

American Trucking Associations

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TRUCK SIZE AND WEIGHT SUMMARY OF RESEARCH STUDIES

Below are the Truck Size and Weight Studies that have been completed in the United States since 1941. The summaries are mainly provided from two sources executive summaries of the study documents and a working paper summary of various studies done over the years by the Federal Highway Administration (FHWA).

U.S. DEPARTMENT OF TRANSPORTATION (USDOT) STUDIES

(1) **2004 - The Western Uniformity Scenario Analysis¹**. As the U.S. Department of Transportation's *Comprehensive Truck Size and Weight (CTS&W) Study* was nearing completion, the Western Governors' Association (WGA) asked the US DOT to analyze another illustrative truck size and weight scenario. The "Western Uniformity Scenario" requested by WGA would assess the impacts of allowing harmonized LCV weights, dimensions, and routes among only those Western States that currently allow LCVs, other than Arizona, which opted out of the study. Specifically, the WGA requested that DOT analyze the impacts of expanded LCV operations assuming that weights would be limited only by federal axle load limits and the federal bridge formula, with a maximum gross vehicle weight of 129,000 pounds. Four truck configurations and operating routes were analyzed:

- (1) A truck tractor and two trailing units with a total of 7 axles, a combined trailer length limit of 81 feet, and a maximum gross vehicle weight of 117,000 pounds to operate on the national truck network with reasonable access.
- (2) A truck tractor and two trailing units with a total of 9 to 11 axles, a combined trailer length limit of 81 feet, and a maximum gross vehicle weight of 129,000 pounds to operate on the national truck network with reasonable access.
- (3) A truck tractor and two trailing units with a total of 9 to 11 axles, a combined trailer length limit of 110 feet, and a maximum gross vehicle weight of 129,000 pounds to operate on the Interstate Highway System with reasonable access.
- (4) A truck tractor and three trailing units with a total of 7 to 8 axles, a combined trailer length limit of 95 feet, and a maximum gross vehicle weight of

¹ The U.S. Department of Transportation's Western Uniformity Scenario Analysis, Executive Summary, 2004

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110,000 pounds to operate on the Interstate Highway System with reasonable access.

Scenario impacts are assessed using the same general methods used to analyze impacts of illustrative scenarios in the *CTS&W Study*, although substantial improvements in data and certain analytical methods have been made since that study. States included in the analysis are Washington, Oregon, Nevada, Idaho, Utah, Montana, Wyoming, Colorado, North Dakota, South Dakota, Nebraska, Kansas, and Oklahoma. Estimated impacts, both positive and negative, of expanded LCV operations in the Western States are substantially smaller than impacts of nationwide LCV operations estimated in the *CTS&W Study*. Several factors account for these smaller impacts including the substantially lower volume of traffic that would be affected by the regional scenario, the lower weights and smaller dimensions assumed for LCVs in the Western Uniformity Scenario compared to the *CTS&W Study*, and the fact that at least some LCV operations already occur in each of the States analyzed in the scenario.

Table ES-1 shows 2010 freight traffic forecasts in the Western States under both current (base case) and scenario size and weight limits. Total truck traffic in the region is estimated to decrease by 25 percent under the scenario assumptions, with the vast majority of that decrease coming from the long-haul trucking sector. Less than one-tenth of one percent of rail traffic in the region is estimated to divert to LCVs under scenario assumptions.

**Table ES-1
Forecasts of 2010 Base Case and Scenario Traffic Under Scenario Assumptions**

	Base Case Traffic Volume (millions)	Scenario Traffic	
		Volume (millions)	Percent change
Total truck (VMT)	18,823	14,028	-25.5%
Short haul truck (VMT)	1,844	1,743	-5.5%
Long haul truck (VMT)	16,978	12,285	-27.6%
Rail Carload (ton-miles)	785,399	785,181	-0.03%
Rail Intermodal (ton-miles)	202,168	201,993	-0.09%

Table ES-2 shows 2010 forecasts of truck traffic by major vehicle configuration for the base case and under scenario assumptions. Estimates of base case LCV travel rely on State-reported traffic counts and analyses of vehicle classification

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and weigh-in-motion data, but these data collection systems are not designed to provide statistically reliable estimates of total LCV travel.

Table ES-2
Forecasts of 2010 Base Case VMT by Vehicle Configuration and Western Uniformity VMT Impact for 13 Analyzed States

Vehicle Configuration	Base Case VMT (millions)	Scenario	
		VMT (millions)	Percent Change
5-axle Tractor Semitrailer	14,476	3,442	-76%
6-axle Tractor Semitrailer	1,924	938	-51%
5- or 6-axle Double	1,351	750	-44%
6-axle Truck Trailer	626	607	-3%
7-axle Double	188	2,190	+1,065%
8- or more axle Double	213	5,626	+2,541%
Triples	45	473	+951%
Total	18,823	14,028	-25%

Despite the fact that LCVs are allowed in all States covered by the scenario, conventional tractor-semitrailers and short twin trailers currently are estimated to account for 94 percent of total heavy truck travel in the region. If all Western States covered by the scenario adopted the weight and dimension limits, there would be an estimated 76 percent reduction in travel by conventional 5-axle tractor-semitrailers, a 44 percent reduction of STAA doubles (5 or 6-axle twin trailers with maximum trailer lengths of 28.5 feet) travel, and a 25 percent reduction in total heavy truck travel.

