

Comprehensive Truck Size and Weight (TS&W) Study

Phase 1-Synthesis

Permits and Pricing Mechanisms

and

Truck Size and Weight Regulations

Working Paper 13

February 1995

Prepared for

**Federal Highway Administration
U.S. Department of Transportation**

By

**Battelle Team
505 King Avenue
Columbus, Ohio 43201-2693**

Comprehensive Truck Size and Weight (TS&W) Study

Phase 1—Synthesis

Working Paper 13—Permits and Pricing Mechanisms and TS&W Regulations

This paper (1) summarizes the most relevant current experience and practice regarding permits (provisions, administrative requirements) and highway use pricing mechanisms (use taxes, permit fees, tolls) of importance for truck size and weight (TS&W) policy considerations; (2) examines implications for TS&W policy; and (3) identifies knowledge gaps and related research needed to address policy objectives and questions.

Most heavier and longer combination trucks currently operate under some form of overweight and/or oversize permit system, and arguments have been made that the most promising approach to achieve improvements in motor carrier productivity, safety, and other goals is through substantially improved permit systems. In addition, truck size and weight policy improvements could be used as a means to develop a more rational relationship between (a) size and weights of vehicles and the costs they impose, and (b) the pricing system for highway use. That rational relationship can be achieved through the permit fee structure, tolls, and/or the highway user tax structure. Even if these policy approaches are not pursued, changes in national size and weight limits and/or regulations could have significant impact on current permit systems and their effectiveness.

There are four ways by which trucking subject to Federal TS&W limits can legally operate at size and weight levels greater than the nominal standard authorized by the law:

- Pursuant to over-riding law or regulations (e.g., operations under grandfather rights)
- Pursuant to oversize/overweight (OS/OW) permits
- Pursuant to (usually informal) enforcement policy (e.g., "we always let that type of truck move at that GVW on this road")
- Pursuant to (usually informal) tolerance policy (e.g., "1500 lbs on tandem axles, unless the carrier takes advantage of the tolerance all the time").

The actual size and weight characteristics of trucks (and their impacts) can be controlled in three ways:

- By specifying limits and standards (e.g., "maximum allowable load on a tandem axle is 34,000 lbs")
- By pricing (e.g., "the toll charge for a truck on this road is \$X per ESAL-mile")

- By a combination of the two (e.g., \$X per ESAL-mile up to Y pounds).

In actual practice, the pricing approach is almost always controlled by an upper bound on axle, gross, and/or bridge formula limits.

1.0 Technical Relationships of Policy Consequence Concerning Permits and Pricing Mechanisms

Different agencies classify OS/OW permits in different ways. Common to most classification systems are the following ideas:

1. Routine vs. non-routine issuance
 - Routine: subject to clerical assessment within established, relatively non-complex guidelines
 - Non-routine: subject to professional assessment within established, complex guidelines, and subject to professional case-specific assessment beyond established guidelines.
2. Single vs. multiple vs. unlimited trips
3. Divisible vs. nondivisible load (or indivisible): definitions and interpretations are important, but vary from State to State
4. Vehicle-specific vs. carrier-specific
5. Route vs. area
6. Time-restricted vs. non-time-restricted: annual, seasonal, trip (e.g., good for 72 hours)
7. Commodity-restricted vs. non-commodity-restricted (e.g., farm products)
8. Agency vs. carrier-administered

Each state has individual permitting programs for OS/OW vehicles which exceed Federal and state size and weight limits. Significant variations exist among states in terms of policies and fees charged for vehicles that are above established size and weight limits. The OS/OW permit program of each state can be extremely complex depending on the rate structure and eligibility criteria of motor carriers. Therefore, this section will avoid trying to provide detailed descriptions of states' permit systems but will focus on policies, objectives, and effectiveness of the programs.

The primary sources for information on states' oversize/overweight permit programs are the following:

- Federal Highway Administration's *Truck Size and Weight; Restrictions on Longer Combination Vehicles and Vehicles With Two or More Cargo Carrying Units; Final Rule*, Federal Register Notice, 23 CFR Parts 657 and 658; June 13, 1994.
- The American Association of State Highway and Transportation Officials' *White Paper on the Feasibility of Longer Combination Vehicles (LCVs)*, prepared for the AASHTO Joint Committee on Domestic Freight Policy, July 1992.
- Truckers' handbooks prepared by some states to summarize their regulations, filing requirements, and fees.
- Summary tables showing state truck size and weight limits such as those prepared by the American Trucking Associations and J. J. Keller & Associates.
- Data on state permit and enforcement practices collected by the Federal Highway Administration (FHWA) for its annual report on *Overweight Vehicles - Penalties and Permits*. The report covers all overweight operations and provides information on the number of vehicles weighed, number of citations issued, number of single-trip permits issued, monetary fines for violating weight regulations, and other enforcement actions such as required off-loadings.
- Special compilations of state LCV regulations and permit practices such as those developed by the FHWA for its LCV reports.¹
- A special survey of LCV states conducted for AASHTO's *White Paper on the Feasibility of Longer Combination Vehicles*. In all, 12 states responded to the survey: Arizona, Florida, Idaho, Kansas, Montana, New York, North Dakota, Oklahoma, Oregon, South Dakota, Utah, and Wyoming. Survey responses from these states were used to update information on size and weight limits, designated highways, equipment restrictions, and operating restrictions.
- A telephone survey of special permit policies from state departments of transportation, highway patrol, and toll authorities conducted in October 1994. Fourteen states responded to the telephone survey: Alaska, Florida, Idaho, Kansas, New York, Massachusetts, Montana, North Dakota, Ohio, Oregon, South Dakota, Utah, Washington, and Wyoming.

¹*The Feasibility of a Nationwide Network for Longer Combination Vehicles* (1985) and *Longer Combination Vehicle Operations in Western States* (1986).

(a) Divisible vs. Nondivisible Permits

Overweight truck shipments are divided into two categories, divisible and nondivisible, for application of special permits. Nondivisible loads are typically large pieces of equipment or materials which cannot easily be divided into smaller individual shipments. All states issue special permits for nondivisible loads which would violate state and Federal gross vehicle weight, axle weight, and bridge formula limits if hauled without a special permit. Overweight divisible loads are permitted in approximately half of the states with some states allowing only specific commodities such as nuclear waste to receive permits.

Variation occurs among states in classifying overweight truck shipments as divisible and nondivisible loads. In general, shipments are classified as divisible if they can be readily shipped separately. However, in cases such as intermodal containers some states classify containers as nondivisible where other states examine the commodities shipped in the container to determine if the load is divisible. FHWA proposed that states treat containers moving in international commerce as nondivisible loads²; however, this proposal raised concern that domestic container shipments would be discriminated against. Additionally, some states consider units operating under U.S. Customs seal to be nondivisible where other states do not. The classification of divisible vs. nondivisible loads is an important issue because it affects the eligibility of many types of cargoes for transport as overweight shipments, particularly in states that do not permit divisible overweight trucks.

FHWA, in the Final Rulemaking for *The Truck Size and Weight; Restrictions on Longer Combination Vehicles and Vehicles With Two or More Cargo-Carrying Units*, defined non-divisible load or vehicle to mean any load or vehicle exceeding applicable length or width limits which, if separated into smaller loads or vehicles, would: (i) compromise the intended use of the vehicle, i.e., make it unable to perform the function for which it was intended; (ii) Destroy the value of the load or vehicle, i.e., make it unusable for its intended purpose; or (iii) Require more than eight workhours to dismantle using appropriate equipment. The applicant for a nondivisible load permit has the burden of proof as to the number of workhours required to dismantle the load. A State may treat emergency response vehicles and casks designed and used for the transport of spent nuclear materials as nondivisible

² Federal Highway Administration (February 25, 1993) *Truck Size and Weight; Restrictions on Longer Combination Vehicles With Two or More Cargo-Carrying Units; Supplemental Notice of Proposed Rulemaking*, Federal Register, (58 FR 11450).

vehicles or loads³. However, the issue of whether intermodal containers should be classified as divisible or nondivisible loads was not addressed.

(b) Single vs. Multiple Trip Permits

OS/OW permits are issued by states on a single trip, multiple trip, or annual basis. Single trip permits are good for only one trip during a specific time period, typically 3-5 days. Multiple trip permits grant permission to shippers to transport overweight shipments at any desired frequency. Typically, multiple trip permits cover 30 to 90 days, but many states routinely issue annual permits. Multiple and annual permits are usually granted to high-volume shippers that make many trips under the same permit.

