

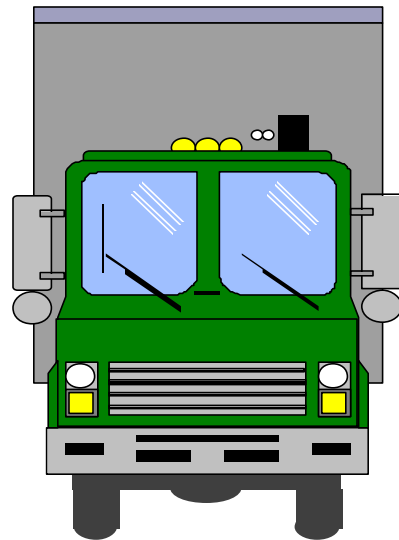
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# APPENDIX A

## Summary of Comments

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## Introduction

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A draft of Volume III, the Scenario Analysis, for the U.S. Department of Transportation's (DOT) Comprehensive Truck Size and Weight (TS&W) Study was made available to the public in December 1998 for comment. Eighteen States, ten trucking industry associations or interests, and nine other interested parties submitted comments. Comments ranged from brief, general comments to extensive, detailed comments and recommendations. As many of the recommended technical clarifications and corrections as possible were incorporated in Volumes I and III. Recommendations for new or modified scenarios could not be accommodated, but the types of changes suggested have been noted.

This appendix is organized by chapter and significant issues that were highlighted or consistently cited in the comments. The issues are summarized in italics and the response or action taken is noted immediately following the comment. The actual comments are available online through the docket room site at <http://dms.dot.gov> under docket #4498.

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## Analytical Framework and Scenario Definition

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### Study Vehicles and Configurations

Both single-unit trucks (SUTs) and combination vehicles are analyzed in this study. The study scenarios include a broad range of commercial truck configurations: three- and four-axle SUTs; five- and six-axle tractor-semitrailers; 28- and 33-foot double trailer combinations; and longer combination vehicles (LCVs). The configurations are analyzed at gross operating weights based on assumptions about axle weight and bridge overstress criteria.

*Comment: Many of the configurations selected for analysis are non-existent or atypical of those currently in use, or likely to be used in the foreseeable future, on a nationwide basis. This flaw in the analysis results in an exaggeration of the potential impacts.*

DOT Response: Because each scenario was analyzed in extensive detail, only a limited number of scenarios could be analyzed in this study. With this limitation in mind, the Department decided that each scenario should reflect the upper range of

potential impacts that might occur with the changes in TS&W limits assumed for each scenario. While gross vehicle weight limits assumed for certain vehicle classes are greater than the weights at which those vehicles typically operate today, all vehicles comply with current axle load limits. Exceptions to this are the vehicles under the North American Trade Scenarios with tridem axle load limits of either 44,000 pounds or 51,000 pounds, since there are no explicit tridem axle load limits in Federal regulations. The 44,000 pound limit was set to result in no increase in pavement consumption allowable bridge stresses. The 51,000 pound limit was set to accommodate the carrying of International Standard Organization (ISO) containers loaded to their maximum allowable weight, and it approximates Mexico's 49,000 pound limit and the range of tridem axle weights allowed in Canada. If lower gross vehicle weight limits had been assumed for various scenarios, impacts, both positive and negative, would be smaller.

### Study Networks

Analytical networks were required to test the impact of the scenario TS&W limits on truck-to-truck and rail-to-truck diversion of freight. The networks for the scenarios

were limited to the National Network (NN) for large trucks, the National Highway System (NHS), and two limited systems of highways for the operation of LCVs. All configurations analyzed were assumed to operate nationwide.

*Comment: Networks selected are inappropriate, too inclusive or exclusive, and not based in reality. For instance, the triple trailer network should be scaled back to all Interstates west of the Mississippi River (excluding urban area Interstates not currently in use) and east of the Mississippi should be Interstates and non-Interstate routes where triples currently operate and nine additional Interstates plus Interstate by-pass routes around major urban areas.*

DOT Response: A wide range of networks was suggested in the various comments on this issue. Developing a broad consensus on the nature and extent of the analytical networks that should be analyzed in each scenario would have been very difficult. The network analysis was one of the most demanding parts of this study since minimum paths between all origins and destinations of commodity movements

analyzed in the study had to be developed. It was not possible within the scope of this study to conduct sensitivity analyses to evaluate implications of more extensive or more limited networks. In general, the illustrative LCV networks were selected to provide access to major markets, but to avoid having LCVs go through congested metropolitan areas. Because the approach to developing LCVs networks was to select an interconnected system of access-controlled highways, two-lane highways in the West and certain turnpikes in the East that currently allow LCVs are not included in the illustrative networks. This does not mean that LCVs could not use those highways if TS&W limits were actually changed to allow such vehicles. In the West eliminating the two-lane highways from the networks could result in lower estimates of LCV use than if those highways had been included, but the exclusion of turnpikes in the East is not expected to significantly affect overall estimates of LCV use since good alternatives generally would be available.