Many factors would affect bridge costs if States were allowed to change size and weight limits in accordance with scenario assumptions. Based on information in FHWA's National Bridge Inventory, many bridges in the Western States are being stressed beyond their design levels by vehicles operating under current State size and weight limits and permitting practices. Since bridges are designed with large safety factors, the overstressed bridges are not in danger of collapsing, but their safety margins are reduced. Base case bridge improvement costs attributable to overstress by vehicles currently operating in the scenario States range from about \$1.6 billion to \$3.3 billion. Incremental costs to accommodate vehicles assumed to operate under the scenario range from \$2.3 billion to \$4.1 billion. Thus bridge improvement costs in the region attributable to bridge overstresses are estimated to more than double under the Western Uniformity Scenario. Twenty-year average annual bridge costs to either replace or strengthen overstressed bridges were estimated by simply dividing total estimated costs by 20. In practice, States might not be able to spread bridge improvement costs over a 20 year period, but they would not have to improve or replace all bridges before LCVs could use the bridges.

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Table ES-4
Added Infrastructure Costs Attributable to the
Western Uniformity Scenario
(millions of 2000 \$)

Infrastructure Element	Base Case Improvement Costs	Total Incremental Cost	20-Year Annual Incremental Cost	Percent Change in Base Case Costs
Pavement Improvements	65,934*	-2,769	-138	-4.2
Bridge Improvements	High 3,257	4,125	206	+127
Geometric Improvements	Low 1,586	2,328	116	+147
	864	776	65	+90

* Total estimated pavement preservation cost in scenario States. Base case costs cannot be linked to vehicles with particular weights and dimensions as can bridge and geometric costs

As shown in Table ES-5, reductions in VMT associated with the Western Uniformity Scenario could reduce fuel consumption associated with freight transportation and could also reduce emissions and highway noise. The 25 percent reduction in truck VMT associated with the scenario is estimated to result in a 12 percent reduction in fuel consumption. Fuel savings are not directly proportional to VMT reductions because fuel economy decreases as vehicle weight increases.

Table ES-5
Energy and Environmental Impacts of Western Uniformity Scenario

Impact Area	Change from Base Case
Energy Consumption	-12 %
Noise Cost	-10 %
Emissions *	-12 %

* Assumes changes in emissions are approximately proportional to changes in fuel consumption.

The largest benefits of truck size and weight changes assumed in the Western Uniformity Scenario are shipper cost savings. If more cargo can be moved in each shipment, driver, equipment, and vehicle operating costs will be lower than in the base case. Table ES-6 shows reductions in transport costs that could be realized if all changes in truck size and weight limits assumed in the scenario were adopted. For shipments currently moving by truck, the expanded availability of various types of LCVs could reduce shipper costs by as much as \$2 billion per

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year. This represents a savings of almost 4 percent of total shipper costs for moves by truck in and through the region. Savings would be lower if some States chose not to allow LCVs to operate as widely as is assumed in the scenario. Shippers that currently use railroads also would realize savings. The actual switch from rail to truck is estimated to be small, producing savings of about \$3 million annually. A greater savings to rail users would come from rate reductions that railroads would make to keep traffic from switching to trucks. These savings would be about \$26 million per year.

Table ES-6
Annual Shipper Cost Savings from Western Uniformity Scenario

Source of Savings	Amount (millions of 2000 \$)	Percent Change
Truck to Truck Diversion	2,036	3.9 %
Rail to Truck Diversion	3	.01 %
Rail Discounts	26	.11 %
Total	2,065	n/a

The study concluded;

1. LCVs have been operating in 13 Western States for many years. Size and weight limits in those States vary as does the extent of the highway network on which LCVs can operate. Some of these differences are due to federal truck size and weight limits, especially grandfather rights under which States can allow vehicles exceeding 80,000 pounds to operate on Interstate Highways. But some of these differences also reflect differences among the States in the vehicle weights and dimensions they believe are appropriate for their highway systems.
2. Like previous studies that have examined the potential impacts of changing truck size and weight limits, this study has estimated substantial shipper benefits from allowing more widespread use of LCVs. Other benefits from the changes in truck size and weight limits assumed in this scenario are reductions in fuel consumption, emissions, and noise-related costs. The full benefits estimated in this study likely would not be realized, however, because all States would not allow LCV to operate as widely as assumed in this scenario.
3. Infrastructure and related costs would not be as great as has been estimated in previous studies because LCVs already operate on at least some highways in each of the 13 States included in the analysis. Nevertheless improvements costing several billion dollars were estimated to be needed to correct deficiencies in bridges, interchange ramps, and other highway elements just to accommodate existing truck operations. If LCV operations expanded under assumptions in this scenario, added infrastructure costs could be from about \$300 million to more than \$2 billion. Several factors would affect the magnitude of these additional

