

Research Report  
UKTRP-85-28

SUGGESTED CHANGES TO KENTUCKY STATUTES  
(VEHICLE WEIGHTS AND DIMENSIONS)

by

Herbert F. Southgate, P.E.  
Chief Research Engineer

and

Robert C. Deen, P.E.  
Director

Kentucky Transportation Research Program  
College of Engineering  
University of Kentucky  
Lexington, KY

in cooperation with  
Kentucky Transportation Cabinet  
Commonwealth of Kentucky

and

Federal Highway Administration  
U.S. Department of Transportation

The contents of this report reflect the views of the authors who are responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the Kentucky Transportation Cabinet, the Federal Highway Administration, or the University of Kentucky. This report does not constitute a standard, specification, or regulation.

November 1985

1. Report No. UKTRP-85-28		2. Government Accession No.		3. Recipient's Catalog No.	
4. Title and Subtitle Suggested Changes to Kentucky Statutes (Vehicle Weights and Dimensions)		5. Report Date November 1985		6. Performing Organization Code	
		8. Performing Organization Report No. UKTRP-85-28		10. Work Unit No. (TRAIS)	
7. Author(s) Herbert F. Southgate and Robert C. Deen		9. Performing Organization Name and Address Kentucky Transportation Research Program College of Engineering University of Kentucky Lexington, Kentucky 40506-0043		11. Contract or Grant No. KYHPR-85-108-8	
12. Sponsoring Agency Name and Address Kentucky Transportation Cabinet Commonwealth of Kentucky Frankfort, Kentucky 40622		13. Type of Report and Period Covered Final		14. Sponsoring Agency Code	
15. Supplementary Notes Prepared in cooperation with Federal Highway Administration, U. S. Department of Transportation. STUDY TITLE: Review of Kentucky Statutes Pertaining to Weight Limits and Special Permits					
16. Abstract The purposes of this report are: <ol style="list-style-type: none"> <li>1. To clearly define the terms "tandem," "tridem," and "triauxle."</li> <li>2. To clearly define the term "600 pounds per inch width of tire" as the "width of the tread in contact with the pavement."</li> <li>3. To make the axleload limits the same throughout the statutes.</li> <li>4. To suggest elimination of indentified discriminatory legislation.</li> <li>5. To recommend additional legislation: <ol style="list-style-type: none"> <li>a. to clearly define the purpose and use of "air-bag" suspension systems -- those that can be raised or lowered by the driver, and</li> <li>b. to enable vehicle weight enforcement officers to use shipping documents as evidence to issue overweight citations without having to weigh the trucks. These documents may be in the possession of the driver, or in the files of the shipping and/or receiving firms.</li> </ol> </li> </ol>					
17. Key Words Pavement, legal axleloads, single axle, tandem axle, tridem axle, tire width, permit fees, and overload fine schedule.			18. Distribution Statement Unlimited with Kentucky Transportation Cabinet approval.		
19. Security Classif. (of this report) Unclassified		20. Security Classif. (of this page) Unclassified		21. No. of Pages 26	22. Price

## TABLE OF CONTENTS

DESCRIPTION	PAGE
BACKGROUND	1
SUGGESTED CHANGES TO KENTUCKY STATUTES	1
STATUTE	
NUMBER	
177.980 Coal recovery road fund--Assessments	1
186.050 Registration fees--Section 8	1
186.050 Registration fees--Section 9	2
186.050 Registration fees--Section 10	2
189.210 Maximum weight permitted on highway-- Section 1	3
189.221 Basic height, width, length and weight limits for trucks, semitrailers-- Exception--Section 5	3
189.221 Basic height, width, length and weight limits for trucks, semitrailers-- Exception--Section 6	3
189.222 Increased height, length and weight limits on designated highways--Section 1(c)	3
189.222 Increased height, length and weight limits on designated highways--Section 3	4
189.222 Increased height, length and weight limits on designated highways--Section 4	4
189.222 Increased height, length and weight limits on designated highways--Section 6(b)	5
189.223 Measuring or weighing of vehicle by peace officer--Unloading of excess weight-- Section 1	6
189.270 Special permits to exceed limits--Section 1	6
189.280 Trucks and trailers owned by governmental units--Regulation of truck and trailers by cities--Section 1	7
189.990 Penalties--Section 2(a)	8
SUGGESTED ADDITIONS TO KENTUCKY STATUTES	
189.222 Increased height, length and weight limits on designated highways--Section 1(f)	8
189.222 Increased height, length and weight limits on designated highways--Section 1(g)	9
189.223 Measuring or weighing of vehicle by peace officer--(2) Receipt of certain overweight loads	9
BACKGROUND FOR SPECIAL PERMIT FEE DISTANCE TABLE	9
DEVELOPMENT OF PROPOSED FINES FOR OVERLOADS BASED ON LOAD EQUIVALENCY FACTORS	10
SUMMARY	11

IMPLEMENTATION

11

REFERENCES

11

## BACKGROUND

A review of the 1984 Commonwealth of Kentucky Motor Vehicle Laws disclosed discrepancies in definitions and the use of the same word to intend different meanings. Therefore, this effort is an attempt to clarify some of these conflicts.

## SUGGESTED CHANGES TO KENTUCKY STATUTES

The suggested changes to the Kentucky Revised Statutes are listed below. Proposed additions are underlined and deletions are enclosed in brackets. Each suggestion is followed by an explanation for the proposed change.

### 177.980. Coal recovery road fund -- Assessments.

(4) A [~~tandem~~] single-unit truck having one steering axle and one tandem axle group or [~~triauxle~~] a single-unit truck having one steering axle and one tridem group shall be limited to transporting coal to a radius of seventy-five (75) air miles from the point at which the coal is mined.

EXPLANATION: The definition of "tandem" means two axles and is used in the statutes to specify the maximum legal load permitted on that axle arrangement. Tandem as used above is a "nick-name" for a dump truck consisting of a steering axle and one set of "tandem" axles. "Triaxle" has been intermingled with "tridem" to mean a group of three axles. Therefore, the above is intended to clarify the intent of the above legislation.

### 186.050. Registration fees.

[(B)] Motor vehicles having a declared gross weight in excess of eighteen thousand (18,000) pounds, which when operated in this state are used exclusively for the transportation of property within the limits of the city named in the affidavit hereinafter required to be filed, or within ten (10) miles of the city limits of the city if it is a city of the first, second, third, or fourth class, or within five (5) miles of its limits if it is a city of the fifth or sixth class, shall not be required to pay the fee as set out in subsection (3) of this section, and in lieu thereof shall pay forty percent (40%) of the fee set forth in subsection (3) hereof and shall be exempt from any fee charged under the provisions of KRS 281.752. Nothing in this section shall be construed to limit any right of nonresidents to exemption from registration under any other provisions of the laws granting reciprocity to nonresidents. Operations outside of this state shall not be considered in determining whether or not the foregoing mileage limitations have been observed. When claiming the right to the reduced fee, the applicant's signature on the certificate of registration and ownership shall constitute a certification or affidavit stating that the motor vehicle when used within this state is used only for the transportation of property within the city to be named in the affidavit and the area above set out and that the vehicle will not be used outside of a city and the area above set out during the current

registration period.]

EXPLANATION: This subsection should be repealed in its entirety to eliminate improper and undesired exemptions to registration fees. These vehicles cause the same degree of damage to the pavements as other vehicles having the same weight and axle arrangement.