### **Study Scenarios**

The outreach process for the initial phase of the study was

used to identify TS&W issues of concern to the States, general public and interest groups. These issues were incorporated into a limited number of illustrative TS&W scenarios. The scenarios are not intended to indicate the DOT's disposition toward particular TS&W policy options, but rather were developed to illustrate potential impacts across a broad range of possible TS&W changes. The analytical framework developed for the study is sufficiently flexible to permit the evaluation of many different options.

*Comment: The capability of the model to reliably predict impacts on a regional, State or commodity basis is questioned.*

DOT Response: The study was designed to estimate nationwide impacts of TS&W changes analyzed in the illustrative scenarios. Even though diversion is analyzed on a shipment-by-shipment basis and scenario impacts are analyzed using sample data on individual pavement sections and individual bridges, the analysis was not designed to provide reliable impact estimates below the national level. It would be possible to analyze scenarios at a regional level, but additional care would have to

be taken in specifying the networks to make sure they are representative of major routes that likely would carry the majority of intercity truck movements. In general, the lower the level at which the analysis is conducted, the greater the detail required to produce results that would provide reliable bases for decisions on the desirability of TS&W policy changes.

*Comment: The illustrative scenarios are not based on real-world current or future industry operations or practices and more realistic scenarios should be analyzed with more logical assumptions. Among the additional scenarios suggested for analysis are a Western-region scenario, a full-cost recovery scenario, alternative bridge formulas, and “quid pro quo” options that improve productivity and are tied to improvements in safety and operations.*

DOT Response: As noted above, with the limited number of scenarios that could be analyzed in this study, the Department decided to analyze scenarios that illustrated the upper bound of likely impacts from various types of TS&W policy changes. The scenarios were not intended to represent options that could or should be implemented, but rather

were intended to illustrate the likely magnitude of impacts from a given set of assumptions. Scenarios that included recovery of infrastructure and other costs could be analyzed, but would require additional analysis to predict the likely response by shippers and carriers to changes in cost. No specific alternative bridge formulas were analyzed, but bridge protection approaches would have to be carefully considered before options with some of the gross vehicle weights assumed in the illustrative scenarios could be implemented. The more detailed the scenario and the closer it is to a true policy option, the more important it is to involve States, shippers, carriers, and other affected groups in the analysis to be sure that likely responses to various options are understood.

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## Freight Distribution

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Freight distribution information is critical to estimating the impact of TS&W changes on infrastructure, operations, the environment and safety. Of particular interest to the study is the shift of freight from one truck configuration to another, and from one gross vehicle weight (GVW) group to

another as the result of changes to TS&W limits and shipper modal choices.

*Comment: The assumptions for estimating diversion from rail-to-truck and truck-to-truck place too much emphasis on cost, and too little on service, as a factor in shipper decision making. This all or nothing decision rule in the model results in significantly overstated diversion.*

DOT Response: Service variables are included in the model, although they ultimately are converted to dollar costs for purposes of comparing vehicle and modal alternatives. The diversion model went through an extensive review process involving academics and consultants familiar with transportation logistics. While the relative importance of service versus price varies widely among shippers, the experts believed that the values in the diversion model were representative. One indication of how well the model reflects actual shipping decisions is the fact that when the model was run against carload shipments in the Rail Waybill, it correctly predicted that shipments would go by rail rather than truck about 95 percent of the time. There was significant discussion among persons

reviewing the model on the issue of whether an all or nothing approach should be used in estimating diversion or whether some threshold cost savings should be required before assuming a shipment would shift to another type of vehicle or another mode. In keeping with other assumptions in the analysis that were intended to estimate the upper range of potential impacts, it was decided to adopt an all or nothing approach and to assume shipments would divert even with only a very small price advantage.

