HIGHWAY MATTERS

Report of the

COMMISSION TO STUDY
MATTERS PERTAINING TO HIGHWAYS

To

THE GOVERNOR

and

The GENERAL ASSEMBLY *of* VIRGINIA

MAJORITY REPORT

and

MINORITY REPORT

SENATE DOCUMENT NO. 13

COMMONWEALTH OF VIRGINIA
Division of Purchase and Printing
Richmond
1953

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MAJORITY REPORT

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COMMERCIAL TRUCK TRANSPORTATION AND THE HIGHWAY SYSTEM

REPORT OF THE COMMISSION TO THE GOVERNOR AND GENERAL ASSEMBLY OF VIRGINIA

RICHMOND, VIRGINIA, *November* 9, 1953.

To:

HONORABLE JOHN S. BATTLE, *Governor of Virginia*

and

THE GENERAL ASSEMBLY OF VIRGINIA

INTRODUCTION

Since 1940 the maximum gross weights permitted on the highways of Virginia have been raised by successive increments from 40,000 pounds to the present maximum gross weight of 50,000 pounds.

During the same period changes were made in the license tax structure applicable to both private vehicles and commercial truck transportation generally, and the gross receipts tax, which was applicable to certain carriers by motor vehicle, was suspended as to certain out-of-State carriers. Coincident with the increase in permissible weights of motor vehicles, the number of trucks on the highways has increased materially. The public as well as highway officials and members of the legislature have been concerned about the effect of heavy traffic on the existing system of highways. The question is also raised whether commercial transportation is paying its fair share of the cost of the maintenance and construction of our roads.

In 1932 the State took over the maintenance and operation of the secondary system of highways. With the exception of the counties of Arlington and Henrico, the secondary system in all of the counties is now maintained by the State Department of Highways. Some counties have been concerned about the allocations to them under the formula adopted by the State Highway Commission for the expenditure of secondary highway funds. From time to time proposals are being made that the formula be changed.

In view of the concern as to the allocation of the secondary highway system funds and in an attempt to obtain adequate information as to commercial truck transportation and its effect on the highway system, the General Assembly in 1952 passed Senate Joint Resolution No. 48 which is as follows:

SENATE JOINT RESOLUTION No. 48

Creating a commission to study matters relating to highways.

"Whereas, the Commonwealth has invested many millions of dollars in a State-wide system of highways; now, therefore, be it

Resolved by the Senate of Virginia, the House of Delegates concurring, that a commission be, and it hereby is, created to make a study and report upon the following matters:

(1) (a) The effect on such highways of the existing maximum weights permitted on the highways; (b) the improvements required if increased maximum weights be allowed on the highways and the cost of such improvements; (c) the effect of the cost of such improvements on the funds available for the secondary system of highways; and, in such connection, whether the secondary highway funds might be allocated upon a more equitable basis.

(2) Whether or not commercial trucks of all classes are paying in property, * gross receipts, and gasoline taxes an amount sufficient fairly to compensate the Commonwealth for the highway facilities it provides.

(3) The extent, if any, to which commercial trucks affect highway safety and what changes if any should be made in this connection.

(4) Whether or not commercial truck transportation with relation to railroads and other forms of transportation is carrying a fair share of the cost of general government in Virginia.

(5) The method of weighing commercial vehicles, and the assessment of penalties for overloading thereof, with regard to the fairness of such method of weighing and the assessment of penalties, to both the State and the owner of such commercial vehicle.

The commission shall be composed of nine members, of whom two shall be appointed from the Senate by the President thereof, three shall be appointed from the House of Delegates by the Speaker thereof, and four shall be appointed from the State at large by the Governor, who shall designate some member of the commission as chairman thereof.

The Department of Highways, State Corporation Commission, the Division of Motor Vehicles, and the Division of State Police shall cooperate with the commission and furnish it with such data as it may require. All other agencies of the State shall assist the commission upon request.