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- infrastructure costs including the extent to which States allowed larger LCVs to operate, the length limits imposed on double trailer combinations, and the extent to which bridges can be strengthened rather than replaced.
4. Few Western States charge fees that cover the infrastructure costs associated with LCV operations. The significant exception is Oregon that routinely conducts highway cost allocation studies to estimate the cost responsibility of various truck classes and adjusts truck-related fees according to results of those studies. When LCVs and other heavy trucks do not pay the full costs of their operations, other motorists must make up the difference. This is inequitable to the highway users who must subsidize LCV operations and contributes to an uneven playing field for railroads and other competitors. States already are experiencing budgetary problems as they look to improve the condition and performance of their transportation systems, and Federal Highway Trust Fund revenues to support the Federal-aid highway program have been growing more slowly in recent years. Before any action is taken with respect to changes in truck size and weight limits that could increase highway investment needs, plans for financing those improvements should be developed that include how the longer, heavier trucks responsible for additional costs would contribute to paying those costs. This is consistent with recommendations in the Transportation Research Board's Special Report (TRB) 267 in which it concluded, "federal legislation creating the (TRBs recommended) permit program should specify a quantitative test for the revenue adequacy of the permit fees imposed by states that wish to participate....Fees should at least cover estimated administrative and infrastructure costs for the program..."
 5. Safety is always the issue of greatest concern when truck size and weight issues are considered. Data simply are not available upon which to develop reliable estimates of changes in the number of crashes or fatalities that might result from a change in truck size and weight limits such as the Western Uniformity Scenario. While some LCV operators claim the safety experience of LCVs is better than for the conventional vehicles they operate, these claims cannot be borne out for LCV operations as a whole. States in which LCVs operate have not noted particular safety problems with current LCV operations, but they have no formal processes in place to monitor safety. Since there are many uncertainties about the safety of substantially increased use of LCVs as might occur under the Western Uniformity Scenario, it would be prudent to require such processes before any substantial change in federal truck size and weight limits such as the Western Uniformity Scenario was implemented. In addition to monitoring the on-road safety of LCVs, processes might also be considered to ensure that the vehicles to be used meet some minimum thresholds for stability and control, and that

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companies operating these vehicles have good safety records and vehicle maintenance programs.

6. Nationwide, the Department believes that an appropriate balance has been struck on truck size and weight. Western States included in this scenario all can allow LCVs to operate at weights substantially above the 80,000-pound federal limit on Interstate Highways, and a number of other States can allow axle loads exceeding federal limits under grandfather rights. While the widely varying State laws appear to be inefficient, they are the result of political processes that have attempted to balance economic development concerns with concerns for safety and infrastructure protection. This balance has resulted in somewhat different size and weight limits from State to State, but these differences largely reflect factors unique to each State. The pattern of truck size and weight limits that has evolved over the years may not be optimal by any objective measure, but it does allow for some appropriate regional variation without compromising safety, which is the Department's highest priority
7. Many proponents of change in truck size and weight limits point to TRB's recommendations in *Special Report 267* as a blueprint for a systematic process to more nearly optimize truck size and weight policy. However, aside from certain segments of the trucking industry and several States interested in truck size and weight increases, strong support for TRB's recommendations has not been evident. The Department has not taken a formal position on the TRB study, in part because it does not favor change in federal truck size and weight policy, but if changes were to be made, the Department believes that the kind of strong monitoring and evaluation that TRB recommends would be essential. Without support for the kind of comprehensive approach to truck size and weight policy and permitting practices recommended by TRB, there would be no mechanism to quickly identify safety or other problems that might arise. In recent years a number of ad hoc, State-specific exemptions from federal truck size and weight laws have been enacted. For instance, TEA-21 contained special exemptions from federal size and weight limits in four States, Colorado, Louisiana, Maine, and New Hampshire. The Department does not support this kind of piecemeal approach to truck size and weight policy. It makes enforcement and compliance with truck size and weight laws more difficult, it often contributes little to overall productivity, it may have unintended consequences for safety and highway infrastructure, and it reduces the willingness to work for more comprehensive solutions that would have much greater benefits. A regional approach such as the Western Uniformity Scenario could have greater benefits than a series of individual exemptions, but it also could have much more serious adverse consequences unless closely monitored. Unless there were very strong support from State elected officials for a carefully controlled and monitored evaluation of changes in truck size and weight limits such as those in the Western Uniformity Scenario, the risks of

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adverse impacts from the unmonitored use of LCVs, the divisiveness that might ensue as the current balance in truck size and weight policy is upset, and the further polarization of this very contentious issue would outweigh the benefits that might be realized. Strong support from elected officials of States within the region for a change in truck size and weight limits has not been evident to date, and there is no compelling Federal interest in promoting changes that are not strongly supported by the affected States.

2000 - The Comprehensive Truck Size and Weight (TS&W) Study². On June 14, 1994, during testimony before the U.S. House of Representatives Committee on Public Works and Transportation's Subcommittee on Surface Transportation, Federal Highway Administrator Rodney E. Slater made a commitment to conduct a Comprehensive Truck Size and Weight Study. The study analyzes several specific TS&W scenarios characterized by assumptions about the maximum weights and dimensions of vehicles that would be allowed to operate and the networks upon which larger, heavier vehicles could travel. While most scenarios assume some increase in TS&W limits, two scenarios assume reductions in allowable weights or dimensions.

Five TS&W scenarios were developed for the study to illustrate the nature and relative magnitude of impacts on safety, productivity, infrastructure, the environment, traffic operations, and the railroads. The scenarios are characterized by specific vehicles that would likely operate within the scenarios; gross weight limits and lengths at which those vehicles would operate; and the networks of highways upon which scenario vehicles would operate and the Federal TS&W limits would apply. Those illustrative scenarios are briefly described below.

