	389	548	333	316
150	564	428	467	657	399	380
175	658	499	544	767	466	443
200	752	570	622	876	532	506
250	940	713	778	1,095	665	633
300	1,128	855	933	1,314	798	759
350	1,316	998	1,089	1,533	931	886
400	1,504	1,140	1,244	1,752	1,064	1,012
450	1,692	1,283	1,400	1,971	1,197	1,139
500	1,880	1,425	1,555	2,190	1,330	1,265
550	2,068	1,568	1,711	2,409	1,463	1,392
600	2,256	1,710	1,866	2,628	1,596	1,518
650	2,444	1,853	2,022	2,847	1,729	1,645
700	2,632	1,995	2,177	3,066	1,862	1,771
750	2,820	2,138	2,333	3,285	1,995	1,898
800	3,008	2,280	2,488	3,504	2,128	2,024
850	3,196	2,423	2,644	3,723	2,261	2,151
900	3,384	2,565	2,799	3,942	2,394	2,277
950	3,572	2,708	2,955	4,161	2,527	2,404
1000	3,760	2,850	3,110	4,380	2,660	2,530

Slide 4

Truck Impact to Pavement Structure

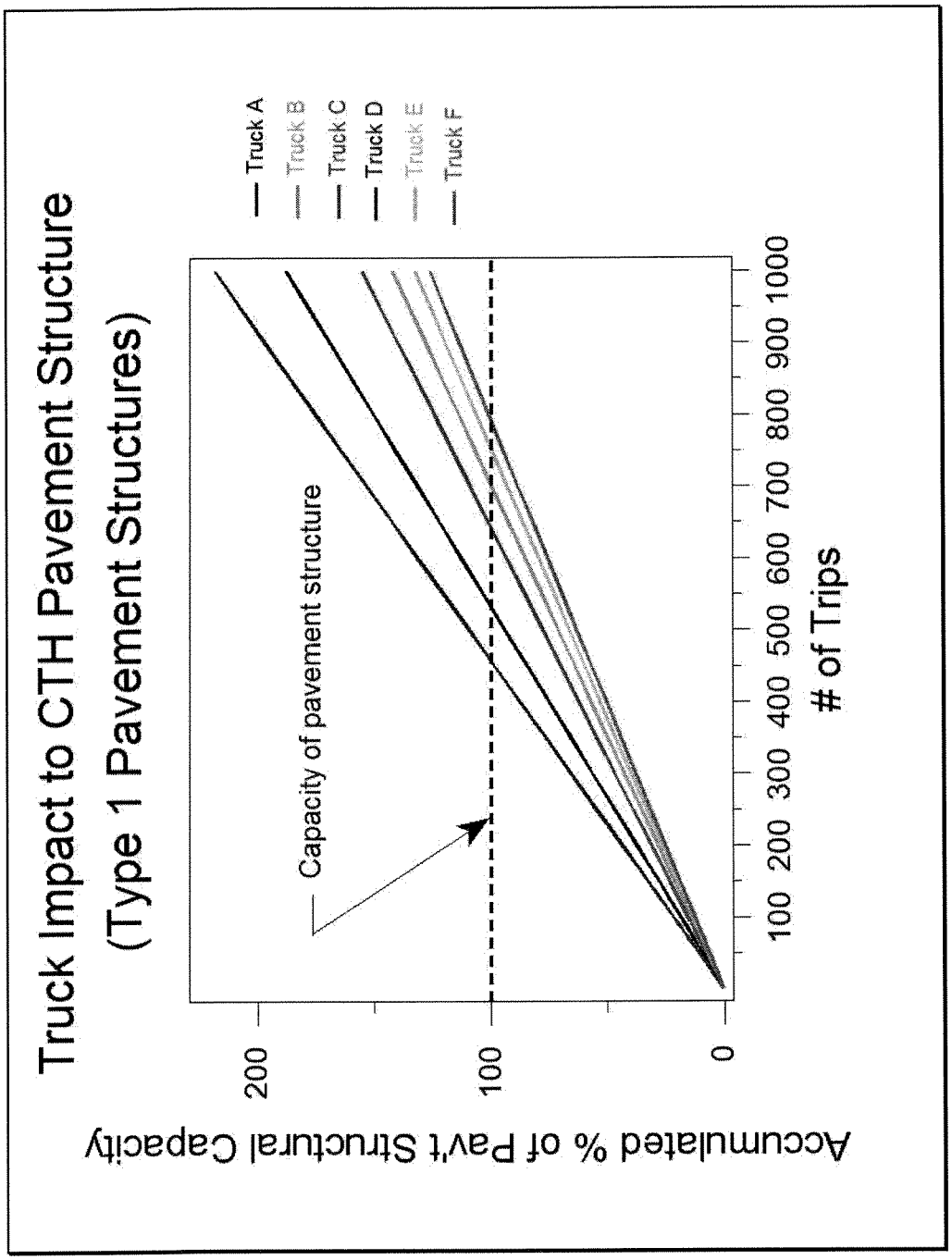
(County Highway Pavement Structure Type 1)

