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NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM  
SYNTHESIS OF HIGHWAY PRACTICE

**68**

**MOTOR VEHICLE SIZE AND WEIGHT  
REGULATIONS, ENFORCEMENT,  
AND PERMIT OPERATIONS**

TRANSPORTATION RESEARCH BOARD  
NATIONAL RESEARCH COUNCIL

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# MOTOR VEHICLE SIZE AND WEIGHT REGULATIONS, ENFORCEMENT, AND PERMIT OPERATIONS

RESEARCH SPONSORED BY THE AMERICAN  
ASSOCIATION OF STATE HIGHWAY AND  
TRANSPORTATION OFFICIALS IN COOPERATION  
WITH THE FEDERAL HIGHWAY ADMINISTRATION

**AREAS OF INTEREST:**

ADMINISTRATION  
USER NEEDS  
OPERATIONS AND TRAFFIC CONTROL  
(HIGHWAY TRANSPORTATION)

TRANSPORTATION RESEARCH BOARD  
NATIONAL RESEARCH COUNCIL  
WASHINGTON, D.C.

APRIL 1980

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**NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM**

Systematic, well-designed research provides the most effective approach to the solution of many problems facing highway administrators and engineers. Often, highway problems are of local interest and can best be studied by highway departments individually or in cooperation with their state universities and others. However, the accelerating growth of highway transportation develops increasingly complex problems of wide interest to highway authorities. These problems are best studied through a coordinated program of cooperative research.

In recognition of these needs, the highway administrators of the American Association of State Highway and Transportation Officials initiated in 1962 an objective national highway research program employing modern scientific techniques. This program is supported on a continuing basis by funds from participating member states of the Association and it receives the full cooperation and support of the Federal Highway Administration, United States Department of Transportation.

The Transportation Research Board of the National Research Council was requested by the Association to administer the research program because of the Board's recognized objectivity and understanding of modern research practices. The Board is uniquely suited for this purpose as: it maintains an extensive committee structure from which authorities on any highway transportation subject may be drawn; it possesses avenues of communications and cooperation with federal, state, and local governmental agencies, universities, and industry; its relationship to its parent organization, the National Academy of Sciences, a private, nonprofit institution, is an insurance of objectivity; it maintains a full-time research correlation staff of specialists in highway transportation matters to bring the findings of research directly to those who are in a position to use them.

The program is developed on the basis of research needs identified by chief administrators of the highway and transportation departments and by committees of AASHTO. Each year, specific areas of research needs to be included in the program are proposed to the Academy and the Board by the American Association of State Highway and Transportation Officials. Research projects to fulfill these needs are defined by the Board, and qualified research agencies are selected from those that have submitted proposals. Administration and surveillance of research contracts are responsibilities of the Academy and its Transportation Research Board.

The needs for highway research are many, and the National Cooperative Highway Research Program can make significant contributions to the solution of highway transportation problems of mutual concern to many responsible groups. The program, however, is intended to complement rather than to substitute for or duplicate other highway research programs.

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The project that is the subject of this report was a part of the National Cooperative Highway Research Program conducted by the Transportation Research Board with the approval of the Governing Board of the National Research Council, acting in behalf of the National Academy of Sciences. Such approval reflects the Governing Board's judgment that the program concerned is of national importance and appropriate with respect to both the purposes and resources of the National Research Council.

The members of the technical committee selected to monitor this project and to review this report were chosen for recognized scholarly competence and with due consideration for the balance of disciplines appropriate to the project. The opinions and conclusions expressed or implied are those of the research agency that performed the research, and, while they have been accepted as appropriate by the technical committee, they are not necessarily those of the Transportation Research Board, the National Research Council, the National Academy of Sciences, or the program sponsors. Each report is reviewed and processed according to procedures established and monitored by the Report Review Committee of the National Academy of Sciences. Distribution of the report is approved by the President of the Academy upon satisfactory completion of the review process.

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## **PREFACE**

There exists a vast storehouse of information relating to nearly every subject of concern to highway administrators and engineers. Much of it resulted from research and much from successful application of the engineering ideas of men faced with problems in their day-to-day work. Because there has been a lack of systematic means for bringing such useful information together and making it available to the entire highway fraternity, the American Association of State Highway and Transportation Officials has, through the mechanism of the National Cooperative Highway Research Program, authorized the Transportation Research Board to undertake a continuing project to search out and synthesize the useful knowledge from all possible sources and to prepare documented reports on current practices in the subject areas of concern.

This synthesis series attempts to report on the various practices, making specific recommendations where appropriate but without the detailed directions usually found in handbooks or design manuals. Nonetheless, these documents can serve similar purposes, for each is a compendium of the best knowledge available on those measures found to be the most successful in resolving specific problems. The extent to which they are utilized in this fashion will quite logically be tempered by the breadth of the user's knowledge in the particular problem area.

## **FOREWORD**

*By Staff  
Transportation  
Research Board*

This synthesis will be of interest to those in state agencies who are responsible for regulating and enforcing overlimit vehicles on their highways. A lengthy review of permit, weighing, and regulating practices demonstrates the enormous differences that exist among states.

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Administrators, engineers, and researchers are faced continually with many highway problems on which much information already exists either in documented form or in terms of undocumented experience and practice. Unfortunately, this information often is fragmented, scattered, and unevaluated. As a consequence, full information on what has been learned about a problem frequently is not assembled in seeking a solution. Costly research findings may go unused, valuable experience may be overlooked, and due consideration may not be given to recommended practices for solving or alleviating the problem. In an effort to correct this situation, a continuing NCHRP project, carried out by the Transportation Research Board as the research agency, has the objective of synthesizing and reporting on common highway problems. Syntheses from this endeavor constitute an NCHRP report series that collects and assembles the various forms of information into single concise documents pertaining to specific highway problems or sets of closely related problems.

Many of the problems associated with enforcing oversize and overweight limits derive from the confusing variety of requirements—for applications, fees, issuance, signs, flags, escorts, actual limits, fines—from state to state and within states. This lack of uniformity sometimes leads truckers to believe that it is cheaper and less time consuming to risk being caught than to conform to law.

The report strongly recommends that uniform standards for interstate over-limit travel be sought. Enforcement efforts and permit procedures also need to be coordinated.

To develop this synthesis in a comprehensive manner and to ensure inclusion of significant knowledge, the Board analyzed available information assembled from numerous sources, including a large number of state highway and transportation departments. A topic panel of experts in the subject area was established to guide the researchers in organizing and evaluating the collected data, and to review the final synthesis report.

This synthesis is an immediately useful document that records practices that were acceptable within the limitations of the knowledge available at the time of its preparation. As the processes of advancement continue, new knowledge can be expected to be added to that now at hand.

## **CONTENTS**

1	SUMMARY
	<b>PART I</b>
2	CHAPTER ONE Legal Limits Introduction Characteristics of Limits Tolerances Exceptions
6	CHAPTER TWO Enforcement State Enforcement Programs Scale Deployment Citations and Dispositions
22	CHAPTER THREE Permit Operations Types of Permits General Controls over Permit Operations Types of Overlimits Trends in Permit Issuance Permit Limits Accessory Requirements Time Restrictions on Permit Operations Permit Application Procedures Other Variations in State Practice Problems Patterns for Improvement
40	CHAPTER FOUR Conclusions and Recommendations Enforcement Permit Operations
43	REFERENCES
	<b>PART II</b>
43	APPENDIX A Communication Concerning State Enforcement Practices on Vehicle Size and Weight
44	APPENDIX B Policy Statement: Uniform Overdimensional/ Overweight Permits Proposed by the Heavy-Specialized Carriers Conference
45	APPENDIX C Summary of WASHTO Mobile and Modular Home Requirements

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Floyd I. Thiel, Transportation Economist, Transportation Research Board, and James K. Williams, Transportation Safety Coordinator, Transportation Research Board, assisted the Special Projects Staff and the Topic Panel.

Information on current practice was provided by many highway and transportation agencies. Their cooperation and assistance were most helpful.



# MOTOR VEHICLE SIZE AND WEIGHT REGULATIONS, ENFORCEMENT, AND PERMIT OPERATIONS

## SUMMARY

Truck weighing programs are the cornerstone of size and weight enforcement, but the differences among the states in almost all aspects of enforcement are great both in amount and effectiveness. The differences include levels of enforcement activity, tolerance, actions taken toward violators, fine schedules for violations, and court actions.

Recommendations are obvious. There is certainly merit in having all size and weight enforcement assigned to a special operations unit that is adequately staffed. A careful program needs to be worked out for the use of various scales to ensure reasonable coverage of state systems and apprehension of violators. (Merits of different kinds of scales and operations are discussed in Chapter Two.)

Among the appropriate and effective actions needed to be taken against violators are fine schedules with deterrent effect. In many cases, these will require both legislative and regulatory action.

State authorities, through the American Association of State Highway and Transportation Officials and the National Governors' Association, need to coordinate programs and develop model systems with the assistance of the Federal Highway Administration.

Differences in permit issuance, which has greater impact on those affected than enforcement, are possibly even more numerous. The problem stems partially from the fact that not all states have similar views on permit issuance. But this does not explain the substantial differences in such things as permit limits, application and issuance methods, routine issuance definitions, types of permits, permit restrictions, and escort, plus motor vehicle accessory requirements.

Some provisions and procedures are obviously superior to others in achieving the results that most states seek. However, users, particularly industrial users—the truckers—find some provisions, or lack of them, unduly restrictive or time-consuming and costly.

The entire economy of a state can be adversely affected when moves of industrial devices are curtailed. Major plant installations have been known to change locations because a state has refused to allow some movements.

A state's ability to actually control sizes and weights on its highways is reduced because some truckers would rather risk getting caught than spend the time and money getting permits. Also, some states do not obtain as much as they should in permit fees. These are results of permit issuance requirements that are difficult to comply with.

There seems to be no reason why states could not cooperate to issue permits for interstate movements. One such compact needs to be examined because it has not had anticipated results. Because of adverse effects of current practice, the permit situation badly needs correction.

## LEGAL LIMITS

### INTRODUCTION

Enforcement activities and permit operations have a combined influence on the character and results of motor vehicle size and weight regulations and should be integral parts of one size and weight control system. However, their administration is not always combined and is often carried out by different state agencies. Even when only one agency is involved, fully effective coordination in the two functional areas is often lacking.

There are aspects of the two functions that are quite independent. Most size and weight enforcement involves vehicle movements within general legal limits that do not require permits. On the other hand, permit issuance is not of specific concern to enforcement officers except as it may relate to effectively controlling some kinds of movements. Practices, procedures, and specific provisions relating to the enforcement and permit functions are different enough to warrant separate treatment. This chapter gives a brief description of current state size and weight limits, Chapter Two deals with enforcement, and Chapter Three deals with permits.

In both administrative areas, the diversity of requirements, rules, and procedures among the states creates not only problems for the trucking industry and others needing to move large or heavy loads on the highways but also substantially different results in the effective control of sizes and weights. Although reasons for the differences are easy to understand, the magnitude of their impact makes it difficult to understand the apparent apathy to doing something to resolve them. Perhaps full realization of the significant differences and problems is lacking at levels of authority where effective action can be taken.

The purpose of this synthesis is to provide an initial basis for action. It contains a summary, from the best data currently available, of the major problems in both the size and weight enforcement and permit operations areas as well as some recommendations for action by national agencies and individual states.

To set the stage for an investigation of state size and weight enforcement programs and permit operations, there follows a very brief discussion of the legal limits established by the different states and the federal government. This is not intended to be a detailed analysis of the subject, which would occupy many pages of text. In any case, the subject has already been comprehensively treated recently in *NCHRP Report 198*, "State Laws and Regulations on Truck Size and Weight" (1).

For even more specific references, the most recent size and weight laws and regulations for each state are recorded in continuously updated manuals available from several sources, including the following:

- Bulletin Advisory Service, American Trucking Associations, Washington, D.C.,
- J. J. Keller and Associates, Neenah, Wisconsin,
- State Motor Carriers Handbook, Western Highway Institute, San Bruno, California,
- Topical Law Reports, Commerce Clearing House, Inc., Washington, D.C., and
- Annual Tabulation, American Association of State Highway and Transportation Officials.

### CHARACTERISTICS OF LIMITS

Each state has defined its own legal limits regulation. The allowable height, width, length, and weight for specific types of vehicles vary substantially among the states. Each state's current legal limits, which vary somewhat by highway system in some states, are given in Table 1. The table does not reflect statutory tolerances and exceptions that alter the actual sizes and weights permitted in some states (see Tables 2 and 3).

#### Federal-Aid Interstate Highways

The Federal-Aid Highway Act of 1975 allows weights up to 20 000 lb (2100 kg) on single axles, 34 000 lb (15 400 kg) on tandem axles, and 80 000 lb (36 300 kg) gross, and widths up to 8 ft (2.4 m) on the Interstate highway system. However, a clause provides for greater weights and widths if they were permitted before the 1956 Federal-Aid Highway Act.

#### Intrastate Differences

Limits sometimes differ among highway classes within a state. Some states establish higher limits for some highway classifications or specific routes; other states do not. Toll roads, for instance, can have a different set of limits. Twenty-five states vary their limits on different highway systems or designate special limits for certain routes.

#### Seasonal Consideration

Several northern states decrease weight limits in the spring to protect pavements from excessive damage during spring thaw. Similarly, some states allow more weight in winter so that the extra strength of the frozen pavement structure can be used. In Michigan, the legal weight limits are reduced 25 percent for concrete and concrete-based highways and 35 percent for other types of highways in March, April, and May. Maine allows a 5 percent weight tolerance generally and a 15 percent tolerance for forest products from December through February.

TABLE 1

## LEGAL DIMENSIONS AND WEIGHTS (1-3)

STATE	Length (ft)		Width (ft)	Height (ft)	Statutory Axle Limits (lb)		Gross Vehicle Weight (lb)		Basis for Gross Weight Limit
	Single-Unit Truck	Truck Combination			Single	Tandem	Five Axles	Other Comb.	
Alabama	40	55	8.0	13.5	20,000	36,000	84,000 <sup>e</sup>	84,000 <sup>e</sup>	TB
Arizona	40	65	8.0	13.5	20,000	34,000	80,000	80,000	TB
Arkansas	40	65	8.0	13.5	18,000	32,000	73,280 <sup>c</sup>	73,280 <sup>c</sup>	AL, SM
California	40	65	8.0	13.5	20,000	34,000	80,000	80,000	TB
Colorado	35	60 <sup>f</sup>	8.0 <sup>m</sup>	13.0 <sup>b</sup>	18,000 <sup>a</sup>	36,000	85,000 <sup>e</sup>	85,000 <sup>a</sup>	BF, SM, OF
Connecticut	55	55	8.5	13.5	22,400	36,000	73,000	73,000	SM
Delaware	40	65	8.0	13.5	20,000	40,000	80,000	80,000	TB, SM
District of Columbia	40	55	8.0	13.5	22,000	38,000	70,000	73,280	OT
Florida	40	55	8.0	13.5	20,000	40,000	80,000	80,000	TB, OT
Georgia	55	55	8.0	13.5	18,000	36,000	80,000	80,000	TB
Idaho	40	75 <sup>f</sup>	8.5 <sup>h</sup>	14.0	20,000	34,000	100,000 <sup>e</sup>	105,500 <sup>e</sup>	TB, BF
Illinois	42	60 <sup>f</sup>	8.0	13.5	18,000	32,000	73,280	73,280	SM, OT
Indiana	36	65	8.0	13.5	18,000 <sup>g</sup>	32,000 <sup>g</sup>	73,280	73,280	SM, AL
Iowa	40	60	8.0	13.5	18,000	32,000	73,280	73,280	OT
Kansas	42 1/2	65	8.0	13.5	20,000	34,000	85,500 <sup>e</sup>	85,500 <sup>e</sup>	OT
Kentucky	35	65	8.0	13.5	20,000	34,000	82,000 <sup>e</sup>	82,000 <sup>e</sup>	AL
Louisiana	40	65	8.0	13.5	20,000	34,000	80,000	80,000 <sup>i</sup>	AL
Maine	45	56.5	8.5 <sup>h</sup>	13.5	22,000	38,000 <sup>j</sup>	80,000	80,000	SM, BF
Maryland	40	55 <sup>f</sup>	8.0	13.5	22,400	40,000	73,280	73,280	SM, OT
Massachusetts	35	60	8.0	13.5	22,400	36,000	80,000	80,000	BF, SM
Michigan	40	55 <sup>f</sup>	8.0	13.5	20,000	34,000 <sup>d</sup>	80,000	154,000	BF, AL
Minnesota	40	65	8.0	13.5	20,000	34,000	80,000	80,000	TB
Mississippi	35	55	8.0	13.5	18,000	32,000 <sup>l</sup>	73,280 <sup>k</sup>	73,280 <sup>k</sup>	OT
Missouri	40	55 <sup>f</sup>	8.0	13.5	18,000	32,000	73,280	73,280	OT
Montana	40	60	8.5 <sup>h</sup>	13.5	18,000	32,000	76,800	76,800	OT, BF
Nebraska	40	65	8.0	14.5	20,000 <sup>p</sup>	34,000 <sup>q</sup>	85,500 <sup>n</sup>	95,000 <sup>n</sup>	OT
Nevada	40	70	8.0	14.0	20,000	34,000	80,000	89,500 <sup>s</sup>	BF, TB
New Hampshire	35	55	8.0	13.5	22,400	36,000	80,000	80,000	TB, SM
New Jersey	35	55	8.0	13.5	22,400	34,000	80,000	80,000	AL
New Mexico	40	65	8.0 <sup>m</sup>	13.5	21,000	34,320	75,000	86,400	OT
New York	35	55	8.0	13.5	22,400	36,000	80,000	80,000	TB
North Carolina	40	55	8.0	13.5	19,000	36,000	76,000	76,000	SM, OT
North Dakota	40	65	8.0 <sup>m</sup>	13.5	20,000	34,000	80,000 <sup>c</sup>	80,000 <sup>c</sup>	SM, OT, BF
Ohio	40	65	8.0	13.5	20,000	34,000	80,000	80,000	OF, OT
Oklahoma	40	65	8.0 <sup>m</sup>	13.5	20,000	34,000	85,500 <sup>e</sup>	90,000 <sup>e</sup>	TB
Oregon	40	60 <sup>f</sup>	8.0	14.0	20,000	34,000	80,000	80,000	TB
Pennsylvania	35	55	8.0 <sup>m</sup>	13.5	22,400	36,000	73,280	73,280	OT, SM
Rhode Island	40	55	8.5	13.5	22,400	36,000	80,000	80,000	SM
South Carolina	35	55	8.0	13.5	20,000	36,000 <sup>q</sup>	80,000	80,000	TB, SM
South Dakota	35	70	8.0	13.5	20,000	34,000	85,500 <sup>e</sup>	95,000 <sup>e</sup>	TB
Tennessee	40	55	8.0	13.5	18,000	32,000	73,280	73,280	AL
Texas	45	65	8.0	13.5	20,000	34,000	80,000	80,000	TB
Utah	45	65	8.0	14.0	20,000	34,000	80,000	80,000	TB
Vermont	60	60	8.5 <sup>h</sup>	13.5	22,400	36,000	80,000	80,000	OT
Virginia	40	55	8.0	13.5	20,000	34,000	76,000	76,000	SM, OT
Washington	35	65	8.0	14.0	20,000	34,000	80,000	80,000	TB
West Virginia	40	50 <sup>f</sup>	8.0	12.5 <sup>b</sup>	20,000	34,000	80,000 <sup>r</sup>	80,000 <sup>r</sup>	TB
Wisconsin	35	59	8.0	13.5	20,000	34,000	80,000	80,000	TB
Wyoming	60	85	8.0 <sup>m</sup>	14.0	20,000	36,000	101,000 <sup>e</sup>	101,000 <sup>e</sup>	TB

## Legend:

BF = Bridge formula

LN

$$W = 500 (\frac{N-1}{N} + 12 \frac{N}{N} + 36)$$

TB = A table of allowable gross vehicle weights derived from the bridge formula.

OF = A formula other than the bridge formula.

OT = A table other than the bridge table.

SM = Specified maximum limits.

AL = Axle limits.

1 ft = 0.3 m

1 lb = 0.45 kg.

<sup>a</sup>20,000 lb on Interstate highways.<sup>b</sup>13.5 ft on designated routes.<sup>c</sup>64,000 lb on some routes.<sup>d</sup>on designated highways only, otherwise 26,000 lb for tandem.<sup>e</sup>80,000 lb on Interstate highways.<sup>f</sup>On specific routes only the following lengths are allowed:

105 ft in Idaho; 65 ft in Illinois, Maryland, Michigan, Colorado,

and Missouri; 55 ft in West Virginia; 75 ft in Oregon.

<sup>g</sup>22,400 lb for single axle, 36,000 lb for tandem axle on

designated highways.

<sup>h</sup>8.0 ft on Interstate highways.<sup>i</sup>With rear triaxle, 83,400 lb on Interstate highways.<sup>j</sup>34,000 lb on Interstate highways.<sup>k</sup>57,650 lb on some routes.<sup>l</sup>28,650 lb on low-limit highways.<sup>m</sup>8.5 ft allowed on specified routes.<sup>n</sup>73,280 lb on Interstate highways.<sup>p</sup>18,000 lb on Interstate highways.<sup>q</sup>32,000 lb on Interstate highways.<sup>r</sup>65,000 lb on some highways.