Table 1.1 summarizes the permit programs for states that allow overweight divisible loads to be permitted on the state highway system. The data in this table are from the state-by-state descriptions of permit practices in FHWA's annual report for FY 1991 in Appendix G, as shown in the source note. The table shows that the majority of states that permit divisible loads exceeding state and Federal weight limits issue annual permits. Single trip permits are issued in eight states, while only four states use multiple trip permits for divisible loads. The tabulation in Table 1.1 disagrees somewhat from statements made in the text of the annual report (pages 15 and 20) stating only 17 states limit permits to nondivisible loads and that the number of states issuing multiple-trip load permits increased from 22 in 1988 to 27 in 1991.

The number of single and multiple trip permits issued by states has been increasing steadily over the last few years. In 1991, states issued a total of 1.65 million divisible and nondivisible permits, an increase of 19 percent from 1988. Multiple trip permits increased 31 percent during this period. These rates of increase raised concern at FHWA that states were allowing multiple trip permits to replace single trip permits⁴, which could result in less awareness of truck loads on pavements and the resultant damage.

³Federal Highway Administration (June 13, 1994) *Truck Size and Weight; Restrictions on Longer Combination Vehicles With Two or More Cargo-Carrying Units; Final Rule*, Federal Register, page 30405.

⁴Federal Highway Administration, *Overweight Vehicles-Penalties & Permits: An Inventory of State Practices for Fiscal Year 1991*, U.S. Department of Transportation FHWA-MC-93-001, pp. 16-21.

Table 1.1 Special Permits for Divisible Loads

STATE	Single Trip Permits	Multiple Trip Permits	Annual Permits	Maximum GVW (lbs.)
Arizona	Yes	Yes	Yes	-
Colorado	No	No	Yes	-
Connecticut	Yes	No	Yes	-
District of Columbia	No	No	Yes ¹	-
Georgia	Yes	No	Yes	100,000
Idaho	No	No	Yes	105,500
Indiana	Yes	No	Yes	134,000
Kentucky	No	No	Yes	120,000
Maine	No	No	Yes	100,000
Montana	Yes	No	Yes	-
New York	No	No	Yes ³	120,000
North Dakota	-	-	-	105,500 ⁴
Oregon	Yes	No	Yes	105,500
Rhode Island	-	-	-	-
Tennessee ²	-	-	-	-
Texas	No	No	Yes	-
Utah	Yes	Yes	Yes	-
Vermont	No	No	Yes	99,000
Virginia ⁵	-	-	-	-
Wisconsin	No	No	Yes ⁶	90,000
Wyoming	Yes ⁴	Yes ⁴	No	-

Notes: ¹ Dump trucks only

² Nuclear waste only

³ Specific counties only

⁴ Specific commodities only

⁵ Coal, concrete, and farm produce only

⁶ Forest products and scrap metal only (coal trucks can exceed limit)

Source: Federal Highway Administration *Overweight Vehicles - Penalties & Permits: An Inventory of State Practices for Fiscal Year 1991*; April 1993; Appendix G (state by state data on permit practices).

(c) Route vs. Area Permits

Operating permits are issued by states for either a specific route or covering a geographic area but remaining on designated highways. Route specific permits allow shippers to transport single or multiple loads only on one designated route. An area permit does not constrain the shipper to a route but allows for operation on any of the designated roads in the permit area. Several services are available to motor carriers in identifying routes that allow the transportation of OS/OW vehicles. Two such services are:

- American Trucking Associations' *Motor Carrier Advisory Service*.
- Truckers' handbooks prepared by some states to summarize their regulations, filing requirements, and fees.

1.1 Longer Combination Vehicle Programs⁵

Longer combination vehicles (LCVs) have generally been defined as those configurations with two or more cargo units whose length exceeds that of double trailer trucks currently operating on the federally designated National Truck Network.⁶ LCVs often operate at gross vehicle weights over 80,000 pounds under "grandfather" exemptions from Federal weight limits.⁷ Several types of LCVs operate in the US. The most common are seven-axle triples (tractor-semitrailer and two trailers, each cargo unit being about 28 feet), seven-axle Rocky Mountain doubles (tractor pulling a long semitrailer of 40 feet to 53 feet followed by a short trailer), and nine-axle turnpike doubles (tractor pulling a long semitrailer and a long trailer each from 40 feet to 53 feet long). However, numerous other LCV configurations are used; for example, some carriers operate triples consisting of a truck pulling two trailers; chip haulers and other natural resource haulers often use seven-axle twins, with each cargo unit in the 30 feet to 33 feet range; natural

⁵Subsection 1.1 Longer Combination Vehicle Program relies on information developed in AASHTO's *White Paper on the Feasibility of Longer Combination Vehicles (LCV's)* and updated with current information from the *Truck Size and Weight; Restrictions on Longer Combination Vehicles and Vehicles With Two or More Cargo-Carrying Units; Final Rule*, 23 CFR Parts 657 and 658.

⁶Double trailer truck combinations with 28-foot cargo units (twin 28s) currently operate on the National Truck Network in all States. The overall length of these combinations is generally 65 to 70 feet.

⁷Section 127 of Title 23 of the United States Code limits the weights of trucks on the Interstate system to 80,000 pounds; however, states can allow the operation of heavier trucks if those trucks could have operated in the state on July 1, 1956.

resource haulers in Utah and Nevada operate triples with very short trailers and 10 or 11 axles; and some carriers of low density cargoes use five-axle doubles with 32 feet trailers that are stretched versions of conventional doubles with 28-foot trailers.⁸

The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) imposes a restriction on states' allowing any expanded operation of LCVs and combination vehicles of two or more carrying units. The regulations restrict the states to allowing operation of only those vehicles in use on or before June 1, 1991. FHWA Docket NOS. 90-9 and 92-15, 23 CFR Parts 657 and 658, Appendix C provide the weight and size provisions for each state that were in effect prior to the ISTEA freeze. Table 1.2 summarizes limits for vehicle combinations in use on or before the June 1, 1991, deadline. The table shows the maximum cargo-carrying length in feet followed by the maximum gross weight in thousands of pounds that the type of vehicle can carry when operating on the Interstate system.⁹

The ISTEA regulations define an LCV somewhat differently from the generally accepted definition stated above. For the purpose of the freeze, an LCV is any combination of a truck tractor and two or more trailers or semitrailers with a gross vehicle weight greater than 80,000 pounds. Thus, an LCV that operates only off the Interstate system (such as in Florida) is not an LCV for the purpose of the LCV freeze. Similarly, an LCV operating up to 80,000 pounds, even on the Interstate system, is not affected by the freeze regulations (such as in Nebraska).

Most LCV operations are conducted under special state permits that require the carrier to certify that its drivers have experience with LCVs, that the equipment can safely handle the load, that a certificate of insurance providing acceptable coverage is on file, and that the vehicle meets safety and inspection standards set forth in Federal and state regulations. Permits may be available on an annual, quarterly, monthly, or single-trip basis. Violations of permit conditions typically result in suspension of a driver or vehicle permit for a period of time ranging from one month to one year, depending on the severity of the violation. Permit suspension typically removes an individual driver or power unit from operation, but may or may not prohibit a carrier from using other LCV power units with the same trailers, or the driver of a suspended vehicle from operating another

⁸Sydec, Inc. *Productivity and Consumer Benefits of Longer Combination Vehicles: Executive Summary*; prepared for the Trucking Research Institute; Alexandria, VA; June 1990.

⁹The maximum lengths shown in the table are from the front of the first cargo unit to the rear of the last cargo unit. The lengths do not include length-exclusive devices.

**Table 1.2 Vehicle Combinations Allowed Under the ISTEA Freeze
(overall lengths in feet and gross weights in thousands of pounds)**

State	Truck Tractor and 2 Trailing units	Truck Tractor and 3 Trailing Units	Other
Alaska	95'	110'	83'
Arizona	95' 111k	95' 123.5k	1
Colorado	111' 110k	115.5' 110k	78'
Florida	106' ²	-	-
Hawaii	65' ²	-	-
Idaho	95' 105.5k	95' 105.5k	1
Indiana	106' 127.4k	104.5' 127.4k	58'
Kansas	109' 120k	109' 120k	-
Massachusetts	104' 127.4k	-	-
Michigan	58' 154k	-	-
Mississippi	65' ²	-	-
Missouri	109' 120k	109' 120k	-
Montana	93' 137.8k	100' 131.06k	-
Nebraska	95' 95k	95' ²	68'
Nevada	95' 129k	95' 129k	98'
New Mexico	86.4k ³	-	-
New York	102' 143k	-	-
North Dakota	103' 105.5k	100' 105.5k	103'
Ohio	102' 127.4k	95 115k	-
Oklahoma	110' 90k	95' 90k	-
Oregon	68' 105.5k	96' 105.5k	-
South Dakota	100' 129k	100' 129k	1
Utah	95' 129k	95' 129k	1
Washington	68' 105.5k	-	68'
Wyoming	81' 117k	-	1

¹ Includes multiple vehicles in this category. See individual state listings in FHWA's Final Rule.

