CHAPTER 1

BACKGROUND AND OVERVIEW

INTRODUCTION

Historically, Truck Size and Weight (TS&W) laws have been driven by concerns for national uniformity and good highway system stewardship. Over time, new pavement and bridge design standards have been adopted by the States to better match the weights and dimensions of vehicles permitted to operate on their highways. However, the potential of premature degradation of the infrastructure with its attendant strain on public resources continues to be a major concern. Further, technology and marketplace demand have contributed to the pressure for larger and heavier trucks, raising concerns about highway safety as well as diversion of rail freight to trucks. Underlying this concern is the role of the Federal Government in the private sector economy. To the extent that government subsidizes any mode of transport, this will result in a misallocation of resources as users over-consume under-priced facilities.

Clearly, questions related to determining appropriate TS&W limits are difficult to resolve. The issues involve differing views of State and Federal authorities, competing economic interests, and uncertainty as to the operational safety of various types of trucks. Shippers and carriers understandably want to improve the efficiency of their operations, while public agencies and interest groups are also concerned about highway safety and preserving highway infrastructure and the environment. The TS&W policy affects not only highway safety and stewardship, but also local, State, and national economic performance.

It has been 16 years since the Department's last comprehensive study of TS&W limits. In recent years, the Transportation Research Board (TRB) and General Accounting Office (GAO) have conducted studies looking at various proposals, including the potential impacts of "longer combination vehicles" (LCVs) which are combination vehicles with two or more trailing units that have gross weights of more than 80,000 pounds. While LVCs have received considerable attention in recent years, of perhaps greater consequence are policy issues affecting conventional single unit trucks and tractor-trailer combinations that operate much more widely than LCVs. These issues include changes to the bridge formula, axle load limits, gross vehicle weight limits (GVWs), and trailer lengths.

Overall, this effort is intended to provide a fact-based framework within which alternative policy actions may be addressed. The outcome will assist decision makers in determining what legislative action, if any, may be indicated. The analytical framework and policy architecture are designed as a structure for gathering and evaluating information related to the potential impacts of alternative truck size and weight options. With periodic updates in data or methodologies, this framework will ensure that the Department can respond to significant TS&W proposals without embarking on a separate, new Study for each proposal.

This Study represents a cooperative effort among the Office of the Secretary of Transportation, Federal Highway Administration (FHWA) as staff, and other Department modal administrations with freight responsibilities. A companion document, the 1997 Federal Highway Cost Allocation (HCA) Study, was transmitted to Congress in August 1997. Taken together, this material will provide the policy and factual framework for congressional deliberations regarding Federal TS&W limits and associated Federal user fees.

PURPOSE

The objectives of the Comprehensive Truck Size and Weight (CTS&W) Study are to: (1) identify the range of issues impacting TS&W considerations; (2) assess current characteristics of the transportation of various commodities including modes used, the predominant types of vehicles used, the length of hauls, payloads, regional differences in transportation characteristics, and other factors that affect the sensitivity of different market segments of the freight transportation industry to changes in TS&W limits; and (3) evaluate the full range of impacts associated with alternative configurations having different sizes and weights.

The analytical tools developed under the Study umbrella can be used to: (1) estimate the effects of various TS&W policy options upon the transport system; (2) evaluate the system's capacity to respond in the global economy; (3) evaluate the capabilities and opportunities created by new vehicles, new technology, and distribution systems for transport logistics; (4) estimate the diverse impacts on rail and truck shippers, carriers, consumers, and the traveling public; and (5) evaluate safety impacts.

The TS&W analysis considers the safety and efficiency of the total transportation system from the point of view of both the public and private sectors. Specifically, the Study addresses:

- Safety of truck operations, including the enforceability of safety regulations across North America;

- Infrastructure impacts (pavements, bridges, and geometric design) and how the costs of these impacts are recovered;

- Effects on productivity and efficiency for shippers and carriers;

- Federal and State roles in regulating traffic and equipment, as well as interstate and international commerce;
- Differences in transportation requirements across regions and commodities;
- Consistency with trends in overall domestic and international freight transportation;
- Impacts on freight shippers, other modes and intermodal movements;
- Equity among user fees for various classes of users;
- Environmental and other social costs;
- Effects on efficiency of automobile travel; and
- Net productivity and efficiency for combined rail and truck freight shipments.

APPROACH

This CTS&W Study was developed along four distinct tracks. The first focused on producing background studies to identify current issues and trends related to freight markets and motor carrier vehicle impacts. The second track involved the development of databases describing truck weights, body types, commodities and truck flows. The third major component of this effort will be the development and/or refinement of tools and models designed to analyze a broad range of impacts associated with truck configurations of different sizes and weights. Finally, the fourth track will bring together the products resulting from the earlier work to evaluate alternative illustrative TS&W policy scenarios.