1. Uniformity Scenario. This scenario assumes grandfather provisions in current Federal law would be removed and requires States to adopt Federal weight limits on all National Network (NN) highways. States now exercising grandfather rights to allow heavier vehicles on the Interstate System would have to roll those weights back to the current Federal limits. They also would have to roll back any higher limits they may now have on other NN highways. With an 80,000-pound weight limit, LCVs would be impractical for all but the lightest loads. A few States have weight limits below Federal limits on non-Interstate portions of the NN. Those States would be required to bring weight limits up to Federal limits on those NN highways. Non-divisible load permits would continue. Off the NN, vehicles would continue to operate at current State-regulated weights.

² The U.S. Department of Transportation, Comprehensive Truck Size and Weight Study, Volume 1, Summary Report, August 2000

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2. North American Trade Scenarios. The North American Trade Scenarios allow heavier gross vehicle weights on certain configurations by increasing allowable tridem-axle loads to be more consistent with tridem-axle loads in Canada and Mexico. Two alternative tridem-axle load limits are tested, one at 44,000 pounds and the second at 51,000 pounds. This second limit would allow transportation of international containers loaded to the International Standards Organization (ISO) limit. Gross weights of six-axle tractor-semitrailers carrying those containers would be 97,000 pounds. Other vehicles considered in this scenario are a four-axle single-unit truck weighing up to 71,000 pounds and an eight-axle twin-trailer combination weighing up to 131,000 pounds with trailer lengths of 33 feet. Because they corner as well as current tractor-semitrailers, the eight-axle twin-trailers would be allowed the same access. Eight-axle doubles are operated in some Canadian Provinces and in States along the U.S.-Canadian border, but not in Mexico. Current grandfathered weight limits would stay in effect in these scenarios.

3. Longer Combination Vehicles (LCVs) Nationwide Scenario. Longer combination vehicles currently operate in 16 States west of the Mississippi River and on turnpikes in 5 States east of the Mississippi River. *The Intermodal Surface Transportation Efficiency Act of 1991* contains an “LCV freeze” that prevents expansion of LCVs into States that did not permit those vehicles before June 1, 1991. The LCVs Nationwide Scenario assumes LCV operations on a nationwide network. Limited networks would be designated upon which LCVs could operate. Turnpike doubles (twin 53-foot trailer combinations weighing up to 148,000 pounds) and Rocky Mountain Doubles (combinations with one 53-foot trailer and one 28.5-foot trailer weighing up to 120,000 pounds) would not be allowed to leave the network because of their relatively poor maneuverability. They would have to use staging areas to assemble and disassemble; travel off the network would be in single trailer combinations. Triple-trailer combinations (combinations with three 28.5-foot trailers weighing up to 132,000 pounds) and eight-axle twin-trailer combinations with two 33-foot trailers weighing up to 124,000 pounds would be allowed to travel off their networks to get to origins and destinations because they can negotiate curves as well as current tractor-semitrailer combinations. In practice triple trailers and the eight-axle twin trailers might not be allowed unlimited access off their designated networks, but there was no way to estimate the extent to which access might be granted. To the extent that diversion to those two vehicles may be overestimated, all of the impact measures, both positive and negative, are also overestimated. The scenario assumes that all States would uniformly adopt the new limits, and therefore, captures the maximum impact. All other Federal size and weight controls would remain.

6. H.R. 551 Scenario. *H.R. 551, “The Safe Highways and Infrastructure Preservation Act.”* was first introduced in 1994 during the 103rd Session of Congress, and again in 1997, as H.R. 551, during the 105th Session. The bill would federalize certain areas of truck regulation that are now State responsibilities. Specifically, H.R. 551 contains three provisions related to Federal

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TS&W limits: (1) it would phase out trailers longer than 53 feet, (2) it would freeze State grandfather rights, and (3) it would freeze weight limits (including divisible load permits) on non-Interstate portions of the National Highway System (NHS).

7. Triples Nationwide Scenario. This scenario assumes operation of triple-trailer combinations across the country at the same weights and dimensions as are assumed under the LCVs Nationwide Scenario.

Table ES-1 shows estimates of the diversion of traffic from existing trucks and from rail to selected vehicles for each of the scenarios.

Vehicle Class	5-axle tractor-semitrailer		6-axle tractor-semitrailer		LCVs		Total Truck ²		Rail	
	VMT (millions)	% change	VMT (millions)	% change	VMT (millions)	% change	VMT (millions)	% change	Car-miles (millions)	% change
Base Case	83,895	na	6,059	na	1,517	na	128,288	na	25,555	na
Uniformity	91,205	8.7	3,519	-41.9	542	-64.3	132,351	3.2	na	na ³
N.A. Trade (1)	22,274	-73.5	6,209	2.5	49,837	3185.2	114,671	-10.6	24,354	-4.7
N.A. Trade (2)	24,997	-70.2	6,246	3.1	47,453	3028.1	114,632	-10.6	24,073	-5.8
LCV nationwide	19,611	-76.6	na ¹	na ¹	40,980	2601.4	98,562	-23.2	20,546	-19.6
H.R. 551	83,915	0.0	6,051	-0.1	1,517	0.0	128,311	0.0	na	na
Triples	23,405	-72.1	na ¹	na ¹	39,647	2513.5	102,400	-20.2	24,533	-4.0

N.A. Trade (1) – 44,000 pound tridem axles; N.A. Trade (2) – 51,000 pound tridem axles.
¹ To facilitate the diversion analysis, six-axle tractor-semitrailers were not included in the analysis for the two scenarios involving LCVs.
² The Total does not equal the sum of the three vehicle classes shown in the table because other vehicle classes included in the Total are not shown in the table.
³ Potential diversion from truck to rail under the Uniformity and H.R. 551 Scenarios could not be estimated because of lack of data on rail pricing.