² No maximum weight is established as this vehicle combination is not considered an "LCV" per the ISTEA definition. Florida's combination is not allowed to operate on the Interstate system, and the combinations for Hawaii, Mississippi, and Nebraska are not allowed to exceed 80,000 pounds.

³ No maximum cargo-carrying length is established for this combination. Because state law limits each trailing unit to not more than 28.5 feet in length, this combination is allowed to operate in all NN routes under authority of the STAA of 1982, regardless of-actual cargo-carrying length. The maximum weight listed is New Mexico's maximum allowable gross weight on the Interstate system under the grandfather authority of 23 U.S.C. 127.

Source: Federal Highway Administration (June 13, 1994) *Truck Size and Weight; Restrictions on Longer Combination Vehicles and Vehicles With Two or More Cargo-Carrying Units; Final Rule*, Federal Register; page 30423.

LCV.¹⁰ However, suspending or revoking all of a carrier's permits is an option in most states. Since this action would effectively put a carrier out of business, it provides a strong incentive for conformance with permit conditions, even though such actions occur infrequently in practice.

(a) Equipment Restrictions

In addition to the equipment requirements prescribed in the Federal Motor Carrier Safety Regulations (FMCSR) or state regulations for conventional combinations, some states have additional equipment requirements for LCVs. Equipment requirements in states that allow LCVs are summarized in Table 1.3. In most cases, these additional requirements are based on model LCV regulations prepared by the Western Highway Institute.¹¹ Similar guidelines have been adopted by the Western Association of State Highway and Transportation Officials.

(b) Operating Restrictions

In addition to length and weight limits, LCV operations on designated highways are usually subject to other operating restrictions, as shown in Table 1.4. Restrictions often require LCVs to maintain a minimum speed and to drive in the right-most lane to prevent LCVs from adversely affecting the speeds of other vehicles.

The stability of multiple-trailer vehicles is affected by the sequence in which trailers of various weights are arranged. Several states have LCV regulations requiring trailing units of unequal weight be operated with the lighter unit in the rear. Several states require that LCVs maintain a minimum distance (typically 500 to 600 feet) behind another truck in the same lane. This requirement is intended to provide safe distances for braking situations and safe passing, turning, and merging movements.¹²

¹⁰Federal Highway Administration; *The Feasibility of a Nationwide Network for Longer Combination Vehicles*; Washington, DC; 1985.

¹¹*Western Highway Institute Model Rules and Regulations for the Uniform and Safe Operation of Multiple Trailer Combinations (LCVs) Operated Under Special Transportation Permit*; San Bruno, CA; 1987.

¹²FHWA 1986; op. cit.

Table 1.3 Special Equipment Restrictions on LCV Permits (Truck Tractor with 2 and 3 Trailing Units)

State	Oversize Warning Sign	Swerving Less Than 3 Inches	Tires	Fifth Wheel	King Pin	Draw Bar	Axles	Brakes	Splash/Spray Suppress.
Alaska	x								
Arizona		x	x	x	x		x	x	x
Colorado		x		x	x	x	x	x	
Florida		x ¹						x	
Hawaii					x				
Idaho				x		x			
Indiana		x							x
Kansas							x		x
Massachusetts							x	x	
Missouri							x		x
Montana					x	x	x		x
Nebraska		x							
Nevada		x	x					x	
New Mexico									
New York		x		x				x	x
North Dakota				x					
Ohio									
Oklahoma		x		x	x		x	x	x
Oregon				x		x			
South Dakota	x						x		
Utah	x	x		x	x	x	x	x	x ²
Washington ³									
Wyoming									

¹ Restriction on swerving is less than 2 inches.

² Splash and spray suppressants are recommended.

³ Vehicle operating conditions are the same for permitted doubles as for STAA of 1982 doubles. The source does not define what these conditions are.

Source: Federal Highway Administration (June 13, 1994) *Truck Size and Weight; Restrictions on Longer Combination Vehicles and Vehicles With Two or More Carrying Units; Final Rule, Federal Register.*

Table 1.4 Special Operating Restrictions on LCV Permits (Truck Tractor with 2 and 3 Trailing Units)

State	Minimum Speed ¹	Trailer Sequence	Following Distance	Weather Restrictions	Volume/ Congestion Restriction	Right Lane Only	Time of Day Restriction	Visibility Restriction
Alaska		x		x	x	x		x
Arizona	20 mph			x				
Colorado	20 mph	x					x	
Florida	40/30 mph							
Hawaii								
Idaho	15 mph			x				
Indiana		x	500 ft.					
Kansas	40 mph	x	100 ft./10 mph	x		x	x ²	
Massachusetts	20 mph							
Missouri	40 mph	x	500 ft.	x		x	x ²	
Montana	20 mph	x	100 ft./10 mph					
Nebraska		x						
Nevada	20 mph		500 ft.	x				
New Mexico								
New York	20 mph							
North Dakota	15 mph	x		x				
Ohio								
Oklahoma	40/20 mph	x						
Oregon				x				
South Dakota	40 mph							
Utah	20 mph	x	500 ft.	x				
Washington ³								
Wyoming		x						

¹ Two minimum speeds indicate speeds for flat terrain and grades.

² Permits may restrict day, hour, or seasonal operation.

Source: Federal Highway Administration (June 13, 1994) *Truck Size and Weight; Restrictions on Longer Combination Vehicles and Vehicles With Two or More Cargo-Carrying Units; Final Rule*, Federal Register.

Most states with permit programs explicitly restrict LCV operations during inclement weather or hazardous roadway conditions. LCVs cannot be dispatched in Arizona, North Dakota, and Oregon when ice, snow, frost, or rain create hazardous conditions. Idaho, Kansas, and Utah include sleet, fog, mist, dust, and smoke in their list of hazardous conditions, requiring that speeds be reduced and that operations be discontinued when these conditions become dangerous. North Dakota and Oregon prohibit movement of combinations when wind or other conditions may cause the trailing units to deviate from the path of the towing vehicle. LCV operations are also subject to restrictions in three states during high volume or congested travel periods, according to information obtained from the states by FHWA and reported in the June 1994 Final Rule. In contrast, FHWA's 1986 LCV report identified eight such states, implying that there may have been some loosening of such restrictions in a few states; however, this has not been investigated. Also, Montana places seasonal weight restrictions on LCVs to minimize damage to highway pavements during freeze/thaw periods.¹³

(c) Driver Restrictions for LCVs

Some LCV states have special driver requirements for LCVs beyond those required for conventional trucks. Four states have higher minimum age limits for LCV drivers (Florida - 23, Nevada - 25, Indiana and Ohio - 26) than the minimum age of 21 prescribed by Federal regulations for drivers of conventional trucks.¹⁴ Five western LCV states require special training or experience for operating LCVs. In these states, the carrier holding the special permit generally provides the special instruction in operating LCVs or certifies that the driver is qualified to operate LCVs based on prior experience, and the prospective driver must pass an LCV driving test prior to receiving a license.¹⁵

Kansas requires carriers applying for permits to provide the following information:

- A description of the applicant's training and supervisory program for drivers

¹³FHWA 1986; op. cit.

¹⁴FHWA 1985; op. cit.

¹⁵FHWA 1985; op. cit.

- A description of the applicant's shop facilities and maintenance programs for equipment
- A description of the applicant's compliance with driver qualification standards
- A description of the applicant's safety program
- A list of the vehicles for which permits are being applied including model and vehicle identification numbers
- A list of the drivers to be certified
- Maps showing routes to and from the applicant's terminal.

(d) Designation of Highways and Bridges for LCV Use

In the past, prior to the LCV freeze, requests from carriers to expand the highways on which LCVs were allowed to operate were typically treated on a case-by-case basis, rather than through the application of specific formulas or formal criteria. Key considerations include the following:

- Is there adequate space for LCVs to carry out turning maneuvers at intersections and sharp curves? Specifically, given roadway and shoulder widths and curvature, will turning LCVs encroach onto roadsides or into lanes for opposing traffic?
- Can LCVs be accommodated without adversely affecting the speeds of other vehicles? For two-lane roads, are there adequate opportunities for trailing vehicles to pass LCVs. Also, does the road have steep grades, which heavy trucks can negotiate only at reduced speeds?
- Are the load-bearing capacities of bridges on the highway segment adequate to accommodate LCVs?