IMPACT AREAS ASSESSED

Nine impact areas were included in the analysis: (1) safety; (2) infrastructure; (3) traffic operations; (4) environment; (5) energy; (6) modal considerations; (7) economic performance; (8) compliance and enforcement; and (9) intergovernmental issues. These areas of interest were identified through the extensive literature review conducted during the first phase (Track 1) of this Study. The impact measures for each area were identified and grouped into one or more of three categories, qualitative, quantitative, or cost and are summarized in Table I-1. The impact models and the analysis results, are described in Volume III of this CTS&W Study.

TABLE I-1
STUDY EVALUATION AND IMPACT MEASURES

Impact Area	General Discussion of Impact Area Issues	Impacts	Impact Measures		
			Qualitative (Technical Discussion)	Quantitative	Cost
Safety	Accident Causation Accident Severity Vehicle Performance Rollover Transient Offtracking Braking Speed Limit Changes Driver Fatigue Public Perception -- Outreach Meetings, Focus Group Results, Docket Comments and Polls	Accidents: Fatal Personal Injury Property Damage Only Vehicle Stability and Control		Number of Accidents: Fatal Personal Injury Property Damage Only Engineering Performance Index	Change in Accident Costs
Infrastructure	Bridge Stress Bridge Fatigue Load Equivalency Steady-State Offtracking Cost Recovery	Bridges Pavement Interchanges Intersections Grades		Bridge Overstress Bridge Fatigue Load Equivalency Factors Interchange and Intersection Improvement Needs	Bridge Costs Pavement Costs Costs of Geometric Improvements
Traffic Operations	Effects of TS&W Factors on Traffic Operations Public Perception	Congestion Passing Speed Maintenance	Passing Speed Maintenance	Passenger Car Equivalents	Congestion Costs
Environment	Air Quality Noise and Vibration Effects	Air Quality Noise	Noise Effects and Exposure	Pollutant Emission Burden	Air Pollution Costs Noise Costs
Energy	Modal Use Rates Truck Use Rates	Energy Use		Change in Truck Fuel Consumption	(In Operating Costs)
Modal Considerations	Shipper Needs Freight Diversion Modal Equity -- "Level Playing Field"	Effects on Rail and Waterborne Modes Amount of Truck Travel	Effects on Waterborne Mode	Changes in Payload Ton-Miles or Truck and Rail Change in Truck VMT	Future Rail Revenue
Economy	Changes in Production and Distribution Patterns International Trade Resource Markets Market Areas Container Transportation	Truck Operating Costs Per Unit of Payload Logistics Costs Production Costs Truck and Rail Total Cost Trade Facilitation		Truck VMT by Body Type, Configuration, and Length of Haul Rail Payload Ton-Miles by Car Type Container Use	Truck Operating Costs for Short Haul Total Logistics Costs for Long Haul Total Truck and Rail Logistics Costs
Compliance and Enforcement	Permit Use Administrative Burden Resource Needs	State Administration and Enforcement Requirements	Institutional Issues and Barriers	Permit Issuance Needs Vehicle Inspections Needs File Audit Needs	State Administrative and Enforcement Costs
Intergovernmental Issues	Federal and State Roles Federal-State Relationship Uniformity State Flexibility Grandfather Rights				

BUILDING BLOCKS: CONFIGURATION, SYSTEM AND GEOGRAPHY

Technical building blocks analyzing a broad range of truck configurations at varying GVWs provide the foundation for the analytical framework. These configurations include 3- and 4-axle single unit trucks, 5- and 7-axle truck trailers, 5- and 6-axle semitrailers, 28-foot doubles, intermediate length (31-foot to 33-foot) doubles, and LCVs. They are illustrated in Figure I-1.

An evaluation of each configuration will be conducted in relation to various highway system(s) -- the Eisenhower National System of Interstate and Defense Highways (Interstate System), National Network (NN) for trucks, National Highway System (NHS), and a limited system of highways tailored for the operation of LCVs on which these configurations now operate or might be proposed to operate.

Operations of each configuration also are to be examined in relation to major geographic considerations for that configuration -- national, regional, and State. In addition, configurations are analyzed at operating weights which vary according to different assumptions about axle weight and bridge formula restrictions. These analytical building blocks are represented in Table I-2 below:

TABLE I-2
ANALYTICAL BUILDING BLOCKS BY CONFIGURATION, SYSTEM, AND GEOGRAPHY

Configuration	Max. GVW range (000 pounds)	Highway System				Geography		
		Interstate Restricted*	NN	NHS	Restricted	National	Regional	State
Single Unit Truck	54-68	X	X	X	.....	.....	X	X
Semitrailer	80-97	X	X	X	.....	X	X	X
Double 28 - 28.5 feet Trailers	80-111	X	X	X	.....	X	X	X
Intermediate Length Double (31 - 33 feet)	105.5-128	X	.....	X	.....	X	X	.....
LCVs	105.5-148	.....	.....	.....	X	X	X	.....

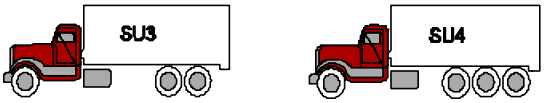
*****Highways on which LCVs currently operate or might be proposed to operate.