The members of the commission shall receive no compensation for their services but shall be paid their necessary expenses incurred thereon for which, and for such secretarial and other assistance as the commission may require, there is appropriated from the General Fund the sum of ten thousand dollars. The commission shall complete its study and make its report to the Governor and General Assembly not later than November one, nineteen hundred and fifty-three."

Pursuant to the resolution the Speaker of the House of Delegates appointed from the membership of the House, John H. Daniel, Charlotte Court House, Henry B. Gordon, Charlottesville, and Charles D. Price, Stanley. The President of the Senate appointed from the Senate, W. Marvin Minter, Mathews, and George W. Palmer, Green Bay. The Governor ap-

*Note: The Commission and interested parties appearing before it have interpreted "property" in question (2) as intended to mean license fees since "real property taxes" would come under Question No. (4).

pointed Carter Glass, Jr., of Lynchburg, R. A. Marr, Jr., of Virginia Military Institute, Lexington, Worthington Faulkner of Glasgow, and Walter L. Grant of Danville. The Governor designated Colonel Marr as the Chairman of the Commission.

The Commission met and organized on November 10, 1952, and Senator W. Marvin Minter was elected Vice Chairman, John B. Boatwright, Jr., and G. M. Lapsley were appointed Secretary and Recording Secretary, respectively. An Executive Committee, composed of Messrs. Marr, Daniel, Faulkner, Minter and Palmer, was created.

The Commission began by compiling information applicable to the various forms of transportation in the State. In this connection it submits the following findings:

1. Oil and gas transmission companies are paying the real estate and other taxes applicable to business generally throughout the State. They are not subjected to any special form of taxation. Their activities do not directly affect the highways and are not of such magnitude as to justify detailed consideration of their problems in this report.

2. The commercial air lines are likewise subject to the same taxes that are applicable to business generally throughout the State. They have little taxable property within the State and pay relatively small amounts in taxes to the State and its political subdivisions. The gasoline taxes which they pay are segregated for expenditure for aviation purposes.

3. Transportation by barge and barge line is of relatively little importance in the State.

4. Ships and shipping lines are subject to the same forms of taxation that are applicable to business generally throughout the State. No special forms of taxation are applicable to them. Since the amendments passed by the 1952 session of the General Assembly, the shipping lines are not subject to the gross receipts tax. Their operations do not affect highways sufficiently to warrant their inclusion in this study.

5. Passenger buses operating as common carriers outside cities pay the State tax on their gross receipts; such buses operating within cities pay such cities a tax on their gross receipts. Both types of carrier pay the usual State and local taxes applicable to business generally. Only a few of this commission's recommendations will affect these carriers and specific mention will be made of these in succeeding sections of the report.

This Commission has deemed its primary function to be to consider commercial truck transportation, its effect upon the highway system, and the adequacy and equity of taxes paid by this industry. In this group are found the common carrier, the contract carrier, and the private hauler. Each of the three classes operating on the highways of this State is composed of both domestic and foreign carriers.

Many meetings of the Commission have been devoted to a consideration of the problems before it. The Commission has met on the following dates: November 10, and December 10, 1952, February 6, February 20, April 2 and 3, May 13, June 17 and 18, August 1, October 12, and November 9, 1953. The February, April, May and June meetings were open to the public, and interested individuals and organizations were given ample opportunity to appear and present their views. There appears in the Supplement to this report lists of those persons and organizations to whom notices of the hearings were sent, as well as those who testified before the Commission.

The data which was assembled for the consideration of the Commission is voluminous. Much of it was supplied through the cooperation of the Division of Motor Vehicles, the Department of State Police, the State Corporation Commission, and the Department of Highways. Officials and

employees of these agencies have been of the greatest assistance to the Commission furnishing it with expert, technical advice throughout its study.

The Commission secured the services of Dr. Boyd Harshbarger, Head, Department of Statistics, V. P. I., Blacksburg, Virginia, and the facilities of his staff and Statistical Laboratory to prepare a number of independent studies in connection with the economic problems involved in question No. 2.