Idaho uses a form that allows carriers to estimate off-tracking for any given configuration; based on the amount of off-tracking the carrier can determine what routes are open to that specific configuration based on maps available at ports of entry throughout the state.¹⁶ South Dakota places restrictions on the

¹⁶Off-tracking is a condition in which the paths of the trailing wheels of a turning vehicle are offset from those of the leading wheels. Off-tracking can cause potentially hazardous encroachment by the rear of a trailer onto adjacent lanes or roadsides.

maximum off-tracking of LCVs for specific curves. Prior to the LCV freeze, when a new route was requested, South Dakota DOT reviewed the radii of turns on the route to determine if they were adequate for LCVs. If not, the route would not be added to the network until the turn radii were improved. Oregon required demonstration runs to determine whether longer or heavier combinations should be allowed to operate on a given segment of the highway network.

(e) Staging Areas for LCVs

The six states with LCV operations on turnpikes construct and maintain staging areas for assembling and disassembling those LCVs that cannot be operated off the turnpikes -- i.e., primarily turnpike doubles, but also triples in a few cases. New York provides 32 staging areas for LCVs, Florida, 7, Ohio, 5, Massachusetts, 4, Indiana, 3, and Kansas, 2. Special permits issued by turnpikes may contain provisions stating that staging areas are to be used only for make-up and break-up operations upon entering or leaving the facility, and may not be used for the extended parking of trailers or as temporary truck terminals.

Access provisions for LCV operations on turnpikes vary considerably. Some states leave access to be determined by local authorities, while others limit access to a specified distance from the turnpike. These distances range from 1,500 feet in New York to 20 miles in Kansas in the vicinity of Kansas City.¹⁷

In the survey conducted for AASHTO's 1992 White Paper, the New York State Thruway Authority reported several problems in providing staging areas for turnpike doubles: land availability, pavement costs, the need to improve ramp widths, lighting requirements, the need for high impact bumper rail, and snow and ice control. Also, high levels of congestion on the Thruway require restrictions on peak period entries and exits.

(f) The LCV Freeze

Since the ISTEA freeze on any further increases in limits for doubles and triples in 1991, various studies have been underway and some have been completed.¹⁸ Recent research and policy analysis suggests that more work is

¹⁷FHWA 1985; op. cit.

¹⁸*Truck Safety: The Safety of Longer Combination Vehicles Is Unknown*; GAO; March 11, 1992. *Longer Combination Trucks: Driver Controls and Equipment Inspection Should Be Improved*; GAO; November 23, 1993. *Larger Dimensioned Vehicle Study: Final Report*; FHWA; September

likely to have to be done to resolve the issues that have been raised in these studies and that pressure is likely to continue to have these issues resolved before lifting or modifying the LCV freeze.

As an example of this point, at the September 7, 1994, meeting of the AASHTO Subcommittee on Highway Transport, a resolution was passed recommending that the freeze not be lifted until a program was adopted that would assure that any future increases in state or Federal limits was accompanied by actions that would assure that safety and other improvements would be achieved as a product of such decisions. The background for this resolution was a discussion by the subcommittee of a recommendation in TRB's Truck Weight Limits report that future state TS&W increases be made subject to Federal regulation of state permit systems to assure achievement of safety and other improvements.

The referenced TRB report recommended that regulations would have to be designed to assure the achievement of several objectives as part of permit programs:¹⁹

- Limitation to routes that can safely accommodate the vehicles
- Maximum weights controlled by a modified bridge formula
- Fees adequate to cover all incremental costs
- An aggressively enforced program of safety restrictions covering:
 - Power requirements for acceleration and hill climbing
 - Driver qualifications
 - Accident reporting and insurance requirements
 - Connecting equipment such as fifth wheels, pick-up plates, kingpins, and hitch connections
 - Axle width, tires, and rims.

TRB research concluded that these types of actions could be effective in overcoming the problems identified.

1993. *Longer Combination Trucks: Potential Infrastructure Impacts, Productivity Benefits, and Safety Concerns*; GAO; August 1994.

¹⁹*Truck Weight Limits: Issues and Options*; TRB Special Report 225; June 1990.

This TRB recommendation was similar to a recommendation made in an LCV study performed for the Trucking Research Institute²⁰ (TRI) and in a subsequent unpublished draft report for FHWA. Both recommendations were based on conclusions reached in these two studies that these types of actions would result in substantial economic and safety benefits without substantial increase in costs.

The TRI report recommended that the following standards be met by all state LCV permit systems:

- Specified minimum standards for uniformity in terms of highway access and equipment permitted
- Fees that bear a direct relationship to any added cost of LCV operation and administration, rather than being used as just another revenue source
- Achievement of minimum safety standards
- No unnecessary burdens on carriers.

An expanded list of items that should be covered by Federal regulation of state LCV permits includes:

- Driver qualifications and training
- Enforcement and inspection requirements
- Criteria for geometrics, bridge load carrying capacity, and other safety considerations for routes to be used for each major class of LCV
- Antilock brakes, coupling equipment, power, and other safety equipment
- Special coupling requirements and roll threshold warning devices for tank combinations
- Maintenance standards
- Accident reporting and insurance requirements
- Axle lengths, tires, and rims

²⁰*Productivity and Consumer Benefits of Longer Combination Vehicles: Executive Summary*; prepared by Sydec, Inc. in association with Jack Faucett Associates for TRI; June 1990; page 8.

- Guidelines for estimating incremental costs of LCV operations and establishment of appropriate user charges
- Standards for revocation of permits.

(g) Summary

Longer combination vehicles, with lengths exceeding those of conventional "twin 28s," currently operate on turnpikes or designated highways in 20 to 23 states, depending on the definition of LCV.²¹ In eastern states with LCVs, operations are generally limited to turnpikes and staging areas are provided for assembling and disassembling LCVs. In midwestern and plains states, LCVs generally have limited access off of turnpikes. In western states, however, a more extensive network of designated highways is provided, including three states that open their entire state highway systems to LCVs.

Most states require special permits for LCV operations, which generally require the carrier to certify that its drivers have experience with LCVs, that the equipment can safely handle the load, that a certificate of insurance providing acceptable coverage is on file, and that the vehicle meets safety and inspection standards set forth in Federal and state regulations. Maximum weights for LCVs, equipment, operating, and driver restrictions differ considerably among the 20 LCV states.

In the past, prior to the LCV freeze, requests from carriers to expand the highways on which LCVs were allowed to operate were generally treated on a case-by-case basis, rather than through the application of specific formulas or formal criteria. Key considerations included whether there was adequate space for LCVs to carry out turning maneuvers at intersections and sharp curves, whether LCVs could be accommodated without adversely affecting the speeds of other vehicles, and whether the load-bearing capacities of bridges on the highway segment were adequate to accommodate LCVs.

In the survey conducted for this study, four states reported the results of monitoring accident experience of LCVs operating on their highways. All four reported that LCV accident experience compares favorably with that of other vehicles.

²¹As shown in Table 1.2, 23 states allow LCVs of some type, but Florida does not allow them on the Interstate system, only on turnpikes, and Hawaii and Mississippi allow doubles with cargo unit lengths of up to 65 feet, but not over 80,000 pounds. Nebraska allows empty triples, but heavier ($\leq 95,000$ lbs.), long (≤ 95 feet) doubles. Thus, a total of 20 states allow LCVs according to the ISTEA definition ($\geq 80,000$ lbs. on the Interstate system.)

1.2 Conventional Configuration Permit Vehicles

In addition to longer combination vehicles, conventional configurations are eligible for special permits in all states for nondivisible loads and in approximately half of the states for divisible loads.²² The permit systems of the states vary in terms of the types of permits, maximum allowable weight, permitted transportation routes, and eligibility for special permits. Several states have begun addressing issues related to OS/OW permit vehicles, such as their cost responsibility, enforcement of size and weight limits, and safety issues related to longer and heavier vehicles operations; several more are expressing interest in doing so in the near future.

1.3 Enforcement Issues of OS/OW Permit Vehicles

All states are required by Federal regulation to enforce size and weight limits on Federal-aid highways, and this responsibility extends to permitted vehicles. Enforcement officials generally have an understanding of the effectiveness of their programs and can determine the frequency of size and weight limit violations through their daily activities. As part of the research conducted for this working paper, several questions were asked of state special permit office staffs in 14 states concerning enforcement of permitted vehicles in order to better understand state enforcement of permitted vehicles and to determine the magnitude of permit violations occurring²³.

Enforcement issue responses to the special permit telephone survey are summarized in Table 1.5. Additional information obtained during the survey is presented below.