ILLUSTRATIVE SCENARIO OPTIONS

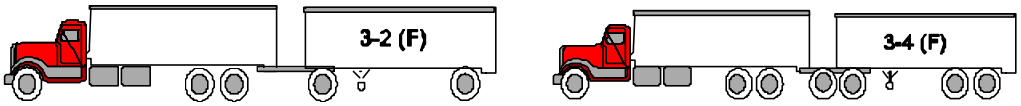
Evaluation of possible regulations pertaining to a variety of configurations, such as elimination of grandfather provisions, freezing weight limits on the NHS, limiting trailer and semitrailer lengths to 53 feet, and lifting the LCV freeze are also examined. The inclusion of a configuration at a GVW limit or on a certain network does not imply a predisposition of the Department of Transportation (DOT) toward its adoption.

FIGURE I-1
BUILDING BLOCK VEHICLES

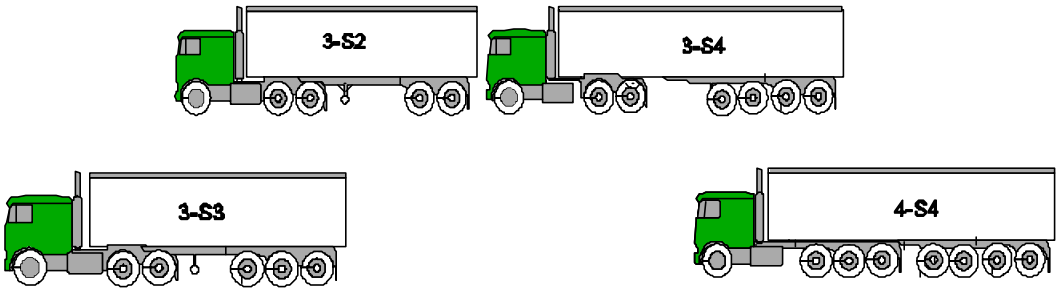
Single Unit Trucks



Truck-Trailer Combinations



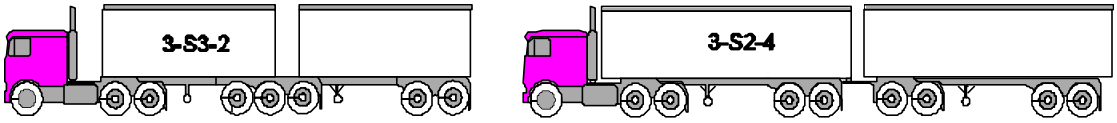
Truck-Semitrailer Combinations



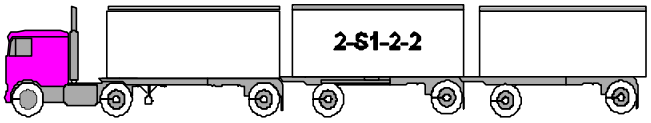
STAA Double-Trailer Combination

Longer Combination Vehicles (LCVs)

Double Trailer Combinations



Triple-Trailer Combinations



In an effort to conduct a thorough and comprehensive study, a wide range of options will be evaluated to (1) test the analytical tools and (2) provide an assessment of the full range of alternative TS&W impacts. The scenarios selected for full analysis are intended to establish representative benchmarks delineating the range of potential impacts.

GUIDING PRINCIPLES, OVERSIGHT AND OUTREACH

GUIDING PRINCIPLES

NATIONAL FREIGHT TRANSPORTATION POLICY STATEMENT

On January 6, 1997, the Office of the Secretary of Transportation published a statement of National Freight Transportation Policy. The statement "establishes the most important principles that will guide Federal decisions affecting freight transportation across all modes. The aim . . . is to direct decisions to improve the Nation's freight transportation systems to serve its citizens better by supporting economic growth, enhancing international competitiveness and ensuring the system's continued safety, efficiency and reliability while protecting the environment."[1] The policy establishes eight principles to guide freight transportation policy development:

- *Provide funding and a planning framework* that establishes priorities for allocation of Federal resources to cost-effective infrastructure investments that support broad national goals;

- *Promote economic growth* by removing unwise or unnecessary regulation and through the efficient pricing of publicly financed transportation infrastructure;

- *Ensure a safe transportation system*;

- *Protect the environment and conserve energy;*

- *Use advances in transportation technology* to promote transportation efficiency and safety;

- *Effectively meet our defense and emergency transportation requirements*;

- *Facilitate international trade and commerce*; and

- *Promote effective and equitable joint utilization* of transportation infrastructure for freight and passenger service.

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[1] "National Freight Transportation Policy," Office of the Secretary of Transportation, Federal Register, Volume 62, Number 3, January 6, 1997, pp. 785-790.

These eight principles provide the framework for evaluation of the various scenarios under review in this Study.