Accumulated % of Pav't Structural Capacity

# of Trips	Truck A	Truck B	Truck C	Truck D	Truck E	Truck F
1	0.19	0.14	0.16	0.22	0.13	0.13
2	0.38	0.29	0.31	0.44	0.27	0.25
3	0.56	0.43	0.47	0.66	0.40	0.38
4	0.75	0.57	0.62	0.88	0.53	0.51
5	0.94	0.71	0.78	1.10	0.67	0.63
6	1.13	0.86	0.93	1.31	0.80	0.76
7	1.32	1.00	1.09	1.53	0.93	0.89
8	1.50	1.14	1.24	1.75	1.06	1.01
9	1.69	1.28	1.40	1.97	1.20	1.14
10	1.88	1.43	1.56	2.19	1.33	1.27
20	3.76	2.85	3.11	4.38	2.66	2.53
30	5.64	4.28	4.67	6.57	3.99	3.80
40	7.52	5.70	6.22	8.76	5.32	5.06
50	9.40	7.13	7.78	10.95	6.65	6.33
60	11.28	8.55	9.33	13.14	7.98	7.59
70	13.16	9.98	10.89	15.33	9.31	8.86
80	15.04	11.40	12.44	17.52	10.64	10.12
90	16.92	12.83	14.00	19.71	11.97	11.39
100	18.80	14.25	15.55	21.90	13.30	12.65
125	23.50	17.81	19.44	27.38	16.63	15.81
150	28.20	21.38	23.33	32.85	19.95	18.98
175	32.90	24.94	27.21	38.33	23.28	22.14
200	37.60	28.50	31.10	43.80	26.60	25.30
250	47.00	35.63	38.88	54.75	33.25	31.63
300	56.40	42.75	46.65	65.70	39.90	37.95
350	65.80	49.88	54.43	76.65	46.55	44.28
400	75.20	57.00	62.20	87.60	53.20	50.60
450	84.60	64.13	69.98	98.55	59.85	56.93
500	94.00	71.25	77.75	109.50	66.50	63.25
550	103.40	78.38	85.53	120.45	73.15	69.58
600	112.80	85.50	93.30	131.40	79.80	75.90
650	122.20	92.63	101.08	142.35	86.45	82.23
700	131.60	99.75	108.85	153.30	93.10	88.55
750	141.00	106.88	116.63	164.25	99.75	94.88
800	150.40	114.00	124.40	175.20	106.40	101.20
850	159.80	121.13	132.18	186.15	113.05	107.53
900	169.20	128.25	139.95	197.10	119.70	113.85
950	178.60	135.38	147.73	208.05	126.35	120.18
1000	188.00	142.50	155.50	219.00	133.00	126.50

(Values > 100 is pavement failure)

Slide 5


Truck Impact to CTH Pavement Structure
(Type 1 Pavement Structures)
Truck A
Truck B
Truck C
Truck D
Truck E
Truck F
Capacity of pavement structure
Accumulated % of Pav't Structural Capacity
0
100
200
100 200 300 400 500 600 700 800 900 1000
# of Trips