- Only three states out of fourteen respondents confirmed that previous permit violations were considered when issuing OS/OW permits. Many states cited lack of resources and inability to check a violations database as the reason for not screening previous permit violators.
- In most states operating permits are suspended, revoked, or become invalid if a violation is detected. The truck is placed out-of-service until the load is shifted or off-loaded to make the truck legal. Some states will issue a new operating

²²Federal Highway Administration, (1993) *Overweight Vehicles - Penalties and Permits: An Inventory of State Practices for Fiscal Year 1991*.

²³ A telephone survey of special permit policies from state departments of transportation, highway patrol, and toll authorities conducted in October 1994. Fourteen states responded to the telephone survey: Alaska, Florida, Idaho, Kansas, New York, Massachusetts, Montana, North Dakota, Ohio, Oregon, South Dakota, Utah, Washington, and Wyoming. Questions were asked concerning enforcement, safety, and cost responsibility of permitted vehicles.

permit to allow a motor carrier to proceed if the truck's weight is within the maximum GVW limit that applies to permits.

- In Washington State a truck which is found to be in violation of a permit is immediately placed out-of-service until load is shifted or off-loaded to comply with the permit, or a new permit is issued.
- For state permit officials who had knowledge of how often permits were suspended or revoked, the frequency ranged from 300-400 annually in Montana to extremely infrequently in Idaho.
- In Ohio, when motor carriers receive multiple violations they are called and asked to meet with enforcement officials to discuss the permit violations.
- Massachusetts' special permit office stated that revoking special permit privileges of motor carriers is an extremely lengthy process and therefore is not very effective. Often independent truckers change the name of the company to avoid losing special permit privileges. In one example, a company changed its name three times to avoid losing eligibility.
- Utah has recommended that AASHTO perform a national study on enforcement of OS/OW permitted vehicles because states are limited in the amount of resources they can devote to such concerns.
- The Idaho special permit office expressed concern that too many resources are being devoted to weight enforcement for both permitted and non-permitted vehicles. Less than 0.3 percent of vehicles weighed in Idaho are found to be in violation of state and Federal weight limits.

Table 1.5 Enforcement Issues of OS/OV Permit Vehicles

STATE CONTACT PERSON	Are Previous Permit Violations Considered in Issuing OS/OV Permits	Are Permits Revoked When Suspended or Permit Violations Occur	Approximate Frequency of Permits Being Suspended or Revoked	Have Any Formal State Level Studies Been Performed on Enforcement Issues	COMMENTS
Alaska - Doug Panila (907) 345-7636	No	-	-	No	Past violations are not reviewed in issuing new OS/OV permits.
Florida - George Herndon (904) 488-5596	-	Yes	-	Informal Reviews	No formal studies have been performed on special permit enforcement in Florida.
Idaho - Clayton Sullivan (208) 334-8405	No	Yes	Extremely Infrequent	No	Feels that Idaho is devoting too much resources to weight enforcement for all trucks.
Kansas - Steve Zimmerman (913) 296-3618	No	Yes	Under 100	No	OS/OV permits are not revealed if load is shifted or off-loaded to become legal.
Massachusetts - Steve Frymer (617) 973-7345	Yes	-	-	No	Revoking special permit privileges is a very lengthy process - problems have occurred with small trucking companies changing their names.
Montana - Carolyn Knickles & Dan Kiely (406) 444-6130	In Certain Circumstances	Yes	150-200 Annually	No	If permit violation is detected, permit is revoked and motor carrier must obtain a new permit.
New York - Marygrace Parker (518) 436-2816	No	Yes	-	No	If permit violation is detected, permit is revoked and motor carrier must obtain a new permit.
North Dakota - Sue Wood & Dennis Ericson (701) 224-2455	No	Yes	-	No	Permit is suspended until load is shifted or off-loaded to comply with permit limit.
Ohio - Dennis Murphy (614) 777-0224	Yes	-	-	-	A review is performed for companies with multiple permit violations - the company is called in to discuss the issues.
Oregon - Thomas Bradd (503) 943-7910	No	-	-	No	Oregon is developing a program which evaluates previous violation records.
South Dakota - Mike Young (605) 773-3571	-	Yes	-	No	Special permits are revoked when permits are violated.
Utah - Norm Lindgren (801) 965-4325	-	Yes	300-400 Annually	No	State has recommended that AASHTO perform a national study on permit enforcement issues.
Washington - John Balcom (206) 664-9494	-	Yes	-	No Recent Study	Permit is revoked when permit violation occurs, truck is placed out-of-service until new permit is issued.
Wyoming - Captain Gerard (307) 777-4301	Yes	Yes	-	No	In the self-issuing permit program, motor carriers are monitored intensively and repeat violators are removed from program.

Note: - indicates no response.

Source: State OS/OV permit program information is based on telephone interviews with state permit office staffs in October 1994. Blank cells indicate that the contact person could not provide an answer.

This last point raises a question as to the possible counter-effectiveness of current Federal enforcement planning and reporting requirements. States may be devoting too much effort to weighing at fixed weigh stations for long periods in order to report a high number of vehicles weighed. Shorter weighing periods at randomized locations and at randomized hours would be much more cost effective even if fewer trucks were weighed.

1.4 Safety Performance of OS/OW Permitted Vehicles

Safety performance of OS/OW permitted vehicles is a significant issue in evaluating existing special permit programs. A comparison of the safety performance of OS/OW permitted vehicles to conventional configured trucks would provide insight in addressing future truck size and weight limits. Several questions were asked of states' special permit offices in order to determine the perception of safety performance of OS/OW vehicles.

Safety performance responses to the special permit telephone survey are summarized in Table 1.6. Additional information provided in the survey is presented below:

- Only Idaho had performed a study that examined safety performance of OS/OW vehicles in comparison to conventional configurations. The study examined LCVs because accident data identified these vehicles but excluded other permitted vehicles. The study found that LCVs are safer than other commercial vehicles, and that this can be attributed to the strict regulation of this program.
- No state specifically examined safety records in determining eligibility for special permit programs. Several states cited general safety requirements but acknowledged that the requirements were generally not being actively monitored.
- Several states referred to safety requirements of specific programs such as the Longer Combination Vehicle program or the "Over 117,000 lb. Program" (Wyoming). The motor carrier safety rating is required to be satisfactory or conditional in order to qualify for the programs.
- Oregon has a program designed to increase safety performance and weight compliance of motor carriers. Safety inspectors meet directly with trucking companies to discuss safety and weight compliance issues.

Table 1.6 Safety Performance of OS/OW Vehicles

STATE CONTACT PERSON	Have Any Studies Been Performed on Safety Issues of OS/OW Vehicles vs. Conventional Configurations	Are Driver Safety Records Considered in Issuing Special Permits	Does Your State Have Special Enforcement Policies to Achieve Better Safety Performance of OS/OW Vehicles	COMMENTS
Alaska - Doug Panila (907) 345-7636	No	-	No	Safety performance of OS/OW vehicles is not considered in the permitting process.
Florida - George Herndon (904) 488-5596	No	-	-	Safety performance of OS/OW vehicles has increased but here are no formal studies done in Florida on this subject.
Idaho - Clayton Sullivan (208) 334-8405	Yes For LCV	General Safety Requirements	No	General safety requirements exist for motor carriers to obtain permits; however, the safety regulations are not enforced.
Kansas - Steve Zimmerman (913) 296-3618	No	No	No	A Special Vehicle Class (SVC) or triples program has been established to provide truck drivers of LCV with safety and operating information.
Massachusetts - Steve Frymer (617) 973-7345	No	-	-	Truck weight enforcement program has been effective in deterring violations of OS/OW permits resulting in increased highway safety.
Montana - Carolyn Knuckles & Dan Kiely (406) 444-6130	No	No	Not Aware	A site inspection of vehicle may be performed if permit is obtained from port of entry -- no inspections occur if permit is issued from the DOT.
New York - Marygrace Parker (518) 436-2816	No	Yes for LCV	Yes	For the LCV program, driver records are reviewed, equipment must be certified, and tandem driver permit must be obtained.
North Dakota - Sue Wood & Dennis Ericson (701) 224-2455	No	No	No	Not aware of any enforcement programs designed to improve safety performance of OS/OW vehicles.
Ohio - Dennis Murphy (614) 777-0224	No	No	-	Safety performance of OS/OW vehicles is not considered in the permit process.
Oregon - Thomas Bradd (503) 943-7910	No	No	Yes	The motor carrier enforcement program includes visits to trucking companies to discuss issues of safety and violations of OS/OW vehicles.
South Dakota - Mike Young (605) 773-3571	-	-	-	Did not comment on safety performance of OS/OW vehicles.
Utah - Norm Lindgren (801) 965-4325	-	-	-	Did not comment on safety performance of OS/OW vehicles.
Washington - John Balcom (206) 664-9494	No	-	-	In order to qualify for an OS/OW permit, a vehicle must be in proper working order; however, inspections are not performed for permits.
Wyoming - Captain Gerard (307) 777-4301	No	For Specific Program	No	For vehicles over 117,000 lbs., the safety rating of a motor carrier must be satisfactory or conditional in order to receive a permit.