*Comment: A major problem with the model is it looks only at major railroads and no consideration is given to regional or short-line railroad operations typical of many States that are more likely to experience diversion because they transport a high volume of small shipments.*

DOT Response: A major problem when looking at regional or short-line railroads in a study such as this is the lack of data, both operational and financial, of these classes of rail carriers. For the short-line railroads, many do not appear in the waybill as an originator or terminator of traffic. As a consequence, assessing freight flows is impossible.

While the regional rail carriers are in the waybill, there are no available financial and operational data that would allow a financial impact analysis such as the one constructed for the Class I rail industry and the four selected Class I carriers. Regional railroads are not required to file R-1 financial and operational data, which contain detailed revenue and cost information, with the Surface Transportation Board. These data compiled by the Association of American Railroads in the *Analysis of Class I Railroads, 1994* were an essential component to complete the analysis. However, due to the profile of divertable traffic found in the study and the connectivity of the rail network, one could infer that there are likely additional effects that were not assessed in the study because of resource constraints.

*Comment: The LCVs Nationwide scenario overestimates the truck-to-truck diversion because it does not give adequate emphasis to the costs incurred by carriers in distributing freight from staging areas to final destination. Nor does it consider costs of changing fleets and the impact of driver shortages on operations.*

DOT Response: Assumptions in the LCVs Nationwide Scenario are based on the development of efficient operations to move freight from staging areas to final destination. Such efficiency would not happen overnight, but would require some time to evolve. Brokerage services could match drivers with loads to minimize the time a trailer waits in the staging area before being delivered. All carriers might not be able to achieve such high levels of efficiency, but it must be assumed that staging area operations would develop that would be more efficient than current operations at turnpike staging areas that are lightly used compared to the extent of use predicted in the scenario. Changing fleets would be a gradual process, depending on the extent to which various carriers wished to enter and compete in the LCV market. No attempt was made to estimate effects of operational considerations such as driver shortages that would be difficult to predict for the future with reasonable certainty.

*Comment: The estimated impact on U.S. railroads is consistent with the Canadian railroad experience following implementation of changes to TS&W policy in the provinces in the late*

1980s. However, U.S. railroads believe the financial impact is underestimated.

DOT Response: The railroad financial analysis conducted in this study is a static analysis based upon research about the rail industry by industry experts. Because it is a static analysis, it is unable to evaluate the long term, dynamic response of the rail shippers to any rate increase designed to capture lost revenues. It is also unable to capture rail carriers' response to maintain access to the capital markets or to maintain return on investment (ROI). As the study states and as commenters noted, the industry may shrink their systems to return ROI to acceptable levels. Such shrinkage would cause the loss of rail service on marginal routes. Another scenario would see the carriers attempting to increase rates. Such increases would be followed by a further reduction in rail traffic as shippers move to more attractive truck rates. The study acknowledges these possibilities and the difficulties in assessing each. However, to move beyond the study's findings and quantify future second and third order results from different scenarios would be highly

speculative.

*Comment: The model needs to estimate diversion from truck-to-rail since the uniformity scenario would reduce truck weight limits, diversion of freight to rail could increase and the assertion that diversion is likely to be relatively minor is unsubstantiated.*

DOT Response: Currently there are no reliable data for pricing the movement by rail of freight presently moved by truck as such pricing is largely market-determined or set strategically by the railroads. Future improvements to the model will include improved ability to estimate potential truck-to-rail diversion. Such shifts from highway to truck are likely to increase, regardless of whether changes in TS&W limits such as assumed in the Uniformity Scenario are made. Improved intermodal freight efficiency and increasing highway congestion will be important forces acting to shift freight traffic from truck to rail in some freight corridors.

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## Pavement Impacts

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The condition and performance of highway pavements depend on many

factors. The focus of this study was not on analyzing all factors associated with truck-pavement interactions, but rather to concentrate on factors most relevant to impacts of TS&W policy changes. While dynamic truck-pavement interaction has been the focus of considerable research in recent years, it was not considered in this study since the results are inconclusive where TS&W policy is concerned and the effects appear to be of secondary importance relative to static axle loads when considering impacts of TS&W policy changes.

*Comment: The study analysis should include the effect of tire pressure and type, the effect of temperature (freeze/thaw), the influence of various distresses in rehabilitation, and the effects of mixing variables.*

DOT Response: Tire pressure and type, climatic effects, and interactions among these and other factors are all important considerations in estimating pavement deterioration. They are not as important in estimating effects of changes in TS&W limits on pavement distress and pavement rehabilitation needs because these factors are independent of changes in TS&W limits. For instance, an implicit

assumption in all scenarios analyzed for this study is that there would be no changes in tire pressures or tire type resulting from the scenarios. Since axle load limits are assumed to remain unchanged, interactions between axle load and some of the factors mentioned in the comment are no greater than under current TS&W laws. Temperature and other environmental factors are explicit variables in the pavement deterioration models used in the study. Thus any changes in traffic by environmental region are captured in the pavement analysis.