In addition to the information which the agencies of the State have supplied, a considerable amount of information from other states, federal agencies, and other sources has been made available to the members of the Commission. A list of the material studied by the Commission is too long for inclusion in the body of this report but the reader is referred to the Supplement where he will find a bibliography of the material which is generally available. Anyone attempting a detailed study of this material particularly the elaborate briefs submitted by both the Virginia Highway Users Association and the Virginia Railway Association should note the procedure followed by the Commission in studying these documents. These briefs were submitted in advance of public hearings. After study, the Association concerned was furnished in advance a list of questions on which further data was desired or clarification deemed necessary. A major portion of the hearings was devoted to such a question-and-answer presentation. This supplementary data is given on the verbatim reports of the public hearings.

FORM OF THE REPORT

A consideration of Senate Joint Resolution No. 48 will indicate that it is readily divisible into two parts. One portion, consisting of Paragraphs (1), (3) and (5), deals directly with factual questions concerning the effect of the maximum permissible weights and possible increased weights on the highways, both primary and secondary, the effects of commercial truck transportation on highway safety, and the program for controlling weights carried by trucks. The other portion of the resolution consisting of Paragraphs (2) and (4), deals primarily with questions of taxation and economics.

In view of the divisible nature of the study directed by the resolution, the Commission has decided to make its report in two parts. Part I will deal with Paragraphs (1), (3), and (5) of the resolution and Part II will deal with Paragraphs (2) and (4). Each division will be further subdivided as necessity appears to indicate.

PART I

QUESTION 1-A

"The effect on such highways of the existing maximum weights permitted on the highways."

FOREWORD

The Trucks on our Virginia Highways

The non-professional who attempts to study truck weights and their effect on the costs both of construction and maintenance of our highway system soon finds himself confused by a multiplicity of technical terms peculiar to this fast-growing form of transportation. In conferring with highway engineers and administrators or in reading technical or even popular writings on the subject, he immediately encounters terms such as—

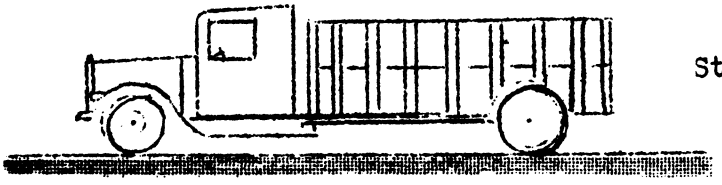
"50,000 pound tractor and semi"
"Tandem axle loads equivalent to single"
"Primary System"
"Test Road One—Md. proves—"
"The AASHO formula—"
"Fatigue stresses"

and many others, unfamiliar but of equal importance.

What follows, has been written in an attempt to explain some of these terms.

First, let us consider so-called "commercial vehicles" which consist of both trucks and buses as compared with private passenger cars. Buses will be treated separately later. The average citizen is conscious of the larger trucks as he meets them on the road, but is not familiar with their dimensions or weights. It will be well, therefore, to learn something of the "silhouettes" of shapes of trucks and their corresponding dimensions and weights.

Let us start with a familiar type of "straight truck", Figure 1, so-called because both the rear or power axle and the front or steering axle are attached to the same frame or chassis. This is commonly called a light or medium truck, and in Virginia may be licensed from 10,000 to 24,000 pounds of so-called "gross weight".



Stake Body Truck

Figure 1

In the larger units of this type, the wheels on a single rear axle can be of the dual type, or the rear axle may be of the "tandem type" with two closely-spaced parallel axles.