TABLE 2  
TOLERANCE LEVEL BEYOND SPECIFIED LEGAL LIMITS (1, 4, 7, 8)

STATE	LEGAL LIMIT TOLERANCES	
	Statutory Tolerance?	Tolerance
Alabama	Yes	10% on axle weights
Arizona	No	None indicated
Arkansas	No	None indicated
California	No	None indicated
Colorado	No	None indicated
Connecticut	Yes	2% on weights not exceeding 73,000 lbs
Delaware	No	None indicated
District of Columbia	No	None indicated
Florida	Yes	10% on weights
Georgia	Yes	13% on weights
Idaho	No	None indicated
Illinois	No	None indicated
Indiana	Yes	1,000 lb on weights, 4% on length
Iowa	Yes	3% on single and tandem axles; 8% on axle groups; 8% on registered weight
Kansas	No	None indicated
Kentucky	Yes	5% on axle weights
Louisiana	Yes	2,000 lb on single axles, 3,000 lb on other axles (non-Interstate Highway)
Maine	No	5% to 15% on weights, varies with type of loads and season
Maryland	No	1,000 lb on weights
Massachusetts	No	5% tolerance on weight
Michigan	No	None indicated
Minnesota	No	None indicated
Mississippi	Yes	Confidential scale tolerance not statutory; 3,350 lb on tandem axles on designated routes
Missouri	No	None indicated
Montana	No	None indicated
Nebraska	Yes	5% on axle weight 3% on gross, maximum tolerance 1,000 lb
Nevada	No	None indicated
New Hampshire	No	5% on weight
New Jersey	Yes	5% on axle weight if GVW is not exceeded
New Mexico	No	None indicated
New York	No	5% on weights
North Carolina	Yes	5% on GVW and 1,000 lb on single axle, 2,000 lb on tandem axle
North Dakota	No	None indicated
Ohio	Yes	3% on weights
Oklahoma	No	None indicated
Oregon	No	
Pennsylvania	Yes	3% on axle weights or gross weight under 73,280
Rhode Island	No	None indicated
South Carolina	No	10% on weights
South Dakota	No	1,000 lb on GVW
Tennessee	No	None indicated
Texas	No	5% on axle weight; 5% on axle weight on permitted loads
Utah	No	None indicated
Vermont	Yes	5% on axle weights
Virginia	No	None indicated
Washington	No	None indicated
West Virginia	No	None indicated
Wisconsin	Yes	1,500 lb on single axle; 1,600 lb on tandem axles
Wyoming	No	None indicated

**TABLE 3**  
**EXCEPTIONS TO LEGAL LIMITS (2, 4)**

Type of Commodity or Vehicle	Military Vehicles			Farm Implements				Farm Products				Baled Hay and Straw			Cotton	Livestock	Milk	Forest Products			Road Machinery	Well-Drilling Equipment		Structural Members			Pipe, Poles, and Pillings			Auto or Boat Carriers			Mobile Homes	Concrete Mixers	Sand and Gravel	Fire Fighters	Snow Removers	Mowing Machines	Traction Engines
	A	L	W	L	W	H	Wt	L	W	H	L	Wt	Wt	W	L	Wt	Wt	W	L	W	L	L	L	W	L	H	W	W	Wt	Wt	A	A	A	W					
Alabama	X	X	X	9'	X	X	X	X	X	X			X	8'6"	X							X	X		X														
Arizona		X	X																		X		X	X		14'						X							
Arkansas		X	X																	X	X	X	X								X								
California		X	X	X						10'	14'		X		X	X	X	10'				X	X									X							
Colorado		X	X																			X																	
Connecticut										X	X											80'	80'		60'														
Delaware		X	X																			70'	70'		65'										9'2"				
District of Columbia																						80'	80'								X								
Florida																						X	X																
Georgia		X	X										X		75'	X						75'	75'		X														
Idaho		X	X			X						X			X	X														X									
Illinois		X	X	X								X									80'	80'	80'		X					X	X								
Indiana	X	X	X	X	X														X		X	110'	X		8'6"														
Iowa		X	X			X						X	X									X	X		60'					X									
Iowa		X	X			X						X	X																	X									
Kansas		X	X																			X			85'	X	8'6"	X		X	X								
Kentucky	X																			X	X			85'	X														
Louisiana		X	X								X	X	X	X	X	X														X									
Maine		X	X			10%		X							X	X	10%							X	X		10%	10%		X	X								
Maryland		X	X			X									70'							70'	70'		X										X				
Massachusetts		60'													60'		X					60'	60'																
Michigan		X	15'6"												8'8"										8'8"														
Minnesota		60'	X					X	X	X				8'4"	X	X							X		60'					X									
Mississippi		X	X	X							X				X							X	X							X									
Missouri		X	X																			X	X						X	X									
Montana			12'					X																															
Nebraska		X	X								X			8'4"								X	X																
Nevada		X						X							X							X	X																
New Hampshire								X						8'6"	X						X	X	X																
New Jersey			X					8'10"														X	X																
New Mexico		X	X																			X	X							X	X				X				
New York			X							X												X	X																
North Carolina								X														X	X																
North Carolina								X														X	X																
North Dakota	X																				X		X																
Ohio		X	X																		X	X									X					X			
Oklahoma		X	X																					80'							X								
Oregon	X	X	X											X	X	X						75'	75'																
Pennsylvania		70'	X	X	X			X						70'							70'	70'	70'	X															
Rhode Island		X	X																			X	X							X	X								
South Carolina																								X	X					X									
South Carolina																								X	X					X									
South Dakota		X	X											8'4"	80'							80'	80'	80'						X	X								
Tennessee		X	X																							X													
Texas		X	X											90'								X	X																
Utah		X	X																			X	X																
Vermont		X	X					X														X	X							X									
Virginia		X	X																			X																	
Washington		X	X																					X						X									
West Virginia		X	X											80'								X	X							X									
Wisconsin		X	X					9'			X	X	8'6"	X	X	X						X	X		8'6"					X									
Wyoming		X						X					X																										

**Legend:** A = all limits H = height limit  
 L = length limit Wt = weight limit  
 W = width limit x = varies up to no restriction

## TOLERANCES

Of the 18 states that have statutory tolerances on axle weights, 9 also have tolerances on gross weights. Tolerances range from 2 to 10 percent of the legal limits or are simply set between 1000 and 4000 lb (450 to 1800 kg). Basically, a tolerance is established to account for possible inaccuracy of weighing scales, both those that are employed in legal weighing and those that may have been used by people loading vehicles. The tolerance level for each state is given in Table 2.

## EXCEPTIONS

Most states grant some extensions of legal limits to military, agriculture, or other industries of local interest. The commodity load may be divisible or indivisible, depending on the discretion of the individual state. According to what the exception specifies, permitted overlimit shipments may be transported legally on designated highways or all highways. The most common types of exceptions are for extra length for indivisible loads such as pipes, poles, pilings, and structural members and extra width for farm implements. Exceptions to legal limits are given in Table 3.

## CHAPTER TWO

# ENFORCEMENT

### STATE ENFORCEMENT PROGRAMS

The individual states are responsible for the effective enforcement of all state and federal laws that pertain to the size and weight of vehicles operating within their borders. However, approaches to choosing the combination of weighing scale operations, deployment strategy, and responsible enforcement agency differ considerably.

The scale systems chosen by enforcement agencies are of three general types: portable, semiportable, and permanent (fixed). A fourth system, weight-in-motion, is often combined with one of the other scale types. The combination is determined by the enforcement strategy of the agency.

Hundreds of trucks can be weighed per day at a permanent scale site. A single installation located at or near a state port of entry on the inbound side of a major route can enforce the full range of laws regulating interstate trucking, while twin permanent scales—one in each direction—at a port of entry or elsewhere can effectively extend enforcement to shipments originating within the state. In spite of obvious volume advantages, the popularity of permanent scales is not universal. One state reports operating 66 fixed scales; others operate none.

Portable scales are small, light, and inexpensive, but the number of vehicles they can weigh per day is substantially smaller than that of fixed scales. It sometimes takes several operations to weigh one vehicle. This type of scale, however, does allow an enforcement crew to quickly set up a temporary weigh station along a route believed to be traveled by a disproportionate number of overweight trucks. Portable scale popularity varies considerably, from more than 500 scales in use in one state to fewer than 10 in others.

Semiportable scales can be installed in shallow pits or used on the ground surface by connecting two ramps at each end. These scales can weigh more vehicles per day

and have better operating efficiency than portables but are still reasonably easily movable to be used selectively where they are most needed. Because semiportable scales are commonly reported as portables, the extent of their popularity is not known.

Table 4 presents some characteristics of portable, semiportable, and fixed scales. They are compiled from specifications provided by some scale manufacturers in order to show the differences in their general characteristics. The deployment of each type of scale is discussed individually in the following sections.

Deployment and scheduling strategies vary with the type of scale and location. Permanent scales on inbound main routes often operate continuously; their outbound twins and other less important permanent installations can operate on a regular or a random basis. Portable and semiportable scales are usually employed in fair weather in daylight. While they are being used on a regular basis, random deployment rather than random scheduling will offer the element of surprise.

In most states, the agency responsible for enforcement is the state police department. In some of these states, truck size and weight laws have been seen as part of the larger body of vehicle-related laws and no emphasis has been given to their specific enforcement. This situation is rapidly changing, however, because of increasing pressure from federal authorities to protect national highway interests. In other states, a separate division of the state police carries out all enforcement in this area, which perhaps reflects more concern for highway damage or detrimental safety impacts of illegal vehicle operations. In a decreasing number of states, the responsibility for size and weight enforcement is assigned to a special division or section of the state transportation agency; in a few cases, other state agencies are involved. Regardless of which agency is responsible, the size, scope, and characteristics of enforcement op-

TABLE 4  
COMPARISON OF SCALES BY TYPE

Characteristic	Scale Type					
	Portable		Semiportable		Fixed	
Maximum weighing capacity (lb)	10,000	20,000	40,000	80,000	60,000	120,000
Weight of scale (lb)	40-60		700	1,400 (set of two)		-
Platform length	10	25 in.	7	13 ft		15 65 ft
Platform width	10	22 in.	25	35 in.		10 15 ft
Pit depth	N/A <sup>a</sup>		4-8 in.		4.5 6 ft	
Moving method	Hand carry		Trailer		Not movable	
Cost of scale	Low		Medium		High	

Source: Specification from scale manufacturers.

1 lb = 0.45 kg

1 in. = 25 mm

1 ft = 0.3 m

<sup>a</sup>N/A = not available.

erations differ materially from state to state in terms of both personnel and equipment used and the plans and strategies employed.

Uniformity among states is also lacking in the way permits for oversize or overweight highway movements are issued (see Chapter Three). The results increase the problems of enforcement in many ways. The enforcement agency may not be the issuing agency, and communications between the two may be poor. Permit provisions and controls and methods of issuance can differ materially from state to state, and there is very little communication among the states about their relevant enforcement operations.

Fine structures and adherence to them probably differ more from state to state than any other aspect of truck size

and weight enforcement. Some states have fixed fine structures—violators are given the same fines regardless of the amount over. Some have a variable structure—fines are based on the amount of oversize or overweight together and sometimes the distance traveled. The sizes of penalties vary extensively. A trucker driving a rig that is 12 000 pounds (5400 kg) overweight on an interstate trip of less than 100 miles (161 km) could be fined as little as \$100 in one jurisdiction or as much as \$2850 in another. Leniency among magistrates and judges also differs.

The wide variation in approaches to truck size and weight enforcement can be explained by the fact that it traditionally has been viewed as strictly a state matter subject only to state legislation. The recent federal certification program should bring about increased enforcement activity and an increased interest in the effectiveness of various enforcement strategies.

## SCALE DEPLOYMENT

### Fixed-Scale Use and Deployment

Fixed scales are commonly single-platform or three-platform scales. The latter allows a typical tractor-semi-trailer combination to be weighed in a single operation and will accommodate double-trailer vehicles in no more than two operations. Figure 1 shows a typical permanent scale layout. Sometimes only one weighhouse is used to monitor the traffic in both directions.

The type of instrumentation and degree of automation of fixed scales differ. In many cases with systems of traffic lights to move vehicles, one person can carry out the entire weighing operation although a larger crew is normally used. The apron next to the weighing platform is often marked or instrumented to allow simultaneous estimation of vehicle dimensions from the weighhouse. Straps suspended overhead can provide a measurement of height.

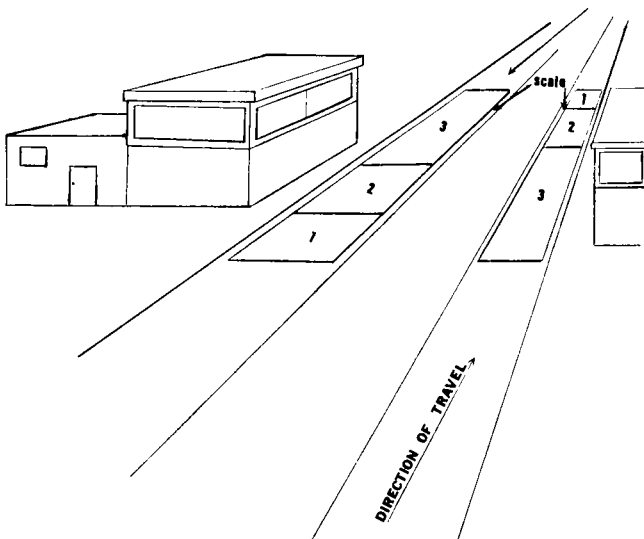


Figure 1. Typical permanent scale layout.

Table 5 gives the best available information on the current use and deployment of fixed scales by state. The information, however, has been compiled from several sources that do not always agree. The information on deployment and schedules for many scales was obtained by a brief telephone questionnaire shown in Appendix A. The total number of scales was compared with the figures reported to the Federal Highway Administration (FHWA) for 1978 certification. Where there is disagreement, the 1978 figures are shown in parentheses. The total number of scales reported sometimes varies because of different interpretations of what constitutes a scale or scale operation. For example, the state of Virginia reported a total of 25 permanent scales for the 1974 certification. The figures increased to 75 for the 1977 and 1978 certifications. The fact is that Virginia has 25 installations, each composed of 3 scales. Similarly, twin scales may be variously counted as one scale installation or two separate scales, particularly where two weighhouses at one location are employed for opposing traffic service.

There are also differences in interpreting what constitutes a port-of-entry scale installation. Some states designate fixed scales as port-of-entry types even though they are a distance from the border and have intervening interchanges. Some states have included scales at motor vehicle inspection stations; others may not have done so. Reporting agencies are not always aware of all installations run by other responsible agencies. Some states probably include scales that are no longer in use.

Table 5 gives a wide variation in the number of fixed-scale installations and their deployment. The characteristics of fixed scales and the nature of weighing operations also vary considerably, as will become apparent in subsequent sections.

#### *Types of Fixed Scales*

Two basic types of fixed-platform scales are employed by state agencies in truck weighing programs: beam (mechanical) scales and electronic scales. Beam scales have a platform, commonly of concrete, on a steel weighbridge, suspended on a system of levers and pivots connected to a weight readout system. Electronic scales involve a platform supported at the periphery on load-cell rocker bearing assemblies. The readout is electronic with digital display.

More recent versions of the beam scale also have electronic readout based on transducers or load cells mounted at the end of the main transverse level. Older versions of the beam scale can be retrofitted for electronic digital readout, and many apparently have been converted.

The newest fully electronic fixed scales have both advantages and disadvantages when compared with beam scales. Advantages include less complex and lower cost platform installation, automatic zero tracking, push-button zeroing, digital readout, printout capability, relative tamperproofness, built-in diagnostics, better motion stability, no special adjustments for load ranges, and fewer readout errors. Some of these advantages disappear or are reduced when the comparisons involve a beam scale fitted with an electronic readout, which can also provide for automatic zero

tracking, push-button zeroing, digital readout, and printout capability.

The primary disadvantages of fully electronic scales, may be less operational reliability and correspondingly higher maintenance costs as compared with the older beam types. The problems have been ascribed to the relative newness of the device. Another disadvantage is the relatively high cost of the entire scale installation when the cost of the electronics is included.

#### *Costs of Fixed-Scale Installations*

The costs of fixed-scale installations vary from site to site. A heavily traveled roadway, particularly a multilane divided highway, may require a complete installation for each direction of traffic flow, including sets of multiunit scales. Two complete weighhouses may be involved, although some installations use only one two-level building. However, there are cases where one set of scales and a single weighhouse are employed in the median of multilane divided highways. On a low-volume road a much less complicated single-platform scale may be used on one side of the roadway.

Primary installation costs cover the scale(s), weighhouse, and apron(s). Additional costs may include those of acquiring rights-of-way and constructing highway off and on ramps and parking areas, plus providing for associated activities such as a weigh-in-motion operation for preliminary screening.

The costs of scales depend on the type selected, such as mechanical or electronic, as well as on the number of platforms and other particulars of an installation. Costs of the buildings associated with the scales can vary considerably with the type and complexity of the operation. In some cases, a low-cost metal building can meet the requirements, particularly in low-traffic-volume areas where weighing is performed on a parttime, irregular schedule. In other cases, the building serves as the headquarters for a weight enforcement crew who cover an area that has portable scales as well as fixed scales. In differing circumstances, as previously indicated, buildings may have one or two stories.

Weigh-in-motion provisions cost between \$50 000 and \$100 000. However, weigh stations with weigh-in-motion equipment usually require larger areas, and the purchase of additional rights-of-way can add to the cost of the installation.

Table 6 gives typical costs of fixed-scale installations as estimated by enforcement authorities in a large proportion of the states. The northeast corridor installation cost estimate includes fully electronic scales and weigh-in-motion screening provisions in one of the heaviest traffic corridors in the country.

Most states appear to choose beam scales with electronic readouts in the \$60 000 (single platform) to \$200 000 (triple platform) cost range, which includes weigh platforms, aprons, and buildings.

#### **Portable Scale Use and Deployment**

Although they have the advantages of larger weighing capacities and more efficient operations, fixed scales can be



TABLE 5  
PERMANENT SCALES

STATE	Number by Deployment					Number by Schedule			
	Ports of Entry		Other		Total <sup>a</sup>	Contin- uous (A)	Daily Regular (B)	Random (C)	Other
	FAI	Non-FAI	FAI	Non-FAI					
Alabama	0	0	0	0	0	0	0	0	
Alaska	0	0	0	10	10				
Arizona	-	-	-	-	(11)				
Arkansas	5	9	0	0	14(18)	14	0	0	
California	0	0	45	4	49				A, B + C
Colorado	-	-	-	-	(26)				
Connecticut	0	0	2	1	3 (7)	0	0	3	
Delaware	0	0	0	1	1 (0)	0	0	1	
District of Columbia	0	0	0	2	2	0	0	2	
Florida	4	5	4	9	22	9	4	8	1
Georgia	-	-	-	-	(12)				
Hawaii	0	0	0	0	0				
Idaho	5	3	0	14	22(23)	8	3	11	
Illinois	-	-	-	-	(32)				
Indiana	-	-	-	-	(23)				
Iowa	0	0	17	21	38(37)	0	0	38	
Kansas	1	0	2	2	5 (12)	3	2	0	
Kentucky	0	1	6	0	7 (15)	0	6	1	
Louisiana	4	0	3	5	12	11	0	1	
Maine	0	0	0	1	1	0	0	1	
Maryland	-	-	-	-	(3)				
Massachusetts	0	0	0	0	0	0	0	0	
Michigan	-	-	-	-	(19)				
Minnesota	0	0	3	5	8	0	1	-	Others up to 16 hr. per day
Mississippi	12	26	0	2	40	31	4	5	
Missouri	0	0	25	16	41(39)	- <sup>b</sup>		3	
Montana	4	0	1	6	11(37)				A, B + C
Nebraska	0	0	4	11	15	15	0	0	
Nevada	0	0	0	8	8 (2)	0	0	8	
New Hampshire	-	-	-	-	(4)				
New Jersey	-	-	-	-	(4)				
New Mexico	5	12	0	0	17	17	0	0	
New York	0	0	0	0	0	0	0	0	
North Carolina	0	0	8	11	19	19	0	0	
North Dakota	6	5	1	0	12 (13)	10			2
Ohio	-	-	-	-	(23)				
Oklahoma	0	0	6	4	10 (12)				B + C
Oregon	2	1	10	53	(66)	3		63	
Pennsylvania	0	0	0	-	1 (2)	1	0	0	
Rhode Island	0	0	0	0	0	0	0	0	
South Carolina	0	0	9	0	9	0	0	9	
South Dakota	-	-	-	-	10 (8)				
Tennessee	0	0	7	4	11 (12)	7			4
Texas	0	0	1	3	4	0	0	4	
Utah	4	4	0	0	8(10)	8	0	0	
Vermont	0	0	2	2	4	0	0	4	
Virginia	-	-	-	-	(75) <sup>c</sup>				
Washington	2	2	16	43	63				A + C
West Virginia	0	0	0	3	3	0	3	0	
Wisconsin	-	-	-	-	(24)				
Wyoming	1	8	1	14	27(20)	9	3	14	1

Source: Responses of state enforcement agencies to telephone inquiry and FHWA certification requirements for 1978

<sup>a</sup>Numbers in parentheses are those reported to FHWA for 1978 certification

<sup>b</sup>Inbound FAI continuously, outbound FAI regularly

<sup>c</sup>25 sets of 3.

TABLE 6  
FIXED-STATION COSTS (1978)

COST ELEMENTS	COST RANGE (Thousands of Dollars)
1. Complete weigh station installation, both sides, with ramps, parking areas, and associated provisions	300 to 3,000 <sup>a</sup> (low ADT, single platform) (triple platform)
2. Building, scales, and apron on one side--no right of way, ramps, parking area (beam scales)	60 to 200 (single platform) (triple platform)
3. Building, scales, and apron on one side--no right of way, ramps, parking area (full electronic)	350 (triple platform)
4. One building	5 to 50 (metal) (perm., 2-story)
5. Off-road permanent site for portable scale operations	30 to 100
6. Weigh-in-motion (WIM) screening provision--complete	50 <sup>b</sup> to 100

Source: Responses of state enforcement agencies to telephone inquiry.

<sup>a</sup>Preliminary estimate for Northeast Corridor.

<sup>b</sup>Included in cost of complete provision for Northeast Corridor (item 1).

easily bypassed. Overweight trucks can take an alternate route around a permanent weighing station and then return to the main route at the next interchange. For this reason most states use portable scales to supplement fixed-scale installations.

Table 7 gives state-by-state use and deployment of portable scales. Total numbers of units are broken down by electronic and mechanical scales. Older, purely mechanical loadometers and more recent, mechanical units with hydraulic load cells are included under the mechanical heading.

The difficulties of defining permanent scales apply to portable scales as well. In reporting the number of portable scales to FHWA, some states give the total number of wheel-weighing units; some use the number of pairs capable of weighing tandem wheels or an axle, and some report the number of sets of units used in a complete vehicle-weighing operation but give no indication as to whether the set includes 2 wheel weighing units or 10. Because the certification requirement is a recent one, the definition difficulties are understandable.

The most commonly used portable scales are about the size of a briefcase, weigh about 50 lb (23 kg), and are designed to measure the vertical load on a single tire, the outside tire of a dual pair. A new model weighs the load on both tires. A single pair of portable units would suffice to weigh an entire truck—one axle, wheel, or dual pair at a time; but, if used in sets of four, the axle weights and

gross vehicle weight of a five-axle truck could be determined in only two or three weighings depending on the types of units employed. Best accuracy is achieved when all wheels of a truck are weighed simultaneously on level ground. Weighing one truck wheel or axle at a time can create error because more load is distributed to the axles on the ground in a lower position. This error is more significant if the commodity carried is fluid or powder.

The most common portable scale uses a hydraulic load cell and sells for about \$3200 for a set of four. The primary advantage of this hydraulic load-cell scale is that you need neither batteries nor access to an external power source. The disadvantage, when compared with electronic units, is that the analog readout is from a meter built into the scale. This reduces its convenience of use and versatility.

The electronic counterparts use strain-gauge load cells. These units are slightly larger than, about the same weight as, about twice as expensive as, and much more accurate than the hydraulic scales. Electronic scales feature digital readout on the single units with remote readout available for sets of two or four. In addition, four units with remote readout can be installed in a shallow pit for semipermanent operation. The primary disadvantages of the electronic scales are power source requirements—either alternating current or rechargeable batteries—and possibly higher maintenance costs.