COORDINATION WITH THE HIGHWAY COST ALLOCATION STUDY

The first Federal HCA Study since 1982 was undertaken in 1995 for two key reasons: (1) to determine how changes in the Federal highway program, including user fees which support the program, have affected the equity of Federal highway user fees; and (2) to provide complementary information to the CTS&W Study. These two studies, when taken together, will provide information on how alternative TS&W limits might affect highway infrastructure and social costs and what impact those changes would have on assignment of cost responsibilities and user fees to different truck configurations.

OVERSIGHT

INTERNAL DEPARTMENTAL: POLICY OVERSIGHT GROUP

In June 1995, the Secretary of Transportation established a Policy Oversight Group (POG) chaired by the Assistant Secretary for Transportation Policy to provide overall policy direction, ensure that major decisions guiding the CTS&W Study would be made on an intermodal basis and assist the FHWA team effort by providing guidance and early review of draft documents associated with the final Study document.

The POG also provided policy guidance for the HCA Study. The group included policy-level representatives from the Office of the Secretary of Transportation, FHWA, Federal Railroad Administration (FRA), National Highway Traffic Safety Administration (NHTSA), Maritime Administration (MARAD), and Bureau of Transportation Statistics (BTS).

PUBLIC OUTREACH

Underlying this CTS&W Study has been an extensive outreach effort. Outreach activities included: (1) a Federal Register[2] Notice requesting public comment; (2) public meetings; (3) regional focus sessions aimed at reaching out to major constituencies and experts; and (4) special teleconference sessions with our partners at the State-level in addressing their issues of importance.

Federal Register Notice

A February 1995 Federal Register Notice (Docket 95-5) requested comments on 23 questions concerning truck size and weight limits and on 13 working papers produced in the initial phase of the Study. The comments submitted to the docket addressed one or more of the following areas:

[2] Federal Register, February 2, 1995, Docket Number 95-5.

- Safety (enforcement, driver fatigue and overall issues);
- Infrastructure damage;
- Truck productivity;
- Modal diversion;
- Study plan;
- Changes in TS&W limits (particularly the LCV freeze);
- Performance based standards;
- Federal versus State roles;
- Enforcement; and
- Cost responsibility.

Respondents to the docket may be grouped into the following categories: (1) State government agencies; (2) local government agencies; (3) industry associations; (4) public interest groups; (5) shippers; (6) motor carriers; (7) other organizations; and (8) private citizens. Table I-3 shows the number of comments received by respondent category.

TABLE I-3
RESPONSE TO FEDERAL REGISTER NOTICE

Respondent Category	Number of Responses
State Government Agency	29
Local Government Agency	5
Industry Associations	32
Lobbying Groups	5
Shippers	3
Motor Carriers	26
Other Organizations	10
Private Citizens	13,042
TOTAL	13,152

Of the comments received, a selection of 10 are summarized in Table I-4. Respondents represented in Table I-4 include: (1) California Department of Transportation (CALTRANS); (2) American Association of Railroads (AAR); (3) Policy Services, Inc.; (4) American Automobile Association (AAA); (5) United Parcel Service (UPS); (6) a petition signed by 45 private citizens; (7) National Private Truck Council (NPTC); (8) Citizens for Reliable and Safe Highways (CRASH); (9) Advocates for Highway and Auto Safety; and (10) Regular Common Carrier Conference (RCCC).

Public Meetings

Public meetings were held in Denver, Colorado; and Washington, D.C. They were attended by representatives of large and small carriers, trucking industry associations, safety advocates, and representatives from State and local governments. Testimony of the carriers focused primarily on the operation of LCVs and individual company operations and safety history. The carriers testified that the operation of Rocky Mountain Doubles (RMDs), twin 28-foot trailers, and triple trailers had not resulted in a deterioration of safety. The carriers generally supported restricted operation of LCVs and lifting of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) freeze.

The safety advocates, represented by CRASH, argued that continuation of the LCV freeze was necessary based on their experience that longer and heavier trucks are inherently more dangerous, irrespective of accident history. Further, they believe that trucks designed to carry heavier loads are more dangerous when they travel empty because of the potential for jackknifing.[3]

Regional Focus Sessions

Regional focus sessions were held in April and May 1996 in four locations (Detroit, Michigan; Salt Lake City, Utah; Houston, Texas; and Philadelphia, Pennsylvania) and were intended to (1) provide information on how the Study was being conducted, (2) obtain input from private citizens and interest groups, and (3) develop an improved understanding of special or regional concerns.

Each of the sessions resulted in a list of issues or concerns that the participants believed should be addressed prior to any consideration of TS&W policy changes. Two significant points of concern were: (1) safety and safety enforcement to attain "complete compliance," with no particular concern for TS&W enforcement; and (2) regional differences on proper Federal/State roles ranging from advocating States' rights to supporting a strong Federal role which would enhance safety compliance by the States and prevent the States from liberally interpreting any future changes to Federal vehicle requirements.

[3] Excerpted from testimony of Mr. Jack Rendler, CRASH, presented at Public Meeting on the CTS&W Study at Lakewood, Colorado, March 21, 1995.