Slide 6

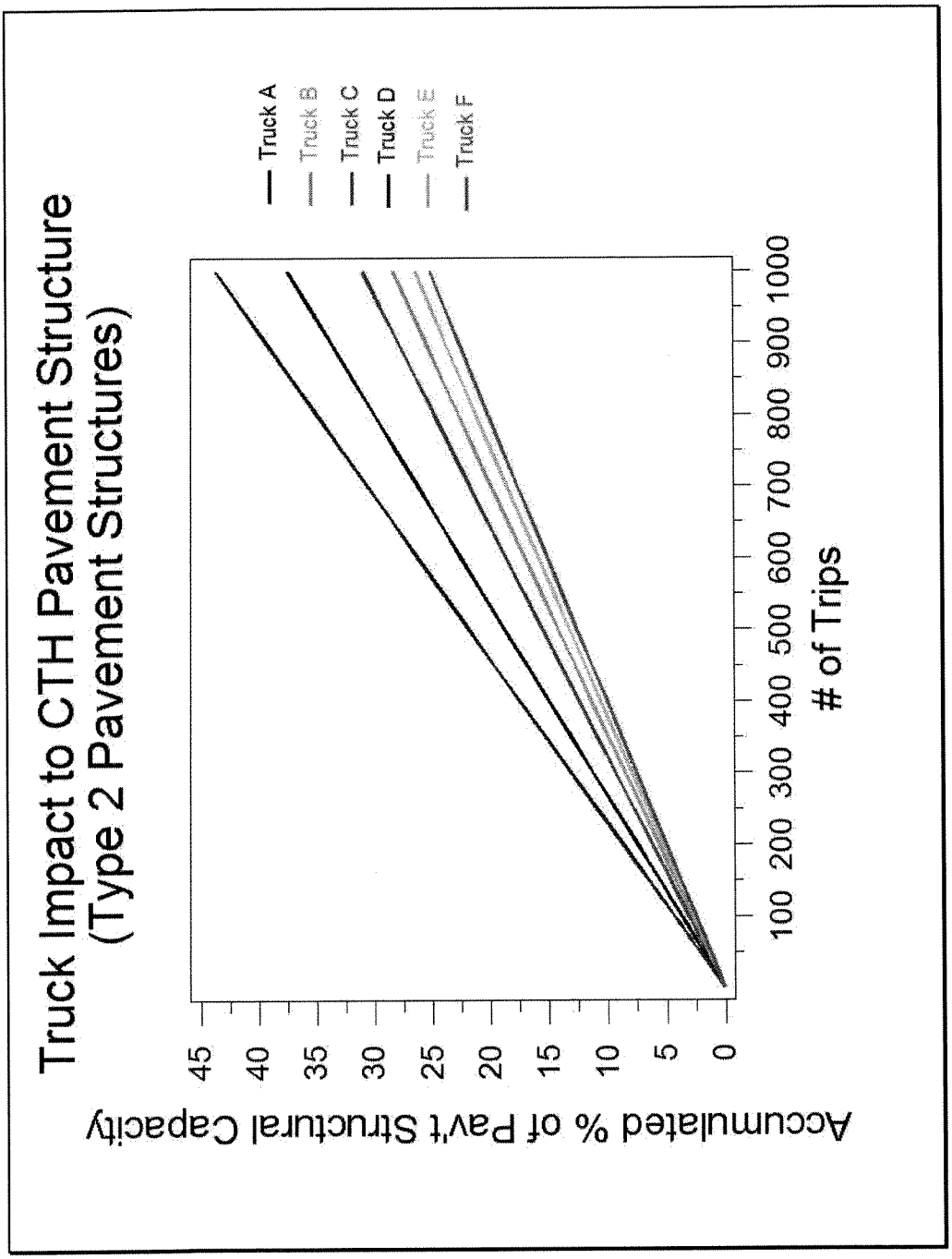
Truck Impact to Pavement Structure

(County Highway Pavement Structure Type 2)