**186.050. Registration fees.**

[(9) Motor vehicles having a declared gross weight in excess of eighteen thousand (18,000) pounds, which are used exclusively for the transportation of primary forest products from the harvest area to a mill or other processing facility, where such mill or processing facility is located at a point not more than fifty (50) air miles from the harvest area or which are used exclusively for the transportation of concrete blocks or ready mixed concrete from the point at which such concrete blocks or ready mixed concrete is produced to a construction site where such concrete blocks or ready mixed concrete is to be used, where such construction site is located at a point not more than thirty (30) air miles from the point at which such concrete blocks or ready mixed concrete is produced shall not be required to pay the fee as set out in subsection (3) of this section, and in lieu thereof shall pay forty percent (40%) of the fee set out in subsection (3) hereof and shall be exempt from any fee charged under the provisions of KRS 281.752. The applicant's signature upon the certificate of registration and ownership shall constitute a certification that the motor vehicle will not be used during the current registration period in any manner other than that for which the reduced fee is provided in this section.]

EXPLANATION: This subsection should be deleted in its entirety. Both forestry and concrete transit-mix trucks typically are loaded heavier than their design loads and heavier than any similar axle arrangement on vehicles hauling other commodities. Thus, these vehicles cause more damage to the pavements and bridges than most other vehicles having the same arrangement of axles. Furthermore, these vehicles usually operate on county roads and city streets that have thinner pavements. Their effect on thinner pavements is far more severe than for higher type highways. Usually, local repair budgets are very nominal. Therefore, these vehicles should be assigned a higher registration fee, not a reduced fee as the existing legislation allows.

**186.050. Registration fees.**

[(10) Motor vehicles used exclusively for the transportation and delivery of motor vehicles, not including trailers and semi-trailers, by means of the full amount or truckaway methods on trailers of semi-trailers, shall pay an amount equal to three-fourths (3/4) of the fee set out in subsection (3) hereof. Any applicant for such registration shall present to the county clerk a certification from the cabinet that the vehicle may be licensed in accordance herewith. No clerk shall issue registrations under this section without attaching a copy of the department's certification to the transportation cabinet's copy of the certificate of registration and ownership.]

EXPLANATION: These vehicles are loaded to the maximum legal limits and cause the same damage to pavements and bridges as other vehicles of the same classification. Therefore, the registration fee should not be reduced.

189.210. Maximum weight permitted on highway. -- (1) No person shall operate on a highway any vehicle, object of contrivance, other than a motor truck or semitrailer truck, which weighs more than fifteen (15) tons, including the weight of the vehicle, object or contrivance and load, except as provided by subsection (2). This shall not apply to vehicles run upon [tracks] railroad rails [or] fire apparatus belonging to any municipal or volunteer fire department or used by such a department in the discharge of its functions.

EXPLANATION: The word "tracks" can mean railroad rails, street car rails, or a series of hinged plates surrounding a series of sprockets that propel the vehicle upon the plates. A vehicle equipped with tracks as described by the latter definition should not be allowed to travel upon a highway surface. Street cars are no longer in use in Kentucky.

189.221. Basic height, width, length and weight limits for trucks, semitrailers -- Exception --.

(5) Any truck, semitrailer or tractor-trailer unit which exceeds a gross weight equal to the [sum] product of 600 pounds and [per inch of] the combined width of the [tires] tire tread in contact with the pavement [of the tires] upon which such vehicle may be propelled, but in no event more than 36,000 pounds.

EXPLANATION: The phrase "width of tire" appears in several places in the statutes. However, there are three different definitions of "width" used by the tire industry: a) width of tire rim, b) out-to-out dimension of the tire walls, and c) width of tire tread in contact with the pavement. Loads are transmitted to the pavement through the tire tread only. Therefore, the allowable load should be defined in terms of the width of the tire tread.

189.221. Basic height, width, length and weight limits for trucks, semitrailers -- Exception --.

[(6) Notwithstanding the provisions of this section, any truck hauling building materials to a road construction project on a highway rated less than the maximum weight provided above, may haul up to 80,000 pounds gross weight, including the load, without a permit. This privilege shall extend only to travel between the materials manufacturing site and the road construction project and shall be automatically rescinded upon completion of said project.]

EXPLANATION: This subsection potentially allows an inferior pavement to be loaded to failure while constructing another pavement. One pavement should not be demolished to build another.

189.222. Increased height, length and weight limits on designated highways.

(1) (c) Weight, twenty thousand (20,000) pounds per single axle, with axles less than forty-two (42) inches apart to be considered as a single axle; thirty-four thousand (34,000) pounds on two (2) axles in tandem arrangement which are spaced forty-two (42) inches or more apart and less than ninety-six (96) inches apart; fifty thousand four hundred [(50,000)] 50,400 pounds on three (3) axles (tridem) for which the distance between the centers of the first and third axles are spaced forty-two (42) inches or more apart and less than one hundred twenty (120) inches apart. In no event shall any single axle in arrangement of two, or more, axles exceed 18,000 pounds, or six hundred (600) pounds per inch of the [aggregate] combined width of all the tires on [a] an [single] individual axle, whichever is less. In no event shall the total gross weight of the vehicle and load exceed eighty thousand (80,000) pounds;

EXPLANATION: (1) The phrase "width of tire" appears in several places in the statutes. However, there are three different definitions of "width" used by the tire industry: a) width of tire rim, b) out-to-out dimension of the tire walls, and c) width of tire tread in contact with the pavement. Loads are transmitted to the pavement through the tire tread only. Therefore, the allowable load should be defined in terms of the width of the tire tread.

(2) Section 189.222 1(d) states, "Except on the interstate highway system, a tolerance of not more than five percent (5%) per axle load shall be permitted..." Theoretically, each axle of a tandem is limited to 17,000 pounds and of a tridem to 16,800 pounds. Recent research has shown that uneven load distribution between the axles of a tandem causes an average of 1.4 times the damage compared to the damage when the load is equally divided between the axles. For a tridem, the factor is 2.3. Thus, changing from 20,000 to 18,000 is made to limit the amount of damage to pavements and bridges. However, the reduction is still in line with the limitation included in the paragraph cited above. A five percent (5%) tolerance equals 850 pounds and 840 pounds, respectively, and each tolerance added to the individual axleload is still less than 18,000 pounds. The change from 50,000 to 50,400 pounds for tridems is suggested to bring it into conformance with the weight allowed on the Interstate System and the difference is insignificant. Therefore, the change is suggested so that the same value is used throughout the statutes.

189.222. Increased height, length and weight limits on designated highways.

[(3) Vehicles engaged exclusively in the transportation of farm or primary forestry products and registered under KRS 186.050(4) or KRS 186.050(9) shall be excluded from the axle weight provisions, except on interstate highways, and subject only to total gross weight provisions.]

189.222. Increased height, length and weight limits on designated highways.

[(4) Vehicles designed for and engaged exclusively in the



collection and hauling of refuse and registered under KRS 186.050(3)(b) shall be excluded from the axle weight provisions, except when in operation on the federal interstate system, and subject only to total gross weight provisions.]

EXPLANATION: For subparagraphs 3 and 4, one industry should not be allowed to damage pavements to a greater degree than any other industry. This is discrimination. A strong policy statement is needed as substantiation if this statute is to remain.

189.222. Increased height, length and weight limits on designated highways.

(6) (b) Weight, twenty thousand (20,000) pounds per single axle, with axles less than forty-two (42) inches apart to be considered as a single axle; thirty-four thousand (34,000) on two (2) axles in tandem arrangement which are spaced forty-two (42) inches or more apart and less than ninety-six (96) inches apart; [forty-eight thousand (48,000)] fifty thousand four hundred (50,400) pounds on three (3) axles (tridem) for which the distance between the centers of the first and third axles are spaced forty-two (42) inches or more apart and less than one hundred twenty (120) inches apart. In no event shall any single axle in the arrangement of three axles exceed 18,000 pounds, or six hundred (600) pounds per inch of tire tread for all tires on an individual axle in contact with the pavement, whichever is less. In no event shall the total gross weight of the vehicle and load exceed eighty thousand (80,000) pounds; provided, however, in the event any federal law or laws or regulations thereunder are hereafter enacted authorizing weights and dimensions in excess of those set out in paragraphs (a) and (b) of this subsection, then the secretary of the transportation cabinet may by official order increase the maximum weights and dimensions but in no event shall said increased weights and dimensions exceed those set out in this section.