*Comment: The use of the Highway Performance Management System (HPMS) data is problematic as it is inconsistently reported among the States.*

DOT Response: While the Department recognizes that there are inconsistencies in the reporting of pavement data in the HPMS, the Department uses that database for several major policy studies such as the biennial report to Congress on the Conditions and Performance of the Nation's Highway and Transit Systems and the Federal Highway Cost Allocation Study. Considerable editing of pavement-related data in the HPMS database is done before the pavement analysis

is conducted, and results are shown only at the national level. If the analysis were conducted at the State level and differences among the States were important issues, inconsistencies in reporting might be of more concern, but at the national level the HPMS database is the best source of nationwide pavement data available. The Federal Highway Administration recently completed a major review of the HPMS database with the active participation of many State representatives. Issues related to the consistency with which various data items are reported were addressed, and changes will be made to improve the accuracy and consistency of pavement and other data items.

*Comment: The use of the National Pavement Cost Model (NAPCOM) in the analysis is questioned as it does not use the AASHTO fourth power law but rather an exponent which usually would be less than four, thereby producing more benign estimates of distress. For example, use of the AASHTO fourth power law produces more damaging effects for the use of tridem axles than the NAPCOM model.*

DOT Response: The NAPCOM model considers

13 separate pavement distresses that are among the most important in decisions by States to rehabilitate or reconstruct pavements. These distresses are estimated using tools much more advanced than the empirical relationships developed for a single region of the country in the AASHO Road Test. In particular, they take into account material properties and the actual mechanisms by which pavement distresses develop under loads by single, tandem, and tridem axles. Each of the different distresses has a different relationship between axle load and pavement damage. While most relationships are below the fourth power relationship originally estimated from data from the AASHO Road Test, several distresses have more than a fourth power relationship. Recent statistical analyses of the original Road Test data have shown that the relationships between axle load and pavement damage found in the Road Test are closer to a third power than a fourth power relationship.

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## Bridge Impacts

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The impact of a truck on a bridge varies, primarily by the weight on each group of axles on the truck and the

distance (spacing) between axles and axle groups. The number of axles in each group is less important than the distance between adjacent groups. The study analyzed the impact on bridge structural requirements that could result from changes to TS&W limits.

*Comment: A concern with the North American Trade scenario is the lack of a specified axle spacing for tridem axles. The negative impacts of shorter wheelbase straight trucks operating at higher weight limits could have significant impact on shorter span bridges. Providing exceptions to the Federal formula B severely hampers efforts for nationwide uniformity.*

DOT Response: The analysis of tridem axles for the North American Trade Scenarios was based on a spacing of nine feet between the two outer axles of the tridem group, as discussed in Chapter V. At the 44,000 pound limit there would be no increase in bridge stress, however for the 51,000 pound limit there would be a considerable increase in bridge stress.

*Comment: The use of strict replacement costs for bridges that rate deficient under the stress models is*

*excessive and causes an overstatement of actual impact of heavier trucks and also results in overstatement of delay costs. The inclusion of user delay costs is questionable and adds a new element to the analysis.*

DOT Response: The Department is aware that not all bridges identified as being structurally deficient would have to be immediately replaced before LCVs could be allowed to operate and that options other than replacement may be possible for some bridges. Research, in fact, is underway under the National Cooperative Highway Research Program to evaluate in more detail relationships between heavy trucks and bridges. That research will provide a basis for making some assessments of potential State responses other than replacement. Previous DOT and Transportation Research Board (TRB) studies have all made the same assumption as was made in this study that structurally deficient bridges would have to be replaced, and this is consistent with other assumptions in the report which attempt to set the upper range for potential impacts. User delay costs in and around work zones are very real costs to truckers and motorists alike when bridges are replaced, repaired, or

reinforced and would be important considerations in making any improvements that might be necessitated by changes in TS&W limits. Likewise, the added air pollution caused by traffic congestion around work zones is a real cost, perhaps not to motorists, but certainly to those whose health is affected by air pollution. Whether or not user delay and air pollution costs should be included in any cost recovery systems that may be implemented to recoup additional costs associated with changes in TS&W limits is open to debate. Cost recovery mechanisms generally do not consider those costs at present.