TABLE I-4
SUMMARY OF DOCKET COMMENTS

ISSUE AREA	PRO RESPONDENTS	CON RESPONDENTS
TS&W Study Plan	Pro respondents feel study is needed and should focus on facts rather than emotionally or politically-based appeals.	The study is biased towards increases in TS&W limits, ignores safety concerns, underestimates rail diversion, lacks sufficient data and modeling capabilities, too narrow in scope and should be expanded to include other important issues.
Safety: Enforcement	Not addressed by any of the ten	Advocates maintain increasing TS&W limits will aggravate problem of enforcement of driver violation of hours of service, falsifying log books, overweight trucks, increasing number of State issued permits for weight.
Safety: General	Pro respondents point out that trucking industry has made large improvements in safety over last decade and potential for further improvements with improved vehicle and driver standards.	Note that heavier trucks are inherently more dangerous, improvements in truck designs might be lost after placed in operation and larger trucks are more dangerous under congested driving conditions. Also note, even if trucks are made safe, the general public fears trucks and these fears can lead to safety risks. Increasing TS&W limits will aggravate safety concerns.
Safety: Driver Fatigue	Not addressed by any of the ten	Advocates raise concern over potential increase in driver hours of service and falsifying log books, will increase risk of accidents, problems exist now and will increase the risk of and damage levels from accidents with bigger trucks.
Cost Responsibility	RCCC states that permit programs should allow heavier vehicles if appropriate fee structures are put in place. Not addressed by other nine.	Noted that under current user charge structures, heavy trucks pay less in user fees than the total costs that they create, permits do not capture the full cost of heavy truck travel.
Truck Productivity	Pro respondents indicate increased TS&W limits would lead to reduced operating costs and improved truck productivity.	Agreed that increased TS&W limits would increase truck productivity but would occur only because trucks do not pay their fair share of highway use and are outweighed by the societal costs imposed by truck travel. Improved truck productivity would severely impact railroads.
Infrastructure Damage	Argue that productivity improvements can be made that are not damaging to infrastructure and numerous techniques available to strengthen infrastructure to sustain increased TS&W limits.	Increased TS&W limits will damage infrastructure, current user fees will not collect sufficient revenue to rebuild infrastructure.
Modal Diversion	RCCC stated transportation providers and consumers should determine future use of transportation systems, not Federal rules governing TS&W, should not seek to protect or enhance railroad profits by TS&W restrictions.	AAR commented on impact to railroad industry if TS&W limits change, elimination of freeze would not reduce VMT, diversion from rail offset any anticipated reduction in truck VMT, trucks pay far less than costs they impose and can reduce rates to divert freight from railroads, would cause serious traffic and revenue loss to railroads, would be devastating since large proportion of rail traffic is potentially truck competitive, existing rail diversion models are flawed.
Elimination of LCV Freeze	Favor elimination because of substantial savings to consumers from reduced transportation costs, have a proven safety record in Western States, some restrictions on operations are needed and should be set at the State level.	Support continuing LCV freeze, citing a variety of safety concerns and lack of adequate safety research on LCVs, and heavy trucks do not pay their full cost responsibility.
Performance-Based Standards	Will allow flexibility in equipment design while minimizing the impact on the infrastructure and would reduce the need for permitting.	Performance-based standards are a validation of current practices by setting standards sufficiently low, using ideal vehicles in development of standards and unknown effects of wear and maintenance leave large gap in determining real performance-based standards and no one knows how to implement and enforce these types of standards.

Source: Comments to the Docket from (1) CALTRANS, (2) AAR, (3) Policy Services Inc., (4) AAA, (5) UPS, (6) A petition signed by 45 private citizens, (7) NPTC, (8) CRASH, (9) Advocates for Highway and Auto Safety and (10) RCCC

CONTEXT

THE TRANSPORTATION ENVIRONMENT

The U.S. freight transportation industry has experienced enormous changes in the last few decades. In the late 1970s, Congress reevaluated the body of transportation regulation that had been developed since the Interstate Commerce Commission (ICC) was created in 1887. Congress acknowledged that there were vast inefficiencies, caused by both rate and entry-exit regulation. The belief was that the Nation's transportation system could perform better with less regulation and more competition. Numerous pieces of Federal legislation -- including the Motor Carrier Act of 1980, Staggers Rail Act of 1980, Surface Transportation Assistance Act (STAA) of 1982, ISTEA, Trucking Industry Regulatory Reform Act of 1994. Title VI of the Federal Aviation Administration Authorization Act of 1994, and finally, the ICC Termination Act of 1995 -- played major roles in the deregulation of the surface freight industry.

Freight transportation has become more complex since deregulation and the evolution toward a global marketplace. The complexity of TS&W issues has also increased, especially with the advent of integrated, multi-modal transportation, increased international container movements, and the enactment of the North American Free Trade Agreement (NAFTA). Evolving logistics requirements are changing the way that many goods are transported. Speed and reliability are becoming increasingly important to the business community replacing the traditional emphasis on moving the largest volumes at the absolute lowest rates.