EXPLANATION: (1) The change in allowable load on a tridem is made to specify the same limiting axleload wherever "tridem" appears in the statutes. The insertion of "tridem" is to clarify the definition.

(2) There are three different definitions of "width" used by the tire industry: a) width of tire rim, b) out-to-out dimension of the tire walls, and c) width of tire tread in contact with the pavement. Loads are transmitted to the pavement through the tire tread only. Therefore, the allowable load should be defined in terms of the width of the tire tread.

(3) Section 189.222 1(d) states "Except on the interstate highway system, a tolerance of not more than five percent (5%) per axle load shall be permitted..." Theoretically, each axle of a tandem is limited to 17,000 pounds and of a tridem to 16,800 pounds. Recent research has shown that uneven load distribution between the axles of a tandem causes an average of 1.4 times the damage compared to the damage when the load is equally divided between the axles. For a tridem, the factor is 2.3. The 18,000 pound limit is suggested to reduce the amount of damage to pavements and bridges. The reduction is still in line with the limitation included in the paragraph cited above. A five percent (5%) tolerance equals 850 pounds and 840 pounds, respectively and each tolerance added to the individual axleload is still less than

18,000 pounds.

189.223. Measuring or weighing of vehicle by peace officer -- Unloading of excess weight. Any peace officer having reason to believe [that] the height, length, width or weight of any motor truck, semitrailer truck, or trailer[,] is in excess of the maximum limits prescribed by KRS 189.221 and subsection (1) of 189.222 or permitted by any special permit issued under KRS 189.270 and in the possession of the operator[,] may measure it or weigh it either by portable or stationary scales[,] and may require it to be driven to the nearest scales, if such scales are within a distance of five (5) miles from the point at which the vehicle is first directed to stop. If the officer shall determine [that] the operation of the motor truck, semitrailer, or trailer[,] was unlawful, he shall require the operator of said motor truck, semitrailer truck, or trailer to unload such portion of the load as may be necessary to decrease the gross weight of the vehicle to the maximum gross weight permitted under the terms of KRS 189.221 and subsection (1) of 189.222 or of KRS 189.270, or he may, at the election of the [operator,] peace officer, permit the operator to move the vehicle with its load to the nearest city or nearest court having jurisdiction, at which place the excess load [shall] may be unloaded[,] or the vehicle shall be impounded. If the decision is made to unload the excess load, the excess load shall be unloaded at the sole risk of the owner. The refusal of the operator to permit his motor truck, semitrailer truck, or trailer to be measured or weighed, or to proceed to a scales, or to unload the excess load, shall constitute a violation of KRS 189.221 to 189.223.

EXPLANATION: Moving the vehicle should be at the discretion of the peace officer and not the operator. If the cargo is a hazardous substance, it should not be unloaded unless proper facilities are available. If the load is too severe, the vehicle should be impounded until the load can be divided safely.

189.270. Special permits to exceed limits.

(1) The Cabinet may prescribe, by orders of general application, rules and regulations for the issuance by it of permits for the operation of motor vehicles, mobile homes, recreational vehicles and vehicles transporting microwave satellite television antennae or farm equipment, whose gross weight including load, height, width or length exceeds the limits prescribed by this chapter or which in other respects fail to comply with the requirements of this chapter. Permits may be issued by the Cabinet for stated periods, special purposes and unusual conditions, and upon such terms in the interest of public safety and the preservation of the highways as the Cabinet may, in its discretion, require. The Cabinet shall require, as a condition to the issuance of the permit, that the applicant pay a fee of thirty dollars (\$30.00) for each [overweight or] overdimension permit; for overweight vehicles, the applicant shall pay a basic fee of thirty dollars (\$30.00) plus an additional amount based upon the product of ten dollars (\$10.00) and the distance factor as shown in TABLE 11; a fee of twenty dollars (\$20.00) for each single trip house trailer permit; a fee of eighty dollars (\$80.00) for each annual house trailer, farm equipment or

microwave antennae transporter permit; and may require that the applicant give bond, with approved surety, to indemnify the state or counties against damage to highways or bridges resulting from use by the applicant. The operation of motor vehicles, mobile homes and recreational vehicles in accordance with the terms of any such permit shall not constitute a violation of this chapter if the operator has the permit, or a copy of it, authenticated as the department may require, in his possession.

TABLE 1. SCHEDULE OF FACTORS FOR SPECIAL PERMITS BASED ON DISTANCE

DISTRICT NUMBER	1	2	3	4	5	6	7	8	9	10	11	12
1	1.00	2.67	4.35	5.62	7.08	9.04	8.46	7.35	10.81	10.35	9.50	11.88
2	2.67	1.00	2.38	3.04	4.38	6.25	5.88	5.15	8.19	7.69	7.38	9.50
3	4.35	2.38	1.00	1.81	3.65	5.58	4.42	3.00	6.81	5.92	5.15	7.62
4	5.62	3.04	1.81	1.00	1.84	3.77	2.85	2.42	5.22	4.65	4.46	6.46
5	7.08	4.38	3.65	1.84	1.00	2.00	2.00	3.19	3.96	4.00	4.54	5.77
6	9.04	6.25	5.58	3.77	2.00	1.00	2.04	4.27	2.50	3.42	4.69	4.88
7	8.46	5.88	4.42	2.85	2.00	2.04	1.00	4.27	2.50	3.42	4.69	4.88
8	7.35	5.15	3.00	2.42	3.19	4.27	2.35	1.00	2.42	2.04	2.77	3.81
9	10.81	8.19	6.81	5.22	3.96	2.50	2.42	4.42	1.00	1.77	3.62	2.58
10	10.35	7.69	5.92	4.65	4.00	3.42	2.04	3.12	1.77	1.00	1.85	1.81
11	9.50	7.38	5.15	4.46	4.54	4.69	2.77	2.19	3.62	1.85	1.00	2.77
12	11.88	9.50	7.62	6.46	5.77	4.88	3.81	4.65	2.58	1.81	2.77	1.00

EXPLANATION: There are fundamental and technical reasons for the differences between fees to be paid for special permits and fines to be assessed for overload. Overloads occur when additional load is carried on a vehicle with a fixed number of axles. For overloads, the damage to pavements increases rapidly for a small increase in load. Special permits for overloads should be based upon the distance to be traveled. The recommendation of ten dollars (\$10) per unit of distance is a reasonable fee because the vehicle must have the proper number of axles to minimize the damage to pavements and bridges before the special permit is issued. Table 1 contains ratios of relative distances between approximate geographic centers of each district, with the reference or divisor being the "radius" of District 5, the smallest area and "radius". Each district was assumed to have a relative distance of unity.

189.280. Trucks and trailers owned by governmental units -- Regulation of truck and trailers by cities.

(1) KRS 189.221 to 189.230, 189.280 and 189.490 shall not apply to motor trucks, semitrailer trucks or trailers owned by the United States, [the Commonwealth of Kentucky, or any agency of them, any county or city.]

EXPLANATION: State, County, and City government vehicles should abide by its own laws. However, the state cannot limit the Federal Government.