*Comment: Structural and bridge engineers have been moving away from a working stress method toward “reliability-based” procedures that more directly ensure structures provide a uniform level of safety, rather than tolerate a uniform level of stress—Load and Resistance Factor Design (LRFD). Software packages based on LRFD are almost non-existent at this time. The new procedures should at least be discussed within the study.*

DOT Response: Indeed today, engineers design most bridges using the Load Factor



(LFD) or Load Resistance Factor Design (LRFD) methods. However, the analysis to determine whether or not a bridge is overstressed is not directly related to the design or rating method. The analysis compares the total (live load plus dead load) moment of the scenario vehicles to the total moment produced by the rating vehicle as reported in the National Bridge Inventory (NBI). The total moment, of course, is only a function of span length, dead load, axle loads and axle spacings. For example, if a bridge were designed by the old Working Stress Design (WSD) method to be an HS20 bridge, but its rating, for example, using the LRFD method is HS23, then the analysis compares the total moment of the scenario vehicles on each span of the bridge with the moment generated by an HS23 vehicle.

Where the design method does affect the results is in the estimation of dead load. We computed dead loads based on designs using the WSD method. Since the NBI does not report the design method, WSD derived dead loads are the most appropriate to use since most existing bridges were designed using the WSD or similar method,

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## Roadway Geometry

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The impact of changes to TS&W limits on highway geometry may require improvements to curves and intersections on the existing highway system to safely accommodate longer combination vehicles (LCVs). The relationship between vehicle turning characteristics and roadway geometry is incorporated into the analysis of illustrative scenarios by vehicle configuration and networks.

*Comment: The assumptions used for determining the number and cost for staging areas are flawed. First, the construction of a staging area every 15.6 miles in rural States and areas is not necessary. In the western States LCVs have been operating safely without staging areas for 40 years and if there are costs included for the western States, they should not have been. Second, the cost per area in the study is extremely low based on experience of States— one State indicated the cost to construct one area ranged from \$1.0 million to \$10.8 million and the total cost for interchanges and staging areas in this State would be \$1.5 billion. The nationwide*

*total cost is given as only \$4.5 billion for improvements and construction.*

DOT Response: The LCVs assumed in the LCVs Nationwide Scenario are longer and heavier than those generally being operated in the Western States and there would be many more LCVs in the Western States under assumptions of the LCVs Nationwide Scenario than there are today. While some States might choose to allow vehicles with the dimensions assumed in this scenario to have limited access off Interstate Highways and other freeways, the assumption in this study was that scenario vehicles generally would not have access off the limited system of highways available for their use. The issue of spacing, costs, and need for staging areas is discussed in greater detail in the final report than in the draft. Also, assumptions used in estimating staging area costs were reviewed and costs were increased in the final report.

*Comment: The sample size for the analysis of intersections and interchanges is too small to draw conclusions from. If the intersections can't handle the current trucks as stated, then how are the*

*trucks getting through ?*

DOT Response: While cost estimates for potential intersection and interchange improvements could have been refined with analysis of a larger sample, the Department did not believe that such a detailed analysis was justified for this study of purely illustrative scenarios. In practice, before LCVs or other longer vehicles were allowed to operate, most States would likely conduct a detailed assessment of the adequacy of intersections and interchanges to accommodate the specific types of vehicles that might be permitted if TS&W limits were changed. The Department believes the analysis of intersection and interchange improvement needs estimated with the limited sample used in this study adequately illustrates the nature and relative magnitude of the problem nationwide. Problems in specific States might be more or less severe than those estimated from the sample, but the Department believes the study presents an adequate assessment of the dimensions of the problem nationwide.

*Comment: Premising an analysis of scenario offtracking on a model which permits offtracking right to the edge of shoulders, or to lane lines or centerline, is*

*not a responsible approach. Likewise, the allowance for encroachment into one, same-direction lane for intersections and ramp terminals is unacceptable.*

DOT Response: This comment calls for a standard higher than that used in practice today since many conventional tractor-semitrailer combinations cannot make turns at intersections without encroaching into adjacent lanes. To apply this higher standard for all traffic could result in significant costs to redesign and reconstruct interchanges and intersections. Assumptions simply reflect standard practice for vehicles in use today. Some jurisdictions might choose to apply higher standards to LCVs than to existing vehicles, but speculating what those standards would be and how widely they would be adopted was beyond the scope of this study.