A few states indicated that they still use the "original" loadometer scales. These purely mechanical scales are

TABLE 7  
PORTABLE-SCALE OPERATIONS

STATE	Numbers by Type			Deployment
	Mech.	Electronic	Total <sup>a</sup>	
Alabama			100	
Alaska			6(48)	
Arizona			8(10)	
Arkansas			132(68)	
California	292	0	292(321)	All State and County Roads
Colorado			11	
Connecticut	0	20	20(51)	All Highways
Delaware	5	4	9(5)	All State and Nonstate Roads
District of Columbia	8		8(12)	
Florida	96	14	110(167)	All State Roads without Permanent Scales
Georgia	144		144(272)	
Hawaii			10	
Idaho	15	28	43(28)	
Illinois			0(4)	
Indiana			127	
Iowa	80	0	80(75)	
Kansas		70	70(36)	All State Roads (others on request)
Kentucky	354		354(325)	
Louisiana			72(186)	
Maine	68	0	68	
Maryland			42(116)	
Massachusetts		24	24(48)	All State Roads
Michigan			324	
Minnesota	9	1	10(8)	
Mississippi	77	0	77	State Roads Only (county on request)
Missouri	70	0	70(64)	All Public Roads but Interstate
Montana	34	12	46(41)	All Highways
Nebraska	54	0	54(9)	All Highways
Nevada	8	14	22(21)	All Roads and Highways
New Hampshire	4	0	4(44)	
New Jersey			22(32)	
New Mexico	36	0	36(9)	All Roads and Highways
New York	157	10	167(150)	All Roads and Highways
North Carolina	348	0	348	US-N.C. Restricted Low Tonnage Axle Roads
North Dakota	84	1	85(84)	All Systems
Ohio			110	
Oklahoma	98		98	County/State and City Systems
Oregon	70		70	All state highways except Interstate
Pennsylvania	107	12	119(121)	
Rhode Island	3	0	3(12)	
South Carolina	70	8	78(82)	Entire State System
South Dakota			2(10)	
Tennessee	176	0	176	
Texas	528		528(530)	All Highways
Utah	16	0	16(12)	
Vermont	64	0	64(60)	
Virginia	146	0	146	
Washington	124	0	124	All Highway Systems
West Virginia	65	30	95(90)	
Wisconsin			110	
Wyoming	0	0	0	No Non-Permanent Enforcement

<sup>a</sup>Numbers in parentheses are those reported to FHWA for 1978 certification.

older, larger, heavier, more cumbersome, and take longer to use than modern wheel weighers. The opinion of weight enforcement officials in these states is that these loadometers are the most accurate portable scales available, and that they are willing to put up with the additional inconvenience to gain the additional accuracy.

#### *Semiportable Scales*

Scales generally referred to as semiportable can also be used by roving enforcement teams. These units come in pairs from 7 to 12 ft (2.1 to 3.7 m) long and can be moved on their own trailer or in the bed of a pickup truck. The cost of a standard pair capable of weighing tandem axles,

with remote digital readout, is about \$10 000. Power requirements are either 12 V DC (from an automobile cigarette lighter) or 110 V AC. These scales can also be installed in shallow pits for semipermanent operation and, if purchased in a 12-ft (3.7-m) length, can accommodate a standard triple-axle truck weighing up to 80 000 lb (36 000 kg). Because semiportable scales weigh 700 to 1000 lb (318 to 454 kg) per pair, they cannot be set up by one person. However, when set up, they allow an enforcement officer to direct the truck onto the weighbridges and to complete the weighing from a safe distance. In a more portable operation, a single 12-ft semiportable scale may be employed across the width of a truck to weigh one axle at a time. The primary advantage of the semiportable system is that it can weigh trucks more quickly and more safely than its fully portable counterpart. Even more trucks per day can be weighed if weigh-in-motion screening devices are installed at the same site. The primary disadvantages of semiportable scales are their size and weight, cost, and need for an external power source.

#### **Weigh-in-Motion**

The effectiveness of permanent weigh stations as enforcement tools has declined in recent years because the increasing use of citizen's band radios allows truckers to warn one another when a permanent weigh station is in operation. Accordingly, overweight or oversize trucks are often able to circumvent the station. This also may happen in the case of some vehicles that conform to the law but whose drivers are concerned with possible delay. High volumes of truck traffic on some Interstate routes also pose special problems in the case of fixed-scale operations. In the most serious cases, the volumes of trucks to be weighed may cause queues to develop on the highway shoulders, which increases truck transport time and creates a safety hazard. In particular, a line-haul trucker on a high-volume Interstate route traveling through several states with continuous-operation, port-of-entry, and midstate weigh stations may have to spend much time being weighed, only to reaffirm that the truck is within size and weight requirements.

Delay and unsafe queues—two of the trucking industry's most frequent and reasonable complaints—can be alleviated by weigh-in-motion (WIM) scale installations. Some states have used WIM scales for several years to collect highway statistics necessary for transportation planning. Use of WIM as an enforcement tool has been severely limited because of poor correlation between dynamic and static results. Recent installations, however, have brought dynamic weight measurements to within 5 percent of static weight measurements at a confidence level of 95 percent when the speed of the vehicle is held to between 35 and 45 mph (56 and 72 km/h), and within 1 percent if the speed is held below 10 mph (16 km/h).

Figure 2 shows a typical permanent WIM installation. In such an installation the first of two sets of weighbridges combined with detection loops give overall wheelbase, number of axles, weight of each axle (including left-to-right balance), weight of each tandem pair, gross weight, and weight allowability as determined by the American Association of State Highway and Transportation Officials (AASHTO) bridge formula. In addition, other identifying

information can be entered from the weigh station console. If the vehicle exceeds any predetermined limit, signal systems direct the vehicle to other scales. These may be at a fixed weigh station, a semipermanent site, or a temporary installation of portable or semiportable scales. In the future, a second set of WIM weighbridges—crossed at about 5 mph (8 km/h)—may be used if the courts can be persuaded to accept the results.

If a semipermanent WIM system is planned where measurements are made on the travel lanes of the highway itself, the cost can be quite modest. The initial expense for a single site (including scales, computer, mini-motor home, training, etc.) would be about \$60 000. Each additional site would be about \$3000 for one lane. In the present state of the art, such a system can provide only statistical data, because the speed of the vehicles cannot be effectively controlled. Also, proper signing upstream would be necessary to direct trucks into the lane containing the weighbridges; otherwise the statistical sample from such an installation would be biased toward either the slower or the faster vehicles that ordinarily use the lane.

WIM can readily be combined with an existing fixed installation for general as well as particular application. If the WIM equipment indicates a substantial number of overweight vehicles, the fixed installation could be opened. Operation could thus be limited to those times when the percentage of violators exceeds a predetermined threshold. Or, when the WIM equipment detects a possible violator, the operator can radio a description of the truck to a weight enforcement officer who shunts the vehicle to the fixed scales. Also, if WIM scales are installed on ramps to fixed scales, more fully automatic weigh or no-weigh operations should be possible.

Because current WIM scales are relatively simple, cheap, efficient, and effective, particularly as screening devices, they may well find wider acceptance as part of permanent fixed-scale installations in the future.

#### **Scale Accuracy**

All static scale systems currently available to enforcement agencies meet or exceed National Bureau of Standards (NBS) requirements for accuracy. Manufacturers of portable scales guarantee the accuracy of their products even when used in the less-than-ideal conditions often encountered by a roving enforcement team.

Manufacturers of WIM equipment indicate that dynamic weights within 1 percent of static weights are easily attained if the vehicle crosses the weighbridge at less than 10 mph (16 km/h). In spite of this accuracy, however, the courts do not, as yet, generally accept the results of WIM for judicial purposes. Accordingly, use of WIM scales is largely confined to screening, as previously indicated. This could change in the future.

Only one state reported difficulty with the legal acceptability of weighings made on scale systems currently available, and that was many years ago. Often judicial requirements are considerably less stringent than those of either the manufacturer or NBS.

Although most states require that the accuracy of all scales be certified yearly, some weight enforcement officers have their units checked as often as quarterly.

**Scheduling of Weighing Operations**

Weighing operations may be scheduled in several different ways. Some states operate fixed scales on a 24-hr schedule of 8-hr shifts. Others operate every day on a shift basis during daylight hours only or a mixture of dark and daylight hours. Still others operate on a random, unpublished schedule, usually of 4-hr periods.

The 4-hr random operation used to be considered effective because truckers never knew when they might be weighed and thus were not as prone to bypass. However, because with CB radio all drivers on a route immediately know when scales are opened, random operation loses much of its effectiveness.

In some cases, fixed scales are operated on a regular basis to intercept trucks at Interstate ports of entry but on an irregular basis at other locations within the state. Some permanent installations are in operation for as few as 52 days per year.

Operations with portable and semiportable scales vary considerably. In some cases, officers carrying portable scales may occasionally stop and weigh vehicles judged to be possibly overweight. In other cases, special enforcement crews give regular coverage to segments of the highway system and watch especially for possible violators. In still other cases, previously identified portable-scale sites may be operated for long enough periods of time to weigh a significant sample of passing truck traffic.

Generally, roving crews work during the day in fair weather. They often operate in conjunction with a fixed scale and intercept potential violators trying to avoid the permanent location by switching to an alternate route. In this case, the portable-scale operations may well catch more vehicles than the fixed-scale operations do.

Where enforcement officers are state troopers, they may work singly or in pairs. Sometimes weight enforcement officers without police authority may be accompanied by state troopers.

In most cases of roving operations, officers look for symptoms of overload such as slow acceleration and low-riding truck bodies or trailer boxes and platforms. They may also look for trucks, firms, or drivers known to be frequent violators. When a potential violator is spotted, the truck, patrol car, and crew move to the closest possible location suitable for safe weighing activities.

Table 5 gives the scheduling of the permanent weigh stations in each state. Of the 36 contiguous states and the District of Columbia contacted to answer the questions, as shown in Appendix A, 4 do not use fixed scales, 6 operate solely on a continuous basis, and 9 schedule all scales on a random basis. The other 17 have adopted a mixed strategy: some operate continuously or regularly, others randomly. Because of the numerous variances, it has not proved practicable to develop an illustration showing the differences among states in portable operations.

WIM operations are now established or being established in several states. Among the most long standing are Georgia and Texas. Minnesota is one of the most recent and is currently establishing an operation using a design from Saskatchewan in Canada.

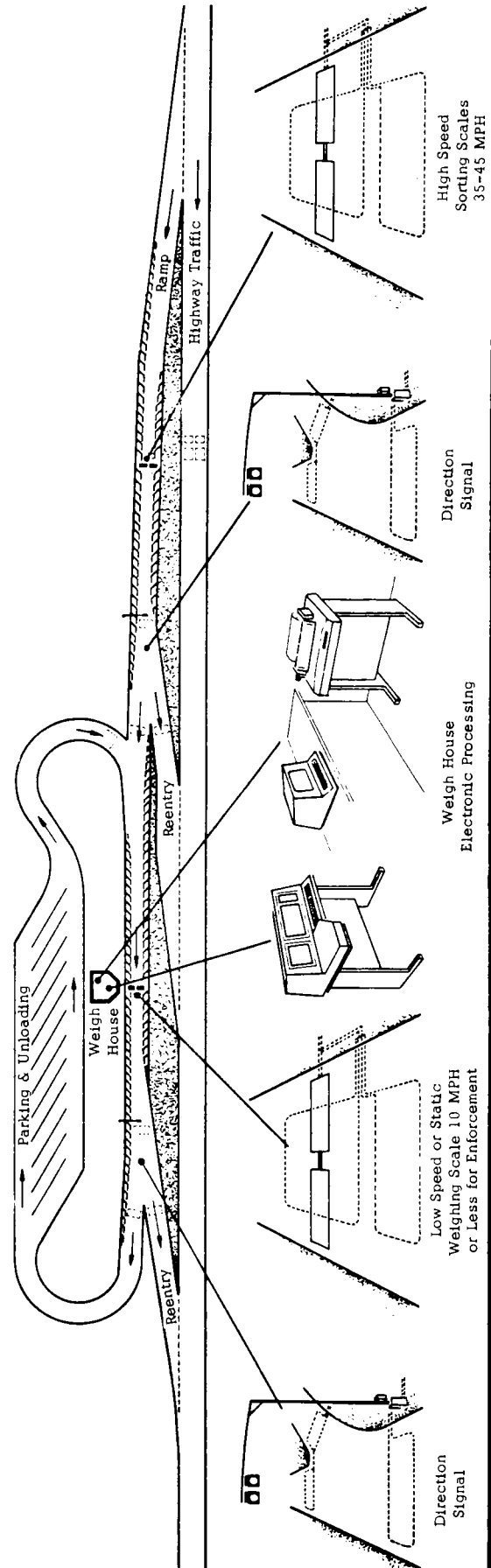


Figure 2. Typical permanent weigh-in-motion installation.

## CITATIONS AND DISPOSITIONS

### Vehicle Disposition and Fines

Table 8 gives the disposition of overweight vehicle offenses in the different states. This table has been compiled from several sources including truckers' handbooks, statutes, and enforcement officers in the listed states. The most recent statutes and practices may not be represented in every case, but the table is a good illustration of fundamental differences. Treatment varies considerably. In most cases the drivers of cited vehicles are required to bring their vehicles to within the legal limits. Usually part of the load must be removed if gross vehicle weight limit is exceeded. In some cases the load can be shifted to reduce the burden on the overloaded axle and bring an otherwise legal vehicle into compliance with the law. The driver is often allowed to move a short distance to a safer or more convenient unloading site. In one case the overloaded vehicle is required to move away from the scale site, and in some cases an escort is required.

Often the decision to require the driver to bring the vehicle within compliance is up to the officer. If the vehicle is loaded with livestock or perishable food, the driver is often allowed to continue. In the case of gaseous loads, the unloading location must be appropriate to the type of gas, and, in at least one case (Rhode Island), the escort must be driver-financed fire department personnel and equipment. If the vehicle must unload part of the cargo in order to bring the vehicle into legal compliance, the responsibility for the cargo unloading remains with the driver. A few states admit that their on-the-spot reduction laws are seldom enforced, which places them in the same category as states that have no unloading requirements.

Table 9 gives the approximate fine for gross overweight on a common five-axle tractor-semitrailer for the first offense. These figures were determined from the fine schedules provided by the states via telephone. A fine levied in a specific situation, however, may differ considerably from that listed in the table because of police or court discretion.

Generally, the amount of the fine is a function of the amount by which the vehicle is overweight. In many cases there is a tolerance on the legal limit, as shown in Table 2, to allow for scale inaccuracy. Occasionally, the distance the truck traveled while overweight, or the time of day the violation occurred, is also factored in the amount of fine.

Some states raise the fine structures for a driver at each offense and keep suspension as an option after as few as three convictions. Sometimes the fines are set by the judge or justice of the peace within statutory guidelines; other times the fine structure is set by law with no judicial discretion given. Often the structure sets a maximum fine seen by the enforcement agencies as being too low to provide a deterrent to regular overweight operations. In some states, a driver convicted of operating a vehicle excessively overweight—perhaps 25 percent or more—will be required to post a bond that may be forfeited upon conviction of a second similar offense. Several people indicated that the effectiveness of the fine structure can be reduced considerably by a lenient judiciary.

### Enforcement Agency

Table 10 gives the agencies responsible for enforcement of truck size and weight laws. Effective enforcement is necessary for the safety of the entire motoring public and ensures that loads do not shorten the service lives of the highways. Accordingly, responsibility for enforcement of size and weight laws lies with state departments of public safety (usually including the state police) in 24 states or with the department of transportation in 12 states. In a few states the responsibility lies with other state agencies that have regulatory or revenue functions associated with motor vehicles. In 4 states two agencies share the responsibility. The agency with primary responsibility may operate fixed and semipermanent weigh stations as well as conduct roving crew operations to enforce laws relating to trucks. The state police—when not the primary enforcement agency—may carry sets of portable scales to carry out their enforcement responsibilities and may work with the primary agency.

### Enforcement Effort

Trucking is a business and truckers want to maximize profits. Truckers know that when they are operating within specific states there is a certain probability that they will be weighed and measured. They also know the probability that they will be required to pay a specific fine if they are caught overweight. If the probability of being weighed and measured is 10 percent and the probability of being required to pay an overweight fine of \$100 is 50 percent, truckers know they can expect, in the long run, that it will cost them about \$5 on the average for every specific overweight load through the state [ $\$100$  (fine)  $\times$  0.10 (the probability of being checked)  $\times$  0.5 (the probability of being required to pay the fine if caught) = \$5]. If the state does not increase the fine with each subsequent violation and if the trucker can make more than an additional \$5 by operating overweight on a trip, the expected return exceeds the expected cost and many truckers will be tempted to run overweight. The overweight operation may be particularly tempting if the load is legal in other states on an interstate trip.

Some independent owner-operators may be inclined to operate above legal limits if it generally proves profitable. Many of these small businesses operate on marginal returns in a highly competitive and sometimes cutthroat environment. But they are of immense importance, especially to the nation's farm industry.

If the state desires to effectively reduce the number of overweight vehicles, it may possibly increase the likelihood of violators being apprehended by increasing the level of enforcement and increasing or improving the use of scales. The state may also increase the cost of violations to truckers once they are apprehended. Costs of violations may be in the form of fines or time and possibly property loss from mandatory unloading. Because the second of these two options might require more legislative and judicial cooperation than the first, the sensible short-run approach might be to alter enforcement strategy to maximize the likelihood that extralegal vehicles will be intercepted.

TABLE 8  
DISPOSITION OF OVERWEIGHT VEHICLES

State	No Unload Requirement	Unload Required May Move Vehicle To Convenient/ Safe Location	Unload Required On Site	Comment
Arizona		x	D	
Arkansas		x	D	Police escort to safe place
California		x	D	
Colorado		x	M	
Connecticut			≥ 90,000# (P)	D Type of load
Delaware			Over 25% (P)	D
District of Columbia		x	D	
Florida		≥ 6,000# (P)	M	
Idaho		x	D	
Illinois		x	M	
Indiana			x	D
Iowa		≥ 3,000# (P)	D	
Kansas		x	D	On axle only
Kentucky			x	M
Louisiana		Perishable or hazardous cargo	M	x M
Maine			x	Except unsafe
Maryland	Perishable cargo at 1st offense		Over 5,000# Within 5,000#	D
Massachusetts		x	D	Escort required
Michigan		x	D	
Minnesota		x	D	
Mississippi		x	D	
Missouri		Hazardous, perishable, livestock	P	x M Cargo consideration
Montana			x	D
Nebraska			x	
Nevada		x	D	
New Jersey		x	M	
New Mexico		x	D	
New York		x	D	Cargo consideration
North Carolina	Refrigerated or perishable	x	P	x D Cargo consideration
North Dakota		Livestock or perishable	P	x M Cargo consideration
Ohio		x	D	
Oklahoma		x	M	Cargo consideration
Oregon		x	M	
Pennsylvania			x	M Seldom enforced
Rhode Island	1st offense		2nd Offense	D
South Carolina		x	D	
South Dakota		x	D	
Tennessee		Over 80,000#	D	
Texas	Livestock		x	M
Utah		x	D	Cargo consideration
Vermont	x			
Virginia	x			
Washington		x	D	
West Virginia			x	D Seldom enforced
Wisconsin		x	M	
Wyoming		x	D	

Source: Responses of state enforcement agencies to telephone inquiry.

Legend: x = yes  
D = police discretion authorized by law  
M = mandatory by law  
P = practice

Table 11 gives the state estimated work hours for size and weight enforcement and the number of citations issued. In order to compare the enforcement effort among states with various travel characteristics, the numbers of work hours and citations were divided by the estimated rural truck mileage in each state. Table 12 gives the number of vehicles weighed or measured and the number of vehicles

cited for overweight or oversize from October 1976 through September 1977. It should be noted that interpretation difficulties extend to these data as well. Although most states report the weighing of a single tractor-semitrailer combination as one vehicle weighed, at least one state reports this as two vehicles weighed—one tractor and one semitrailer.

TABLE 9

TYPICAL FINES FOR VARIOUS LEVELS OF THREE-AXLE TRACTORS WITH TWO-AXLE SEMITRAILERS GVW OVERWEIGHT (FIRST OFFENSES)

STATE	Fine for Amount of Overweight				Comments
	1,000 lb	2,500 lb	6,000 lb	12,000 lb	
Arizona	\$ 30	\$ 55	\$ 255	\$ 280	
Arkansas	110	200	400	700	Set by Court or by Statute
California	10	20	160	910	Fines Are Mandatory
Colorado	20	30	45	75	By State
Connecticut	10 - 20	25 - 50	120 - 180	600 - 720	Fines Set by Statute
Delaware	20	50	150	450	By State
District of Columbia	100	100	100	100	Fine Independent of Severity
Florida	10	85	260	560	Civil Penalty - Lien on Vehicle
Georgia	8	30.5	138	418	
Idaho	12.5	26.25	67.5	132.50	
Illinois	0	60	320	920	
Iowa	10	25	75	480	
Kansas	20	50	120	240	Bond System - Judicial Discretion
Kentucky	50	55	280	500	Fine Assessed above 5% tolerance
Louisiana	200	200	400	700	
Maine	0	40	80	200	
Maryland	0	30	100	400	
Massachusetts	30	90	180	420	
Michigan	20	60	320	920	Court Discretion
Minnesota	50	50	400	500	Supreme Court Guidelines - Judicial Discretion
Mississippi	17.50	52.50	105	210	Minimum 50 Mile Violation
Missouri	52	202	552	1,152	
Montana	30	40	50	125	Set Minimum - Judicial Discretion
Nebraska	25	25	100	200	Strictly Judicial Discretion
Nevada	0	20	100	475	Set Fine Schedule - No Judicial Discretion
New Jersey	50	50	120	260	
New Mexico				200	Fine Set by Court - No Minimum
North Carolina	10	30	130	430	Exceeding 5% tolerance
North Dakota	10	25	190	670	
Ohio	25	50	145	385	
Oklahoma	75	85	155	250	Bail Bond System
Oregon	15	25	420	840	Maximum fine--Judicial Discretion
Pennsylvania	150	150	1,050	2,850	
Rhode Island	10	25	60	120	Possible Suspensions
South Carolina				100	Maximum Fine - Judicial Discretion
South Dakota	0	85	350	950	
Tennessee	25			80	Maximum Fine - Judicial Discretion
Texas	25			200	Fine Function of Number of Offenses - Judicial Discretion
Utah				299	Maximum Fine - Judicial Discretion
Vermont	5	15	60	180	No Judicial Discretion
Virginia	20	50	300	600	Possible Suspension
Washington	80	125	230	410	
West Virginia	20	20	60	180	
Wisconsin	60	100	470	890	
Wyoming	100			100	Set Maximum Fine for the No. of Offenses and Time of Day

Source: Responses of state enforcement agencies to telephone inquiry.