189.990. (2) (a) Any person who violates the weight provisions of KRS 189.221, 189.222, 189.226, 189.230, 189.270 or 189.271 shall, upon conviction, be fined in an amount equal to two cents (2¢) per pound for each pound of excess load when the excess is two thousand (2,000) pounds or less, three cents (3¢) per pound when the excess exceeds two thousand (2,000) pounds and is three thousand (3,000) pounds or less, five cents (5¢) per pound when the excess exceeds three thousand (3,000) pounds and is four thousand (4,000) pounds or less, seven cents (7¢) per pound when the excess exceeds four thousand (4,000) pounds and is five thousand (5,000) pounds or less, and nine cents (9¢) per pound when the excess exceeds five thousand (5,000) pounds but in no case shall the fine be less than sixty dollars (\$60.00) nor more than five hundred dollars (\$500.00) as follows:

i. If the total gross excess weight is not more than 1,200 pounds, sixty dollars (\$60.00);

ii. If the total gross excess weight is more than 1,200 pounds but not more than 2,000 pounds, sixty dollars (\$60) plus five cents (5¢) per pound for each pound in excess of 1,200 pounds;

iii. If the total gross excess weight is more than 2,000 pounds but not more than 4,000 pounds, one hundred dollars (\$100) plus eight cents (8¢) per pound for each pound in excess of 2,000 pounds;

iv. If the total gross excess weight is more than 4,000 pounds but not more than 7,000 pounds, two hundred sixty dollars (\$260) plus eleven cents (11¢) per pound for each pound in excess of 4,000 pounds;

v. If the total gross excess weight is more than 7,000 pounds but not more than 10,000 pounds, five hundred ninety dollars (\$590) plus fourteen cents (14¢) per pound for each pound in excess of 7,000 pounds;

vi. If the total gross excess weight is more than 10,000 pounds but not more than 15,000 pounds, one thousand ten dollars (\$1,010) plus seventeen cents (17¢) per pound for each pound in excess of 10,000 pounds;

vii. If the total gross excess weight is more than 15,000 pounds but not more than 30,700 pounds, one thousand eight hundred sixty dollars (\$1,860) plus twenty cents (20¢) per pound for each pound in excess of 15,000 pounds;

viii. If the total gross excess weight exceeds 30,700 pounds, the maximum fine shall be five thousand dollars (\$5,000).

#### SUGGESTED ADDITIONS TO KENTUCKY STATUTES

189.222. (1) (f) Variable load axles. -- A vehicle equipped with one or more variable-load axles shall have the pressure control preset so the weight carried on the variable-load axle may not be varied by the operator during transport of any load. The actuating control for the axle shall function only as an "on and off" switch.

EXPLANATION: "Air bag" suspension systems are notorious for not carrying their appropriate share of the total load on that axle group. It has been observed and confirmed by weigh data that the air suspension axle varies from barely touching the pavement to being grossly overloaded. Such variation produces confusion to the peace officer when attempting to apply the "600 pounds per inch of tire tread

officer when attempting to apply the "500 pounds per inch of tire tread in contact with the pavement". In contradiction, the "five percent (5%) rule" should control such vast differences in load distribution except when the axle has only two tires.

**189.222 (1) (g) Relevant Evidence:** A document evidencing the receipt of goods issued by the person consigning the goods for shipment or a person engaged in the business of transporting or forwarding goods, which states a gross weight of the vehicle and load or the weight of the load when combined with the empty weight of the vehicle is in excess of the prescribed maximum weight limitation permitted by this chapter, is relevant evidence that the weight of the vehicle and load is unlawful. For the purposes of this section and sections 189.221 and 189.270, a document required to be kept under section 189.223 (2) indicating a unit of measure that, when converted to weight and combined with the weight of the empty vehicle, indicates a gross weight in excess of the prescribed maximum weight limitation permitted by this chapter is relevant evidence that the weight of the vehicle and load is unlawful. The foregoing provisions do not limit the introduction of other competent evidence bearing upon the question of whether or not there is a violation of the prescribed maximum weight limitations permitted by this chapter.

**EXPLANATION:** This subsection permits a peace officer or auditor to issue a citation based on the bill of lading, which is prima facie evidence of the vehicle being overloaded. This proposed statute was copied from Minnesota's statute (1) that has been tested and determined to be constitutional by that state's Supreme Court.

**189.223 (2) Receipt of certain overweight loads -- (a) Record Keeping.** A person who weighs goods before or after unloading or a person who loads or unloads goods on the basis of liquid volume measure shall maintain a written record of the origin, weight and composition of each shipment, the date of loading or receipt, the name and address of the shipper, the total number of axles on the vehicle or combination of vehicles, and the registration number of the power unit or some other means of identification by which the shipment was transported. The record shall be retained for 30 days and shall be open to inspection and copying by a peace officer or Department of Vehicle Regulation representative upon demand.

**EXPLANATION:** The above permits peace officers to use shipping documents as evidence to issue an overload citation based on the combined tare weight and net load of the vehicle. The vehicle does not have to be weighed to issue the citation. This proposed statute was copied from Minnesota's statute (1) that has been tested and determined to be constitutional by that state's Supreme Court.

#### BACKGROUND FOR SPECIAL PERMIT FEE DISTANCE TABLE

In the review of existing Kentucky statutes, special permit fees are fixed values without regard to weight and/or distance. The review

committee for this study decided to recommend a permit fee system based on distance to be traveled. Several methods for developing distance fees were discussed, but the simplest method is the product of ten dollars (\$10) and the factors shown in Table 1.

The basic steps to determine the distance portion are as follows:

1. Distances between geographical centers would be based upon air miles as determined by scaling from the state maps published by the Kentucky Transportation Cabinet.
2. The total area in each district would be determined by summing the area for each county in that district as shown on each county map. The total area was assumed to represent a circular area to permit calculating an "equivalent radius" for each district.
3. The approximate geographical center was determined as nearly as possible using the calculated equivalent radius and by judgment. Figure 1 shows the approximate geographical centers.
4. All distances between approximate geographical centers would be divided by the smallest radius of the district "circular areas".
5. Regardless of the calculated equivalent radius, the relative distance would be assumed to have a ratio of 1.00 and the same fee would apply to travel confined within one district.
6. Table 1 presents the ratios of distances between geographical centers.

#### DEVELOPMENT OF PROPOSED FINES FOR OVERLOADS BASED ON LOAD EQUIVALENCY FACTORS

Kentucky's load equivalency factors for asphaltic concrete pavements (Table 2) were used in this study to determine the relative effects of overloads. Findings of recent research are as follows:

1. Uneven loading of the two axles of a tandem set causes 1.40 times more damage than a tandem of the same gross load equally distributed between the two axles. Review of weigh data indicates only ten percent of the tandem axle assemblies have uniformly loaded axles.
2. For tridem assemblies, uneven loading was 2.32 times more damaging than the same gross load equally distributed to the three axles. Review of national weigh data indicates only ten percent of tridem assemblies have loads equally divided between all axles of the assembly.
3. Load equivalency factors were developed based upon results of the AASHO Road Test conducted in the late 1950's and early 1960's when tire inflation pressures were 75 psi. Current inflation pressures indicate the average to be 105 psi. The increased inflation and subsequent contact pressures on the pavement cause the equivalency factor associated with given load to be increased by a factor of 1.25 for axles having four tires and by 2.18 for two-tired axles.
4. For any axle assembly, the load equivalency factor combining the effects of a given overload, tire pressure, and load distribution (where appropriate) was divided by the load equivalency factor associated with the current legal load for that same axle assembly to obtain a relative ratio.
5. Though each configuration of axles has different set relative

damage factors, assessing fines based on each configuration was determined to be too cumbersome for everyday use. Thus, the relative factors for all axle configurations were averaged to produce the final recommended tables of fines. Load equivalency factors determined above were used to develop Tables 3 through 6 for the steering axle, four-tired single axle, eight-tired tandem axle assembly, and twelve-tired tridem assembly, respectively. Figure 2 displays the effect of increasing overload and relative damage to asphaltic concrete pavements. Figure 3 presents a method of an increasing rate of fines as a function of increasing relative damage. Figure 4 illustrates the application of Figure 3 to increasing overloads compared to the existing rate of fines. Figure 5 presents the existing rate of fines as well as three rates of fines that have been converted to tabular form as shown in Table 7. The schedule of fines suggested in section 189.990 (2)(a) is based upon Curve B in Figure 5 and tabulated in Table 7.