Table ES-2 shows estimated changes from base case levels for key impact areas. Bridge replacement costs change significantly under all scenarios, including those that would reduce certain vehicle weights and dimensions. The assumption in this study is that all bridges that would be stressed beyond overstress criteria underlying the Federal bridge formula ultimately would be replaced to accommodate vehicles allowed under the various scenarios.

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	Uniformity	N.A. Trade (1)	N.A. Trade (2)	LCV Nationwide	H.R. 551	Triples
Pavement Costs	-0.3	-1.6	-1.2	-0.2	0	0
Bridge Costs	-13.0	+33.1	+42.2	+34.4	0	+10.4
Geometric Costs	0	+13.3	+13.3	+965.0	0	0
Congestion Costs	+0.6	-1.2	-1.2	-2.9	0	-7.6
Energy Costs	+2.1	-6.2	-6.3	-13.8	0	-12.8
Shipper Costs	+3.0	-5.1	-7.0	-11.4	0	-8.65
Rail Contribution	na	-42.8	-49.7	-55.8	na	-38.2

N.A. Trade (1) – 44,000 pound tridem axles; N.A. Trade (2) – 51,000 pound tridem axles.
¹ The amount of rail revenue available to pay fixed costs after freight service (variable) costs have been covered.

Safety impacts are not shown on this table because there are so many dimensions to the safety issue that no one adequately captures safety considerations surrounding the illustrative scenarios. Previous TS&W studies have estimated changes in crashes and crash costs that might result from TS&W changes, but in this study the Department determined that changes in crash rates could not reliably be estimated for the LCV scenarios. The small body of evidence on LCV crash rates in western States is based on such different operating conditions and vehicles than those evaluated in this study that they do not provide a credible basis for estimating crash rates for vehicles with the dimensions and weights analyzed in this study, especially on congested highways on eastern portions of the illustrative LCV networks. Other factors, therefore, need to be considered in assessing safety impacts of possible TS&W changes. These include stability and control properties of different configurations, and perceptions of drivers concerning the safety of longer and heavier vehicles. The LCV configurations generally show poorer stability or control properties than the base tractor semitrailer configuration. Short multitrailer combinations have poor lateral stability that can result in the rearmost trailers traveling outside their lane or at the extreme rolling over if rapid steering maneuvers are required. In general the shorter the trailers, the worse the lateral instability, although certain types of trailer connections can improve stability.

Thus while shorter trailers on triple trailer combinations reduce offtracking, they also reduce lateral stability. Reducing allowable weights and dimensions of scenario vehicles would improve stability and control, but would also reduce productivity for many segments of the trucking industry. The study concluded:

1. Significant productivity benefits are estimated for each illustrative scenario that allows heavier vehicle weights, but these benefits are derived primarily from the use of LCVs even under the North American Trade Scenarios.
2. Nationwide use of LCVs would entail significant infrastructure costs, adverse impacts on Railroads and potentially negative safety impacts.

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- Furthermore, officials in many States that currently do not allow LCVs oppose policies that would relax restrictions on LCV use.
3. States differ markedly on their positions regarding changes in Federal TS&W limits. Some States oppose changes in Federal TS&W laws that would give States either the flexibility to allow higher gross weights or to allow LCVs. In general, they fear that if neighboring States allow LCVs they will face irresistible pressure to also allow LCVs to keep their businesses competitive. States that presently allow LCVs on their State highways generally favor removing the LCV freeze and liberalizing rules under which LCVs may operate. They argue that grandfathered operations in most States are based on laws in effect in 1956 and that highways have become safer since that time. They also maintain that LCVs have had good safety records in their jurisdictions, that LCVs improve productivity, that LCVs can operate on their highway systems without staging areas or interchange improvements, and that current grandfather laws often result in LCVs having to operate off the Interstate System rather than on the safer Interstate Highways. Still other States would like increases in gross weights allowed for six-axle tractor-semitrailers and single unit trucks like dump trucks, garbage trucks, and other specialized hauling vehicles. These States want additional truck productivity without the infrastructure costs and potential safety concerns associated with LCVs. No separate analysis was conducted in this study to estimate effects of allowing only those shorter vehicles. In general, such vehicles would not be expected to cause additional pavement damage on Interstate Highways, nor would they increase costs to improve roadway geometrics.
 4. Bridge impacts would be mixed depending on the gross weights allowed. The heavier vehicles allowed under the North American Trade Scenario would require substantial bridge improvements. Heavier six-axle tractor-semitrailers, such as the 97,000 pound vehicle that would be allowed to operate under H.R. 1667 introduced in 1999, generally would exceed bridge formula limits and would cause stresses exceeding bridge design stresses.
 5. While basic Federal TS&W limits have not changed since 1982 with the exception of the LCV freeze, this does not mean that the status quo has been maintained. Several States have been granted exceptions to Federal gross weight or axle-weight limits in either authorizing or appropriating legislation since 1982, including four States that received such exemptions in TEA-21. States are granting increasing numbers of oversize and overweight permits, especially for international containers, but also for many other commodities.
 6. The cubic capacity of vehicles has also changed, primarily as the result of increasing trailer lengths. For example, at the time of the Department's last comprehensive report on TS&W policy issues in 1981, the standard trailer length was 45 feet, with 48-foot trailers becoming increasingly common. Fifty-three foot long semitrailers are becoming a standard for