1 lb = 0.45 kg



TABLE 10

## AGENCIES RESPONSIBLE FOR TRUCK SIZE AND WEIGHT ENFORCEMENT

STATE	RESPONSIBLE AGENCY
Alabama	Department of Public Safety
Arizona	Motor Vehicle Division, Department of Transportation
Arkansas	Weight Division, Arkansas State Highway and Transportation Department
California	California Highway Patrol
Colorado	State Police and Department of Revenue - Ports of Entry
Connecticut	State Police
Delaware	Delaware State Police
District of Columbia	Department of Transportation & Metro Police
Florida	State Highway Patrol
Georgia	Permit and Enforcement Division, Department of Transportation
Idaho	Weight Station Bureau Commercial Vehicle Division, Department of Law Enforcement
Illinois	Illinois State Police
Indiana	Indiana State Police
Iowa	State Highway Department, Highway Patrol
Kansas	Motor Carriers Inspection Bureau, Department of Revenue
Kentucky	Department of Transportation, Division of Highway Enforcement
Louisiana	Department of Transportation and Development
Maine	State Police
Massachusetts	Department of Public Safety
Michigan	Driver & Vehicle Administration, Public Service Commission
Minnesota	Minnesota State Patrol
Mississippi	Motor Vehicle Comptroller
Missouri	State Highway Patrol
Montana	Department of Highways, GVW Division - Highway Patrol
Nebraska	State Patrol
Nevada	Primary - Motor Carrier Department, Secondary - Nevada Highway Patrol
New Hampshire	Motor Vehicle Division, Department of Safety
New Jersey	Division of Motor Vehicles, Bureau of Motor Carriers
New Mexico	Motor Transportation Division, Department of Transportation
New York	New York State Police
North Carolina	Department of Transportation, Division of Motor Vehicles
North Dakota	Truck Regulatory Division of State Highway Department
Ohio	Ohio State Highway Patrol & Department of Transportation
Oklahoma	Department of Public Safety
Oregon	Highway Division and State Police
Pennsylvania	State Police
Rhode Island	Registry of Motor Vehicles
South Carolina	South Carolina Highway Patrol
South Dakota	Department of Public Safety
Tennessee	Enforcement Section, Motor Vehicle Division, Department of Revenue
Texas	Department of Public Safety
Utah	Utah State Highway Patrol
Vermont	Department of Motor Vehicles and Department of Public Safety, State Patrol
Virginia	State Police
Washington	Washington State Patrol
West Virginia	Weight Enforcement Division, Highway Department
Wisconsin	Department of Transportation
Wyoming	Highway Patrol

Figure 3 shows how the number of cited vehicles changes as more time is devoted to enforcement. When the enforcement effort is poor, the probability of a nonlegal vehicle's being caught is low. Therefore, the number of vehicles cited is also low but increases as more hours are used until at some point truckers are apparently inhibited from operating overweight vehicles. The percentage of overweight vehicles begins to decrease significantly so that fewer vehicles are cited even though more effort may be expended.

The relationship between enforcement effort and percentage of overweight vehicles is further substantiated by Figure 4. Four states found that, at fewer than  $50 \times 10^{-6}$

work hours per truck mile, more than 20 percent of the weighed vehicles were overweight. However, an average 11 percent are overweight for the states in the sample group for which work hour information is available. The percentage drops significantly where enforcement hours are increased and levels off at a point somewhere between 70 and  $120 \times 10^{-6}$  work hours per truck mile.

The preceding provides a rough basis for estimating those levels of enforcement effort likely to be most cost effective in reducing overweight. Its applicability in each state depends, however, on judicial action and the fine structure and on typical truck shipping characteristics.

TABLE 11  
LEVEL OF ENFORCEMENT EFFORT

STATE	Work Hours (1976) <sup>a</sup>			Citations <sup>b</sup> (10/1/76 - 9/30/77)	Work Hours/ Rural Truck Mile	Citations/ Rural Truck Mile (x 10 <sup>-6</sup> )
	Fixed Scales	Temporary & Roving	Total			
Alabama	N/A <sup>c</sup>			5,189		
Alaska	N/A			439		
Arizona	N/A			650		
Arkansas	208,000	101,920	309,920	7,932	188	4.5
California	124,800	116,480	241,280	58,736	47	10.6
Colorado	284,960	10,400	295,360	5,201	245	3.9
Connecticut	4,160	4,160	8,320	1,525	22	4.1
Delaware	N/A			86		
District of Columbia	0	16,640	16,640	1,589		
Florida				26,089		
Georgia				11,946		
Hawaii				3		
Idaho				3,314		
Illinois	312,000	16,640	328,640	31,170	100	9.0
Indiana	45,340	22,670	68,010	10,614	24	2.5
Iowa	-	-	160,300	22,245	72	6.8
Kansas				44,610		
Kentucky				7,195		
Louisiana	166,400	41,600	208,000	6,616	164	5.2
Maine	0	12,480	12,480	1,952	20	3.1
Maryland				11,697		
Massachusetts				1,359		
Michigan				3,341		
Minnesota	15,600	13,520	29,120	6,279	17	3.2
Mississippi				9,815		
Missouri	324,480	62,400	386,880	25,395	177	9.3
Montana	74,880	18,720	93,600	1,708	119	1.3
Nebraska				23,636		
Nevada	370	995	1,265	401	3	0.6
New Hampshire				646		
New Jersey	8,320	10,400	18,720	5,010	23	5.3
New Mexico				2,014		
New York	0	97,760	97,760	11,199	35	3.6
North Carolina				20,128		
North Dakota				1,639		
Ohio				10,574		
Oklahoma				4,666		
Oregon	141,440	18,720	160,160	45,548	122	34.5
Pennsylvania				1,254		
Rhode Island				-		
South Carolina				8,844		
South Dakota				446		
Tennessee	124,800	135,200	260,000	27,123	97	8.4
Texas	-	-	266,240	107,428	33	4.8
Utah	145,600	12,480	158,080	6,202	294	8.0
Vermont	6,240	2,080	8,320	918	48	4.6
Virginia	193,440	41,600	235,040	15,001	76	4.4
Washington	148,720	36,820	185,540	25,452	197	24.8
West Virginia	2,080	93,600	95,680	3,064	128	3.3
Wisconsin	74,650	29,430	104,080	13,573	53	6.1
Wyoming	0	14,560	14,560	699	43	1.3

<sup>a</sup>These work hours are the "man-hours" of the questionnaire for NCHRP Report 198. 1 mile = 1.6 km.

<sup>b</sup>Citations for 1977 FHWA certification requirements.

<sup>c</sup>N/A = not available.

TABLE 12  
ENFORCEMENT VOLUMES (10/1/76-9/30/77)

STATE	Vehicles Checked		Vehicles Cited		Percent Overweight of All Weighed	Percent Oversize of All Measured
	Vehicles Weighed	Vehicles Measured	Overweight	Oversize		
Alabama	11,075	N/A <sup>a</sup>	4,665	524	42.1	-
Alaska	26,149	642	439	N/A	1.7	-
Arizona	12,260	7,771	582	68	4.7	0.9
Arkansas	4,082,216	4,082,216	7,475	457	0.2	0.0
California	4,692,256	4,692,256	54,107	4,629	1.2	0.1
Colorado	1,722,157	43,300	4,688	513	0.3	1.2
Connecticut	N/A	N/A	1,525	N/A	-	-
Delaware	N/A	N/A	59	119	-	-
District of Columbia	1,748	500	1,589	0	90.0	0.0
Florida	3,244,290	3,244,290	24,511	1,578	0.8	0.0
Georgia	263,290	263,290	4,461	7,485	1.7	2.8
Hawaii	188	151	10	11	5.3	7.3
Idaho	751,342	N/A	3,238	76	0.4	-
Illinois	5,176,300	5,176,300	30,091	1,079	0.6	0.0
Indiana	869,244	869,244	7,069	3,545	0.8	0.4
Iowa	804,733	804,733	15,101	7,144	1.9	0.9
Kansas	781,901	781,901	3,991	475	0.5	0.1
Kentucky	196,350	215,985	6,523	672	3.3	0.3
Louisiana	1,678,238	49,304		6,616	-	-
Maine	N/A	N/A	1,883	69	-	-
Maryland	145,377	231,310	6,096	5,601	4.2	2.4
Massachusetts	14,739	14,739	1,136	12	7.7	0.1
Michigan	1,765,994	N/A		3,341	-	-
Minnesota	424,156	424,156	5,570	709	1.3	0.2
Mississippi	9,012,200	3,217	9,377	438	0.1	13.6
Missouri	3,096,414	3,096,414	20,357	5,038	0.7	0.2
Montana	365,842	57,766	996	712	0.3	1.2
Nebraska	1,468,627	324,151	22,508	1,128	1.5	0.3
Nevada	987	987	252	149	25.5	15.1
New Hampshire	20,491	664	518	128	2.5	19.3
New Jersey	21,851	1,533	4,436	574	20.3	37.4
New Mexico	3,200,000	16,000	1,865	149	0.1	0.9
New York	39,968	7,242	9,992	1,207	25.0	12.1
North Carolina	4,180,550	N/A	19,323	805	4.6	-
North Dakota	916,722	45,000	1,516	123	0.2	0.3
Ohio	4,851,000	4,851,000	10,035	539	0.2	0.0
Oklahoma	490,425	33,884		4,666	-	-
Oregon	1,072,973	1,072,973	45,398	150	4.2	0.0
Pennsylvania	12,960	5,185	378	876	2.9	16.9
Rhode Island	N/A	N/A	0	0	-	-
South Carolina	118,750	169,872	7,509	1,335	6.3	0.8
South Dakota	20,045	N/A	312	134	1.6	-
Tennessee	4,700,000	235,000	22,596	4,527	0.5	1.9
Texas	435,758	435,758	103,090	4,338	23.6	1.0
Utah	1,318,300	143,810	4,315	1,887	0.3	1.3
Vermont	10,383	10,383	808	110	7.8	1.1
Virginia	6,890,710	13,681	13,607	1,394	0.2	10.2
Washington	4,090,200	4,855	23,441	2,011	0.6	41.4
West Virginia	84,093	2,454	2,454	610	2.9	24.9
Wisconsin	1,107,459	1,107,459	11,882	1,691	1.1	0.2
Wyoming	26,701	49,374	446	253	1.7	0.5

Source: 1977 FHWA certification requirements.

<sup>a</sup>N/A = not available.

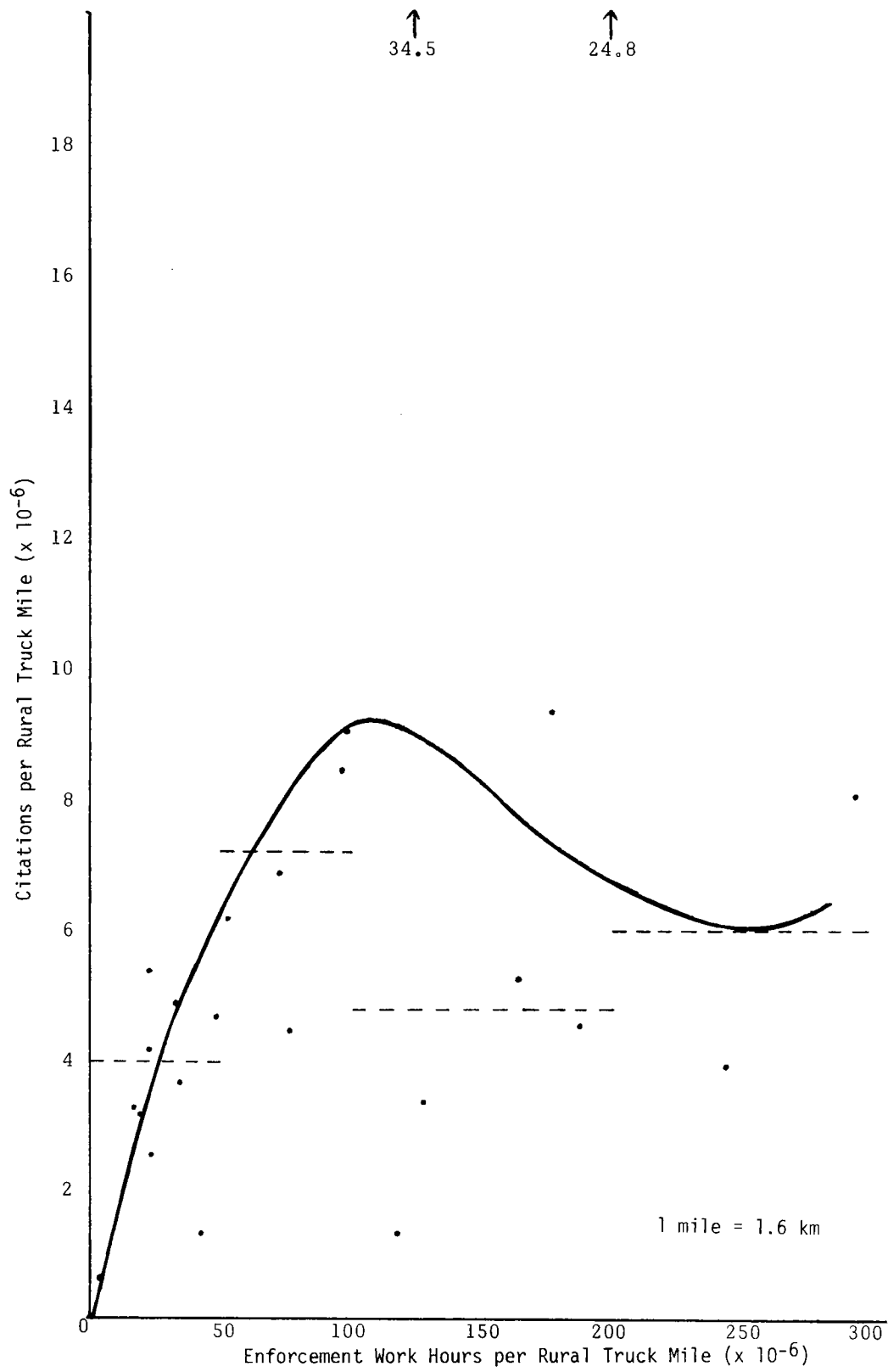


Figure 3. Citations per truck mile vs. work hours per truck mile.

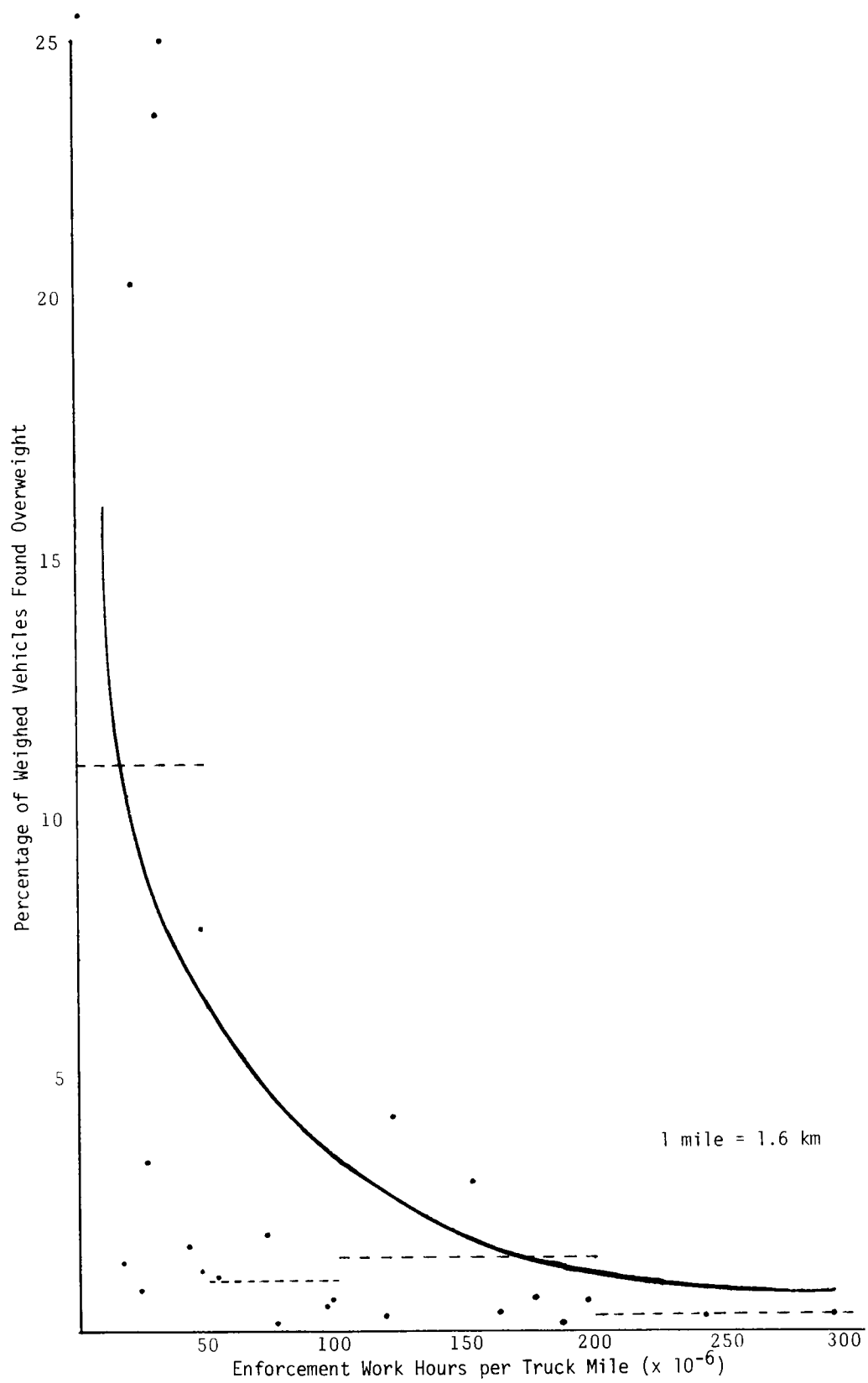


Figure 4. Percent of overweight vehicles vs. enforcement effort.

## PERMIT OPERATIONS

Statutory size and weight limits specify the maximum allowable dimensions and weights of motor vehicles on the highway systems within a state. When an indivisible piece of cargo exceeds the specified limits in length, width, height, or weight and the highway is the most practicable mode of transportation, a permit must be obtained before shipping starts. Construction equipment, mobile homes, and very large electrical transformers are examples of commodities for which permits are usually granted. Several states also grant permits for reducible loads of significant economic importance. For example, some states consider agricultural produce important enough to allow extra weights during the harvest season. Under these circumstances, permits are granted to shippers of certain types of reducible commodities.

The primary objectives of permit operations are to control shipments of overlimit and not readily dismantled cargo so that (a) the structural integrity of the highway system may be protected and (b) such shipments do not create traffic safety hazards or undue delays for motorists.

Although objectives may be the same, states vary substantially in their practices for permit operations. *NCHRP Report 80*, "Oversize-Overweight Permit Operation on State Highways" (5) presented a thorough review of practices in the mid-1960s. Among the objectives of this report are updating the information in *Report 80*, analyzing the current trends of state practices, identifying the problems of the current system, and recommending improvements.

### TYPES OF PERMITS

In general there are two types of size and weight control permits: single-trip permits and multiple-trip permits.

A single-trip permit is good for a single, one-way or round trip as specified in the permit under the laws of each state. Most states issue single-trip permits that are valid for from 3 to 5 days. Thirty-five states issue single-trip permits that are valid for less than one week, 11 that are valid for from one to two weeks, and only the District of Columbia and North Carolina issue 30-day single-trip permits. Twenty-eight states will grant an extension of a similar period if a shipment is not made within a permit period because of an unforeseeable situation such as inclement weather and if the permittee telephones to request this type of extension when the permit is still valid. Two other states grant extensions but only for one day. At least 3 states require an extension fee.

According to the previous NCHRP study, about two-thirds of all single-trip permits were issued each to construction equipment and mobile homes equally.

Multiple-trip permits cover movements within a certain period of time, from two weeks to one year. Generally,

multiple-trip permits are issued to manufacturers, contractors, and others who frequently need to ship the same kind of overlimit load. There are usually ceiling limits specified by each state to control the issuance of multiple-trip permits. These are not necessarily the same in each state. A single-trip permit is still needed if the size or weight of a cargo shipment is to exceed the limits specified on the multiple-trip permit.

Most states limit permit issuance to nonreducible loads. However, for economic reasons, some states allow overlimit divisible loads, such as grain, crops, forest products, fuel, and concrete, to be moved on a permit basis. As a result, there are several typical categories of movements permitted under multiple-trip permits, and a state may permit any combination of them. These include:

1. Seasonal harvest permits, granted as blanket permits by several states to unprocessed agricultural produce on a seasonal basis;
2. Special permits to allow specific overlimits for forest products;
3. Blanket permits for implements of husbandry with the radius of movement ordinarily restricted;
4. Work-project-oriented permits to allow utility or highway construction, maintenance equipment, and material to move to the construction site for the duration of a project;
5. Permits for mobile home manufacturers or dealers;
6. Blanket permits for energy resources, such as petroleum, fuel, and coal;
7. Permits for public utility poles or pipes; and
8. Other permits for specific industry resources or manufactured products.

The variance in permit policy with respect to reducible loads is offset to some degree by exceptions to legal limits that apply variously in every state. Table 3 shows these exceptions.

According to the data documented in *Report 80*, about 35 percent of multiple-trip permits were issued for construction equipment and 15 percent for mobile homes. Structural members and pipes and poles altogether accounted for another 15 percent.

Table 13 gives the number of permits issued in 1977 by all contiguous states except Connecticut, Oregon, Pennsylvania, New Jersey, Oklahoma, and South Dakota, for which accurate current data are not available. The multiple-trip permits are broken down into 30-day, 90-day, 6-month, and 12-month (annual) groups. About 88 percent of all permits are single-trip permits. Annual and monthly permits account for approximately 5 percent each; the remaining 2 percent are quarterly and semiannual permits.

TABLE 13  
NUMBER OF PERMITS ISSUED (10/1/76-9/30/77)

STATE	SINGLE-TRIP PERMITS	MULTIPLE-TRIP PERMITS			
		≤ 30 day	Up to 90 day	6 month	Annual
Alabama	31,295	0	1,021	0	653
Arizona	45,907	7,409	0	0	1,003
Arkansas	87,531	0	0	0	0
California	99,286	0	466	0	6,234
Colorado	55,235	6,069	0	0	0
Delaware	19,826	344	0	0	6
District of Columbia	1,479 <sup>k</sup>	0	0	0	747
Florida	77,113	431	0	0	7,773
Georgia	48,856	0	261	0	3,390
Idaho	22,907	208	0	0	3,836
Illinois	121,130	4,510	6,625	265	0
Indiana	100,261	0	0	0	11,215
Iowa	48,319	0	0	0	9,789
Kansas	60,715	0	0	0	0
Kentucky <sup>a</sup>	56,190	0	0	0	730
Louisiana <sup>b</sup>	140,364	300	0	0	0
Maine	14,453	2,960	0	0	0
Maryland	179,639	1,857	0	0	187
Massachusetts	21,250	0	3,750	0	6,000
Michigan	76,507	12,308	0	0	0
Minnesota <sup>c</sup>	43,339	8,411	1,562	0	632
Mississippi	46,369	0	0	727	0
Missouri	75,032	600	0	0	3,489
Montana	22,898	0	0	0	40,404
Nebraska <sup>d</sup>	37,233	0	629	0	0
Nevada	7,205	0	0	0	2,140
New Hampshire <sup>e</sup>	12,586	15	0	0	550
New Mexico	41,390	0	0	0	3,379
New York	45,395	16,039	4,353	0	2,802
North Carolina	29,914 <sup>k</sup>	0	0	0	7,150
North Dakota	40,146	0	0	0	0
Ohio	97,792	114	0	0	1,267
Oregon	37,676	182	133		15,441
Rhode Island	2,022	0	0	38	2
South Carolina	5,229	27,966	0	0	2,401
Tennessee	58,721	5,804	0	0	726
Texas	336,646	18,730	2,809	0	1,060
Utah <sup>f</sup>	38,053	0	23,345	0	2,162
Vermont	5,715	0	0	0	764
Virginia <sup>g</sup>	28,175	0	0	0	10,375
Washington <sup>h</sup>	121,784	8,615	4,034	0	12,571
West Virginia	105,648	0	0	0	0
Wisconsin <sup>i</sup>	44,288	0	0	0	24,076
Wyoming <sup>j</sup>	69,684	0	0	0	704
TOTAL	2,623,527	122,650	48,855	1,030	168,217
Percentage change from 1966	+72%	+36%	+42%	-95%	+171%

Source: 1977 FHWA certification requirements.