Weight Distribution to Axles

The gross weight of a vehicle consists of the weight of the empty vehicle plus the weight of its contents. In Virginia this is the weight for which commercial vehicles are licensed. This GROSS WEIGHT is distributed to the road through the axles with their wheels as shown by the sketch below. (Figure 2)

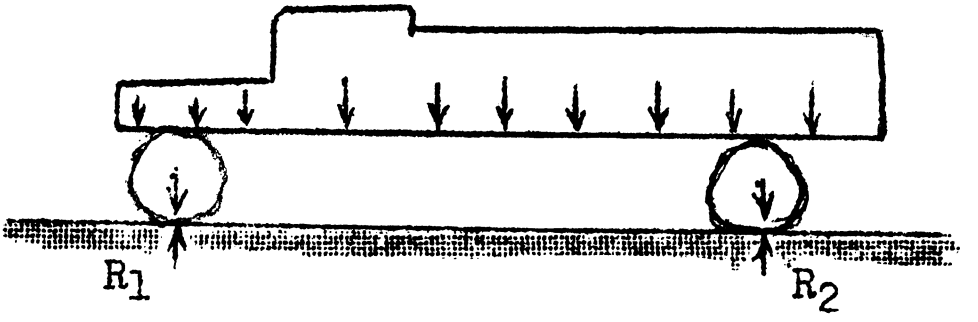


Figure 2

Considering wheel reactions, (R_1 and R_2) the tire pushes DOWN on the road surface, which in turn transmits this force to the subgrade. The road surface conversely pushes UP against the tire to support the GROSS WEIGHT.

The gross weight is DISTRIBUTED to the axles according to the physical laws of mechanics. Let us hang a weight on a pole carried by two men. Obviously, if the weight is hung in the middle, each man carries one-half of the weight. (Figure 3)

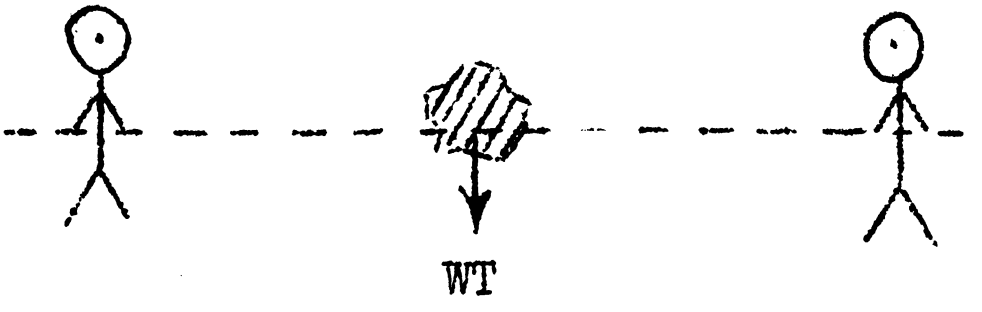
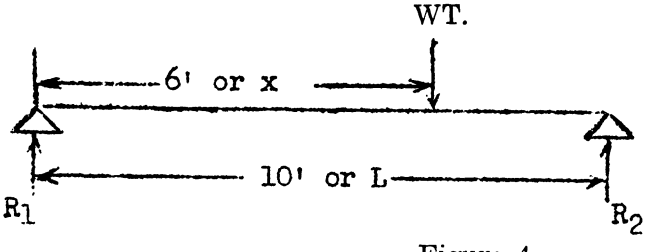


Figure 3

However, if we shift the weight CLOSER to one man, he will support *more* than a HALF according to the "Law of Levers", such that—