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- many carriers, and some States allow trailers up to 60 feet in length. Average operating weights of tractor-semitrailers have actually gone down slightly in recent years with decreases in cargo density and pressures to provide smaller, more frequent deliveries to support just-in-time and other advanced logistics operations. There are several implications of these ad hoc trends that are occurring while basic Federal TS&W limits remain unchanged. With the increasing weights being allowed under permit, pavements and bridges will deteriorate faster. Increasing trailer lengths probably have not had as significant an effect because carriers are operating those vehicles with the rear axles pushed forward so that their off-tracking is not significantly worse than 48-foot trailers. As trailer lengths have moved beyond 53 feet in some States, however, geometric deficiencies have increased because there is a limit to how far forward the rear axles can be pushed to minimize offtracking. The sum of these ad hoc changes at the State level has been to create an ever more diverse patchwork of TS&W limits nationwide.
7. Increasing trade with Mexico and Canada, which have higher allowable gross weight and axle weight limits than the U.S., will cause even greater pressures to increase weight limits in this country, especially in major trade corridors. One scenario evaluated in this study, the Uniformity Scenario, would virtually eliminate the lack of uniformity in State TS&W limits, but little sentiment to roll back Federal TS&W limits to the extent assumed in this scenario was expressed in comments on the draft report. The H.R. 551 Scenario would phase out trailers longer than 53 feet and freeze weight limits on the National Highway System, but would retain existing grandfather and other legislative exemptions to the basic Federal weight laws.
 8. Cost recovery is an issue that several States mentioned in comments to the docket, and is an issue for the Federal Government as well. Most increases in TS&W limits would require some infrastructure improvements. Even if more incremental changes in TS&W limits were implemented than those included in the illustrative scenarios, bridge, geometric, and perhaps pavement costs could increase. Some States capture a large share of the additional infrastructure costs associated with operations of oversize and overweight vehicles through permit fees, but other States charge fees that cover little more than costs to administer the permit program. At the Federal level, there is no mechanism for capturing added costs of larger, heavier trucks through user taxes. Weaknesses of the current Federal user fee structure to reflect the cost responsibility of different vehicle classes were discussed in detail in the 1997 Federal Highway Cost Allocation Study.

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1986 – Longer Combination Vehicle Operations in Western States³. In 1985, the Senate Appropriations Committee called for a study of LCV operations in the Western States. This study reported that the productivity benefits of allowing LCVs to operate more widely and at higher weight are unquestioned. The report noted the DOT's commitment to work with the States and trucking groups to explore ways to improve the efficiency and safety of trucking. The DOT would be better prepared to evaluate truck size and weight initiatives and enhance the productivity of LCVs, once ongoing research and congressional studies were completed.

1985 – Feasibility of a Nationwide Network of LCVs⁴. In the Surface Transportation Assistance Act of 1982, the Congress mandated a study on the potential benefits and costs that could be anticipated from the establishment of a nationwide network for LCVs. The study report concluded that:

1. There is no compelling evidence that LCVs are so desirable that increased federal intrusion into State size and weight regulation authority was justified; and
2. The transportation efficiency gains were potentially substantial, but they are offset by safety concerns, loss of rail productivity, and high initial investment to realize the potential efficiencies.

1964 – Maximum Desirable Dimensions and Weights of Vehicles Operated on the Federal-Aid System⁵. In the Federal-Aid Highway Act of 1956, Congress instructed the Secretary of Commerce to report on research and make recommendations regarding maximum desirable weights and dimensions for vehicles operated on the Federal-aid highway systems, including the Interstate System. The principal recommendations were:

1. not to make recommendations for Federal vehicle standards for Federal-aid primary and secondary systems and their respective urban extensions (because of lack of relevant information);
2. retention of the current width and axle limits (18,000, 32,000, and 73,280 pounds), **removal of the gross vehicle weight cap**, and the adoption of a bridge formula A for a 3 year period;
3. introduction of maximum length limits for single and combination units, and a height limit;

³ Federal Highway Administration, March 1995, Comprehensive Truck Size and Weight Study, Summary Report for Phase I – Synthesis of Truck Size and Weight (TS&W) Studies and Issues.

⁴ Ibid.

⁵ Ibid.

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4. introduction of performance standards respecting maximum weight-to-power ratio, minimum brake system performance, and linkage mechanism requirement for combinations; and
5. After 3 years, increase in the width limit and axle weight limits, and adoption of bridge formula B.

1941 – Federal Regulation of the Sizes and Weight of Motor Vehicles⁶:

Congress instructed the Interstate Commerce Commission to investigate the need for Federal regulations of the sizes and weight of freight-carrying motor vehicles engaged in interstate or foreign commerce. The principal findings were:

1. State limits were a costly obstacles to interstate trade,
2. Federal intervention was accordingly warranted but only in response to specific complaints regarding particular situations, and
3. Considerations of safety and convenience do not unto themselves justify Federal involvement.

⁶ Ibid.