### SUMMARY

The statute portion of the 1984 edition of the Commonwealth of Kentucky Motor Vehicle Laws was reviewed for inconsistencies and possible desired amendments and additions. The Administrative Regulations section was not reviewed, but should be when any modifications presented herein are adopted by the 1986 General Assembly. Proposed changes to the statutes are recommended in this report.

### IMPLEMENTATION

The proposed changes to the statutes included herein have been reviewed in detail by the research committee and are recommended for adoption by the Kentucky Transportation Cabinet.

### REFERENCE

1. Minnesota Motor Vehicle and Traffic Laws, State of Minnesota, St. Paul, Minnesota, 1984.

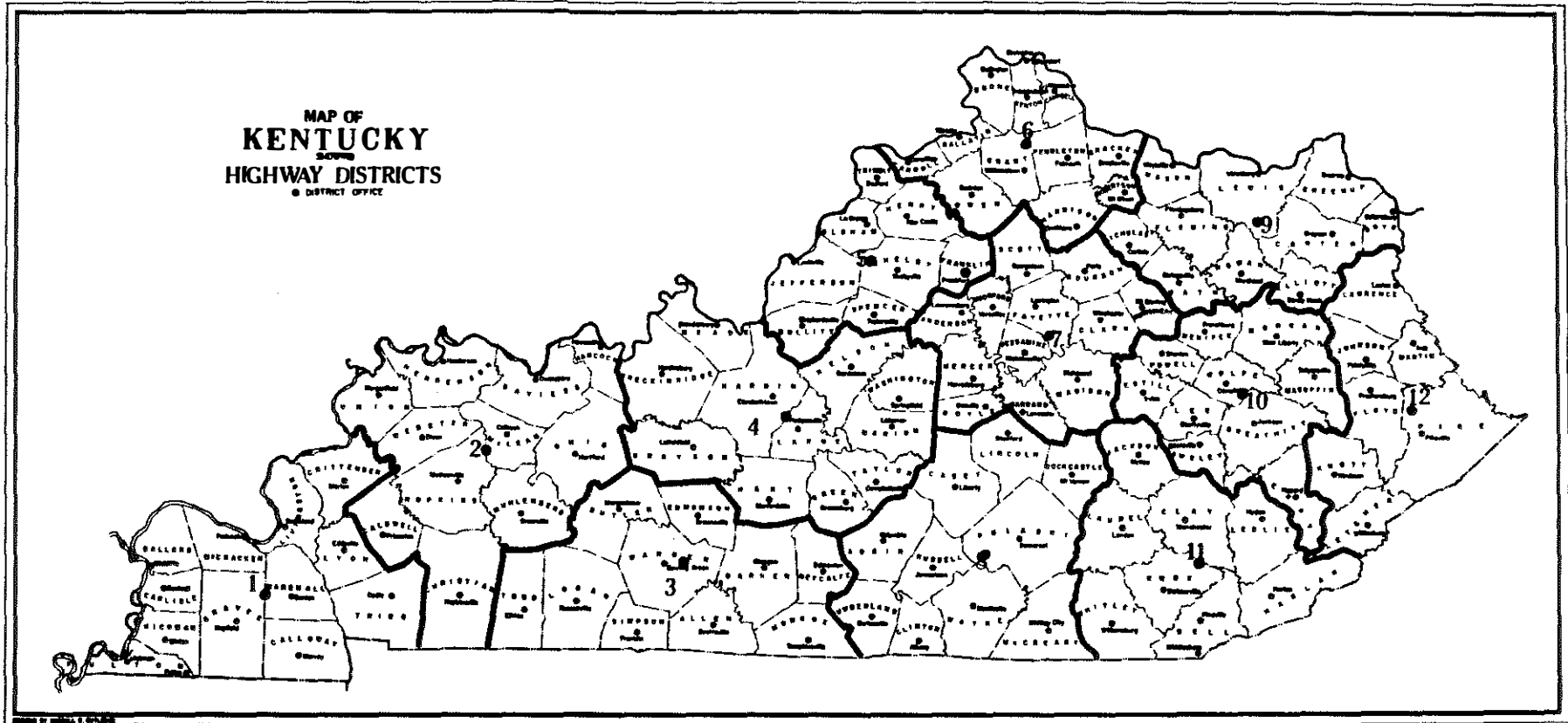


Figure 1. Map of Kentucky Showing Location of Approximate Geographic Center for Each Highway District.



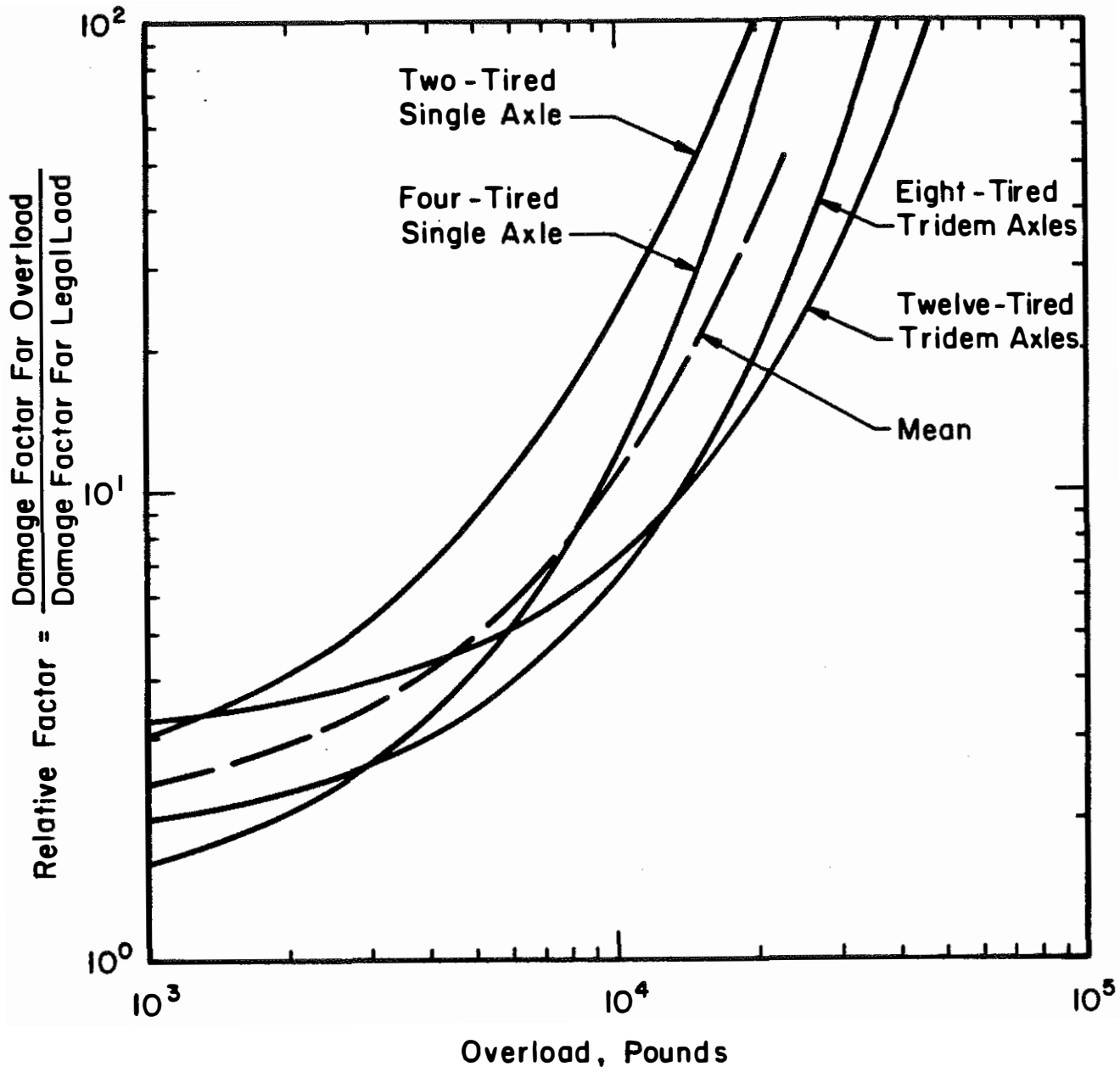


Figure 2. Relative Damage Factor as a Function of Overload for Several Axle Configurations in Kentucky.