$$R_2 = \frac{6}{10} \text{ (WT.)}$$

$$\text{or } R_2 = \frac{x}{L} \text{ (WT.)}$$

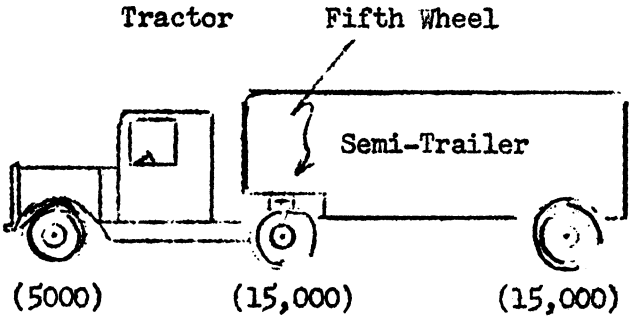
Figure 4

The *entire* GROSS WEIGHT shown in Figure 2 must be divided between the two axles. Due to the length of hood and cab, little of the cargo weight can be carried by the front or steering axle, which carries largely the weight of the motor and transmission. Most of the cargo weight, therefore, must be carried on the rear or driving axle. In heavier units this will be made a "tandem axle" with parallel axles spaced at approximately 48″ center to center for better distribution of such weight. This principle of weight distribution explains why in larger units, the COE (cab over engine) type of vehicle allows better distribution of gross weight.

Heavier Units

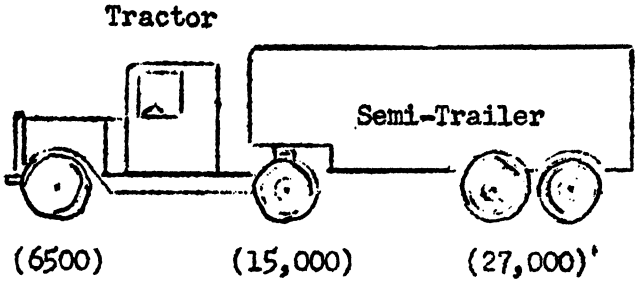
Heavier units are usually combinations of a tractor plus a "semi" or full trailer, but the problems of weight distribution are the same. The fundamental differences are that a greater gross weight is distributed over a larger number of axles and that the "fifth wheel" connection between tractor and trailer allows a much LONGER total unit to have a shorter turning radius and greater mobility. The United States Bureau of Public Roads classifies all trucks with gross weights of over 24,000 pounds as "heavy trucks".

The silhouettes given below, Figures 5 and 6, are typical of two common types of heavier units seen on our Virginia highways. The tractors vary somewhat in size and power and there are many types of trailer units designed for specific uses.



In Virginia, usually licensed for 40,000 pounds

Figure 5



In Virginia, usually licensed for 50,000 pounds

Figure 6

(Tractors with "full trailers" are not used in Virginia)

These heavy combinations run the range from low body platform type "dollies" used by contractors to move heavy equipment, such as bulldozers, from job to job, to double-deck cattle-trailers, gasoline tank wagons, and even tank trailers for bulk milk. Figures shown under each axle, Figures 5 and 6, are average ACTUAL axle weights as determined by the Virginia Highway Department by loadometers (fixed or portable scales) used at their permanent or movable weighing stations in Virginia. The Commonwealth operates four such permanent weighing stations and a number of "floating parties" which weigh the heavier units to check for overloading on both axle and gross weight. It should be noted that at present a 5% tolerance is allowed on legal weight limits. This tolerance helps the small operator who hauls a very varied cargo and who does not have platform scales to check his own weights. In 1952, of the total 1,700,000 trucks so checked, less than seven-tenths of 1% were found overweight and fined accordingly.

Since the GROSS WEIGHT is eventually distributed to the road through the vehicle axles and tires, it is the AXLE weight (whether single or tandem) which is the determining factor in designing the thickness of the road surface and the required bearing capacity of the subgrade. This is true whether the road surface is of the RIGID SLAB type (concrete paving) or the non-rigid, semi-flexible type such as the black top roads which constitute the major portion of our Virginia highways. For bridges long enough to hold simultaneously all the axles of one or more trucks at the same time, the gross weight, as well as the maximum axle weight, become the determining factors in design.