<sup>a</sup>Loads of industrial resources can be divided.

<sup>b</sup>Loads of agricultural or forest products can be divided.

<sup>c</sup>Loads of forest products or cement can be divided.

<sup>d</sup>Loads of agricultural products can be divided.

<sup>e</sup>Loads of forest products can be divided.

<sup>f</sup>Loads of energy resources can be divided.

<sup>g</sup>Loads of forest products, cement, or coal can be divided.

<sup>h</sup>Loads of agricultural products or cement can be divided.

<sup>i</sup>Loads of energy resources can be divided.

<sup>j</sup>Loads of forest products can be divided.

<sup>k</sup>Single-trip permit valid for 30 days.

## GENERAL CONTROLS OVER PERMIT OPERATIONS

Practices vary considerably, but many states designate specific routes on state highway systems over which permit movements of different kinds generally will be made. These may take into consideration such things as geometric characteristics of the highway, structural characteristics of bridges, and general environment. Route maps may be given out at the time of permit issuance or used to specify in written terms the route(s) that will be followed. They may be used in connection with single- or multiple-trip permits. In some states, they can provide a basis for routine permit issuance up to specified overlimits.

Sometimes state laws specifically except some kinds of goods movements from these kinds of controls, as in the case of farm or mineral products. However, movements exceeding the general weight limits for the Interstate system, including limits permitted under grandfather clause exceptions in some states, may not generally be permitted on this system. (There are also some limited exceptions to this general rule as a result of grandfather provisions.)

### TYPES OF OVERLIMITS

A shipment may be oversize, overweight, or both. More specifically, an oversize load may be overlength, overwidth, overheight, or any combination of the three. Overweight permits may be issued for gross overweight or axle overweight.

In 1966, about 67 percent of permits were for oversize-only movements, 6 percent for overweight only, and the remaining 27 percent for oversize *and* overweight. Approximately 62 percent of oversize permit movements were overlength, 90 percent overwidth, and 20 percent overheight. About 87 percent of overweight movements exceeded gross limits; 65 percent exceeded axle limits. (The percentages do not add up to 100 because of overlaps.) Construction equipment and mobile homes were each issued approximately one-third of the permits. Generally speaking, construction equipment tends to be both oversize and overweight. Mobile homes usually exceed length and width limits but are seldom overweight.

The numbers of single- and multiple-trip permits by type of overlimit issued by each state from October 1976 through September 1977 are given in Table 14. Data from states that do not separate oversize and overweight permits are not presented in this table. Some states specified the number of both overweight and oversize permits, and some have a special category for mobile homes. Where these breakdowns are available, they are presented in separate columns. Mobile homes are considered as oversize only.

According to these data, 32 percent of single-trip permit movements and 50 percent of multiple-trip permit movements are overweight. Eighty-two percent and 53 percent are the respective figures for oversize movements. Although the data are not directly comparable to the 1966 data for *NCHRP Report 80*, there seems to have been some increase in the proportion of overweight to oversize permit movements. According to the data from seven states where mobile home permits are differentiated, about 33 percent of total permits were issued to mobile homes. This is comparable to the 31 percent figure for 1966.

## TRENDS IN PERMIT ISSUANCE

From 1966 to 1977, the number of permits issued increased by 71 percent. This represents a 72 percent increase in single-trip permits and 63 percent increase in multiple trips. The data seem to indicate a large percentage increase in overweight permits, but this is offset by a reduction in oversize and overweight. As indicated above, the result seems to be a 4 to 5 percent increase in the total proportions of overweight permits. Different categorizations of data in the two periods are probably reflected in apparent discrepancies.

Table 15 gives the percentage increase in the 11-year period for each state. Out of 42 states and the District of Columbia, 3 apparently experienced decreases in permit issuance ranging from 6 to 24 percent; 11 issued more than twice as many. The distribution can be seen in Figure 5(a). The issuance of oversize permits has a similar type of distribution, as shown in Figure 5(b). Eight of the 28 states issued fewer oversize permits than in 1966, and 6 more than doubled the issuance of these permits. Figure 5(c) shows a completely different type of distribution for overweight permits; more than 50 percent of the 26 states in this sample apparently doubled their issuance. Generally, the trend is toward more overweight permits.

The factors that have affected the changes in permit issuance vary among states. A state such as Iowa, which has retained lower size and weight limits compared with other states, may have a greater rate of increase of permit issuance because other states allow similar movements without permit. A state in the process of rapid development may find a large increase in the number of permits issued for construction equipment. The degree of enforcement has a definite impact on the amount of permit issuance because a lax policy encourages truckers to avoid the red tape of permit application. Also, the comparisons with 1966 data that are presented need qualification. The 1966 study involved analysis of a consistently drawn sample of permits in each state. At the time, there was no comparable breakdown of data in the states' records. This may be true in some states at present, so that some current reports may be estimated.

### PERMIT LIMITS

Overlimit loads may create problems in highway traffic operations and hasten structural deterioration. In order to protect the soundness of the highway system, each state has made rules or regulations deemed appropriate for its own highway systems. Some problems that can occur as a result of overlimit shipments follow.

1. If routes are not selected properly, overheight loads may damage highway overhead structures.
2. Overwidth trucks may create traffic hazards because of encroachment into other lanes. Moreover, excessively wide loads cause traffic delays and operational problems on narrow bridges or roadway sections.
3. The highway design standards for curvature, both in general and on freeway ramps, control accommodation of overlength vehicles. Overlength trucks may create traffic problems by off-tracking.



TABLE 14  
NUMBER OF PERMITS BY TYPE OF OVERLIMIT (10/1/76-9/30/77)

STATE	Single-Trip Permit				Multiple-Trip Permit			
	Over-weight	Oversize	Over-weight Oversize	Mobile Home	Over-weight	Oversize	Over-weight Oversize	Mobile Home
Alabama	97	25,878	5,320	-	0	0	0	653
Arizona	5,669	28,154	-	12,084	1,929	6,483	-	0
Arkansas	21,351	66,180	-	-	0	0	0	0
Colorado	14,106	19,127	-	21,912	3,351	2,057	-	661
Delaware	4,081	9,086	-	6,659	350	0	-	0
Florida	18,806	58,307	-	-	5,648	2,556	-	-
Idaho	3,140	3,648	16,119	-	3,277	605	162	-
Illinois	42,400	78,730	-	-	4,555	6,845	-	-
Kansas	17,285	0	43,430	-	0	0	0	0
Kentucky	28,900	27,290	-	-	396	334	-	-
Louisiana	35,861	104,503	-	-	0	300	0	0
Maine	9,403	5,050	-	-	1,915	1,045	-	-
Maryland	8,928	170,711	-	-	1,308	736	-	-
Minnesota	847	35,850	6,642	-	1,006	8,616	583	-
Mississippi	0	33,240	13,129	-	-	-	-	-
Missouri	5,812	69,220	-	-	-	-	-	-
Montana	11,639	11,259	-	-	16,548	23,856	-	-
Nebraska	24,919	12,314	-	-	629	0	0	0
Nevada	2,306	4,899	-	-	852	1,288	-	-
New Hampshire	890	9,610	2,086	-	60	0	505	-
New Mexico	6,375	14,705	-	20,310	340	3,039	-	-
New York	862	33,791	10,742	-	15,448	2,470	5,276	-
North Carolina	5,667	15,540	7,521	1,186	179	0	1,428	5,543
North Dakota	5,013	27,949	7,184	-	0	0	0	0
Ohio	5,019	68,509	24,264	-	0	1,381	0	0
Utah	11,587	26,466	-	-	19,884	5,623	-	-
Vermont	29	4,910	716	-	271	359	134	-
Virginia	6,950	21,225	-	-	1,975	8,400	-	-
Washington	473	49,075	72,236	-	9,473	15,747	-	-
West Virginia	17,665	87,983	-	-	0	0	0	0
Wisconsin	16,314	27,342	632	-	-	-	-	-
Wyoming	1,408	33,082	35,898	-	-	-	-	-
TOTAL	333,802	1,183,633	245,919	62,151	89,794	91,740	8,088	6,857

Source: 1977 FHWA certification requirements.

4. Overweight loads may damage bridges or pavements or both.

5. Overlimit vehicles that cannot maintain reasonable speeds may excessively delay other motorists.

#### Routinely Issued Single-Trip Permit

Most states have adopted standard procedures, based on experience and knowledge of their respective highway systems, to expedite the processing of permit applications. A set of routine limits may be selected, beyond which an engineer or professional needs to be consulted or special protection needs to be given.

In *NCHRP Report 80*, "routine limit" was defined as a size or weight limit beyond which any or all of the following are needed:

- Bridge division check,
- Escort,
- Approval from headquarters,
- Issued by headquarters only, and
- Extensive route analysis.

This definition, however, is not always consistent with those of the states. A permit may be issued as a routine procedure even though one or two escorts are required. There-

TABLE 15  
PERCENTAGE CHANGE OF PERMIT ISSUANCE

STATE	PERCENTAGE CHANGE IN PERMIT ISSUANCE FROM 1966 TO 1977		
	Total Permit	Oversize Permit	Overweight Permit
Alabama	+220	+211	-
Arizona	+ 48	+ 33	+ 50
Arkansas	+ 90	+ 47	+183
California	+ 17	-	-
Colorado	+ 24	- 10	- 65
Delaware	+ 16	- 9	-
District of Columbia	- 14	-	-
Florida	+ 98	+ 47	+225
Georgia	+ 22	-	-
Idaho	+ 10	- 15	+409
Illinois	+ 80	+ 35	+122
Indiana	+ 90	-	-
Iowa	+198	-	-
Kansas	+ 18	- 15	+350
Kentucky	+ 98	- 2	+225
Louisiana	+ 65	+ 25	+303
Maine	+ 12	- 59	+190
Maryland	+320	+298	- 21
Massachusetts	+132	-	-
Michigan	- 6	-	-
Minnesota	+ 57	+ 50	+129
Mississippi	+ 25	-	-
Missouri	+ 37	-	-
Montana	+174	+ 52	+132
Nebraska	+ 22	- 60	+510
Nevada	+ 48	+ 15	126
New Hampshire	+ 44	+ 36	- 17
New Mexico	+ 44	+ 34	+ 91
New York	+ 50	+ 16	+ 41
North Carolina	+ 19	+ 1	+ 76
North Dakota	+116	+141	+ 82
Ohio	+ 42	+ 55	- 6
Rhode Island	+ 40	-	-
South Carolina	+ 41	-	-
Tennessee	+135	-	-
Texas	+ 53	-	-
Utah	+136	+123	+155
Vermont	+ 20	+ 43	+ 72
Virginia	- 24	- 35	- 27
Washington	+ 70	+118	+255
West Virginia	+279	+227	+ 91
Wisconsin	+185	-	-
Wyoming	+112	-	-
AVERAGE	+ 71	+ 47	+101

fore, limits for routine permits are given two ways in Table 16: (a) to agree with whatever is indicated as routine by each state and (b), for comparison purposes, to agree with the definition of *Report 80* by using the the same criteria regarding escort vehicles. In the latter case, if any escort vehicle is required, the issuance is not considered routine.

#### Multiple-Trip Permit

Twenty-five states and the District of Columbia have specified maximum size or weight that a multiple-trip permit covers. For cargo shipments exceeding those specified limits, shippers must obtain single-trip permits even though they possess valid multiple-trip permits.

### Exceeding Routine Limits

The policies for allowing shipments to exceed routine limits vary. As given in Table 17, at least 20 states will not issue such permits except under emergency or very special circumstances. At least 32 states require extensive route surveys; approval from highway engineers, bridge engineers, or highway patrol officials; or special studies. Four states have strict axle limits or tire capacities that cannot be exceeded. Five states require a higher bond or more insurance. Three states will issue such permits only when no alternate form of transportation is available.

### Trends in Routinely Issued Permits

In 1966, only 35 states had established limits for routine issuance of permits and most of those were on a weight-only or size-only basis. Today, all states have standardized procedures for handling permit applications with specified overlimits that are accepted as routine.

Generally, most states have either increased or maintained the same limits, except 12 out of the 27 that decreased width limits they defined as routine. This may be due to increased concern for vehicle width and may also reflect an increased use of escort vehicles for substantially overwidth loads.

### ACCESSORY REQUIREMENTS

To warn the average motorists of the exceptional characteristics of overlimit movements, most states require accessory vehicles or devices to accompany the overlimit vehicles. They can be classified as (a) flag, (b) sign, (c) escort vehicle, and (d) flagman. These requirements are shown by numbers of states in Table 18.

### Flags

All but nine states require red flags on oversize loads. Six states prescribe specific limits for flag requirements. Table 19 gives the number of states requiring flags for each type of overlimit.

The requirements relative to sizes and number of flags vary. The sizes range from 12 x 12 in. (300 x 300 mm) to 24 x 24 in. (700 x 700 mm). Numbers of flags range from two to a variable requirement for flags at all corners, extremities, protrusions, and overhangs.

On a *State Overweight/Overdimensional Permit Survey* sponsored by the Heavy-Specialized Carriers Conference and carried out in 1978, 38 of 46 states that responded said they would accept four 18-in. (450-mm) red flags mounted on the four corner extremities of an overdimensional load. Of the 8 states responding negatively to the question pertaining to their acceptance of this type of flagging, 1 would accept if it were legal in other states, the remaining 7 said they did not limit the number of flags required to four but to a variable number depending on the shape of the load.

### Signs

To warn general motorists about the unusual nature of overlimit movements, 37 states require signs on the overlimit vehicles. Of the 12 states that do not require signs on

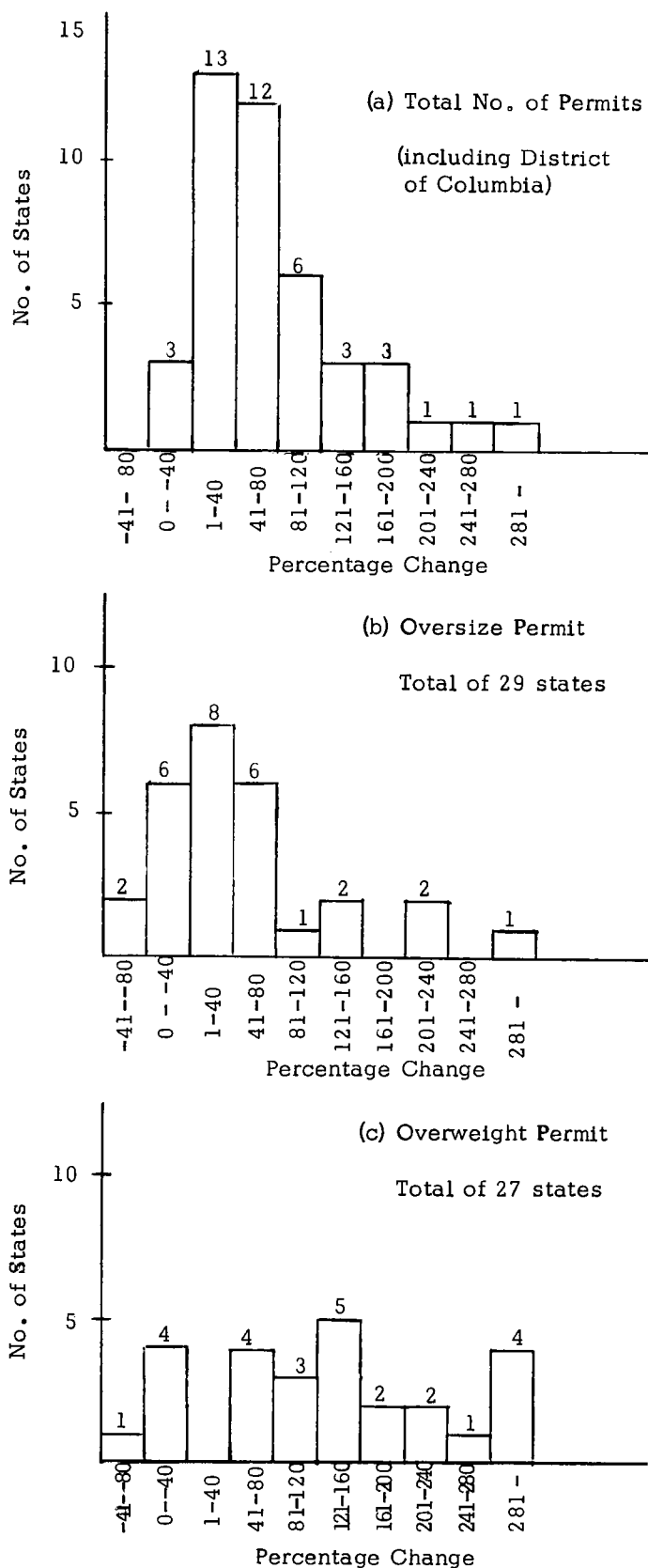


Figure 5. Distribution of percentage change of permit issuance (from 1966 to 1977).

TABLE 16  
LIMITS FOR ROUTINELY ISSUED SINGLE-TRIP PERMITS (3)

STATE	Routine Limits as Defined in NCHRP Report 80					Routine Limits as Specified by States (escort not considered)				
	Length (ft)	Width (ft-in)	Height (ft-in)	Gross Weight (lb)	Single Axle Weight (lb)	Length (ft)	Width (ft-in)	Height (ft-in)	Gross Weight (lb)	Single Axle Weight (lb)
Alabama	75	12-0	13-6	80,000	22,000	75	12-0	14-0	80,000	22,000
Arizona	100	15-0	15-0	-	-	100	15-0	15-0	96,000	24,000 <sup>a</sup>
Arkansas	75	12-0	17-0	108,000	25,000	-	14-0 <sup>h</sup>	R	108,000	25,000
California	135	14-0	R	T	28,000	135	14-0	R	T	28,000
Colorado	70	14-0	15-0	100,000 <sup>5</sup>	-	R	14-0	15-0	100,000	-
Connecticut	90	10-0	14-0	122,000 <sup>5</sup>	-	90	12-0	14-0	122,000	-
Delaware	70	12-0	14-0	90,000	-	70	14-0	14-0	90,000	-
District of Columbia	80	12-0	13-0	72,780	31,000	70	12-0	13-6	R	31,000
Florida	75	10-0	14-0	100,000 <sup>5</sup>	22,000	75	10-0	14-0	100,000	22,000
Georgia	75	12-0	14-6	100,000	25,000	75	12-0	14-6	100,000	25,000
Idaho	75	12-0 <sup>a</sup>	14-6	131,875	22,500	75	12-6	14-6	131,875	22,500
Illinois	110	12-0	15-0	88,000 <sup>5</sup>	20,000	145	14-0 <sup>i</sup>	15-0	88,000	20,000
Indiana	70	12-0	14-6	104,000	28,000	70	12-0	15-0	104,000	28,000
Iowa	80	R	14-4	75,000	-	120	14-0	R	90,000	18,540
Kansas	85	14-0	18-0	95,000 <sup>5</sup>	22,000	126	16-6	18-0	95,000	22,000
Kentucky	75	12-0 <sup>a</sup>	13-6	96,000 <sup>5</sup>	24,000	110 <sup>j</sup>	12-0	15-0	96,000	24,000
Louisiana	90	12-0	14-10	120,000	24,000	90	16-0 <sup>c</sup>	14-10	120,000	24,000
Maine	80	12-0	15-0	130,000 <sup>5</sup>	-	80	12-0	15-0	130,000	-
Maryland	85	13-0	16-0	90,000	30,000	85	13-11	15-6	90,000	30,000
Massachusetts	70	12-0	R	100,000	-	75	15-0	R	120,000	-
Michigan	80	12-6	15-0	132,000 <sup>5</sup>	-	150	14-0	15-0	132,000	-
Minnesota	85	14-6 <sup>b</sup>	14-0	84,000 <sup>5</sup>	20,000	85	14-6 <sup>b</sup>	14-0	84,000	20,000
Mississippi	R	10-0	14-0	109,000 <sup>5</sup>	-	R	12-0	14-0	109,000	-
Missouri	75	10-4	R	86,000 <sup>5</sup>	19,000	85	12-4	R	86,000	19,000
Montana	80	12-0	13-6	105,500 <sup>5</sup>	20,000	85	15-0	13-6	105,500	20,000
Nebraska	-	12-0	R	106,000 <sup>7</sup>	20,000	-	12-0	R	106,000	20,000
Nevada	105	12-0	18-0	129,000	18,000	105	14-0	16-0	129,000	18,000
New Hampshire	75	10-3	R	120,000 <sup>5</sup>	-	R	12-0	R	120,000	-
New Jersey	100	14-0	R	-	-	R	16-0	R	-	-
New Mexico	90	14-0	16-0	115,000 <sup>5</sup>	-	90	14-0	16-0	115,000	-
New York	85	12-0	14-0	110,000 <sup>5</sup>	-	100	14-0	14-0	110,000	-
North Carolina	110 <sup>d</sup>	12-0	18-0	94,500 <sup>5</sup>	25,000	80	12-0	R	94,500	25,000
North Dakota	80	14-0	15-6	87,000 <sup>5</sup>	20,000	80	14-0	15-6	87,000	20,000
Ohio	85	12-0	14-0	T	29,000	85	12-0	14-0	105,000	29,000
Oklahoma	80	12-0	14-6	82,000 <sup>5</sup>	20,000	125	15-0	14-6	82,000	20,000
Oregon	80	9-0	14-6	96,000	21,500	80	12-6	14-6	96,000	36,000
Pennsylvania	85	12-0	15-0	150,000	27,000	120	15-0	14-0	150,000	27,000
Rhode Island	80	12-0	14-0	100,000 <sup>5</sup>	-	100	14-0	14-0	100,000	-
South Carolina	120	12-0	R	90,000 <sup>5</sup>	-	120	12-0	R	90,000	-
South Dakota	75	12-0	16-0	90,000 <sup>5</sup>	20,000	75	12-0	16-0	90,000	20,000
Tennessee	75	10-0	R	84,000 <sup>5</sup>	18,000	100	14-0	15-0	84,000	18,000
Texas	75	14-0	17-0	100,000 <sup>5</sup>	-	75	14-0	17-0	100,000	-
Utah	90	14-0	17-6	-	-	R	14-6	17-6	-	-
Vermont	84	10-6	14-6	100,000	-	84	14-0	14-6	100,000	-
Virginia	90	12-0 <sup>a</sup>	R	102,500 <sup>5</sup>	24,000	110 <sup>n</sup>	12-0	R	102,500	24,000
Washington	140 <sup>f</sup>	12-0 <sup>f</sup>	R	-	22,000	R	20-0 <sup>c</sup>	R	-	22,000
West Virginia	70	10-6	14-0	110,000	22,000	70	12-0	14-0	110,000	22,000
Wisconsin	75	12-0	16-0	110,000 <sup>5</sup>	25,000	75	12-0	16-0	110,000	25,000
Wyoming	100 <sup>d</sup>	18-0	15-0	135,000	22,500	100 <sup>d</sup>	18-0	5-0	135,000	22,500

## Legend:

R = restricted by route only.

T = by formula and/or table.

5 = five-axle combination truck.

7 = seven-axle combination.