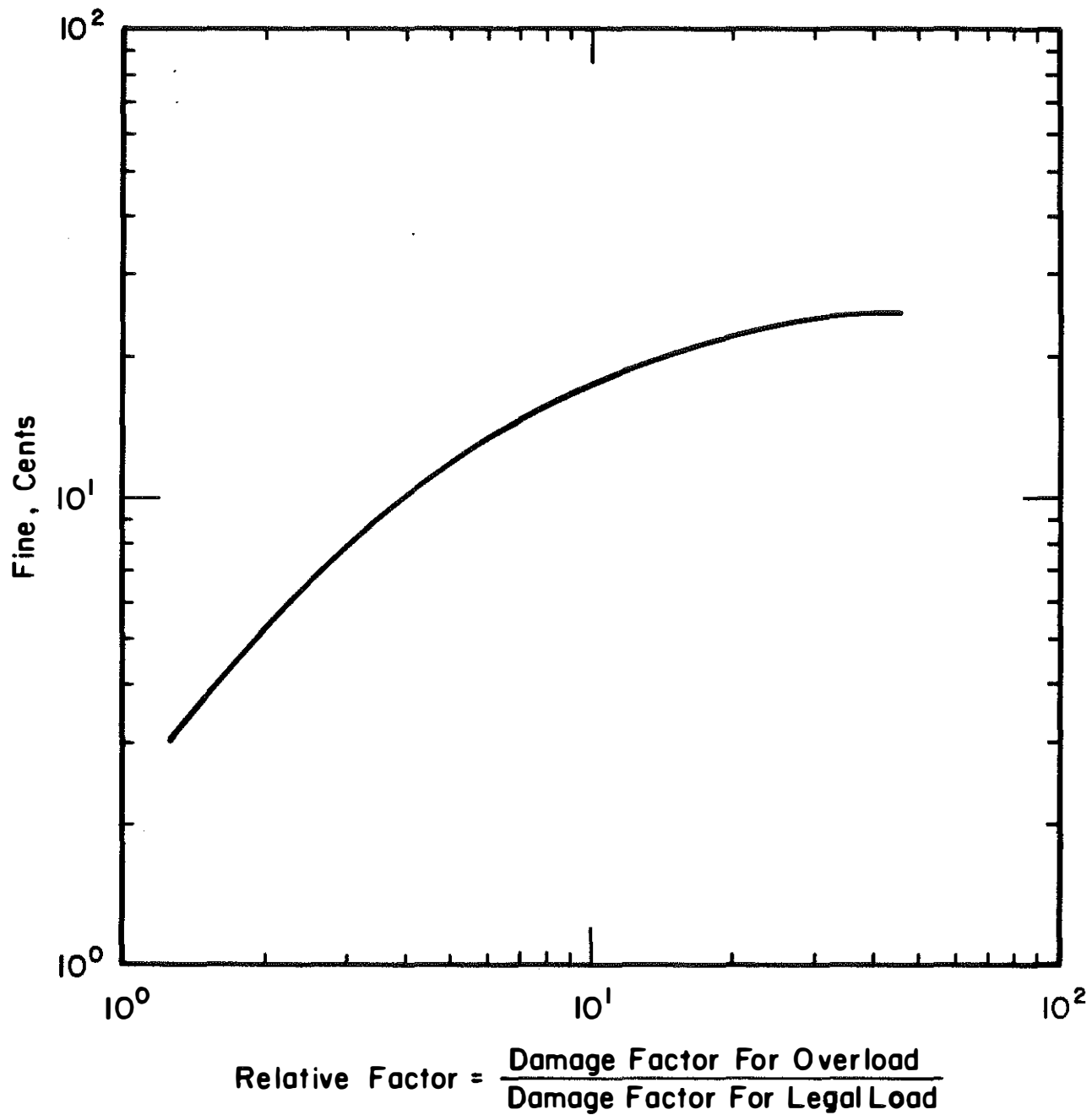


Figure 3. Illustration of One Relationship between Fines as a Function of Relative Damage Factor.

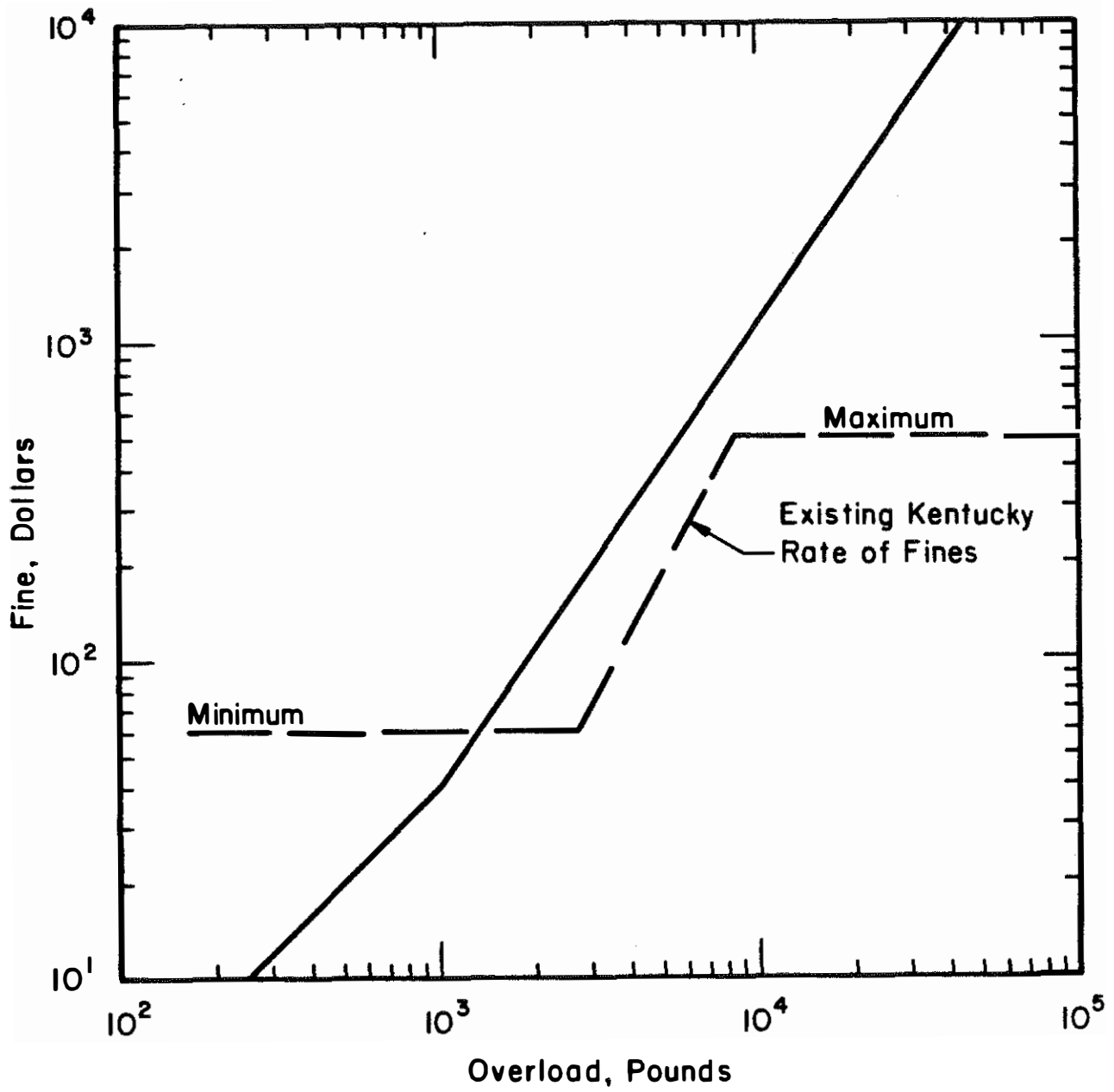


Figure 4. Fines (in Dollars) as a Function of Overload and Comparison with Current Practice.