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## Safety

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Most studies on the safety of larger and heavier trucks, and whether allowing increases in TS&W limits would degrade safety, have taken one of two approaches to address the question: crash data analyses

or comparative analyses of safety-related engineering performance characteristics of various truck configurations. Multiple factors contribute to truck crashes and isolating crash rates as a function of TS&W variables is difficult. There are, nevertheless, several key trends evident relative to truck safety, in general, and TS&W policy choices in particular. These trends are discussed in the study, however the analysis does not estimate crash rates for the LCVs analyzed in this study because those vehicles generally are larger and heavier than vehicles currently in use and because they are assumed to operate in much different environments than they currently operate in.

*Comment: Citing the crash history of LCVs based on the western States experience would be misleading since the highway system characteristics are high quality, relatively low traffic density roads and do not reflect the likely result in urban areas with high volumes of traffic.*

DOT Response: As noted above, the Department did not believe that the crash record of LCVs currently in use in the Western States and on Eastern turnpikes would be representative of LCV crash rates if vehicles were

operated at the weights and dimensions assumed in the LCV Nationwide Scenario and on the nationwide network of highways assumed in that scenario, some of which are very heavily traveled.

*Comment: The analysis fails to include important factors influencing truck crashes, such as truck maintenance and performance, effect of work zones and weather, driver performance and fatigue.*

DOT Response: While these factors certainly affect crash rates, there was no basis for estimating the extent to which the effect of the factors would be different than the effect of those factors on crash rates of trucks in use today. The assumption is that maintenance and performance would be at least as good under the LCVs Nationwide Scenario as it is today. Work zones certainly would have to be designed differently than they are today to accommodate longer vehicles, but if that were done, it is not clear that the work zones would be any more of a problem than they are today. While companies operating LCVs today may use their best drivers to operate LCVs, if there were many more LCVs in operation, it would be difficult to maintain the same

experience and skill levels as we have today. Uncertainties such as these are among the reasons the Department did not attempt to estimate specific crash rates for LCVs as they were assumed to be operated in this study.

*Comment: Applying accident history based on previous years does not accurately depict the “real world” today. There appears to be a need for further study on the effects of TS&W changes to safety.*

DOT Response: The report discusses the need for additional data and analysis of impacts of changes in TS&W limits on crash rates and other indicators of highway safety. However, there will always be some uncertainty about the relative safety of operating larger and heavier vehicles in environments in which they have not been allowed to operate before.

*Comment: Problems of overtaking LCVs on two-lane highways, passenger car instability caused by LCV wind turbulence on all types of highways, and intimidation factor caused by the sheer size of LCVs should be discussed, as well as lower acceleration increases the potential for traffic conflicts on grades, when*

*merging at freeway interchanges, and at many rail/highway grade crossing.*

DOT Response: These and related issues are discussed in Volume II.

*Comment: The decision-support capability goals of the study fails to be achieved without established crash rates for the vehicles analyzed, and an effort should be made to establish these. Additionally, DOT should fund an effort to collect the safety data necessary to produce reliable LCV crash rates for the types of highways these vehicles operate on routinely.*

DOT Response: The Department agrees that having crash rates for each of the different types of vehicles would be desirable, but as discussed above, reliable crash rates could not be estimated for LCVs operating at the weights and dimensions and on the nationwide network assumed in this study. The study does present new information on the relative stability and control properties of various vehicle configurations that are important considerations in any decisions to allow longer and heavier vehicles. The scenarios analyzed in this study do not make specific

assumptions about enforcement, permit systems, inspections, driver qualifications, or other regulatory measures that might be desirable in practice to promote the safe operation of larger and heavier vehicles. More detailed specifications of such safety regulations and how they would be enforced would allow safety implications of TS&W policy changes to be estimated with greater certainty. One comment expressed the opinion that in the “real world,” regulation cannot guarantee the safety of inherently more risky vehicle types -- the Department agrees that if everything else is equal, an inherently more risky vehicle can be expected to have higher crash rates than less risky vehicles. However, if regulations are adequately enforced the risks can be reduced and better quantified so that improved decisions can be made.

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## Traffic Operations

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Longer and heavier trucks generally disrupt traffic flow more than conventional trucks. The degree of disruption depends on the vehicle’s length, turning radius, offtracking, and ability to accelerate. Characteristics of the highway also affect the

impact of longer, heavier trucks on traffic flow. Impacts would be greater on heavily traveled highways with tight corners and curves, steep grades, and closely spaced interchanges, than on lightly traveled highways in flat terrain with good geometrics and few weaving and merging areas. Changes in delay, and associated costs or savings, resulting from changes in TS&W policies are projected for the five illustrative scenarios.