Note: - indicates no response.

Source: State OS/OW permit program information is based on telephone interviews with state contact persons in October 1994.

- In general, the permit offices of the state departments of transportation did not believe that safety performance of OS/OW permitted vehicles was a significant issue on the state highways. Several states cited the increased safety performance of LCVs attributed to the strict monitoring of the program.

1.5 Performance Standards Regulation of TS&W

Conceptually, a performance standards approach to TS&W regulation could be superior to the traditional limits approach because it might be used to create an incentive for achieving productivity, safety, and other goals. This approach could involve establishment of a set of standards that, if achieved, would allow carriers to operate at greater size and weight limits. Such standards might deal with:

- Off-tracking
- Speed and acceleration on different grades
- Braking
- Emergency avoidance maneuverability
- Rearward amplification
- Rollover threshold and control.

Only very limited attempts have been made to use this approach, although it has been advocated and discussed in some detail by J.R. Billing of the Ontario Ministry of Transportation.²⁴ Both Billing and the summarizer of the Cambridge Conference, H. K. Walker, encourage the trend to the use of standards based on performance measures, but recognize that "it is probably premature to adopt a policy based entirely on performance standards at this time."²⁵

The most successful example of an approach that is at least generally related has been the Vehicle Weights and Dimensions Study conducted during the 1980s by the Road and Transportation Association of Canada (recently renamed the Transportation Association of Canada), leading to the adoption of a national Memorandum of

²⁴*Proceedings of the Third International Symposium on Heavy Vehicle Weights and Dimensions*, University of Cambridge; June 1992; p. 278-283.

²⁵Cambridge Conference report; p. 450.

Understanding on Vehicle Weights and Dimensions.²⁶ The study examined the stability, control characteristics, and highway impacts of different types of configurations being used throughout the country. Various performance measures were used to evaluate configurations in both field tests and analyses, leading to nationwide agreement on a uniform set of limits that allowed heavier and longer truck combinations meeting certain specifications to operate on a nationwide basis. Safety was a dominant criterion in defining the performance standards used. The concept of using performance standards to define a window through which trucks can pass has since been extended to other configurations and similar types of performance-based regulations.²⁷

1.6 Elimination of Grandfather Clauses

Several of the major national TS&W studies have evaluated the impacts of eliminating or phasing out the grandfather clauses in Federal statutes which allow states to retain higher limits than current Federal weight limits, including the bridge formula. Several scenarios analyzed in U.S. DOT's 1981 TS&W report to Congress, in the 1990 Sydec-Jack Faucett Associates TS&W report to FHWA (the Part Two report), and in TRB's Special Report 225 all show that there would be substantial negative impacts in terms of productivity losses -- greatly outweighing savings in highway agency costs for pavements and bridges if grandfather clauses were eliminated. Impacts would be particularly severe for certain industries and in certain regions (e.g, construction in the Northeast and natural resource haulers in the Rocky Mountains and Pacific Northwest).

As a result of these findings, none of these studies has led to any recommendation to eliminate or phase out the grandfather clause, although the TRB study did lead to a recommendation to replace grandfather rights with a special permit program. TRB's Committee of the Truck Weight Study concluded that:

²⁶Memorandum of Understanding on Vehicle Weights and Dimensions; Cambridge Conference report; RTAC; Ottawa; February 1988.

²⁷Billing, J.R., Cam, C.P., and Couture, J.; *Development of Regulatory Principles for Multi-axle Semitrailers*; Proceedings of the Second International Symposium on Heavy Vehicle Weights and Dimensions; Kelowna, B.C.; June 1989.

Baas, P.H., and White, D.M.; *Safety Improvements for Increased Weights and Dimensions in New Zealand*; Proceedings of the Second International Symposium on Heavy Vehicle Weights and Dimensions; Kelowna, B.C.; June 1989.

New Trucks for Greater Productivity and Less Road Wear; Special Report 227, Transportation Research Board; Washington, D.C.; 1990.

"...the grandfather test itself is an arbitrary and inequitable means for determining such exemptions. Under the grandfather test, a state's request for an exemption is based on interpretations of its laws in 1956 and 1974, not on the likely consequences of granting the exception. When Federal weight laws were implemented, grandfather exemptions made sense as temporary measures to ease the transition to a nationally uniform set of weight limits. But Congress did not establish any termination date for grandfathered rights. Given the dim prospects for national uniformity, a more rational basis for determining exemptions to Federal weight limits is needed. The committee believes that its recommendation for a special permit program (summarized later) provides such a basis."

1.7 Pricing Mechanisms

Heavier and longer vehicles can cause an increase in the construction, maintenance, and rehabilitation costs for the facilities on which they operate. However, pricing mechanisms can be designed to recover the higher costs associated with size and weight increases. Mechanisms that can be used to recover costs associated with heavier and longer vehicles can be broken down into four categories:

- Tolls
- Highway user fees
- OS/OW permit fees
- Fines for violation of size and weight limits.

Each of these is discussed in the following paragraphs.

(a) Tolls as a Pricing Mechanism

Literature specific to establishing toll structures in relation to the cost responsibility of heavier and longer combination vehicles is lacking. Extensive literature exists on various components of highway costs and external costs associated with heavier and longer vehicles; however, no efforts have been made to pull this knowledge together as a basis for establishing toll structures for heavy vehicles.

Despite the lack of such research or policy analysis, actual toll structures in use on toll roads, bridges, and tunnels may well be closer to matching the cost responsibility of heavier vehicles than is the typical situation for either of the other two categories of pricing mechanisms -- i.e., highway user taxes and OS/OW permit fees. Truck tolls are typically based on the number of axles (which in turn correlates fairly well with gross weight and ESALs), and for toll roads of any length, tolls are generally based on mileage traveled on the toll road (with higher rates often being charged for more costly sections with major structures). Toll rates per axle are typically several times as high for heavy trucks as they are for light vehicles.

Although no analysis of this type has been done, this review of current practice suggests that toll structures may prove to be the most rational category of pricing mechanism. There appears to be more direct linkage between fee structure and cost responsibility for toll structures than for the other two types of pricing mechanisms, perhaps because the typical management structure for toll facilities creates an environment more conducive to market-oriented pricing.

There are some problems, however, with fees based only on the number of axles. They do not distinguish between empty and loaded vehicles. Also, they discourage the use of more axles, which would reduce pavement damage.

(b) Highway User Fees as a Pricing Mechanism

In contrast to the lack of literature on rational pricing to establish truck tolls, the literature on rational pricing to establish efficient and equitable highway user fees for trucks is very extensive -- i.e., the highway cost allocation study (HCAS) literature.

HCASs typically involve a major focus on truck taxes, as distinct from general highway user taxation. This is true partly because complex issues and relationships are involved in determining heavy vehicle cost responsibility, but also because of the importance of the relationships to the interest groups involved. However, in actual practice, relatively little of the focus of HCASs has been on establishing rational user taxes for heavier and longer combination vehicles -- i.e., appropriate fees at and above size and weight limits. For example, the HCAS that was the most comprehensive in technical scope and the most detailed in terms of vehicle classes analyzed -- the 1979-1982 Federal HCAS -- lumped all trucks over 75,000 pounds together as a single class.

Three important exceptions to that focus are:

- The series of cost responsibility studies conducted by the Oregon Department of Transportation, which have used detailed breakdowns of weight categories above 80,000 pounds and have been used to develop recommendations for detailed graduated weight-distance tax rates.²⁸
- The Idaho HCAS, which included the development and application of a special vehicle analysis spreadsheet designed to analyze cost responsibility and fee structures for OS/OW vehicles and help establish permit fee structures and other special tax rates and fee schedules.²⁹
- U.S. DOT's 1988 *Heavy Vehicle Cost Responsibility Study* (report of the Secretary of Transportation to Congress) which analyzed the equity of the existing Federal highway user tax structure for 14 different truck configurations at 25 operating weight intervals, including 5,000 pound increments up to an "over 120,000" category.

These sources provide good material on the manner in which state and Federal highway costs vary by registered weight and operating weight for each of several types of heavier and longer combinations, as well as single unit trucks.