1 ft = 0.3 m

1 in. = 25 mm

1 lb = 0.45 kg

<sup>a</sup>10 ft 6 in. on two- or three-lane road.<sup>b</sup>For 12-ft lane; 12 ft 6 in. for 11-ft lane.<sup>c</sup>14 ft on two-lane roads.<sup>d</sup>90 ft long on two-lane roads.<sup>e</sup>65 ft long and/or 9 ft wide for two-lane road.<sup>f</sup>100 ft long and/or 10 ft wide for two-lane road.<sup>g</sup>28,000 lb on specified roads.<sup>h</sup>20 ft on roads other than Interstates.<sup>i</sup>10 ft on specified roads.<sup>j</sup>75 ft on two-lane roads.<sup>m</sup>140,000 lb on selected roads.<sup>n</sup>100 ft on two-lane roads.

TABLE 17  
POLICY FOR SHIPMENTS EXCEEDING ROUTINE LIMITS (3)

STATE	Emergency or Very Special Circumstance Only	Route Survey Required	Approval From	Special Arrangement Required	Higher Bond or Insurance	Other
Arizona			Bridge Engineer & Highway Patrol			
Arkansas	x					Axle limit not exceeded
California						Formula & table
Colorado		x			x	
Connecticut				x		
Delaware			Bridge Engineer			
Florida	x					Essential to nat'l defense
Georgia				x		
Idaho		x		x		
Illinois	x			x		
Indiana	x			x		
Iowa				x		Axle limits not exceeded
Kansas	x				>10,000 lb	
Kentucky				x		
Louisiana	x		Permit Engineer			
Maine				x		
Massachusetts	x	x				
Michigan	x		Highway Engineer & Permit Section			
Minnesota	x	x				
Mississippi	x			x		
Missouri				x	x	
Montana			Gross Vehicle Weight Division			
Nebraska	x					
Nevada		x				
New Hampshire		x		x		
New Jersey						Tire capacity
New Mexico		x				
New York				x		
North Carolina				x		
North Dakota	x					
Ohio				x		
Oklahoma	x	x				
Oregon		x	Permit Supervisor	x	x	Tire capacity axle load
Pennsylvania	x		Highway Engineer			
Rhode Island		x		x		
South Carolina	x					
South Dakota	x	x				
Tennessee				x		Other transport not available
Texas						Other transport not available
Vermont	x	x		x		Other transport not available
Virginia	x				x	
Washington	x					
West Virginia	x					
Wisconsin		x				
Wyoming			Office of Overweight Load, Highway Patrol			

TABLE 18  
NUMBER OF STATES REQUIRING ACCESSORY FOR  
EACH TYPE OF OVERLIMIT

Overlimit Type	No. of States Requiring Accessory			
	Flag	Sign	Escort Vehicle	Flagman
Overlength	24	21	44	10
Overwidth	28	33	49	16
Overheight	14	8	22	9
Overweight	2	1	6	0
Not specified (required)	10	3	0	12
Not required	9	13 <sup>a</sup>	0	19

<sup>a</sup> Three states require signs on mobile homes only.

the overlimit vehicles, 6 require warning signs on escort vehicles and 3 require signs on mobile homes only (see Table 19). Twenty-three states specify limits for particular sign requirements; others (14) simply use legal limits.

The standards of signs vary considerably from state to state. The shapes vary from the largest rectangle at 9 ft x 18 in. (2.7 m x 450 mm) to the smallest at 3 ft x 12 in. (0.9 m x 300 mm) or they may be squares 6 x 6 ft (1.8 x 1.8 m) or 3 x 3 ft (0.9 x 0.9 m). Most states have adopted black lettering on a yellow background as standard colors for warning signs. However, red lettering on a white background, black on orange, and orange on black are variously required by a few states. Wording is usually OVERSIZE/WIDE/LONG LOAD, as required by the situation. Three states have adopted the sign CAUTION OVERSIZE/WIDE LOAD; one state uses DANGER OVERSIZE LOAD. Lettering height ranges from 5 in. (125 mm) to 12 in. (300 mm), and the width of strokes varies from 0.75 to 2 in. (19 to 50 mm).

In the permit survey previously cited, 25 states said they would accept a 7 ft x 18 in. (2.1 m x 450 mm) sign with black lettering 10 in. (250 mm) high with 1.5-in. (38-cm) strokes on a yellow background. Of the 24 states that said that these specifications would not be in accord with their particular requirements, 8 do not require any signs on overlimit vehicles and 3 would accept these specifications if they were the requirements of the vehicle's base state.

#### Escort Vehicles

All states require one or more escort vehicles to accompany the overlimit vehicle when the size or weight exceeds a certain amount. The District of Columbia does not require commercial escort but does furnish police escort if escort is deemed necessary. Ten states furnish police escort if the load exceeds certain limits.

Some states specified different escort requirements for shipments traveling on four-lane and two-lane highways. As a rule a state requires one or two escort vehicles at a smaller size or lower weight on two-lane highways than on four-lane divided highways.

Figures 6 and 7 show distributions of numbers of states requiring escorts for specified limits on highways of four or fewer lanes. The distributions for each type of overlimit on these two types of highways are similar. The distributions show little uniformity among states with respect to escort requirements for overheight and overlength shipments. There is more uniformity in the case of width. Twenty-three out of 40 states specified a limit in the width range of 12 ft 0 in. to 12 ft 11 in. (3.66 to 3.96 m) above which one escort is required on a four-lane highway. Ten out of 28 states specified a limit in the group of 14 ft 0 in. to 14 ft 11 in. (4.27 to 4.57 m). On two- or three-lane highways, 26 out of 38 states require one escort above width limits in the 10 ft 0 in. to 10 ft 11 in. (3.05 to 3.35 m) and 12 ft 0 in. to 12 ft 11 in. (3.66 to 3.96 m) bands, and 25 out of 39 states require two escorts in the 12-ft and 14-ft bands.

Four types of accessories may be required on escort vehicles: (a) amber flashing beacons, (b) flags, (c) two-way radios between the overlimit vehicle and the escort vehicle, and (d) warning signs.

A revolving amber dome light 3 to 9 in. (75 to 225 mm) in size is required on the escort vehicle in most of the states. Five states do not require an amber light, and at least one state prohibits it.

At least 30 states require 12- to 24-in. (300- to 600-mm) red flags on the escort vehicle. The required number varies among states, but is generally two or four.

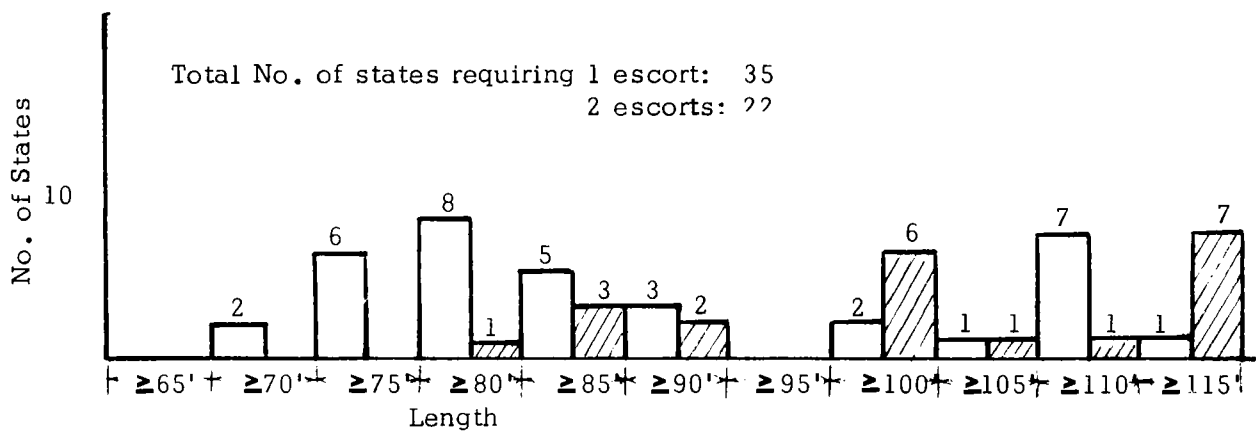
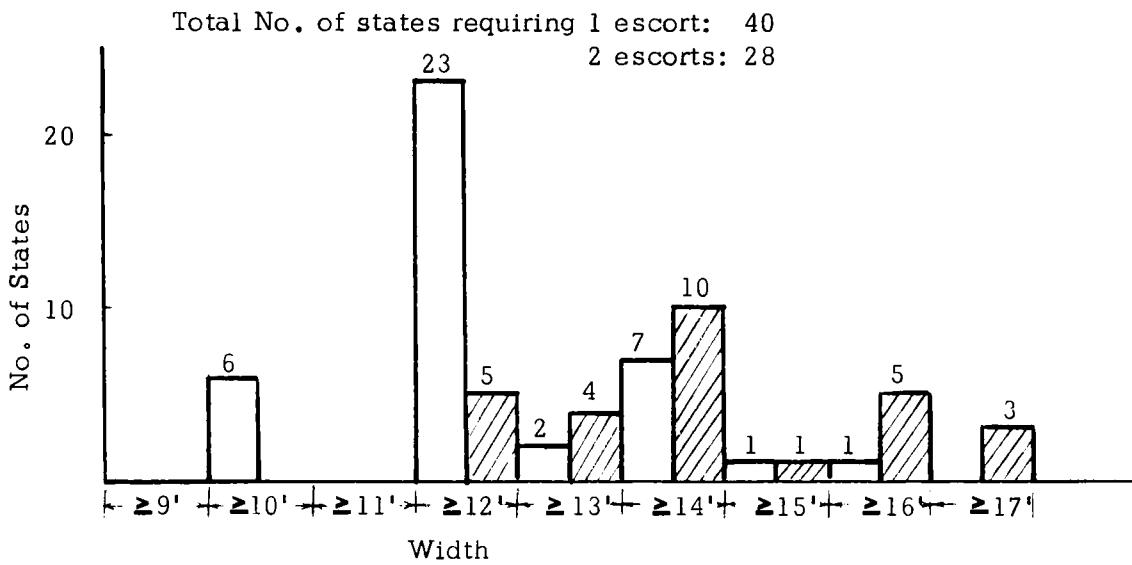
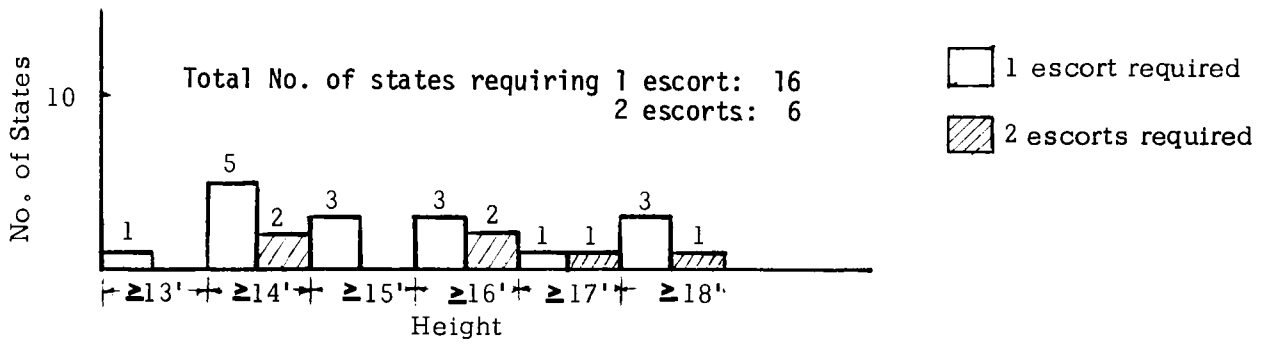
Sixteen states require two-way radios in escort vehicles and overlimit vehicles for all escorted movements. Four states require these for mobile home movements only.

The standards of warning signs on escort vehicles vary substantially from state to state. Rectangular signs from 4 ft x 12 in. (1.2 x 3.1 m) to 6 ft x 18 in. (1.8 x 4.57 m) or square signs of 6 x 6 ft (1.8 x 1.8 m) may be required. Most states require black lettering on a yellow background, although red signs with white lettering are required by two states. The lettering height ranges from 5 to 12 in. (125 to 300 mm) with stroke widths of 0.5 to 2 in. (13 to 50 mm). Out of the 35 states for which data on warning signs for escort vehicles are available, 24 require sign text to be OVERSIZE/WIDE/LONG LOAD in accordance with the circumstances, 4 require text reading OVERSIZE/WIDE/LONG LOAD AHEAD/FOLLOWING, and 1 state specified OVERSIZE LOAD ESCORT; the rest vary and have CAUTION or DANGER in the text.

In the permit survey, it was asked if a sign of 5 ft x 14 in. (1.5 m x 360 mm) with black lettering of a 1-in. (25-mm) stroke on a yellow background reading OVERSIZE LOAD would be accepted. Eighteen states gave negative responses.

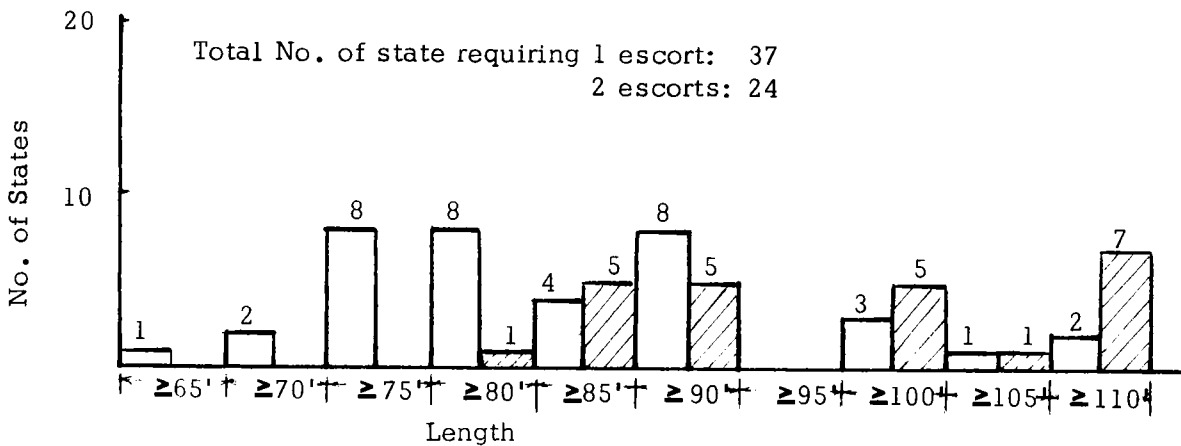
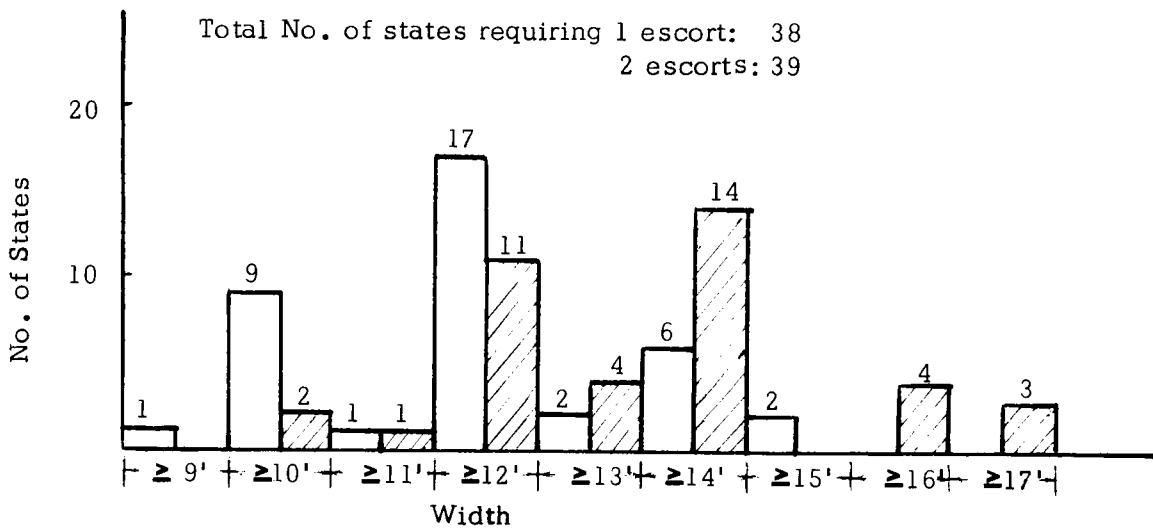
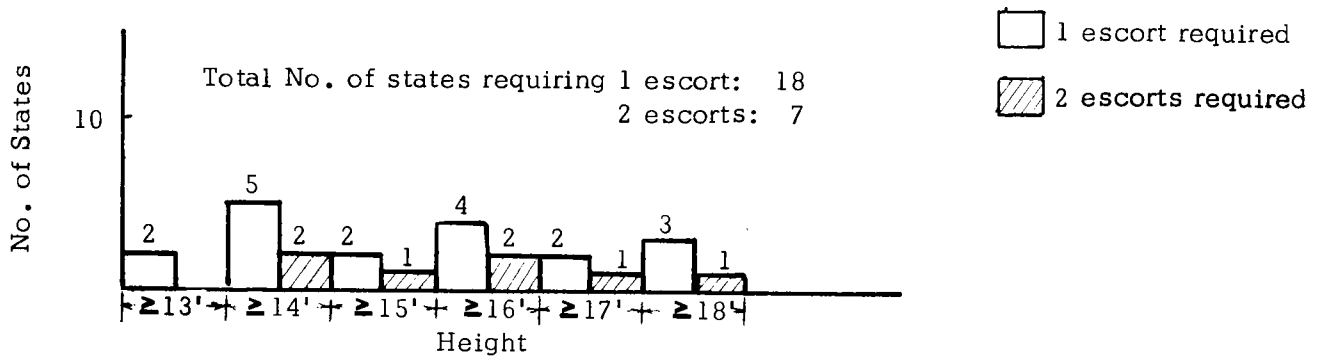
#### TIME RESTRICTIONS ON PERMIT OPERATIONS

Each state has its own time restrictions on permit operations and has specified periods of time when overlimit vehicles are not allowed to travel.



1 ft = 0.3 m

Figure 6. Distribution of escort requirement limits on four-lane roads (3).



1 ft = 0.3 m

Figure 7. Distribution of escort requirement limits on two- or three-lane roads (3).



### Time of Day

Only the District of Columbia does not have specific prohibitions against permit movement in the darkness. Eighteen states allow overweight vehicles that can keep up with the rest of the traffic to travel at night; 2 of these limit the routes. Eight states and the District of Columbia prohibit movements above certain limits in the metropolitan area during the morning and afternoon rush hours.

### Weekends

Four states and the District of Columbia do not restrict permit movements during the daytime hours of weekends. One restricts them only when it is a weekend with a holiday. Twenty-four states prohibit permit movements during weekends, but some of these do not restrict movements of overweight vehicles, and 17 allow movements on Saturday morning. One does not restrict movement in the daytime hours on Saturday, and 1 allows movements on Saturday in summer only. Sixteen states allow overweight vehicles that can keep up with the rest of the traffic to travel in restricted daylight hours during weekends.

### Holidays

With the exceptions of the District of Columbia and Mississippi, all states restrict permit movements on some holidays—from 3 holidays in Iowa to 12 holidays in Connecticut. Most states restrict permit movements on New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, and Christmas Day. Movements on other holidays are restricted less frequently.

Four states restrict movements on the days before and after holidays. Eight others restrict permit movements on the afternoon of the day before a holiday, and four of these also restrict movements on the morning of the day after a holiday.

Fourteen states allow overweight vehicles that do not interfere with the operations of other vehicles to travel on holidays when movements are otherwise restricted.

### Weather and Seasonal Considerations

Most states have permit movement restrictions when the visibility is not good and prohibit movements on foggy days. Some also restrict different types of movements under snowy, icy, or rainy conditions. Shipments of mobile homes have a special problem: at least 12 states restrict mobile home movements on windy days.

In some states heavy vehicle movements are subject to special seasonal considerations that affect permit movements. These relate to the strength of the roadway during spring thaw and during winter freeze. For example, there is a more extensive route restriction in the thawing season in Vermont and Maine allows heavier legal loads during the winter.

The tourist season is also considered. For example, New York prohibits permit movements on the days before and after holidays during summer only. Three states restrict movements for a whole day or half day on Fridays in summer. Utah states that movements may be prohibited on days of expected high traffic volumes such as occur during hunting and fishing seasons.

## PERMIT APPLICATION PROCEDURES

### Responsible Agency

Table 19 gives the agencies responsible for oversize/overweight permit issuance in the 49 continental states. The department of highways or transportation is charged with the responsibility in most states. Within the department, divisions involved may include maintenance, traffic, motor vehicles, safety, weights and enforcement, and special permit divisions. More than half the states have sections within the responsible divisions to handle permit applications. They work closely with bridge and other engineers in handling applications for shipments exceeding limits of routine issuance.

TABLE 19  
AGENCIES RESPONSIBLE FOR PERMIT ISSUING

Agency	No. of States
Department of Highway or Transp.	42
Department of Public Safety	4
Department of Motor Vehicles	1
Bureau of Motor Carriers	1
Bureau of Permits	1

### Place of Application and Issuance

The degree of centralization of permit issuance varies substantially from the extreme of central issuance only to full authority to issue in districts, divisions, resident offices, ports of entry, weigh stations, highway patrols, maintenance stations, and travel information bureaus. Authority given local offices is usually limited. For example, they may be allowed to issue only single-trip permits or permits allowing movements within specified limits. In some states, they are allowed to issue permits for movements within their jurisdictions only, unless authority is obtained from the central office via telephone. In some cases, district offices have the same authority as the central office.

### Methods of Application and Issuance

An application for a permit may or may not be made in a variety of ways, depending on the state. In every state, an application can be made by mail or in person. However, the places where permits are picked up differ. In some cases, they may be obtained at ports of entry, district offices, or special agent offices at diverse locations. In other cases, they can only be picked up at or mailed from the central office. Truckers also use agents who obtain permits for them. There are agencies operating interstate to perform this kind of service—the permits are transmitted by mail or wire.

In all but seven states, central issuing offices will accept an application by telegram or other type of telecommunication, and most of these issue a permit the same way. Most states will accept an application by telephone, but only a limited number—from the last data available—will issue permit authorization in this way.

One state, Louisiana, has an application and issuance system that appears exemplary in maintaining central control while allowing permits to be obtained with reasonable ease. Applications may be made by mail, by charge account, by prepaid system (oversize only), or by wire. By charge account and prepaid permit method, permit applications and permit numbers to be validated at points of entry are given by phone. Permits are also transmitted through special arrangements with wire services.

Other states also have exemplary systems from the standpoints of control and convenience of permit issuance, but some states have far less adequate systems in one or both of these respects. Table 20 gives the general application and issuance procedures of the different states.

TABLE 20  
METHODS OF APPLICATION AND ISSUANCE

Method	States Where Applicable
<u>Application</u>	
In person	All
Mail	All
Telegram or other type of telecommunication	All except Delaware, Kansas, Mississippi, Missouri, Nebraska, Ohio, Wyoming
Telephone	All except Arkansas, California, Colorado, Connecticut, Delaware, District of Columbia, Maine, Minnesota, New Jersey, North Carolina, Ohio, Rhode Island, Washington, West Virginia, Wisconsin
<u>Issuance</u>	
In person	All
Mail	All
Telegram or facsimile transmission	All except Delaware, Kansas, Mississippi, Ohio, Wyoming
Telephone	Arkansas, Louisiana, Mississippi, Utah <sup>a</sup>

<sup>a</sup>These states are as given in Table 3 of NCHRP Report 80; 1977 information is not available.