*Comment: The distribution of highways by percent grade taken from HPMS is not representative of conditions in particular States. Some States have a much higher percentage of highways with steep grades that could cause added problems for heavier trucks that cannot accelerate as well as conventional trucks.*

DOT Response: Analyzing highway characteristics on a State-by-State basis was beyond the scope of this study, and characteristics such as percent grade were not factors used in developing the illustrative networks analyzed in this study. An implicit assumption of the study is that if heavier vehicles were permitted under revised TS&W limits, those vehicles would be required to have engines powerful enough to

maintain some minimum level of performance on grades. If TS&W changes were implemented, such factors would be important considerations in designating routes where specific types of vehicles would be allowed to travel.

*Comment: The experience with LCVs has been in primarily rural areas, yet the network map for the LCV scenario includes extremely congested corridors, such as I-95. Extensive studies should be conducted in each urban area, such as the Baltimore-Washington area, before considering any changes. It may be helpful to compare congestion levels for areas with LCV experience to congested areas.*

DOT Response: As with highway geometry discussed above, States would have to evaluate congestion levels and other traffic characteristics in designating networks that would be available for particular types of vehicles. Where possible routes that go around rather than through congested metropolitan areas were selected for the illustrative networks for this study, but the assumption that a continuous nationwide network serving major markets would be available

for LCVs meant that some congested areas could not be avoided. These networks were purely illustrative and many more route-specific factors would have to be considered in practice in designating highways on which longer, heavier trucks could operate.

*Comment: The effects of starting and stopping heavy loads are magnified in urban areas and the study PCE appear understated. The PCE used in the study are drawn from the latest version of the TRB Highway Capacity Manual which has repeatedly underestimated the congestion effects of heavy trucks.*

*Understatement of this factor could significantly affect the results of the triples nationwide scenario of reduced congestion and delay costs.*

**DOT Response:** The study assumes that heavier trucks would have more powerful engines, which currently are available on the market, such that their weight-to-horsepower ratios would be no worse than those of conventional tractor-semitrailers. As discussed in Chapter IX, the trend in engine selection today is toward more powerful engines. This is an important assumption since PCE are

more sensitive to the weight-to-horsepower ratio than to the length of a truck. The study also assumes that a heavier truck would have more axles and that its braking ability would be no worse than vehicles in use today. The PCE used in this study were not from the TRB Highway Capacity Manual but were estimated using procedures that are now being used by a consultant who is revising the truck PCE portion of the Highway Capacity Manual. The Department believes that assumptions used in estimating PCE for different vehicle classes are based on both industry and State practices and that the PCE are not understated. Of course, under extreme conditions of grade or traffic congestion the average PCE used in this study would not apply, but it was not possible within the scope of this study to use different PCE values for each individual roadway section.

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## Energy and Environment

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The study scenarios were evaluated in terms of energy consumption, air quality, global warming, and noise emissions. The magnitude of each of the four areas is influenced by the extent of

truck travel (vehicle-miles-of-travel—VMT). Other significant variables include vehicle weight, speed, and truck operational parameters.

*Comment: The treatment of this highly complex area is so schematic that the discussion provided has almost no value. A long-term perspective is especially important to assessing the environmental impacts from pressure to build new highways and expand the current system to accommodate increased truck traffic, relocation of firms, changing shipping patterns, shifts in land use patterns and greater sprawl.*

**DOT Response:** The Department agrees that a long term perspective is essential and that planners and decision makers must consider environmental consequences of public and private decisions related to freight transportation. Many of the factors cited in this comment, however, are not directly related to TS&W policy changes and thus were not explicitly evaluated in this study.

*Comment: Given the extensive body of regulations covering emissions, mandated use of low sulfur fuels, CAR diesel in California, smoke testing*

*laws and regulations in several States, some correlation is being drawn on several fronts which contradicts the statement that little information exists.*

DOT Response: The Department worked closely with EPA in estimating the nationwide costs associated with highway-related air pollution for the 1997 *Federal Highway Cost Allocation Study*.

Nationwide models used by EPA include only a limited number of truck classes; all of the truck classes analyzed in this study are part of the same vehicle class in the EPA models. The Department will continue to work with EPA to develop relationships between truck transportation and air pollution costs. As new information is developed, it will be incorporated into future departmental TS&W studies.