Accumulated % of Pav't Structural Capacity

# of Trips	Truck A	Truck B	Truck C	Truck D	Truck E	Truck F
1	0.04	0.03	0.03	0.04	0.03	0.03
2	0.08	0.06	0.06	0.09	0.05	0.05
3	0.11	0.09	0.09	0.13	0.08	0.08
4	0.15	0.11	0.12	0.18	0.11	0.10
5	0.19	0.14	0.16	0.22	0.13	0.13
6	0.23	0.17	0.19	0.26	0.16	0.15
7	0.26	0.20	0.22	0.31	0.19	0.18
8	0.30	0.23	0.25	0.35	0.21	0.20
9	0.34	0.26	0.28	0.39	0.24	0.23
10	0.38	0.29	0.31	0.44	0.27	0.25
20	0.75	0.57	0.62	0.88	0.53	0.51
30	1.13	0.86	0.93	1.31	0.80	0.76
40	1.50	1.14	1.24	1.75	1.06	1.01
50	1.88	1.43	1.56	2.19	1.33	1.27
60	2.26	1.71	1.87	2.63	1.60	1.52
70	2.63	2.00	2.18	3.07	1.86	1.77
80	3.01	2.28	2.49	3.50	2.13	2.02
90	3.38	2.57	2.80	3.94	2.39	2.28
100	3.76	2.85	3.11	4.38	2.66	2.53
125	4.70	3.56	3.89	5.48	3.33	3.16
150	5.64	4.28	4.67	6.57	3.99	3.80
175	6.58	4.99	5.44	7.67	4.66	4.43
200	7.52	5.70	6.22	8.76	5.32	5.06
250	9.40	7.13	7.78	10.95	6.65	6.33
300	11.28	8.55	9.33	13.14	7.98	7.59
350	13.16	9.98	10.89	15.33	9.31	8.86
400	15.04	11.40	12.44	17.52	10.64	10.12
450	16.92	12.83	14.00	19.71	11.97	11.39
500	18.80	14.25	15.55	21.90	13.30	12.65
550	20.68	15.68	17.11	24.09	14.63	13.92
600	22.56	17.10	18.66	26.28	15.96	15.18
650	24.44	18.53	20.22	28.47	17.29	16.45
700	26.32	19.95	21.77	30.66	18.62	17.71
750	28.20	21.38	23.33	32.85	19.95	18.98
800	30.08	22.80	24.88	35.04	21.28	20.24
850	31.96	24.23	26.44	37.23	22.61	21.51
900	33.84	25.65	27.99	39.42	23.94	22.77
950	35.72	27.08	29.55	41.61	25.27	24.04
1000	37.60	28.50	31.10	43.80	26.60	25.30

Slide 7


Truck Impact to CTH Pavement Structure
(Type 2 Pavement Structures)
Accumulated % of Pavt Structural Capacity
0
5
10
15
20
25
30
35
40
45
100 200 300 400 500 600 700 800 900 1000
# of Trips
Truck A
Truck B
Truck C
Truck D
Truck E
Truck F