**Permit Fee Structure**

As in the case of permit provisions and procedures, there are substantial differences among the states in the way permit fee structures are set up and in the amount and scale of fees charged. The following classifies fees in accordance with some of the main differences.

1. Uniform fee, whether for a single- or multiple-trip permit. Ten states use this system on all permit moves; 5 states use it for oversize vehicles; and 1 state charges a uniform \$5 fee for overweight movements and nothing for oversize vehicles.
2. Classes of fees for different permit durations. Fourteen states use this relatively simple fee system without any supplemental structure; 10 other states combine this type of system with other, more complex charging schedules.
3. Charges according to the number of overlimits. Two states do this for length, height, width, and weight.
4. Charges on a per-mile-traveled basis with a minimum or maximum fee.
5. A fee schedule in accordance with overdimension used to calculate the applicable charge. Five states use this basis of charge for oversize moves. The footage of oversize is used to determine the fee. Two of these states also consider the mileage of travel.
6. A fee schedule based on amount overweight. Sixteen states have this type of schedule; 14 of these states also consider the travel mileage.
7. Combinations of the above not otherwise indicated.

As exceptions to the preceding general cases, four states do not charge for permit application, two states charge for overweight movement only, four states have different fee systems for mobile home movements, three states charge for load inspection or route study, and four states charge for police escort.

*Other Requirements*

Apart from the application fee, 19 states may require certificates of insurance for liability up to a certain amount to cover property damage or personal injury on the highway facilities or to otherwise protect the traveling public. Twenty states may require bond or cash deposits.

As indicated previously, the ways a fee may be paid also differ. Some states permit charge accounts, and at least one has prepaid permits for some types of movements. In other cases, payment in a form satisfactory to the state—some may not accept uncertified checks—must accompany the permit application.

**OTHER VARIATIONS IN STATE PRACTICE**

Although the previous sections have outlined the differences among state practices relative to permit provisions, applications, issuances and fees, there are other differences among state oversize/overweight permit operations that are not easily reduced to statistics but do have significant impact on truckers as well as states' abilities to effectively control extralegal movements on their highways.

There has been very little study of size and weight controls on roads and streets for which local governments are responsible. Some states have size and weight laws that ex-

tend to operations on local roads and streets; others do not. Even where they do, state authorities seldom police these systems, and controlling sizes and weights on them is often too hard a task for local jurisdictions. Nevertheless, some local units of government are active in size and weight control and do issue their own permits for oversize or overweight movements on the roads under their jurisdictions. Little is known about the scope or particulars of these operations.

With respect to highways under state control, however, different organizational and administrative practices for permits and size and weight control not reflected in statistics have significant impacts on both truckers and state effectiveness. In some cases, the agency that issues permits has little or no inspection or enforcement authority and less-than-adequate working arrangements with the agency that does. Sometimes there are duplications of authority and less-than-adequate coordination. Sometimes authorities are poorly staffed for either or both the permit administration and the enforcement functions. State police sometimes find it difficult to do justice to weight enforcement.

A definite correlation exists between effectiveness of size and weight enforcement and success of the permits operation in achieving the objectives of state laws. This has been indicated in one state that recently consolidated its permits and weight enforcement operations (which previously involved two state agencies). Among the results, which are partially influenced by improvements in permit issuance procedures, are dramatic increases in the numbers of permits issued under the same general laws.

Some agencies take a relatively rigid attitude toward what can be moved by permit outside of routine issuance limits, particularly in the case of very heavy loads. Other agencies cooperate extensively with specialized heavy carriers to make provisions for moving economically important nonreducible loads for which the first-mentioned group of states generally will not issue permits. Such provisions may involve portable bridge crossing structures or bridge support falsework designed and paid for by the truckers, with state agency technical assistance and control. Pavement damage can usually be prevented through use of additional axles on the transporting vehicles. There are usually legal, bonding, or insurance requirements to save the state harmless in case of any damage. Movements are thoroughly controlled and, as appropriate, carefully policed. Reasonable provision for such movements can have potentially significant impacts on a state's economy.

In order to permit but still have effective control over these kinds of movements, close working arrangements are needed among the permit-issuing office(s), the enforcement office(s), bridge and highway design office(s), and highway maintenance office(s). Organization varies in effectiveness from little to commendable, according to the state.

Cooperative working arrangements among all concerned agencies, divisions, and offices can result in the development of effective general procedures standards for all permit movements, such as are reflected in the designation of highway routes for different kinds of permit movements or the establishment of limits and controls relative to specific highway bridges.

## PROBLEMS

Oversize and overweight permit operations in the different states are characterized by an extreme lack of uniformity. This applies to such things as:

- Legal size and weight base,
- Agency responsible for permit issuance,
- Agency responsible for size and weight enforcement,
- Organization for permit issuance and size and weight control,
- Attitude toward some movements,
- Technical assistance and regulatory input,
- Specific kinds of permits,
- Duration of single- and multiple-trip permits,
- Definition of routine permits,
- Types and locations of issuing offices,
- Methods of issuance,
- How permit authority can be carried,
- On-the-road inspections,
- Escort provisions,
- Signs and flags—numbers and standards,
- Permit fee structures, and
- Payment systems.

Few data have been presented here on how permit authority is carried or how on-the-road inspections are done, but it is known that states differ considerably in these areas. In carrying permit authority, for example, some states require the approved permit form to be carried in the vehicle, whereas others require only the issued number.

There appears to be little sound reason why most of the differences among the states could not be reduced or eliminated through interstate cooperation. Yet, national and regional agencies working toward better conformity and interstate cooperative arrangements have met with little real success.

Undoubtedly, the differing impacts of some types of movements on states' economies, together with traditional attitudes toward oversize or overweight movements on the highways, have an effect. In many cases, these impacts and attitudes are reflected in significant differences in state laws. Also, basic differences among state administrative organizations and attendant differences among those legally responsible for permit issuance and size and weight enforcement make achievement of procedural uniformity extremely difficult.

Even where comparable agencies have basically the same responsibilities, there are differences in internal organization including assignment of divisional responsibilities and extent of centralization or decentralization of authority, sometimes reflecting basic provisions in the law. All of these make it very difficult to obtain procedural uniformity and tend to counter motivation to achieve it.

Inertia is another factor. It is difficult to change traditional practices. This is probably especially true where permit issuance or size and weight organization is a subordinate task within a division that does not recognize its importance. The division may be poorly staffed and ill equipped to perform its role effectively, and proper, up-to-date equipment is extremely important to an effective permit issuance and enforcement operation.

There is a good chance the differences among states can be reconciled if authorities in the agencies responsible either for size and weight enforcement or design, construction, operation, and maintenance of highways are strongly motivated to obtain uniformity. This they must be because of the detrimental impacts of either a poor oversize and overweight permits operation or poor size and weight control (the two tend to go hand in hand). Such detrimental impacts can affect a state's overall economy, the net costs of its weight control program, the condition of its highways and bridges, public safety, the trucking industry, and the transportation costs of some commodities. Many of these impacts are interrelated.

Parts of the trucking industry are seriously affected by lack of uniformity in permit operations, which is cited as one of the five most troublesome problems to the industry in general. It may head the list because not all trucks are affected—many haulers have no need to exceed legal limits.

Table 21 gives some of the reasons why the lack of uniformity among the states is so troublesome to the industry. The first reason is easy to appreciate because of the

TABLE 21  
DRIVERS CITING PROBLEMS WITH OVERSIZE/  
OVERWEIGHT PERMIT REQUIREMENTS (6)

Problems	No. of Drivers
It is hard to keep up to date with each state's requirements	20
The requirements bring about enroute delay	18
The forms take too much time	17
Fees are too high	10
Too much record keeping is required	4
There are too many different forms	2
Filing is required too often	1

number and complexity of the differences among permit procedures and controls. The second may encourage the propensity of some truckers to risk getting caught with an overlimit load rather than experience the time delays and other problems of obtaining permits. As previously indicated, one state found that reorganizing its operations, along with better staffing, equipment, and permit issuance procedures, resulted in a dramatic increase in the number of permits issued. This in turn improved income from permits enough to cover the entire costs of permit operations and related weight enforcement. There are undoubtedly other significant impacts of better size and weight controls,

including less damage to highways and bridges and greater safety for the traveling public.

It would not appear to be too difficult to develop a model of desirable uniform practice. Many states have exemplary provisions and procedures associated with almost every aspect of permit administration. An analysis follows of problems that need to be faced in seeking initial improvements.

#### Legal Limits

NCHRP recently conducted extensive research (1) on the cost and benefit of uniform size and weight limits. In summary, changes in the legal limits of some states, to provide a better level of basic uniformity for interstate movements, may eliminate rerouting and bypassing and reduce truck trip mileage, transportation costs, and energy use. The benefit was found to outweigh the costs.

For indivisible loads moved under permit, legal limits simply serve as a beginning point of permit requirements. However, nonuniform legal limits, together with widely varied exceptions and tolerances, add to the complexity of permit operations. With nonuniform limits, it is even more difficult to achieve a less confusing and less diversified permit system.

#### Permit Limits

The responsible permit-issuing agency in each state, basing its decision on the kinds of representations made by users, the state's legal provisions, the agency's experience in issuing permits, and inputs from other affected state agencies and private groups, establishes limits for permits to be routinely issued or issued on a multiple-trip basis. It also establishes criteria for any extraordinary permit issuances.

Some differences in permit practices are understandable because of state variances in legal limits as well as traditional differences in highway development and design. Although states have different environmental, traffic, and economic conditions, these dissimilarities do not justify substantial differences in permit operations.

Interstate truckers agree that significant benefits would result from a more uniform system. First, it would be easier to keep up with current regulations and to know whether a proposed shipment is beyond routine limits and will require advance arrangement. Second, if requirements were reasonably similar, it would be easier to apply for permits. Third, with appropriate provisions for obtaining permits by wire or, better, by phone, loss of time and agents' fees could be substantially reduced. And, fourth, if several contiguous states can agree to mutually recognize each other's permits, it would reduce the general load of permit issuance and result in significant time savings for both truckers and state personnel.

A compromise between absolute uniformity and the present system is to have basically the same requirements for movements within certain limits but to otherwise allow differences among states. This has been carried out in the Western Association of State Highway and Transportation Officials (WASHTO) states for the regulation of mobile and modular home transportation discussed later.

### Accessory Requirements

Flags, signs, and escort vehicles are necessary for overlimit shipments to reduce traffic hazards. However, the wide diversity in accessory requirements (e.g., the size, number, and placement of flags; the shape, color, lettering, and text of warning signs; and the requirements for escort vehicles) create great confusion and are probably counterproductive in achieving the desired objectives.

As mentioned in the *Manual on Uniform Traffic Control Devices* (7), the primary advantage of uniformity in traffic control devices is that it "simplifies the task of the road user because it aids in recognition and understanding." This also applies to the warning devices on overlimit and escort vehicles. Also, interstate truckers would not need to carry different signs and flags or to keep changing their placement from state to state. Nor would they have to know so many different requirements.

A uniform standard on accessory requirements is desirable for average vehicles, including mobile home movers and vehicles carrying occasional overlimit loads, as well as for commercial truckers and other industrial users.

Some states have allowed movements by vehicles operating at the standards of other states. This policy, although it facilitates interstate shipping, increases nonuniformity within a state because intrastate and interstate movements use different standards even though the characteristics of the movements are the same.

A warning sign with black lettering on a yellow background is advisable because it conforms to the national standard of warning signs on the highway. An average motorist quickly associates its meaning. A sign displaying black lettering on an orange background, as used in North Carolina, tends to be related to construction. Other colors deliver different messages.

The purpose of requiring escort vehicles is to warn motorists well in advance and thus give them sufficient time to respond to the situation. On a two- or three-lane highway, it is sometimes necessary to warn both following and oncoming vehicles because these facilities have relatively narrow travel ways and, for two-lane highways, passing maneuvers require use of the traveling way of opposing traffic. On a divided highway of four or more lanes, however, the need for a lead escort vehicle, which is required in some states, is questionable.

When escort vehicles are used, it is very important to keep the overlimit truck and the escort vehicle(s) in good communication. One study (8) indicated that lack of two-way radio communication can degrade safety. Currently 20 states require such communications. The same study also indicated that low-intensity, revolving dome lights have no effect on motorist response, but that high-intensity flashes do attract immediate driver attention and elicit response.

Requirements pertaining to accessory components are intended to increase the safety of motorists. The multitude of different requirements, of which some are not very effective, indicates that state policies are often based on subjective judgment or arbitrariness. Uniform requirements based on objective research in relevant areas would benefit truckers and would add to the safety of motorists.

### Time Restrictions

Movements need to be restricted during some periods because (a) in darkness, or whenever visibility is poor, oversize movements may create hazards for other motorists because of difficulties in identifying unusual sizes of vehicles, and (b) when traffic demand is high oversize vehicles or slow trucks with heavy loads may interfere with normal highway operations and cause excessive delay or increase safety hazards already existing in heavy traffic. There may be others, such as deployment of enforcement personnel to other duties.

These criteria should be carefully considered when time restrictions for permit movements are being established. Because of impacts on movers, arbitrary restriction of movements should be avoided. Overweight vehicles capable of keeping up with traffic may not need to be restricted because they do not cause traffic delay and are not necessarily more hazardous in the dark than in daylight. The value of restricting permit movements in daylight hours during weekends needs to be carefully examined by using objective criteria.

Restrictions on holidays other than the six main ones may or may not be justified. A study of the impact of overlimit traffic on weekend and holiday traffic is desirable.

### Permit Application and Issuance

Simplification of application and issuance procedures benefits both truckers and states. Truckers save time and money in handling paperwork, and states process applications more efficiently with smaller staffs. Also, movers of overlimit loads may be more inclined to get permits when they should, thus increasing the quality of weight enforcement. There appears to be little reason for antiquated, call-in-person requirements when effective controls over most movements can be obtained by issuing a permit number to a charging customer over the telephone. Through telecommunications, the permit particulars can be made available at ports of entry or way stations for inspection purposes and for providing the driver with a copy of the permit to satisfy roving inspection requirements. Or, roving enforcement teams could obtain permit information by radio by using the permit number. Without a charge system, fees possibly might be paid at the port of entry for a permit already centrally approved. There are many possibilities, some mentioned earlier, for a simple and effective system of issuance and fee collection.

### Permit Enforcement

Although size and weight enforcement are dealt with in Chapter Two, some additional comments can be made about permit enforcement in particular.

One major problem some states have in obtaining optimum effectiveness in size and weight control is lack of full coordination between offices issuing permits and the organizational units enforcing size and weight limits. The degree of coordination can influence the simplicity of the permit authorization system, as in the case of permit numbers and radio checks. Also, enforcement personnel need

to know what to look for—many regular permit customers probably need to be checked only occasionally.

The ideal situation probably puts all size and weight control under the same state agency. This seems to provide the best motivation and optimizes effectiveness. However, there are problems such as a dual enforcement situation—police and a special weight enforcement unit. Also, if the function is entirely under the police, there will be difficulty obtaining needed input from the highway and bridge engineers. Some states, such as Louisiana, have demonstrated that there are ways around these problems, for example, assigning a police enforcement unit to the highway agency.

Many states are improving their truck weighing operations with more permanent scales and better staffed and equipped roving crews. Fully coordinated permit issuance and weight enforcement will result in better uniformity of provisions, procedures, and effects.

#### **PATTERNS FOR IMPROVEMENT**

In this section, a policy of the Heavy-Specialized Carriers Conference (HSCC), regulations for the transportation of mobile homes in western states, and other approaches to improving permit operation, are described. They are by no means perfect, nor should they necessarily be adopted indiscriminately by all states. They are potential improvements of the current situation and indicate a general move toward better uniformity. There is no doubt that authorities will want to study them thoroughly before accepting them as a model for all states.

#### **Policy of Heavy-Specialized Carriers Conference**

HSCC policy was initiated early in 1972 and has been revised four times since. Its primary objective is to achieve uniformity in permit standards, requirements, applications, and documents. However, the policy statement recognizes the different conditions in each state and recommends that permit standards should not necessarily be changed in all instances simply to conform to it. The policy statement is presented in Appendix B.

Extensive survey has shown that many states will accept the proposed standards or the standards of other states on the sizes and shapes of signs and flags and other accessory requirements even though their own specific requirements may be different. Figure 8 shows how accessory requirements proposed by HSCC have been accepted by different states. The darkest area represents the states that accept HSCC standards on size, shape, and color of warning flags and warning signs on overlimit vehicles and warning signs on escort vehicles. The lightly shaded states accept any combination of two of the above three warning devices.

HSCC needs to work extensively with the states, especially those that use practices that differ widely from those proposed, to discuss why they adopted or would not adopt the proposed policy. Revisions may then be made to achieve a more feasible policy on uniformity.

#### **WASHTO Uniform Mobile and Modular Home Transportation Guidelines**

The member states of WASHTO have developed guidelines on reciprocal permits for mobile or modular home

movements. The participating states include Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, South Dakota, Texas, Utah, Washington, and Wyoming. These procedures apply to the issuance of permits for movements on designated highways (including all Interstate highways) by mobile or modular homes within the following ranges of sizes and weight:

*Length.* In excess of 40 ft (12.2 m) up to 65 ft (19.8 m) or by trailer tow combinations in excess of 55 ft (16.8 m) up to 85 ft (25.9 m);

*Width.* In excess of 8 ft (2.4 m) up to 12 ft (3.7 m);

*Height.* To a maximum of 13 ft 6 in. (4.2 m); and

*Weight.* To a maximum of 32 000 pounds (14 400 kg).

The reciprocity arrangements are generally as follows.

1. One form of application is issued by WASHTO states.
2. The originating state issues the permit, which will be applicable for travel on prescribed routes only through WASHTO states. [This provision has not yet been implemented.]
3. The originating state will collect a \$5 fee. Each state through which the trailer-tow is routed will collect a \$5 fee, to be paid at designated collection way points. After paying the fee, the permit will be validated.
4. Each state will designate permitted routes of travel and inspection points en route. The requirements to stop at certain inspection points will be noted on permits.
5. Permits will be limited to a period of 10 days.
6. The originating state will ensure that the vehicle requirements and specifications are met.
7. A certificate of insurance is required to be on file in all states en route.
8. Mobile and modular homes are classified into four categories. Different vehicle standards are required for each category.
9. Uniform requirements on towing vehicles, accessory requirements, and escort vehicles are established.
10. Movements are permitted in daylight from Monday morning to 2:00 p.m. Friday only. Holidays are designated by each state and movements are restricted from 2:00 p.m. the day before to daylight the day after for observed holidays.

The summary requirements for the different categories of mobile homes are presented in Appendix C.

#### **Route-Mapping System**

Several states have adopted a route-mapping system as a logical approach to better permit operations. In contrast, some states have charged responsibility for route selection to truckers and indicate that the granting of permits does not guarantee absolute route clearance. Truckers have to watch posted signs en route. This can create much inconvenience for truckers planning their trips, because they do not have roadway information at hand and can only learn of route problems by experience. This approach may

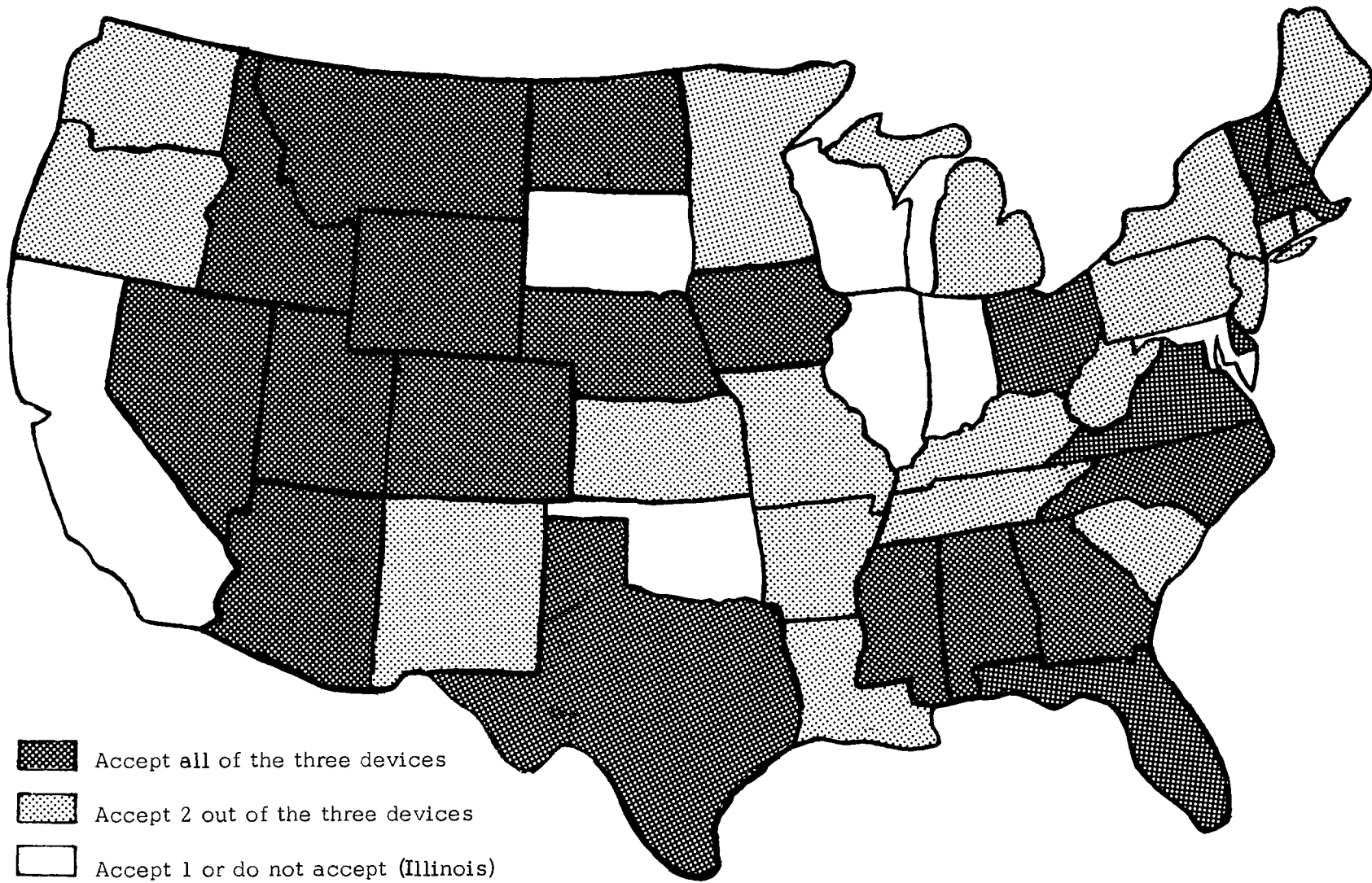


Figure 8. Acceptance of HSCC standards of warning flags, warning signs on overlimit vehicles, and warning signs on escort vehicles.

result in more damage to highways and bridges and less public safety.

The route-mapping system adopted by California and Oregon as well as some other states provides for marking the permit limits, restrictions, and requirements on a set of highway route maps. Thus, one can easily see that a shipment of a certain width is allowed on a section of roadway if one escort vehicle is provided.

The following are some additional important advantages of a mapping system.