(c) OS/OW Permit Fees as a Pricing Mechanism

Cost responsibility of oversize/overweight permit vehicles includes administrative expenses for the permit program, the cost of damage to pavements and bridges, enforcement, and safety costs.

The special permit telephone survey conducted in October 1994 for this paper included several questions related to cost responsibility and permit fees. The responses are summarized in Table 1.7 for states responding to the survey. Additional highlights are presented below:

²⁸*Motor Vehicle Cost Responsibility Study: 1986: Final Report*; ODOT; August 1988. *Task Force on Motor Carrier Taxation: Final Report and Technical Appendix*; ODOT; August 1989. *1992 Motor Vehicle Cost Responsibility Study: Final Report and Technical Appendix*; ODOT; July 1993.

²⁹*Highway Cost Allocation Study: Documentation of Computer Program Package*; prepared by Sydec, Inc. for Idaho Transportation Department; Appendix E; February 1994.

Table 1.7 Cost Responsibility in OS/OW Permit Fees

STATE CONTACT PERSON	Is Cost Responsibility Currently Reflected in OS/OW Permit Fees	Any Future Plans for Incorporating Cost Responsibility	Have Any Studies Been Performed to Estimate Cost Responsibility	COMMENTS
Alaska - Doug Panila (907) 345-7636	No	Uncertain	Yes	Currently, a study is being conducted at the University of Alaska to estimate the cost responsibility of OS/OW trucks.
Florida - George Herndon (904) 488-5596	Partial	Yes	Informal Reviews	Trip permit fee structure was modified recently; however, annual permit fees allow trucks to avoid cost responsibility.
Idaho - Clayton Sullivan (208) 334-8405	No	Yes	Yes	Idaho cost allocation study was recently completed -- future permit fee structure will be based on findings of the study.
Kansas - Steve Zimmerman (913) 296-3618	No	No	No	Permit fees which reflect cost responsibility are being discussed, but are unlikely to be implemented in the near future.
Massachusetts - Steve Frymer (617) 973-7345	No	No	No	Special permit fees in Massachusetts have not been updated to reflect cost responsibility.
Montana - Carolyn Knickles & Dan Kiely (406) 444-6130	Yes	No	Yes	Permit fee structure is based on a cost allocation study performed at Montana State University.
New York - Marygrace Parker (518) 436-2816	No	No	No	The existing permit fee structure is designed to recuperate damage done by OW vehicles but no study was done to estimate costs.
North Dakota - Sue Wood & Dennis Ericson (701) 224-2455	No	-	-	The North Dakota permit fee is based on a flat per ton fee for a monthly permit. Cost responsibility is not currently incorporated.
Ohio - Dennis Murphy (614) 777-0224	No	Yes	Continuous Evaluations	Fee structure is based on the administrative costs of the special permit program.
Oregon - Thomas Bradd (503) 943-7910	Yes	Yes	Yes	OS/OW permit fees include administrative and assessment fees -- the assessment fee is calculated based on additional ESALs.
South Dakota - Mike Young (605) 773-3571	No	No	No	Permit fees are based on a 2-cent-per-ton-mile rate; future modifications will incorporate additional administrative expenses.
Utah - Norm Lindgren (801) 965-4325	Yes	Yes	No	The permit fee structure has been changed to a sliding scale developed from meetings with industry and trucking companies.
Washington - John Balcom (206) 664-9494	Yes	No	Yes	Existing permit fee structure does reflect cost responsibility of OS/OW vehicles.
Wyoming - Captain Gerard (307) 777-4301	No	No	No	A flat 4-cent-per-ton mile fee is charged OS/OW vehicles. Rate is established by the legislature. A \$200 cap was recently removed.

Note: - indicates no response.

Source: State OS/OW permit program information is based on telephone interviews with state contact persons in October 1994.

- Several states had recently performed, or are currently in the process of conducting a cost responsibility study to estimate the cost responsibility of overweight vehicles. The special permit fees would reflect the findings of the studies.
- In Kansas and Florida the Departments of Transportation have proposed incorporating cost responsibility into the permit fee structure for oversize/overweight vehicles; however, both states were not optimistic about legislative approval for the changes.
- Florida recently modified the trip permit fee structure to incorporate cost responsibility; however, because of an existing statute, FDOT has been unable to change the annual permit fee structure. The result is that motor carriers purchase annual permits at lower fees and avoid purchasing trip permits.
- Ohio stated that the permit fee structure was based solely on recuperation of costs associated with administrating the special permit program. This is typical of most states.
- Five states' special permit offices anticipated revisions to the special permit fee structure in the near future, while the remaining nine states felt future modifications were unlikely due to recent changes or lack of interest from the states' legislatures.

Table 1.8 summarizes the fees for LCVs for the western states.

South Dakota sells books of self-issuing single-trip permits. The permit fee for a book of 10 single-trip permits is \$100. All permit fees are based on the administrative cost of the permit program. A staff study was performed in 1986 which indicated that it cost South Dakota about one million dollars per year to administer the permit program. The permit fees recover about 75 percent of this cost.

Fees vary considerably among states:

- In Montana, annual registration fees increase by \$65.50 for each 2,000 pounds over 78,000 pounds.
- In Nevada, the fee for an annual permit is \$60 per 1,000 pounds over 80,000 pounds.

- In Utah, the annual registration fee increases by \$40 for each 3,000 pounds over 84,000.

Table 1.8 Fees for LCV Permits

State	Duration	Administrative Fee	Additional Fee
Arizona	Trip 30 day Annual	\$15 \$30 \$360	Based on travel
Colorado	Annual	\$250	Based on OS/OW ¹ schedule
Idaho	Annual	\$35	Based on OS/OW schedule
Kansas	6 month Annual	\$5 for Turnpike access \$2,000 per company and \$50 per power unit for US 69 and I-70	Based on OW schedule
Montana	Trip Annual	\$10 for doubles; \$20 for triples \$75 for doubles; \$200 for triples	Based on travel
Nebraska	Annual	\$250	None. LCVs must be empty
Nevada	Annual	\$30/1,000 lbs overweight	Based on OW schedule
North Dakota	Trip	\$5	Based on OS/OW schedule
Oklahoma	Annual	\$120	Based on OS/OW schedule
Oregon	Annual	\$8	Based on ESAL-miles ²
South Dakota	Trip	\$10	Based on OS/OW schedule
Utah	Trip Quarterly Annual	\$25 overweight; \$15 oversize \$100 overweight; \$30 oversize \$300 overweight; \$50 oversize	Based on OS/OW schedule
Washington	Trip 30 day Quarterly Annual	\$5+\$1/1,000 lbs overweight \$10+\$1/1,000 lbs overweight \$10+\$37.50/1,000 lbs overweight \$100+\$37.50/1,000 lbs overweight	Based on OS/OW schedule

¹ Oversize/overweight

² ESAL-mile fees are the estimated pavement damage of a configuration based on the declared weight, the number of axles, and reported loaded mileage.

Source: A special survey of LCV states conducted for this study; FHWA, *Longer Combination Vehicle Operations in Western States*, Washington, D.C. 1986; and American Trucking Associations, *Motor Carrier Advisory Service*, Alexandria, VA, 1994.

- In Oregon, LCVs pay an ESAL-mile³⁰ or axle-weight mileage tax, which varies depending on declared weight, number of axles, and reported loaded mileage. The tax rates are shown in Figure 1.1. For a vehicle operating at 82,000 pounds, the tax ranges from 106 mills per mile for a nine-axle configuration to 134 mills per mile for a five-axle configuration. For a vehicle registered at 105,500 pounds, the tax ranges from 140 mills per mile (nine axles) to 174 mills per mile (seven axles).

Oregon DOT conducts very detailed analyses of cost responsibility by vehicle configuration and registered weight, which the legislature generally follows in modifying highway user tax rates.³¹ In most LCV states cost responsibility studies have not been conducted; however, several states have recently conducted cost responsibility studies for permit vehicles or are in the process of doing so.

Most toll authorities do not charge permit fees for LCV operations; however, tolls are calculated on a per-axle basis and thus are higher for LCVs than for conventional combinations. No known toll structure recognizes the fact that ESALs decrease with the number of axles, for any given weight, as the Oregon ESAL-mile tax does.

2.0 Knowledge Gaps and Research Needs

This review has uncovered relatively little in the nature of basic gaps in knowledge needed to analyze and evaluate policy options that are likely to be seriously considered in later phases of this study. Most of the items of needed work identified below are in the nature of either further survey work, data gathering, and applied research designed to assist in better defining and evaluating policy options.