The highway environment also has changed significantly over the last few decades. Congestion in major metropolitan areas has increased dramatically. Concerns about highway safety have grown as trucks have gotten bigger and automobiles smaller. Vocal opposition to further increases in TS&W limits has arisen, not just from safety interest groups, but from large segments of the general public. Accidents involving trucks on congested urban Interstate highways often result in large traffic jams and receive significant media attention, especially when hazardous materials are spilled.

A number of relatively recent legislative developments are important considerations in TS&W discussions. First, the 1991 passage of the ISTEA established a NHS. This network includes all Interstate routes and major connecting principal arterials. It was established to focus Federal resources on the roads that are most critical to interstate travel and national defense; that connect with other modes of transportation; and that are essential for international commerce. The ISTEA also included a freeze on expansion of LCV operations beyond those allowed when ISTEA was passed.

Second, the signings of the NAFTA with Canada and Mexico in 1993 and the General Agreement on Tariffs and Trade (GATT) in 1995, have increased truck traffic related to the

movement of international freight for export and import. The increase in international traffic underlies continued efforts at harmonization of TS&W limits between trading partners, particularly in North America. Also, increased movement of containerized cargo stemming from international transportation creates impacts for the U.S. highway system.

In summary, there have been many changes in the factors interrelated with TS&W laws over the past 20 years. These include growth in freight traffic, changes in freight characteristics and origin-destination patterns, global economics and trade, containerization of freight and intermodalism, economic deregulation, enhanced motor carrier safety programs, and improvements to truck equipment.

These developments suggest important new policy questions concerning Federal TS&W laws. For example, how should Federal TS&W provisions relate to the NHS; and how should harmonization goals for NAFTA be approached? Figure I-2 portrays the environment within which this Study was conducted and highlights the issues that influence and/or impact changes to the Nation's TS&W limits.

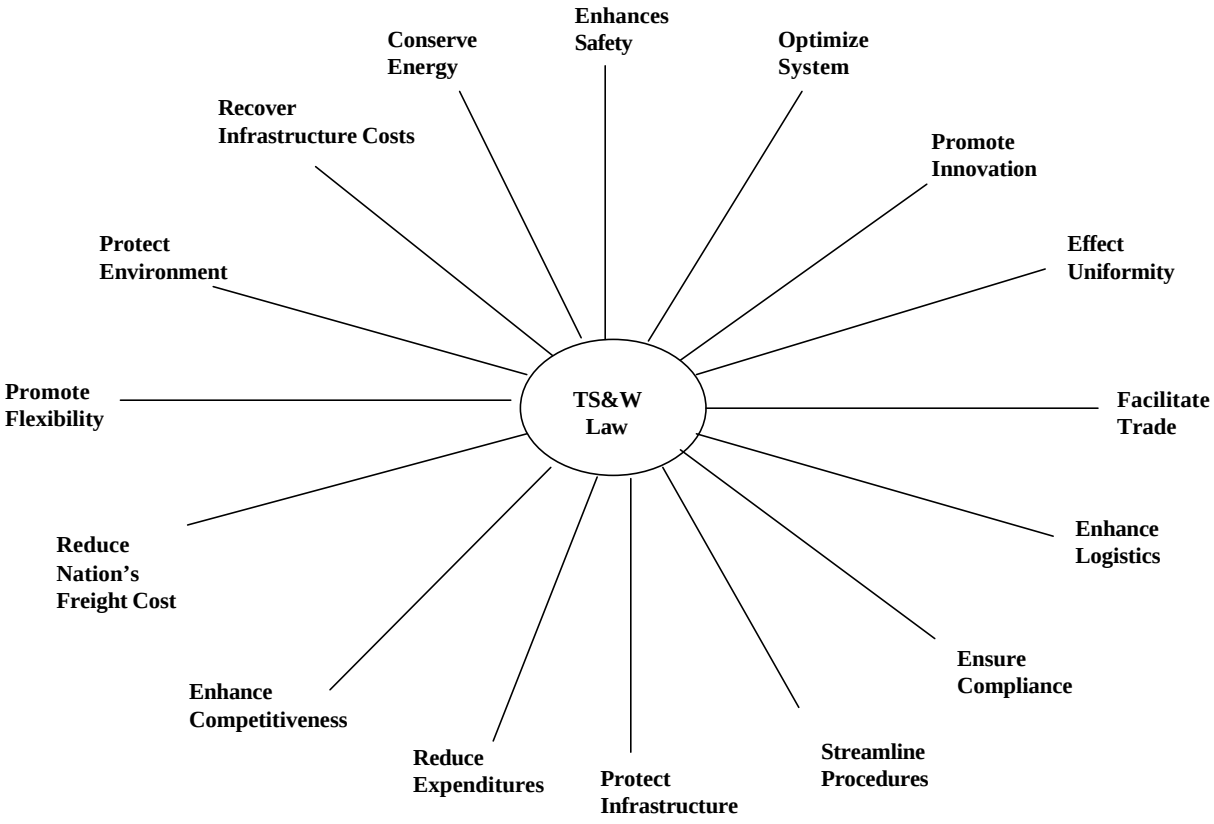
CURRENT FEDERAL TS&W REGULATIONS

Federal law now regulates TS&W limits by specifying basic standards and excepting certain situations from those standards by grandfather right and provision for special permits. Federal laws governing truck weights apply to the Interstate System while Federal laws governing vehicle size apply to a legislated NN which includes the Interstate System. The NN was designated under the authority of the same 1982 Act[4] that established the size limits. Current U.S. Federal TS&W law establishes the following limits:

- 20,000 pounds for single axles on the Interstate;
- 34,000 pounds for tandem axes axles on the Interstate;
- Application of Bridge Formula B for other axle groups, up to the maximum of 80,000 pounds for GVW on the Interstate;
- 102 inches for vehicle width on the NN;
- 48 foot (minimum) for semitrailers in a semitrailer combination on the NN; and
- 28 foot (minimum) for trailers in a twin-trailer combination on the NN.

[4] STAA of 1982.

FIGURE I-2
FORCES AFFECTING FEDERAL TS&W LAW



Underlying Federal regulation of TS&W are a myriad of State and local regulations. The sizes and weights of vehicles have been regulated by State and local law since the early part of this century. Over the years, these regulations have been changed many times in response to needs and circumstances. Change continues -- often without Federal involvement or influence. The importance of State TS&W regulations cannot be over-stated since they govern trucking on the vast majority of U.S. roads.

Broadly speaking: (1) many State provisions differ from Federal provisions, (2) there are many regulatory differences among the States, and (3) these differences are increasing over time. These disparities exist because of differences in local and/or regional political choices that have been made balancing economic activities; freight movements; infrastructure design characteristics and status; traffic densities; mode options; engineering philosophies. Table I-5 provides an overview of the areas where either Federal or State laws specify limits.

TABLE I-5
TS&W LIMITS SPECIFIED IN LAW

AREA	FEDERAL LAW	STATE LAW
Vehicle Weight Limits		
Tire Related		
Number of Tires	**No**	**Some**
Tire Load Limit	**No**	**Some**
Load Distribution Between Tires	**No**	**No**
Axle Related		
Load Limits by Axle Type	**Yes**	**All**
Load Distribution between Axles in a Group	**No**	**Some**
Suspensions	**No**	**No**
Lift Axles	**No**	**No**
GVW		
Bridge Formula	**Yes**	**All**
Cap	**Yes**	**All**
Vehicle Dimension Limits		
Height	**No**	**All**
Width	**Yes**	**All**
Length		
Single Unit	**No**	**All**
Semitrailer	**Yes**	**All**
Trailer	**Yes**	**All**
Combination	**Yes**	**Some**
Vehicle Specifications		
Configuration	**No**	**Some**
Body Type	**No**	**No**
Equipment Specifications		
Safety-Related		
Hitching	**Yes**	**No**
Weight Distribution	**No**	**Some**
Power/weight	**No**	**Some**
Off-Tracking-Related		
Kingpin	**No**	**Many**
Hitching	**No**	**No**

WEIGHT

Federal Law

The Federal Government first became involved in TS&W regulation in the 1950's when truck axle and vehicle gross weight and width limits were established for the Interstate system. The Federal-Aid Highway Act of 1956 placed limits on the weight of vehicles operating on the Interstate System to protect the substantial Federal investment in its construction. The limits were 18,000 pounds for single axles, and 32,000 pounds for tandem axles. The allowable gross weight of each vehicle was determined as the sum of the allowable axle weights, up to a maximum allowable GVW of 73,280 pounds.

In 1975, weight limits were raised and "Bridge Formula B" was imposed to insure that the vehicle load was distributed so as to avoid excessive overstressing of bridges. The Federal-Aid Highway Amendments of 1974 increased the allowable maximums on the Interstate System to 20,000 pounds for single axles, 34,000 pounds for tandem axles, and 80,000 pounds for the gross weight. This legislation also requires vehicles to comply with the Federal bridge formula (FBF), which limits weights allowed on groups of axles at different spacings, whereas, groupings of 2- or more axles (except tandems) and the distances between them are checked against the weight allowed by this formula.

State Laws and Grandfather Rights

The Federal-Aid Highway Act of 1956 also contained a provision that allowed States to retain vehicle weight limits exceeding the Federal limits if the State's weight laws or regulations were in effect in 1956. Some States have elected to retain these higher weight limits because of the transportation savings they afford to industries important to their economies.

There are 14 States in which vehicles on Interstate highways can exceed the Federal axle weight limits or gross weight limits without special permits. At least 30 States permit exceptions to the Interstate System axle load limits or gross weight limits for divisible loads. Such special permits are an exercise of grandfathered permit rights. Special permits sometimes stipulate specific routes, equipment components, driver qualifications, and operating restrictions as conditions for vehicle operations.