- The processing of permit applications can be expedited because it is easy for permit staff to review the proposed routes indicated on the permit.
- Enforcement officers have less difficulty in identifying a violating vehicle.
- If reciprocity agreements on permit issuance among states are put into effect, permit staffs can effectively indicate vehicle routes where moves can be legal for an entire interstate trip.

## CHAPTER FOUR

# CONCLUSIONS AND RECOMMENDATIONS

## ENFORCEMENT

Except for basic limits on the Federal-Aid Interstate System, size and weight administration traditionally has been the prerogative of individual states. Enforcement has followed suit.

Accordingly, there has been and continues to be a multitude of differences in the way enforcement is carried out, including

- Agency responsible,
- Weight enforcement organization,
- Scales and other equipment used,
- Location of fixed scales,
- Hours of fixed-scale operation,
- Ways of employing portable scales,
- Hours of enforcement effort,
- Enforcement action,
- Fine structure, and
- Judicial leniency.

All of this results in significant variations in enforcement impact from state to state, including percentages of overweight vehicles on primary highways.

The use of fixed scales has lost much of its effectiveness in recent years because of the advent of CB radio communications through which truckers are able to bypass fixed-scale weighing operations. Strategy in the use of portable scales thus has become more important, although their effectiveness also suffers from the same cause. In particular, it once was good strategy to set up portable operations at specific, preidentified sites where trucks could be handled with maximum safety and minimum inconvenience to traffic. But operation at these sites will also become known immediately.

Because routes that provide reasonable opportunity to bypass scales on major arterials are limited in number, the use of portables at specific sites on these routes can still be effective. Many agencies also find it worthwhile to use a

spot-weighing technique, by which suspected vehicles are flagged down by knowledgeable weight enforcement officers on patrol. The site technique obviously results in more coverage.

Portable scales are still cumbersome and, even in sets of four or six, weighing still takes more time than is desirable from the standpoint of both officers and truckers, particularly from the latter's viewpoint when they are operating legally.

A common complaint of truckers on long-distance hauls is that they are weighed or diverted to scales more than once in the same state and waste precious time when they are operating legally. Temporary bumper stickers of a different random color and shape each day might provide one solution. Trucks with the proper sticker could bypass the next scales.

WIM scales appear to show the most promise, perhaps in sets where initial weighing is performed on the travel way to identify those near or possibly above legal limits. Through some flagging system, only those vehicles would be directed to off-ramp locations where they might be weighed on WIM scales at slow speeds, if such weights could be legally accepted. Even use of shoulder installations might reduce costs. This kind of complete WIM operation would appear, potentially, to provide optimal reduction of traffic delays. But even the use of WIM to selectively identify trucks for weighing on conventional fixed or semiportable scales—the current trend—shows promise of substantially reducing lost time to the industry.

Some variations in random operation of fixed scales might produce most effective results, such as, for a pair of scales weighing opposing lanes, random operation at hourly or half-hourly intervals, permitting a crew to move from scale to scale.

There appears to be substantial room for better coordination across state lines in many areas of size and weight enforcement. This applies to better uniformity of procedures,



particularly where state laws are comparable. There certainly needs to be more uniformity in permit operations, as discussed in Chapter Three. Cooperating enforcement agencies might even assist each other in spotting attempts to bypass port-of-entry scales or in identifying habitual violators. An identification system, such as the bumper stickers previously suggested, to allow legal trucks to traverse more than one state within a specific time period with only one weighing is not inconceivable. Possibly a set of scales for opposing traffic, operated by one crew, could act as port of entry for two states.

Much is under way to lead to more effective size and weight enforcement on the road. Much more needs to be done.

One major problem is the general lack of enforcement on nonarterial systems, particularly where the roads and bridges are the responsibility of local units of government, and in urban areas where conventional weighing is very difficult. Some local government units do use portable scales; few have fixed scales. The problem is of consequence because oversize and overweight vehicles seriously affect the safety and structural performance of roads and bridges on nonarterial systems. So far, there is no general solution to this problem, which is outside the purview of most organized size and weight enforcement operations.

However, even where enforcement on state highway systems may generally be well handled, this is only one of the requirements for effective results. There also must be effective post-enforcement judicial action. This requires a sound framework of suitable laws and administrative procedures. Tables in this report show the variations among states. Both laws and procedures range widely from excellent to poor, with respect to potential effectiveness. Requirements to off-load illegal vehicles at the site or close by are among the most effective. Specific, stiff fines scaled to amounts of violation, without judiciary prerogative, provide sound support for good enforcement programs. However, some tolerances to account for weight shifts and scale errors appear reasonable.

Multiple offenders should also be dealt with more severely. When there are sound legal provisions, program administrators should use these to maximum advantage. In too many cases now enforcement operations do not comply strictly with the law.

## PERMIT OPERATIONS

The number of overlimit permit issuances has increased by 71 percent since 1966. Permits for overweight shipments showed a notable 86 percent increase, and there was a more moderate 40 percent increase for oversize permit movements. Although these figures come from the best data currently available, they may not accurately reflect changes in the proportions of oversize and overweight loads because (a) proportions may have changed in the numbers of loads covered under multiple and single permits or overload and overweight permits and (b) recent tabulations may not result from the same consistency in permit classification and quantity estimation as those for 1966.

When *NCHRP Report 80* was done in 1966, the permit operation system was one of extreme complexity and non-

uniformity. The report emphasized the importance of a national uniform permit policy and made specific recommendations for actions relative to its achievement. Today, the same complexity and diversification prevails. The present legal limits vary from state to state. The situation is further complicated by different tolerance levels and exceptions.

All states have established some routine limits for issuing permits. Length limits range from 70 to 140 ft (21.3 to 42.7 m); width from 10 to 18 ft (3.1 to 5.5 m); height from 13.5 to 18 ft (4.1 to 5.5 m); and gross vehicle weight from 75 000 to 135 000 lb (34 020 to 61 230 kgs). The policy for handling excessively large or heavy shipments varies among states. Some states are reluctant to issue any permits for such movements except in emergency situations, while some readily allow them as long as adequate protective and warning devices are provided.

Standards of warning devices vary substantially. It is not unusual to find neighboring states requiring completely different standards for accessory warning devices. For example, Tennessee and North Carolina have reverse colors for sign background and letters and neither conforms to recommended standards.

Restrictions of permit movements, place and method of applications, and application fees also vary greatly.

In 1966, *NCHRP Report 80* reached conclusions and made recommendations that appear equally valid today. The recommendations for improvement of permit operations and uniformity are outlined below. Discussion of these recommendations may be found in Chapter Six of the report.

1. As a priority for policy consideration on oversize-overweight permit operations, it is recommended that AASHO give early consideration to developing a national policy for uniformity between states on the conditions under which an oversize-overweight permit will be issued. p. 103
2. Permit administrative authorities should take the lead in forming, by regions, permanent committees composed of representatives of the regional states and representatives of the regional permit user interests, to develop joint recommendations for improving uniformity of oversize-overweight permit administration. p. 103
3. All permit administration authorities should refer requests for movements involving extraordinary loadings of the highways and bridges, not covered by established formula, to the design engineering personnel skilled in determining stresses in roads and bridges. p. 103
4. The small number of states with arbitrary upper limits on gross loads or with limits on axle weights regardless of tires, who cannot support such upper limits fully from engineering determinations of load or structural damage inherent in exceeding such limits, should join the large majority of states in removing such arbitrary limits and in considering each extraordinary permit load application on its own merit considering economic justification and possible highway damages. p. 104
5. There should be, as a matter of approved national policy, recommended standards for posting bridges in accordance with such things as design criteria, condition of members, age of structure, and other parameters. Nationally recommended maximum bridge load tables, formulas, or charts also should be developed for occasional loads under permit. These should be related to the standard postings. p. 104

Since 1966, the WASHTO states have made a notable attempt to achieve reciprocity in one type of permit operation, notably the movement of mobile and modular homes. Unfortunately, there is indication that the industry has failed to take advantage of the reciprocal provisions to make the effort worthwhile.

There may be several reasons for this. For one thing, requirements for permit validation and insurance in each state, particularly the latter, may still result in too much red tape.

The operation of this reciprocity agreement needs to be studied. Therefore, the following recommendation is added to those of the previous report.

6. Studies should be made in the WASHTO states to further analyze the advantages and disadvantages of mobile and modular home movements to the affected industry to determine the reason for the apparently poor response to the reciprocity arrangements.

In addition to these general recommendations for improvements directed toward overlimit interstate movements, the following recommendations cover more specific improvements in both interstate and intrastate provisions.

- HSCC policy is not perfect, but it provides a reasonable beginning for establishing a national uniform policy on oversize and overweight permit operations. AASHTO should work cooperatively with HSCC so that the viewpoints of the industry as well as the states may be considered in developing a uniform code.
- A mapping system, such as those used in California and Oregon, has distinct advantages in helping truckers plan their movements and in providing a sound basis for permit staff to process applications. It also protects roads and bridges. Routine limits may be raised for some movements because an extensive route survey is not required. Mapping also can contribute significantly to reciprocity arrangements.
- Simplifying application procedures in many states is highly desirable. The establishment of escrow or charge account procedures and the acceptance of telecommunication applications and issuances will reduce industry delays and otherwise simplify issuance. Issuance of blank permit books may also help reduce paperwork and delays. (Delaware, Louisiana, Maryland, Missouri, Montana, New Jersey, North Dakota, South Dakota, and West Virginia are already using prepaid permits.) A standardized application form should be developed and used by all states.
- The standards of accessory warning devices should be uniform. Warning signs should have black lettering on a yellow background to conform to standard colors of warning signs. Texts should be short and simple. The

requirement of one following escort vehicle on divided highways is probably sufficient for any type of overlimit in most cases.

- Restricting movement during some periods should not be established arbitrarily. For example, an overweight-only vehicle that can travel as fast as other road users should not be subject to time constraints. Restrictions of movements in daylight on weekends and some holidays may not be justified.
- Reciprocity arrangements need to be worked out between the state permit agencies to facilitate, as much as possible, interstate permit movements.

Although at first glance the legal bases for differences in size and weight administration, including permit operations, seem a difficult obstacle to obtaining better uniformity, it is likely that highly motivated officials can significantly change the laws to achieve better uniformity. What appears to be needed is a model of uniform practices reflecting agreement by the authorities and technicians in the different states on such things as permit classifications, limits, issuance procedures, and relevant weight enforcement. The development of model traffic laws in the 1950s might provide an example.

With industry input, the model provisions could be developed and set forth on a priority basis so that they provide relief from the most troublesome problems first. A model basis of this sort, which for the most part does not now exist would allow responsible authorities in different states to make representations to their own legislatures.

Permit movement requirements need not be the same in every state, but there ought to be essential similarity in such things as general types of permits, upper limits, conditions of routine issuance, methods of issuance, permit authority displays, escort and signing requirements, and periods of restriction. In most of these there is a uniformity of objectives little influenced by a state's peculiar economic needs or general highway conditions. Individual states still can make provisions for special permit categories and movement provisions important to them alone within the system framework.

Once the framework is agreed on by the responsible agencies in the different states, recommendations for revising state laws appropriately, fully supported by reasons and expected impacts, can be made to the state legislatures.

If voluntary action is not taken by the states, the federal government may have reason to become involved in the interests of interstate commerce. Most arterial routings are on federal-aid systems.

There is a great deal of national attention being given now to size and weight control on the highways in general, including legislation and regulation and enforcement. There is room for substantially improved uniformity throughout this whole area, and permit operations are a natural part of the system.

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1. "State Laws and Regulations on Truck Size and Weight." *NCHRP Rep. 198* (Feb. 1979) 177 pp.
2. *Truck and Bus Size and Weights*, Motor Vehicle Manufacturers Assn. (1979).
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4. *State Motor Carriers Handbook, Sizes and Weights, Taxes and Fees*, Western Hwy. Inst. (July 1975).
5. "Oversize-Overweight Permit Operation on State Highways." *NCHRP Rep. 80* (1969) 120 pp.
6. *Effects of Current State Licensing, Permit and Fee Requirements on Motor Trucks Involved in Interstate Commerce*, Midwest Research Inst. (Apr. 1975).
7. *Manual on Uniform Traffic Control Devices for Streets and Highways*, FHWA (1978).
8. *Economic Evaluation of Mobile and Modular Housing Shipments by Highway*, FHWA and HUD (Apr. 1974).

## APPENDIX A

### COMMUNICATION CONCERNING STATE ENFORCEMENT PRACTICES ON VEHICLE SIZE AND WEIGHT

Information concerning the enforcement of vehicle sizes and weights was collected from a variety of sources. To verify and supplement this information, the following summary of data collected plus an indication of additional data still needed was sent to the states.

#### SUMMARY OF KNOWN DATA AND TYPICAL SUPPLEMENTAL DATA NEEDS

State: \_\_\_\_\_

1. *Numbers of Permanent Scales by Location*
  - a. Port of entry on an Interstate Highway \_\_\_\_\_
  - b. Port of entry *not* on an Interstate Highway \_\_\_\_\_
  - c. Other locations on an Interstate Highway \_\_\_\_\_
  - d. Other locations *not* on an Interstate Highway \_\_\_\_\_
2. *Numbers of Loadometer Scales by Type*
  - a. Mechanical \_\_\_\_\_
  - b. Electronic \_\_\_\_\_
3. *Total Cost to Install a Permanent Weight Station*  
\$ \_\_\_\_\_
4. *Permanent Scale Scheduling*  
We need to know whether your permanent scales are

operated (a) continuously, (b) on a regular daily basis or (c) randomly.

5. *Loadometer Scale Deployment*  
We need to know whether loadometer operations are conducted (a) by a fulltime weight enforcement crew and (b) as one of many police functions assigned to your highway or state police. We also need to know on which highway systems loadometer operations are conducted.
6. *Legal Acceptability*  
Are there any particular problems related to legal acceptability of weight scale data?
7. *Unload Requirements*  
When vehicles are found to be overloaded, are they required to unload until the legal weight is reached and, if so, must it be done on the spot or are they given some limited freedom to move to a more convenient location?
8. *The Enforcement System*  
Once a vehicle is cited, are the penalty schedules required by law or levied by the courts considered effective in deterring weight violations?

## APPENDIX B

### POLICY STATEMENT ON UNIFORM OVERDIMENSIONAL/OVERWEIGHT PERMITS PROPOSED BY THE HEAVY-SPECIALIZED CARRIERS CONFERENCE<sup>1</sup>

*Any State Which, Based on Safety Considerations, Has Established Limits in Excess of Those Found in This Proposal Should Continue Such Limitations and Practices.*

#### *Routine Issuance for Single and Blanket Permits*

*Height.* Limited by route only.

*Width.* Routine permit issued for widths exceeding the statutory limit up to 14 ft wide.

*Length.* If legal in all other dimensions and article is not capable of being dismembered, no permit required up to 70 ft. Routine permit issued for length over 70 ft and up to 100 ft.

*Weight.* Routine issue permit for 5-axle combinations not to exceed 100 000 lb and for 6-axle combinations not to exceed 120 000 lb, subject to an axle loading limit of 24 000 lb.

#### *Uniform Permit Application Form and Availability*

A uniform application form for permits will be used by every state which shall be valid on a single-trip permit for five days and for a specified period of up to one year for blanket permits. Any permit may be modified or extended for an additional like period of time without filing of a new or separate permit application. The application upon validation by the state agency, shall become the authorized permit although authorized permits may also be in the form of telegraphic or facsimile communication from the state agency authorizing a permit load movement. Each state shall also authorize the use of book permits issued in groups of 10 in blank for use within a one-year period. Book permits, however, shall be valid for overdimensional load single-trip movements up to a minimum of at least 14 ft wide and 100 ft long. Book permits in their original form shall consist of three copies, the original copy to accompany the load during movement, the second copy to remain in the truck operator office, and the third copy to be sent immediately to the state agency following validation.

#### *Uniform Signs*

Sign 7 ft by 18 in.; black letters 1½ in. wide and 10 in. high on yellow background reading **OVERSIZE LOAD** required on the front and rear of any overweight, overheight, overwidth, or overlength load.

#### *Flag Uniformity*

Four 18-in. square red flags will be mounted on the 4 corner extremities of an overdimensional vehicle.

<sup>1</sup> Revised: October 17, 1977.

#### *Escort Vehicle Requirements*

*Length.* One rear escort after 90 ft overall length on less than 4-lane highways and after 110 ft on 4- or more lane highways. Additional escort in front after 120 ft on less than 4-lane highways.

*Width.* One escort required on all roads when in excess of 12 ft wide. Additional escort required on less than 4-lane highways when in excess of 14 ft wide.

*Height.* No routine escort requirements.

*Weight.* No routine escort requirements.

*Escort Vehicle Markings.* An escort vehicle shall be equipped with two 18-in. red flags mounted on staffs at the vehicle corners. Whenever the vehicle is escorting a load requiring the **OVERDIMENSIONAL LOAD** sign the escort shall display a bumper-mounted yellow 14-in. x 5-in. sign reading **OVERSIZED LOAD** with black letters 8 in. high and 1 in. wide. Wherever special lights are required, a revolving amber dome light meeting the requirements of SAE J845 mounted in the center of the vehicle roof shall meet the state's special lighting requirements.

#### *Periods of Travel Under Permit*

*Overweight Loads Only.* Overweight loads that are not overdimensional and can flow with the traffic, although still subject to permit requirements, shall not be restricted as to travel time.

*Overdimensional Loads.* Daylight hours only. (Except for special reasons when a highway department approves the necessity for an oversize or overweight load to travel at other times. In such cases the permit shall so read.) Daylight hours are defined as extending from ½ hour before sunrise to ½ hour after sunset.

Vehicles under permit shall not travel on New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving, or Christmas.

#### *Permit Fees and Payment*

Wherever permit fees are required in the states, such fees shall be established at reasonable levels. Payment of those fees for permits shall be allowed through either an escrow or charge account protected by reasonable security.

#### *Vehicle Identification*

In cases where vehicle identification is required on any overdimensional and/or overweight load permit for a combination, that vehicle identification shall be limited to either straight truck or towed vehicle when moved in combination.

## APPENDIX C

### SUMMARY OF WASHTO MOBILE AND MODULAR HOME REQUIREMENTS

#### MOBILE AND MODULAR HOME REQUIREMENTS AND CATEGORIES

	CATEGORY I MOBILE HOMES	CATEGORY II MOBILE HOMES	CATEGORY III MODULAR HOMES	CATEGORY IV MODULAR HOMES
* Length	Over 40' less than 55'	Not exceed 65'	Over 40' not exceed 55'	Not exceed 65'
* Width	Over 8' not exceed 10'	Not exceed 12'	Over 8' not exceed 10'	Not exceed 12'
* Height	Not exceed 13'6"	Same	Same	Same
* Weight	Not exceed 17,000 lbs.	Not exceed 24,000 lbs.	Not exceed 22,000 lbs.	Not exceed 32,000 lbs.
* Axles	Two full with minimum overall track width not less than 8' wide.	Three full with minimum overall track width not less than 8' wide.		
* Brakes	On all wheels on two full axles. Automatic in event of hitch disconnect.	Same		
* Tires	7:00" diameter 8 ply minimum in good condition. No tread less than 3/32".	8:00" Diameter 10 ply minimum in good condition. No tread less than 3/32".		
* Moving Equipment			Meets FHWA Motor Carrier Safety Regulation.	Same
* Construction	ANSI 119.1	Same	Uniform Building Code	Same
* Securing Load			Minimum: four steel 3/4" dia. bolts main support members to frame, four feet apart.	Same

#### THE FOLLOWING ARE REQUIRED FOR ALL TRAILER TOWS

* Stop and Turn signals	Rear 6" diameter, CP 36, red reflector, 18" from outer edge, 5' - 6' above road.
* Safety Chains	Two separate 3/8" steel chains, 16,200 pound test.
* Interior Loading	Shift not to exceed 6" laterally 10" longitudinally. (in transit)
* Signs	"Oversize Load", AASHTO Standards, 7' wide 18" high with black letters 10" high 1 5/8" brush stroke on yellow background, 6' - 7' above road.
* Open sides	Rigid material or .5 mil plastic on 4' squares grill. (2 section trailers)

The foregoing information is based upon WASHO Mobile and Modular Home Transportation Regulations and is provided as a summary only.

	TOW VEHICLE	ESCORT VEHICLE
Wheelbase, minimum	120" conventional 85" cabover	95"
Overall length, maximum	15'	
Overall width, minimum	96"	
Rear axle rating, minimum	15,000 lbs.	
GCW, rating minimum	35,000 lbs.	
Transmission, minimum	4 speeds forward	
Weight, curb, minimum	7,500 lbs.	3,000 lbs.
Tires, minimum		
Category I & III trailers	8:00 dia. 8 ply	
Category II & IV	8:25 dia. 10 ply	
Tread	1/8"	
Rear tires, minimum	4	
Range capability, minimum	250 miles w/full load	
Horsepower, minimum	Capable of 35mph within 2,000 ft. from a stopped position on any route traveled	
Signs * Wood or metal panel		
Position	Mounted laterally	Same
Distance above roadway, minimum	4'	5'
To be read from	Front of vehicle	Same for forward escort Rear from rear escort vehicle
Lights, warning, amber		4", 35-60 flashing per minute, one on each end of sign
Radio, communications system	Two way 1/2 mile range (FCC Part 15 Sub E not acceptable) compatible with escorts	Same
Safety equipment required		
Flares	6 each	8 each
Red flags w/staff	4 each	2 each
First aid kit	1 each	1 each
Flagman's vest	1 each	
Portable flashing light, 4" amber	1 each	

\* Signs read "Oversize Load" 5' wide 10" high black letters 8" high, 1" brush stroke on yellow background

**THE TRANSPORTATION RESEARCH BOARD** is an agency of the National Research Council, which serves the National Academy of Sciences and the National Academy of Engineering. The Board's purpose is to stimulate research concerning the nature and performance of transportation systems, to disseminate information that the research produces, and to encourage the application of appropriate research findings. The Board's program is carried out by more than 150 committees and task forces composed of more than 1,800 administrators, engineers, social scientists, and educators who serve without compensation. The program is supported by state transportation and highway departments, the U.S. Department of Transportation, and other organizations interested in the development of transportation.

The Transportation Research Board operates within the Commission on Sociotechnical Systems of the National Research Council. The Council was organized in 1916 at the request of President Woodrow Wilson as an agency of the National Academy of Sciences to enable the broad community of scientists and engineers to associate their efforts with those of the Academy membership. Members of the Council are appointed by the president of the Academy and are drawn from academic, industrial, and governmental organizations throughout the United States.

The National Academy of Sciences was established by a congressional act of incorporation signed by President Abraham Lincoln on March 3, 1863, to further science and its use for the general welfare by bringing together the most qualified individuals to deal with scientific and technological problems of broad significance. It is a private, honorary organization of more than 1,000 scientists elected on the basis of outstanding contributions to knowledge and is supported by private and public funds. Under the terms of its congressional charter, the Academy is called upon to act as an official—yet independent—advisor to the federal government in any matter of science and technology, although it is not a government agency and its activities are not limited to those on behalf of the government.

To share in the tasks of furthering science and engineering and of advising the federal government, the National Academy of Engineering was established on December 5, 1964, under the authority of the act of incorporation of the National Academy of Sciences. Its advisory activities are closely coordinated with those of the National Academy of Sciences, but it is independent and autonomous in its organization and election of members.

**TRANSPORTATION RESEARCH BOARD**

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