³⁰An ESAL is the equivalent single axle load of any given set of axle loads, expressed in terms of the number of 18,000 pound axle loads that would create the same amount of pavement damage as the given set of axles. An ESAL-mile is the equivalent of one 18,000 pound axle traveling one mile.

³¹In May, 1991, the Oregon DOT published an *Update of the 1986 Motor Vehicle Cost Responsibility Study*. The 1991 study found that seven, eight, and nine-axle LCVs were generally meeting their cost responsibility under the rates shown in Figure 1-1. There was, however, some underpayment in the higher five and six-axle weight classes with these rates.

(a) Investigation of the Feasibility of a Performance Standards Approach to Size and Weight Regulation

The body of knowledge in the area of permits and pricing and TS&W would benefit from a better understanding of how performance standards might affect vehicle performance. The paper by J.R. Billing referenced in Subsection 1.5 suggests one approach is to apply a performance standards approach which encourages designers and manufacturers to develop innovative vehicles rather than develop vehicles which get around current limits (e.g., by using lift axles and super single tires). Some problems with the performance standards approach have been identified, but these might be overcome under a flexible approach in applying performance standards to grant permits to new vehicles.

(b) In-Depth Study of Best Practices in States and Provinces

Several surveys have been conducted over the last decade of state permit practices, as documented in Subsections 1.0 through 1.4 of this paper. However, all of these surveys have been limited to requests for information in response to telephone or mail questionnaires, and very little has been done to perform follow-up evaluations except to provide clarifications and/or updates.

A more thorough assessment of best practices should be performed to examine the potential benefits of high-quality permit enforcement systems. This should involve identification of best practices, visits with key staff in the selected agencies, and investigation of the effectiveness of various enforcement activities.

(c) Analysis of Toll Structures in Relation to Cost Responsibility

A representative sample of toll authorities and organizations that may have performed analysis of cost responsibility related to toll facilities should be surveyed. They should be asked for any analyses they have done, what their toll structures are, and how they are determined, and any other knowledge they may have about how their costs relate to vehicle characteristics.

(d) Further Analysis of Single-Unit Truck Permits

Most of the survey work and analyses of OS/OW permits that have been done in the past and in this effort have focused on permits for LCVs and other combination vehicles. Most of the effort has covered OS/OW permits in general, but very little effort has focused on permits for single-unit trucks in particular, either in this project or in previous research. A few states have special higher limits and permit programs for "special hauling vehicles" such as dump trucks, concrete mixers, garbage trucks,

and other construction vehicles. Additional survey work should be devoted to single-unit truck issues.

(e) Cost-effectiveness Analysis of Alternative Enforcement Strategies

In Subsection 1.3 of this paper, the relative cost effectiveness of current Federal regulations governing enforcement planning and reporting was called into question. Current regulations may foster too much emphasis on weighing at fixed weigh stations for long periods in order to report a high number of vehicles weighed. Shorter weighing periods at randomized locations and at randomized hours would be much more cost effective, even if fewer trucks were weighed. Theoretical modeling of alternative strategies of this type was done as part of NCHRP Project 3-34, The Feasibility of a National Heavy Vehicle Monitoring System. Additional effort to refine that work can make the results more directly applicable to state practice, utilizing actual data on enforcement costs, citations, truck weights, and truck volumes from one or more states.

(f) Analysis of Permit Fees Based on Configuration vs. Number of Axles

Oregon's heavy vehicle permit fees, which have been referred to as an ESAL-mile tax, are the most carefully tailored to cost responsibility of any of the state permit systems. Idaho is also considering the adoption of permit fees based on configuration. Research into the complexity of administering and enforcing both types of fee structures, the relative burdens they impose on carriers, and their relative ability to capture costs.

(g) Use of AVI Transponders with Permits

Oregon, Idaho, and Utah have proposed a demonstration project involving the use of transponders on LCV permit vehicles traveling along the Portland-Boise-Salt Lake City corridor. All LCVs with proper credentials and transponders would be allowed to bypass ports of entry and weigh stations along this corridor. An analysis should be conducted of the feasibility and desirability of extending this approach to OS/OW permits nationwide, and using such a system as a tool for improving enforcement of size and weight limits.

(h) Investigation of National Monitoring and Enforcement Systems for OS/OW Permits

As noted in Subsection 1.3, Utah has recommended a national study on enforcement of OS/OW permitted vehicles. This recommendation is closely related to (e) above, because one of the primary ways of addressing Utah's concerns is to ensure the cost-effectiveness of enforcement resources. Such research should address systems which

might be developed at the national level to aid state efforts, such as a national database on OS/OW permit vehicles and carriers that could be accessed by states on a real-time basis. Such a system would encourage states to adopt permit practices that conform to national standards to take advantage of the automated national system.

(i) Guidelines for State Permit Systems

Research findings should be synthesized into guidelines for best practices for state permit systems, which include guidelines for establishing permit fee structures to cover full incremental costs of heavier and longer configurations.

(j) Specifications for Federal Regulation of State OS/OW Permit Systems

As described in Subsection 1.1 (g), three recent analyses of size and weight options (performed for TRI, FHWA, and TRB) have resulted in conclusions and recommendations for Federal regulation of OS/OW permit systems. An evaluation of options and tradeoffs between strict controls and loose guidelines is needed. In addition, items identified as subjects that should be covered in Subsection 1.1 (g) should be investigated.

3.0 References

1994

Federal Highway Administration; *Truck Size and Weight; Restrictions on Longer Combination Vehicles With Two or More Cargo-Carrying Units; Final Rule*; Federal Register; June 13, 1994.

General Accounting Office; *Longer Combination Trucks: Potential Infrastructure Impacts, Productivity Benefits, and Safety Concerns*; August 1994.

Idaho Transportation Department; *Highway Cost Allocation Study: Documentation of Computer Program Package*; prepared by Sydec, Inc.; February 1994.

1993

Federal Highway Administration; *Overweight Vehicles - Penalties & Permits: An Inventory of State Practices for Fiscal Year 1991*; April 1993.

Federal Highway Administration; *Larger Dimensioned Vehicle Study; Final Report*; September 1993.

General Accounting Office; *Longer Combination Trucks: Driver Controls and Equipment Inspection Should Be Improved*; November 23, 1993.

Oregon Department of Transportation; *1992 Motor Vehicle Cost Responsibility Study: Final Report and Technical Appendix*; July 1993.

1992

General Accounting Office; *Truck Safety: The Safety of Longer Combination Vehicles Is Unknown*; March 11, 1992.

Meyer, Cohen, and Roberts; *White Paper on the Feasibility of Longer Combination Vehicles (LCV's)*; AASHTO Joint Committee on Domestic Freight Policy; July 17, 1992.

University of Cambridge; *Proceedings of the Third International Symposium on Heavy Vehicle Weights and Dimensions*; June 1992.

1991

Oregon Department of Transportation; *Update of the 1986 Motor Vehicle Cost Responsibility Study*; May 1991.

1990

Sydec, Inc.; *Productivity and Consumer Benefits of Longer Combination Vehicles: Executive Summary*; prepared for the Trucking Research Institute; Alexandria, VA; June 1990.

Transportation Research Board; *Truck Weight Limits: Issues and Options*; Special Report 225; June 1990.

Transportation Research Board; *New Trucks for Greater Productivity and Less Road Wear*; Special Report 227.

Trucking Research Institute; *Productivity and Consumer Benefits of Longer Combination Vehicles*; Prepared by Sydec, Inc. and Jack Faucett Associates; June 1990.

1989

Billing, J.R., Cam, C.P., and Couture, J.; *Development of Regulatory Principles for Multi-axle Semitrailers*; Proceedings of the Second International Symposium on Heavy Vehicle Weights and Dimensions; Kelowna, B.C.; June 1989.

Baas, P.H., and White, D.M.; *Safety Improvements for Increased Weights and Dimensions in New Zealand*; Proceedings of the Second International Symposium on Heavy Vehicle Weights and Dimensions; Kelowna, B.C.; June 1989.

Oregon Department of Transportation; *Task Force on Motor Carrier Taxation: Final Report and Technical Appendix*; August 1989.

1988

Oregon Department of Transportation; *Motor Vehicle Cost Responsibility Study: 1986: Final Report*; August 1988.

1987

Western Highway Institute *Model Rules and Regulations for the Uniform and Safe Operation of Multiple Trailer Combinations (LCVs) Operated Under Special Transportation Permit*; San Bruno, CA; 1987.

1986

Federal Highway Administration; *Longer Combination Vehicle Operation in Western States*; Washington, D.C.; 1986.

1984

South Dakota Department of Transportation, Division of Planning, Office of Transportation Planning and Programs; *Interstate XX Demonstration Evaluation Report*; April 1984.