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TRANSPORTATION RESEARCH BOARD (TRB) Studies

TRB Special Report 267 - Regulation of Weights, Lengths, and Widths of Commercial Motor Vehicles⁷. The report recommends the creation of an independent public organization to evaluate the effects of truck traffic, pilot studies of new truck designs, and a change in federal law authorizing states to issue permits for operation of larger trucks on the Interstates.

In 1991, Congress placed a freeze on maximum truck weights and dimensions. Some safety groups were protesting against the safety implications of increased truck size and weight, and the railroads were objecting to the introduction of vehicles they deemed to have an unfair advantage. Railroads, unlike trucking firms, must pay for the capital costs of their infrastructure. The railroads contend that large trucks do not pay sufficient taxes to compensate for the highway damage they cause and the environmental costs they generate. Although Congress apparently hoped it had placed a cap on maximum truck dimensions in 1991, such has not proven to be the case.

Carriers operating under specific conditions have been able to seek and obtain special exceptions from the federal freeze by appealing directly to Congress (without any formal review of the possible consequences), thereby encouraging additional firms to seek similar exceptions. In the *Transportation Equity Act for the 21st Century*, Congress requested a TRB study to review federal policies on commercial vehicle dimensions.

The committee that undertook the study that resulted in Special Report 267 found that regulatory analyses of the benefits and costs of changes in truck dimensions are hampered by a lack of information. Regulatory decisions on such matters will always entail a degree of risk and uncertainty, but the degree of uncertainty surrounding truck issues is unusually high and unnecessary. The committee concluded that the uncertainty could be alleviated if procedures were established for carrying out a program of basic and applied research, and if evaluation and monitoring were permanent components of the administration of trucking regulations.

The committee recommended immediate changes in federal regulations that would allow for a federally supervised permit program. The program would permit the operation of vehicles heavier than would normally be allowed, provided that the changes applied only to vehicles with a maximum weight of 90,000 pounds, double trailer configurations with each trailer up to 33 feet, and an overall weight limit governed by the federal bridge formula. Moreover, enforcement of trucks operating under such a program should be strengthened, and the permits should require that users pay the costs they occasion. States should be free to choose

⁷ http://trb.org/news/blurbs_detail.asp?id=640, abstract report, August 24, 2006

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whether to participate in the permit program. Those that elected to do so would be required to have in place a program of bridge management, safety monitoring, enforcement, and cost recovery, overseen by the federal government.

The fundamental problem involved in evaluating proposals for changes in truck dimensions is that their effects can often only be estimated or modeled. The data available for estimating safety consequences in particular are inadequate. Thus, the committee that conducted this study concluded that the resulting analyses usually involve a high degree of uncertainty. What is needed is some way to evaluate potential changes through limited and carefully controlled trials, much as proposed new drugs are tested before being allowed in widespread use.

The committee recommended that a new independent entity be created to work with private industry in evaluating new concepts and recommending changes to regulatory agencies. Limited pilot tests would be required, which would need to be carefully designed to avoid undue risks and ensure proper evaluation. Special vehicles could be allowed to operate under carefully controlled circumstances, just as oversize and overweight vehicles are allowed to operate under special permits in many States. Changes in federal laws and regulations would be required to allow States to issue such permits on an expanded network of highways, under the condition that a rigorous program of monitoring and evaluation be instituted.

TRB Special Report 227 - New Trucks for Greater Productivity and Less Road Wear⁸, An Evaluation of the Turner Proposal. The study evaluates the approach to regulation of the size and weight of trucks using U.S. roads known as the Turner Proposal. This approach had its origin in a proposal put forth in a 1984 address to AASHTO by former Federal Highway Administrator Francis C. Turner.

The approach evaluated by the committee differs in an important respect from Turner's original concept: in the committee's approach, use of the new trucks would be voluntary; that is, truck operators would be offered the choice of continuing with existing equipment and weight rules or adopting the new trucks with the new weight regulations. The committee designed a package of changes in size and weight limits, safety restrictions, and procedures regarding bridge deficiencies, routing, and enforcement that would be a practical regulatory scheme for implementing the "Turner Concept".

The committee recommends that every State, with careful assessment of the risks and uncertainties, consider this proposal as a supplement to current size and weight regulations. If Turner trucks were adopted in all States according to the recommended rules, they would reduce the cost of shipping freight and would

⁸ http://trb.org/news/blurbs_detail.asp?id=2698, abstract report August 24, 2006

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not degrade safety. The total cost of maintaining the road system would be reduced, although pavement wear savings would be partially offset by higher bridge costs.

The committee that carried out this study identified two truck configurations outside the weight and length limits established by federal law that would offer greater productivity without increasing infrastructure or safety costs. These vehicles formed the basis for the configurations recommended in a later (2002) TRB report, "Special Report 267: Regulation of Weights, lengths, and Widths of Commercial Motor Vehicles".

SPECIAL REPORT 225 – Truck Weight Limits: Issues and Options⁹.

To help assess proposals for further changes in federal truck weight limits, Congress requested this study through Section 158 of the Surface Transportation and Uniform Relocation Assistance Act of 1987. To conduct the study, the National Research Council convened a special Transportation Research Board committee with experts in pavements, bridges, highway safety, freight transportation economics, motor vehicle design, highway administration, motor carrier operations, and enforcement of motor vehicle regulations. The study focused on four issues identified in the study request that involve potential changes to federal weight limits for Interstate highways:

- (1) Elimination of existing grandfather provisions;
- (2) Alternative methods for determining gross vehicle weight and axle loadings;
- (3) Adequacy of the current federal bridge formula; and
- (4) Treatment of specialized hauling vehicles--garbage trucks, dump trucks, and other trucks with short wheel bases that have difficulty complying with the current federal bridge formula.