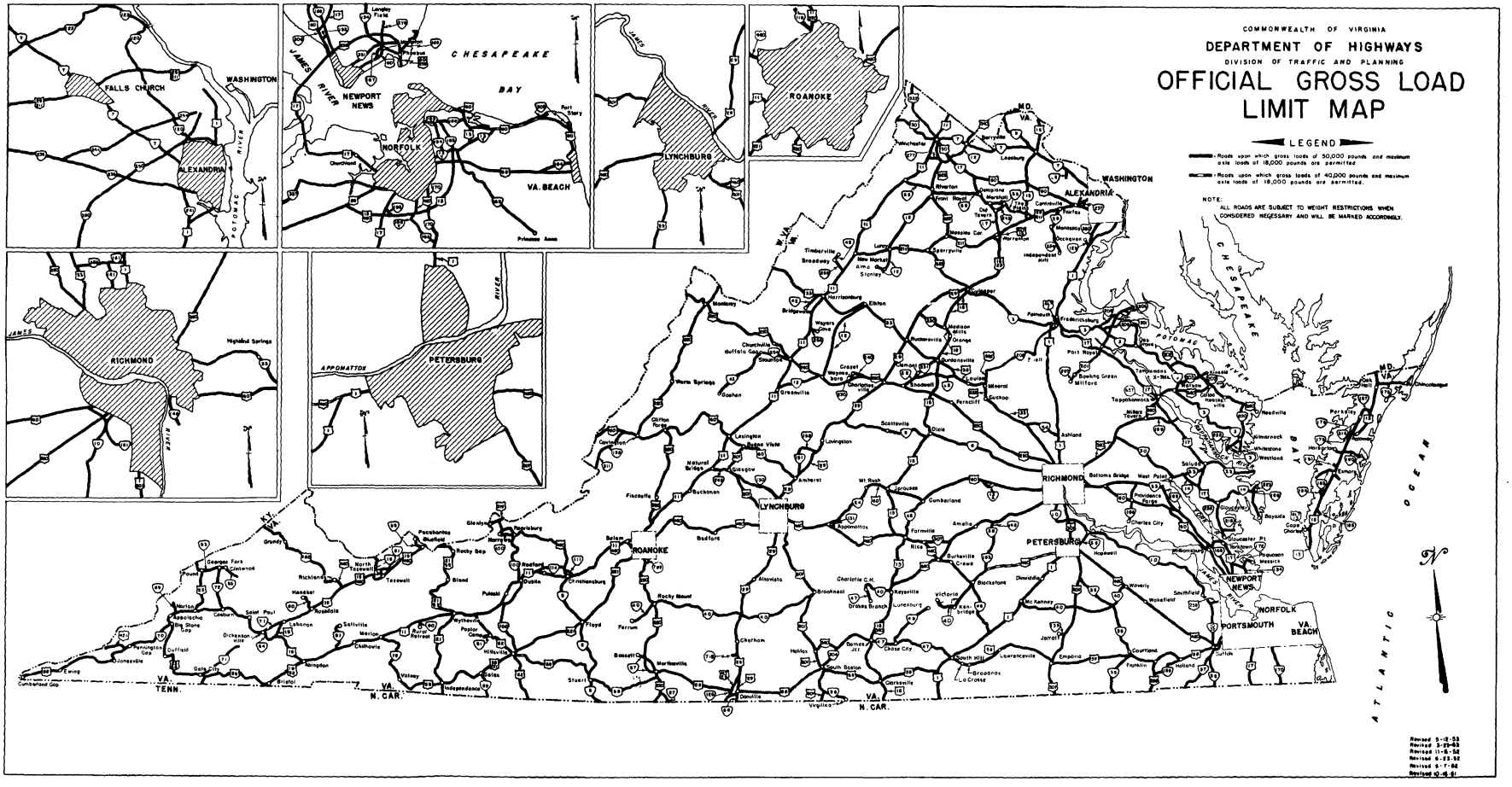
In order to intelligently design new roads and bridges, the maximum truck weight to be carried must be known. In order to protect EXISTING highway surfaces and bridges from destruction and accelerated deterioration, certain legal gross and axle weights must be established by statute for specifically designated routes which the engineers have determined can safely carry these loads.