*Comment: The conclusion that there is no increase in VMT in the HR 551 analysis is incorrect. Even if the status quo is maintained, the increases in freight volume will mean that there will be increases in VMT and energy consumption and degradation of air quality.*

DOT Response: All impacts estimated in this study are changes from the base case.

The base case forecasts include increases in truck VMT associated with growth in the economy. The TS&W changes in H.R. 551 are not estimated to have a significant impact on base case VMT, energy consumption, or air quality.

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## **Rail and Shipper Costs**

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The principal transportation modes for movement of intercity freight are motor carriers, railroads, barges, and pipelines. The bulk of intercity freight is transported by motor carriers and railroads, in both tonnage and revenue. Railroads transport more bulk traffic than trucks and compete with trucks for certain commodities and intermodal traffic. Changes in TS&W limits could have financial effects on the railroad industry and selected railroads resulting from changes to shipper choices in mode of transportation for goods. Shippers strive to minimize costs related to transportation and inventory. A change in TS&W regulations may directly alter a shipper's logistics costs associated with transportation and inventory.

*Comment: There is a pro-rail bias in the study methodology which assumes*

*rail productivity improvements are static. During the past decade there have been great improvements in rail productivity while truck productivity has been restrained. The study should also include a chapter on the effects of rail practices on truck operations to balance the discussion.*

DOT Response: Chapter XI on rail impacts discusses the issue of rail productivity improvements and the fact that many rail analysts expect that significant future productivity improvements will require large infusions of additional capital. While some of those capital investments to improve productivity certainly can be expected, the nature and magnitude of future railroad productivity increases would be highly speculative. Except for changes in allowable vehicle weights and dimensions, no other productivity enhancements are estimated for the trucking industry either. While the analysis does not provide for railroads to improve productivity to respond to increased competition from changes in TS&W limits, it does assume railroad would lower prices all the way to variable cost if necessary to retain traffic. In practice they could not be expected to keep prices that

low in the long run. This study is not intended to be a comprehensive assessment of truck-rail competition in the future, but rather is intended to show the full range of potential impacts of changes in Federal TS&W limits, including potential impacts on the railroads.

*Comment: Four recent rail mergers might affect the outcome of the analysis and should be taken into account.*

DOT Response: There is a discussion of the recent rail mergers in Chapter XI on rail impacts, and an explanation of why results of those mergers could not be considered explicitly in this study. As more information becomes available on long run effects of those mergers on costs and railroad efficiency, those factors can be considered in future departmental TS&W

studies.

*Comment: The shipper model assumes the only consideration for decision making is transportation cost. The true behavior of shippers has not been captured in the study. The time factor may be more important to shippers, depending on the commodity. Highly efficient manufacturing and distribution functions depend on close integration of all the elements of the supply chain, including transportation. Timely pickups and deliveries are important to efficiency in manufacturing and distribution. More discussion on shipper concerns should be included in the study to be commensurate with the importance of trucking productivity gains benefitting shippers and the*

*national economy.*

DOT Response: The TIC model does consider factors other than simple transportation cost. Time enters into the analysis in virtually every stage of movements from pickup and delivery to transfer times at intermodal terminals to average times for LCVs to assemble and disassemble at staging areas. Logistics considerations certainly would be important in decisions regarding whether to shift from conventional tractor-semitrailers to LCVs because of the additional time required to assemble and disassemble LCVs at both ends of the trip. The outreach process for this study included discussions with many different types of shippers which are documented in working papers developed for this study.

**List of Commenters**

<b>State</b>	<b>Industry &amp; Industry Associations</b>
Connecticut DOT Florida DOT Georgia DOT Idaho DOT Illinois DOT Indiana DOT Iowa DOT Maine DOT Maryland DOT Michigan DOT Minnesota DOT Mississippi DOT Montana Lt. Governor Montana DOT Nevada DOT New Jersey DOT New York DOT Texas DOT Vermont DOT Wisconsin DOT	Association of American Railroads American Trucking Associations Distribution and LAL Carriers Association Mississippi Trucking Association Motor Freight Carriers Association Norfolk Southern Corporation National Automobile Transporters Association National Industrial Transportation League National Small Shipments Traffic Conference, Inc. Owner-Operator Independent Drivers Association, Inc. Railway Association of Canada Transystems
	<b>Other Interested Parties</b>
	Advocates for Highway and Auto Safety Coalition Against Bigger Trucks Insurance Institute for Highway Safety Western Highway Institute
<b>Academia</b>	<b>Private Citizens</b>
Montana State University	George Herndon Peter Samuel