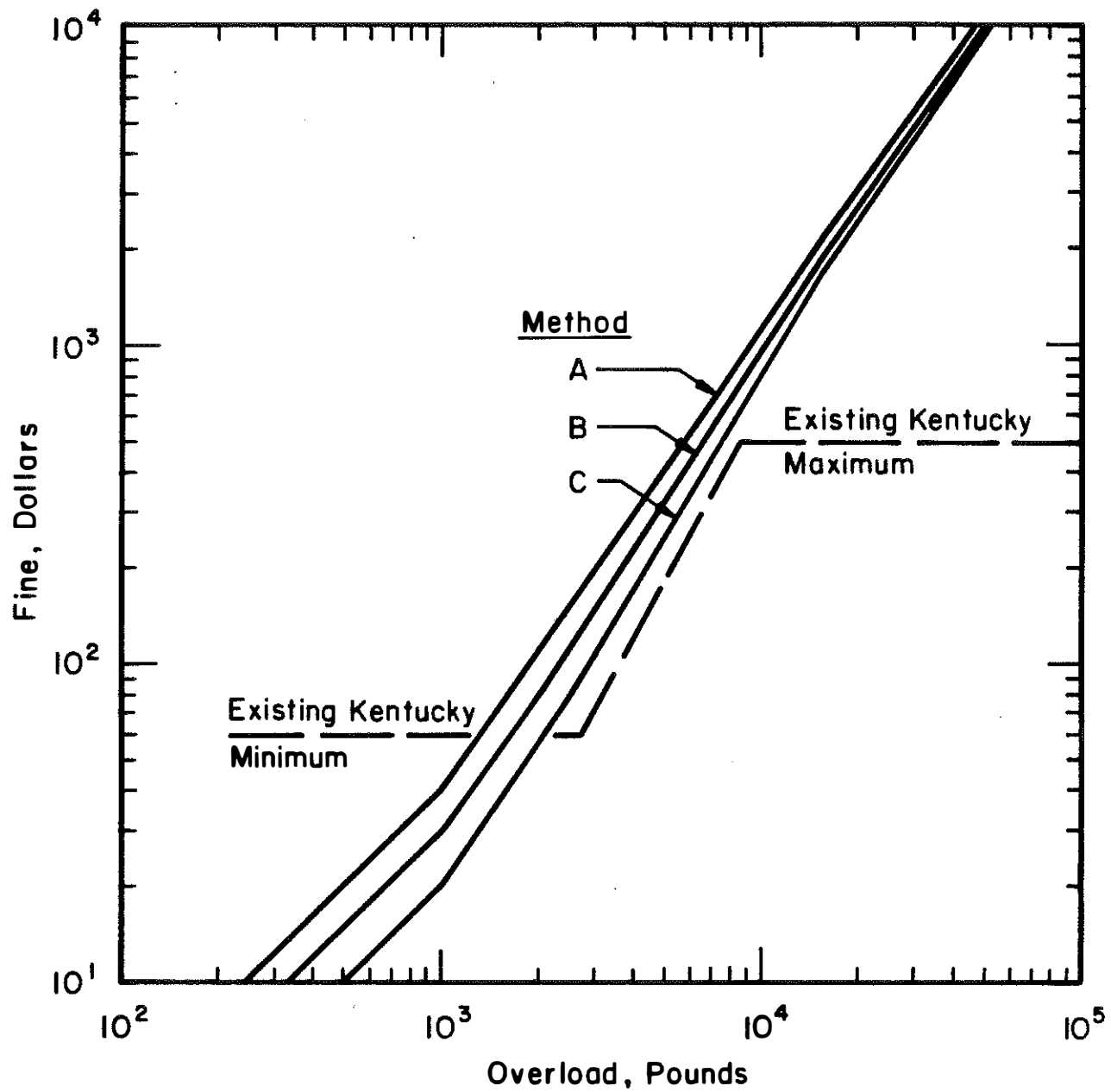


Figure 5. Additional Fine Schedules as a Function of Overload.

TABLE 2. REGRESSION COEFFICIENTS TO CALCULATE DAMAGE FACTORS FOR VARIOUS AXLE CONFIGURATIONS

$$\text{LOG (DAMAGE FACTOR)} = A + B (\text{LOG (LOAD)}) + C (\text{LOG (LOAD)})^2$$

AXLE CONFIGURATION	COEFFICIENTS		
	A	B	C
TWO-TIRED SINGLE FRONT AXLE	-3.540112	2.728860	0.289133
FOUR-TIRED SINGLE REAR AXLE	-3.439501	1.423747	1.846657
EIGHT-TIRED TANDEM AXLE	-2.979479	-1.265144	2.007989
TWELVE-TIRED TRIDEM AXLE	-2.740987	-1.873428	1.964442

TABLE 3. RELATIVE EFFECT OF OVERLOAD ON STEERING AXLE.

OVERLOAD POUNDS	TOTAL LOAD, POUNDS	LOAD EQUIVALENCY	RELATIVE FACTOR
0	9,600	0.26263	1.000
200	9,800	0.61227	2.331
400	10,000	0.65454	2.492
600	10,200	0.69888	2.661
800	10,400	0.74534	2.838
1,000	10,600	0.79399	3.023
1,200	10,800	0.84489	3.217
1,400	11,000	0.89810	3.420
1,600	11,200	0.95369	3.631
1,800	11,400	1.01173	3.852
2,000	11,600	1.07229	4.083
2,200	11,800	1.13542	4.323
2,400	12,000	1.20120	4.574
2,600	12,200	1.26969	4.835
2,800	12,400	1.34097	5.106
3,000	12,600	1.41511	5.388
3,200	12,800	1.49217	5.682
3,400	13,000	1.57224	5.987
3,600	13,200	1.65600	6.300
4,000	14,000	2.02012	7.692
4,400	14,400	2.27579	8.665
4,800	14,800	2.55423	9.726
5,200	15,200	2.85670	10.877
5,600	15,600	3.18446	12.125
6,000	16,000	3.53884	13.475
6,400	16,400	3.92119	14.930
6,800	16,800	4.33286	16.498
7,200	17,200	4.77527	18.183
7,600	17,600	5.24986	19.990
8,000	18,000	5.75809	21.925
8,400	18,400	6.30147	23.994
8,800	18,800	6.88151	26.202
9,200	19,200	7.50247	28.578
9,600	19,600	8.15755	31.173
10,000	20,000	8.8609	34.078
10,400	20,400	9.60247	37.278
10,800	20,800	10.38151	40.773
11,200	21,200	11.20247	44.578
11,600	21,600	12.06151	48.693
12,000	22,000	12.9609	53.128
12,400	22,400	13.90247	57.993
12,800	22,800	14.88151	63.308
13,200	23,200	15.90247	69.073
13,600	23,600	16.96151	75.308
14,000	24,000	18.0609	82.023
14,400	24,400	19.20247	89.238
14,800	24,800	20.38151	96.953
15,200	25,200	21.60247	105.168
15,600	25,600	22.86151	113.883
16,000	26,000	24.1609	123.198
16,400	26,400	25.50247	133.013
16,800	26,800	26.88151	143.328
17,200	27,200	28.30247	154.143
17,600	27,600	29.76151	165.458
18,000	28,000	31.2609	177.273
18,400	28,400	32.80247	189.588
18,800	28,800	34.38151	202.403
19,200	29,200	36.00247	215.718
19,600	29,600	37.66151	229.533
20,000	30,000	39.3609	243.848
20,400	30,400	41.10247	258.663
20,800	30,800	42.88151	273.978
21,200	31,200	44.70247	289.793
21,600	31,600	46.56151	306.108
22,000	32,000	48.4609	322.923
22,400	32,400	50.40247	340.238
22,800	32,800	52.38151	358.053
23,200	33,200	54.40247	376.368
23,600	33,600	56.46151	395.183
24,000	34,000	58.5609	414.498
24,400	34,400	60.70247	434.313
24,800	34,800	62.88151	454.628
25,200	35,200	65.10247	475.443
25,600	35,600	67.36151	496.758
26,000	36,000	69.6609	518.573