Virginia has at present 8,385 miles in the so-called PRIMARY system of highways. Only 5,675 miles of this system are approved to carry the present maximum gross weight of 50,000 pounds (on four axles) and maximum axle weight of 18,000 pounds. The remaining PRIMARY mileage is approved for only 35,000 gross and 16,000 pounds axle loads. It is over this so-called PRIMARY system that the heavy trucks operate. (See attached map indicating the chief truck routes in Virginia).

We are discussing a relatively limited GROUP of vehicles. Statistics show that trucks of ALL classifications constitute only 17% of ALL motor vehicles registered in Virginia and drive approximately 20% of all vehicle miles driven in this State.

In all engineering design, the designer must make certain basic assumptions. These are based on a logical interpretation through a mathematical formula of physical laws. In the same way the materials going into the road are laboratory tested, these assumptions are preferably tested by full-scale field tests on roads themselves. The roads of the United States of the 1930's were in large part designed on theory as modified by the so-called "BATES Road Test" made in Illinois. Recently the Highway Research Board, with the cooperation of the United States Bureau of Public Roads and seven state highway departments, tested to destruction a limited mileage of existing concrete pavement in Maryland. Test trucks applying single-axle weights of 18,000 pounds and 22,400 pounds and tandem-axle weights of 32,000 pounds and 44,800 pounds were used.

A record was made of failure cracks as well as measurement of stresses and deflections caused by the various combinations. Water between the subgrade and a concrete slab is displaced as the slab is bent by an applied