For each of these issues, the study committee estimated the nationwide effects of changes in federal limits proposed by the trucking industry, highway agencies, and other groups. Projections of heavy-truck miles by type of truck, region of the country, highway functional class, and operating weight were developed for a base case and alternative truck weight regulatory scenarios. These projections were then used to estimate impacts on truck costs, pavements, bridges, and safety. The study concluded that:

1. Within limits, the savings in goods movement that would result from allowing heavier trucks would exceed the increased costs for pavements and bridges.
2. A major impediment to making incremental changes in the weight limits, however, is the difficulty highway agencies experience in recouping fees from trucking firms to compensate for the damages they cause. The

⁹ http://trb.org/news/blurbs_detail.asp?id=2700, abstract of report, August 24, 2006

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- inability to charge users directly makes most states reluctant to support higher weight limits, even though society as a whole might benefit from the resulting productivity gains. Heavier trucks can also constrict traffic flow and increase risk, but their net effect depends on the extent to which allowing heavier weights might reduce total truck traffic.
3. Incremental changes to policies limiting vehicle weights, with attendant net benefits to society, could be achieved with relatively minor adjustments to the federal bridge formula (to allow heavier dump trucks to operate) and with a special permit program. The latter would allow states to permit the operation of heavier trucks provided the carrier followed new safety criteria and the fees collected compensated for the potential infrastructure damage. Moreover, a portion of the fees could be used to enhance enforcement against illegal overloads, which are a serious problem. At the same time, a complicating feature of policies designed to rationalize trucking regulations is that certain types of trucking operations compete head-to-head with railroads, and unless the fees charged are appropriate, such operators can have an unfair advantage that would compromise the viability of rail.

The committee recommended¹⁰:

1. A new bridge formula, TTI HS-20 applied to vehicles with a gross weight of 80,000 pounds or less, and formula B for vehicles of 80,000 pounds.
2. A special permit program. Congress should broaden the process of exemptions so that it would not be necessary for States to claim grandfather exemptions in order to permit vehicles over 80,000 pounds.
3. Congress should take no action to restrict grandfather rights that have already been claimed by States, but should prevent future expansion of these claims.
4. Increased Enforcement; and
5. Regional Cooperation in Standardizing Limits and Permit Practices.

IMPACTS OF COMBINED TTI HS-20/FORMULA B¹¹

	Transport	Pavement	Bridges	% VMT	% rail ton-mile	No. of Fatal Crashes/yr
TTI HS20/FB	-\$5.2 billion	-\$0.0	+\$0.9 billion	-2.5%	-2.5%	-110

¹⁰ Transportation Research Board, Special Report 225, Truck Weight Limits – Issues and Options. 1990, summary of pages 14 to 25.

¹¹ Transportation Research Board, Special Report 225, Truck Weight Limits – Issues and Options. 1990, Table 8-4 and 8-5, page 214 ,215.

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GENERAL ACCOUNTING OFFICE

The GAO has conducted three investigations on truck size and weight related matters since 1992 – all dealing with LCV considerations. The observations, conclusion and recommendations from the 1994 report, “*Longer Combination Trucks: Potential Infrastructure Impacts, Productivity Benefits, and Safety Concerns*”, are¹²:

1. Nationwide use of LCVs on interstates would require a one-time infrastructure investment of up to \$3.5 billion (FHWA estimate) and yield an annual reduction in trucking costs of \$3.4 billion (industry estimate). Principal beneficiaries would be the large national small package and less-than-truckload (LTL) carriers.
2. Limited data show that LCVs have not been a safety problem on the western highway and eastern turnpikes where they operate.
3. “Identified operational characteristics of LCVs ... could make them a greater safety risk than single-trailer combinations if allowed on more congested highways”.
4. The American Association of Railroads model used for estimating rail to truck diversion that would result from greater LCV use has significant shortcomings (insensitive to railroad productivity gains; assumes that truckload (TL) traffic will generally convert to using turnpike doubles).
5. Expanded use of LCVs should be permitted by exception to the current freeze, based on State requests and State commitments regarding suitability, cost recovery and enforcement.

The two other reports: (1) *Longer Combination Trucks: Driver Controls and Equipment Inspection Should be Improved*, and (2) *Truck Safety: The Safety of Longer Combination Vehicles is Unknown*, confirmed the difficulty of rendering a clear, definitive conclusion about the on-road safety performance of LCVs relative to other truck types. They reflect the longstanding data limitation problems that have made it impossible to definitively detect differences in on-road safety performance that can be associated with differences in TS&W laws. This is not to say the TS&W law does not affect handling and stability performance characteristics of trucks; it does. However, acceptance of this reality may provide the basis from which useful consideration can be given to how TS&W law might be deployed to improve the inherent safety related performance of trucks, even though these improvements may not be irrefutably detected in a statistically convincing manner.

¹² Federal Highway Administration, March 1995, Comprehensive Truck Size and Weight Study, Summary Report for Phase I – Synthesis of Truck Size and Weight (TS&W) Studies and Issues.