Slide 8

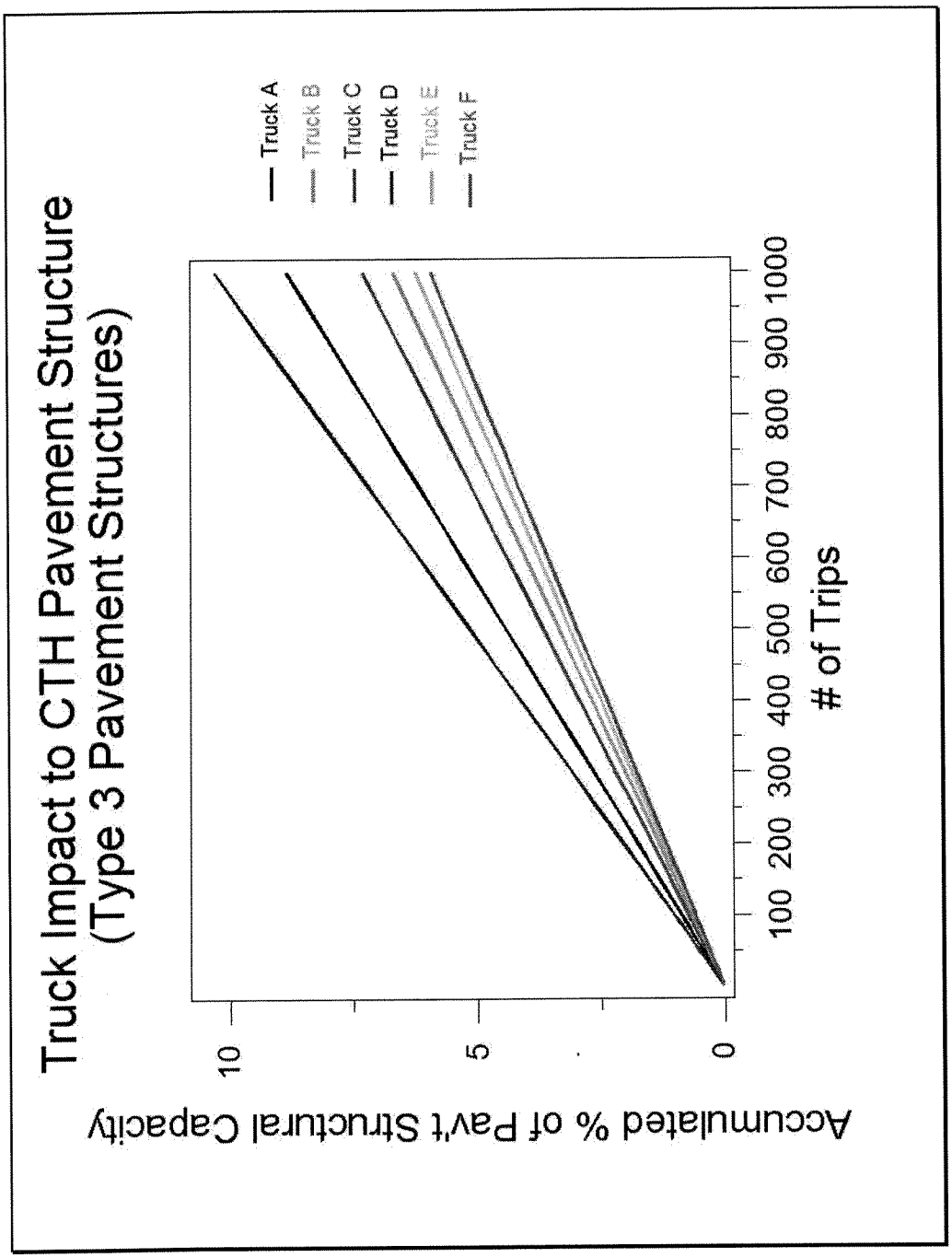
Truck Impact to Pavement Structure

(County Highway Pavement Structure Type 3)

Accumulated % of Pav't Structural Capacity

# of Trips	Truck A	Truck B	Truck C	Truck D	Truck E	Truck F
1	0.01	0.01	0.01	0.01	0.01	0.01
2	0.02	0.01	0.01	0.02	0.01	0.01
3	0.03	0.02	0.02	0.03	0.02	0.02
4	0.04	0.03	0.03	0.04	0.03	0.02
5	0.04	0.03	0.04	0.05	0.03	0.03
6	0.05	0.04	0.04	0.06	0.04	0.04
7	0.06	0.05	0.05	0.07	0.04	0.04
8	0.07	0.05	0.06	0.08	0.05	0.05
9	0.08	0.06	0.07	0.09	0.06	0.05
10	0.09	0.07	0.07	0.10	0.06	0.06
20	0.18	0.13	0.15	0.21	0.13	0.12
30	0.27	0.20	0.22	0.31	0.19	0.18
40	0.35	0.27	0.29	0.41	0.25	0.24
50	0.44	0.34	0.37	0.52	0.31	0.30
60	0.53	0.40	0.44	0.62	0.38	0.36
70	0.62	0.47	0.51	0.72	0.44	0.42
80	0.71	0.54	0.59	0.82	0.50	0.48
90	0.80	0.60	0.66	0.93	0.56	0.54
100	0.88	0.67	0.73	1.03	0.63	0.60
125	1.11	0.84	0.91	1.29	0.78	0.74
150	1.33	1.01	1.10	1.55	0.94	0.89
175	1.55	1.17	1.28	1.80	1.10	1.04
200	1.77	1.34	1.46	2.06	1.25	1.19
250	2.21	1.68	1.83	2.58	1.56	1.49
300	2.65	2.01	2.20	3.09	1.88	1.79
350	3.10	2.35	2.56	3.61	2.19	2.08
400	3.54	2.68	2.93	4.12	2.50	2.38
450	3.98	3.02	3.29	4.64	2.82	2.68
500	4.42	3.35	3.66	5.15	3.13	2.98
550	4.87	3.69	4.02	5.67	3.44	3.27
600	5.31	4.02	4.39	6.18	3.76	3.57
650	5.75	4.36	4.76	6.70	4.07	3.87
700	6.19	4.69	5.12	7.21	4.38	4.17
750	6.64	5.03	5.49	7.73	4.69	4.46
800	7.08	5.36	5.85	8.24	5.01	4.76
850	7.52	5.70	6.22	8.76	5.32	5.06
900	7.96	6.04	6.59	9.28	5.63	5.36
950	8.40	6.37	6.95	9.79	5.95	5.66
1000	8.85	6.71	7.32	10.31	6.26	5.95

Slide 9


Truck Impact to CTH Pavement Structure
(Type 3 Pavement Structures)
Truck A
Truck B
Truck C
Truck D
Truck E
Truck F
Accumulated % of Pavt Structural Capacity
0
5
10
100 200 300 400 500 600 700 800 900 1000
# of Trips