TABLE 4. RELATIVE EFFECT OF OVERLOAD ON  
FOUR-TIRED SINGLE AXLE

OVERLOAD POUNDS	TOTAL LOAD, POUNDS	LOAD EQUIVALENCY	RELATIVE FACTOR
0	20,000	1.30103	1.000
1,000	21,000	2.79344	1.616
2,500	22,500	4.04404	2.340
3,500	23,500	5.12614	2.966
4,500	24,500	6.45223	3.733
5,500	25,500	8.06807	4.668
6,500	26,500	10.02644	5.802
7,500	27,500	12.38801	7.168
8,500	28,500	15.22231	8.808
9,500	29,500	18.60682	10.767
10,500	30,500	22.63766	13.099
11,500	31,500	27.40081	15.861
12,500	32,500	33.04742	19.122
13,500	33,500	39.67585	22.957
14,500	34,500	47.44511	27.453
15,500	35,500	56.52159	32.705
18,000	38,000	86.21233	49.884
20,000	40,000	119.09677	68.912
22,000	42,000	162.58602	94.076
24,000	44,000	219.54362	127.033
26,000	46,000	293.47271	169.810
28,000	48,000	388.63248	224.872
30,000	50,000	510.17148	295.197

TABLE 5. RELATIVE EFFECT OF OVERLOAD ON TANDEM AXLES

OVERLOAD POUNDS	TOTAL LOAD, POUNDS	LOAD EQUIVALENCY	RELATIVE FACTOR
0	34,000	0.77532	1.000
1,000	35,000	1.25150	2.018
2,500	36,500	1.54188	2.486
3,500	37,500	1.76655	2.848
4,500	38,500	2.01919	3.255
5,500	39,500	2.30273	3.713
6,500	40,500	2.62037	4.225
7,500	41,500	2.97557	4.797
8,500	42,500	3.37208	5.437
9,500	43,500	3.81396	6.149
10,500	44,500	4.30561	6.942
11,500	45,500	4.85178	7.822
12,500	46,500	5.45761	8.799
13,500	47,500	6.12862	9.881
14,500	48,500	6.87078	11.077
15,500	49,500	7.69051	12.399
18,000	52,000	10.12576	16.325
20,000	54,000	12.53673	20.212
22,000	56,000	15.43789	24.889
24,000	58,000	18.91335	30.493
26,000	60,000	23.05925	37.177
28,000	62,000	27.98513	45.119
30,000	64,000	33.81551	54.518
32,000	66,000	40.69150	65.604
34,000	68,000	48.77272	78.633
36,000	70,000	58.22922	93.895
40,000	74,000	82.16370	132.467
44,000	78,000	114.40149	184.442
48,000	82,000	157.37547	253.726
52,000	86,000	214.09453	345.170
56,000	90,000	288.26966	464.757
60,000	94,000	384.44860	619.820
64,000	98,000	508.17130	819.290



TABLE 6. RELATIVE EFFECT OF OVERLOAD ON TRIDEM  
AXLES

OVERLOAD POUNDS	TOTAL		RELATIVE FACTOR
	LOAD, POUNDS	LOAD EQUIVALENCY	
0	50,000	0.55780	1.000
1,000	51,000	1.81154	3.248
2,500	52,500	2.08561	3.739
3,500	53,500	2.28768	4.101
4,500	54,500	2.50650	4.494
5,500	55,500	2.74326	4.918
6,500	56,500	2.99920	5.377
7,500	57,500	3.27563	5.872
8,500	58,500	3.57392	6.407
9,500	59,500	3.89555	6.984
10,500	60,500	4.24205	7.605
11,500	61,500	4.61506	8.274
12,500	62,500	5.01630	8.993
13,500	63,500	5.44757	9.766
14,500	64,500	5.91077	10.597
15,500	65,500	6.40793	11.488
18,000	68,000	7.81346	14.008
20,000	70,000	9.12448	16.358
22,000	72,000	10.62360	19.046
24,000	74,000	12.33358	22.111
26,000	76,000	14.27947	25.600
28,000	78,000	16.48879	29.561
30,000	80,000	18.99175	34.048
32,000	82,000	21.82145	39.141
34,000	84,000	25.01400	44.844
36,000	86,000	28.60903	51.289
40,000	90,000	37.18287	66.660
44,000	94,000	47.93633	85.939
48,000	98,000	61.33429	109.958
52,000	102,000	77.92386	139.700
56,000	106,000	98.34565	176.311
60,000	110,000	123.34796	221.135
64,000	114,000	153.80039	275.729

TABLE 7. PROPOSED SCHEDULE OF FINES FOR OVERLOADS  
 FOR CURVE A IN FIGURE 5

CENTS PER POUND OVERLOAD	OVERLOAD ON BASIS OF GROSS LOAD		SCHEDULE OF FINES		
	OVER	UP TO AND EQUAL TO	BASIC COST	PLUS	MAXIMUM COST
4	0	1,000	\$0	\$40	\$40
7	1,000	2,000	40	70	110
9	2,000	4,000	110	180	290
11	4,000	6,000	290	220	510
15	6,000	9,000	510	450	960
19	9,000	20,000	960	2,090	3,050
25	20,000	NONE	3,050		

FOR CURVE B IN FIGURE 5

CENTS PER POUND OVERLOAD	OVERLOAD ON BASIS OF GROSS LOAD		SCHEDULE OF FINES		
	OVER	UP TO AND EQUAL TO	BASIC COST	PLUS	MAXIMUM COST
-	0	1,200	60	0	60
5	1,200	2,000	60	40	100
8	2,000	4,000	100	160	260
11	4,000	7,000	260	330	590
14	7,000	10,000	590	420	1,010
17	10,000	15,000	1,010	850	1,860
20	15,000	30,000	1,860	3,000	4,860
25	30,700		4,860	1,140	5,000

FOR CURVE C IN FIGURE 5

CENTS PER POUND OVERLOAD	OVERLOAD ON BASIS OF GROSS LOAD		SCHEDULE OF FINES		
	OVER	UP TO AND EQUAL TO	BASIC COST	PLUS	MAXIMUM COST
2	0	1,000	\$ 0	20	\$ 20
4	1,000	2,500	20	60	80
7	2,500	5,000	80	175	255
10	5,000	8,000	255	300	525
15	8,000	15,000	555	1,050	1,605
20	15,000	30,000	1,605	3,000	4,605
25	30,000	NONE	4,605		