The regional characteristics of trucking operations are determined, to a large extent, by the existence of grandfather rights. In the western States, LCVs with multiple trailer units operate at high gross weights while meeting Federal axle load and bridge formula requirements. In many Eastern States, heavy trucks with short wheelbases such as concrete mixers and dump trucks operate below the 80,000 pound limit, but with axle loads that exceed the Federal axle load and bridge formula limits. These vehicles are of particular concern since they can cause relatively more pavement and bridge damage than differently configured vehicles traveling at comparable GVWs.

SIZE

Federal Law

In the STAA of 1982, Congress extended the Federal interest to length issues and to highways beyond the Interstate System by requiring all States to permit the operation of 48-foot long semitrailers and twin-trailer combinations with trailing units up to 28 feet long (commonly

referred to as "STAA Doubles"[5]) on the Interstate System and on other non-Interstate, Federal-aid, primary system highways to be designated by the Secretary of Transportation.
Just before passage of the STAA of 1982, length laws in 14 Eastern States from Maine to Florida prohibited operation of 48-foot long semitrailers. The STAA doubles had operated in States west of the Mississippi River for many years, but were not permitted on any roads in 12 States before the STAA of 1982 was enacted. Also, in 1982, minimum length dimensions were enacted for semitrailers. The width limit was increased from 96 inches to 102 inches.

State Laws and Grandfather Rights

As noted above 14 Western States have grandfathered permit authority created by ISTEA and therefore may operate vehicles weighing more than 80,000 pounds on their Interstate highways. In addition, six other States allow limited LCV operations on certain turnpikes. The ISTEA legislation included a freeze limiting LCV routes to those in existence as of June 1991.

Overall Length Limit

The STAA of 1982 prohibited States from setting limits on the overall length of single- and twin-trailers combination vehicles on Interstates and other designated primary highways. However, several States have overall length limits on lower class roads. The reason States were prohibited from limiting the overall length of these combinations was due to safety concerns. To meet such limits, some equipment manufacturers were reducing the size of cabs so that trailer length (and thus cubic capacity) could be increased. When limits on the overall length of combinations on some highways were prohibited, many States instituted limits on the length of cargo-carrying trailers.

Kingpin to Rear Axle Distance

Several States regulate kingpin setting[6] to rear axle distances for combinations, as a means for controlling vehicle off-tracking. The exact definitions of these limits vary: some measure the distance from the kingpin to the center of the rearmost axle, while others measure the distance from the kingpin to the center of the rear tandem.

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[5] Also referred to as "Western Doubles."

[6] Kingpin setting refers to the truck-tractor fifth wheel connection point for the kingpin which is located to the front of the semitrailer.

ORGANIZATION OF VOLUME II: BACKGROUND AND ISSUES

Volume II, Background and Issues, is organized into seven chapters, including this introductory chapter. Brief descriptions of the remaining chapters follow.

TS&W REGULATIONS

Chapter 2 provides a historical perspective of TS&W regulation in the United States during two time periods, pre- and post-1956. An overview of Federal and State regulation for each period is provided, describing roles and responsibilities at each level of government. Landmark Federal legislation in the post-1956 period is discussed and important highlights noted. Current TS&W laws, at both the State and Federal levels, are discussed.

TRUCKING

Chapter 3 describes the truck fleet and trucking industry in the United States, with special emphasis on those aspects that have important implications for TS&W issues. Questions related to the impact of size and weight regulations on trucking and truck characteristics are examined, including the use of split tandems, super single tires, and lift axles.

TRUCK/RAIL COMPETITION

Chapter 4 examines truck-rail competition and how the competitive balance is likely to be affected by possible changes in TS&W limits. The predominant variables affecting shipper selection of mode are identified, given the type of freight, distance hauled, and freight traffic lane density. Emphasis is placed on identifying the commodities that might shift from rail to truck or truck to rail if limits are changed, and on estimating the magnitude of these shifts.

SAFETY AND TRAFFIC OPERATIONS

Chapter 5 examines the role of TS&W factors in highway safety and traffic operations. Results of past studies linking truck characteristics to crash rates are presented. Stability and control related to various truck configurations at different weights is detailed. Traffic operations impacts, including traffic congestion, acceleration capability, and braking efficiency also are described.

HIGHWAY INFRASTRUCTURE IMPACTS

Chapter 6 examines highway infrastructure costs, including bridges, pavements, and roadway geometric features in the context that (1) bridge stress may not be adequately controlled by Bridge Formula B, (2) adverse pavement impacts may be reduced with the introduction of additional axles, and (3) longer and heavier trucks, in general, require changes to such geometric

features as sharp curves (interchange ramps), intersections, hill climbing lanes, vertical curves, intersection clearance, and passing sight distance. The relationship of weight limits to bridge stresses are described. Pavement impacts are discussed, including the effects of axle weight limits, tire regulations, lift axles, road-friendly suspensions, and overweight containers.

ENFORCEMENT ISSUES

Chapter 7 examines enforcement and implementation issues related to changes in Federal TS&W provisions. Evolution of the Federal-State partnership in enforcement is described. Contributions of intelligent transportation systems, vehicle inspections, permit programs, and relevant evidence are considered.