COMMONWEALTH OF VIRGINIA
DEPARTMENT OF HIGHWAYS
DIVISION OF TRAFFIC AND PLANNING
OFFICIAL GROSS LOAD LIMIT MAP
LEGEND
Roads upon which gross loads of 50,000 pounds and maximum axle loads of 18,000 pounds are permitted
Roads upon which gross loads of 40,000 pounds and maximum axle loads of 18,000 pounds are permitted.
NOTE:
ALL ROADS ARE SUBJECT TO WEIGHT RESTRICTIONS WHEN CONSIDERED NECESSARY AND WILL BE MARKED ACCORDINGLY.
FALLS CHURCH
WASHINGTON
ALEXANDRIA
POTOMAC RIVER
CHESAPEAKE BAY
JAMES RIVER
NEWPORT NEWS
NORFOLK
VA. BEACH
Fort Story
Princess Anne
LYNCHBURG
ROANOKE
RICHMOND
Highland Springs
APPOMATTOX
PETERSBURG
MD.
VA.
Winchester
Leesburg
Manassas
Fairfax
Fredericksburg
Port Royal
Tappahannock
Kilmarnock
Warsaw
Reedville
Irvington
Lancaster
Montross
Colonial Beach
Westmoreland
Timberville
Broadway
Harrisonburg
Elkton
Madison Mills
Orange
Culpeper
Warrenton
Gordonsville
Louisa
Mineral
Ferncliff
Scottsville
Dixie
Ashland
Lexington
Natural Bridge
Glasgow
Amherst
Buchanan
Fincastle
Bedford
Salem
Roanoke
Rocky Gap
Radford
Pulaski
Dublin
Christiansburg
Floyd
Ferrum
Rocky Mount
Martinsville
Danville
Virginia
N. CAR.
Grundy
Pocahontas
Bluefield
Princeton
Tazewell
Richlands
Hansser
Saint Paul
Lebanon
Abingdon
Bristol
Cumberland Gap
TENN.
Norton
Appalachia
Big Stone Gap
Dickenson-ville
Jonesville
Duffield
Gate City
Saltville
Marion
Chilhowie
Wytheville
Pastor Corner
Hillsville
Galax
Stuart
Independence
Volney
Glenlyn
Narrows
Rocky Gap
Alleghany
Covington
Clifton Forge
Goshen
Lexington
Buena Vista
Glasgow
Amherst
Buchanan
Fincastle
Bedford
Lynchburg
Appomattox
Farmville
Rice
Burkeville
Crewe
Blackstone
Dinwiddie
Petersburg
Hopewell
Chesterfield
Richmond
Bottoms Bridge
West Point
Providence Forge
Charles City
Williamsburg
Toano
Gloucester Pt.
Yorktown
Newport News
Hampton
Phoebus
Norfolk
Portsmouth
Suffolk
Virginia Beach
Cape Charles
Eastville
Onancock
Wachapreague
Keller
Parksley
Nassawadox
Oyster
Cheriton
Exmore
Machipongo
Nelsonia
Melfa
Accomac
Temperanceville
Pungoteague
Onley
Belle Haven
Chincoteague
Wallops Island
Tasley
Saxis
Crisfield
Princess Anne
Pocomoke City
Snow Hill
Berlin
Ocean City
Salisbury
Delmar
Laurel
Seaford
Georgetown
Milford
Harrington
Dover
Smyrna
Middletown
Newark
Elkton
Perryville
Havre de Grace
Aberdeen
Bel Air
Towson
Baltimore
Annapolis
Edgewater
Mayo
Shady Side
Deale
Prince Frederick
Leonardtown
Hollywood
Lexington Park
Piney Point
Callaway
Ridge
Scotland
Great Mills
Charlotte Co.
Drakes Branch
Keysville
Lunenburg
Victoria
Kenbridge
Brookneal
Alonvista
Gretna
Chatham
Halifax
South Boston
Danville
Virginia
Dames Jct.
Chase City
Clarksville
La Crosse
Lawrenceville
Emporia
South Hill
Broadnax
Jarratt
Courtland
Franklin
Holland
Suffolk
Waverly
Wakefield
Smithfield
Mc Kenney
Prince George
Petersburg
Hopewell
Chesterfield
Richmond
Bottoms Bridge
West Point
Providence Forge
Charles City
Williamsburg
Toano
Gloucester Pt.
Yorktown
Newport News
Hampton
Phoebus
Norfolk
Portsmouth
Suffolk
Virginia Beach
Cape Charles
Eastville
Onancock
Wachapreague
Keller
Parksley
Nassawadox
Oyster
Cheriton
Exmore
Machipongo
Nelsonia
Melfa
Accomac
Temperanceville
Pungoteague
Onley
Belle Haven
Chincoteague
Wallops Island
Tasley
Saxis
Crisfield
Princess Anne
Pocomoke City
Snow Hill
Berlin
Ocean City
Salisbury
Delmar
Laurel
Seaford
Georgetown
Milford
Harrington
Dover
Smyrna
Middletown
Newark
Elkton
Perryville
Havre de Grace
Aberdeen
Bel Air
Towson
Baltimore
Annapolis
Edgewater
Mayo
Shady Side
Deale
Prince Frederick
Leonardtown
Hollywood
Lexington Park
Piney Point
Callaway
Ridge
Scotland
Great Mills
ATLANTIC OCEAN
CHESAPEAKE BAY
Revised 5-18-53
Revised 3-25-53
Revised 11-6-52
Revised 6-23-52
Revised 5-7-52
Revised 10-6-51

wheel load, squeezing the water out to the edge or nearest joint or crack. In the case of fine-grained soils, this water carries soil particles with it, removing the supporting power of the soil. This phenomenon known as "pumping" causes an acceleration of failure and exhaustive tests were run on these "pumping effects".

These tests were conducted on a strictly impartial basis and at a high technical level. The results of what is titled as "Test Road One—Md." are frequently quoted in any study of wheel loads and their destructive effects on highways.

Those interested in the complete details can secure a copy of:

Highway Research Board Special Report No. 4
"Road Test One—Md." (Publication 227)
from
The Director, Highway Research Board
2101 Constitution Avenue
Washington 25, D. C.

at a cost of—$2.00

However, like all engineering formulae or criteria, the results of "Test Road One—Md." *cannot* be applied *blindly* to our Virginia roads. Of the 5,675 miles in the Primary system approved for the 18,000 pound maximum axle weight, only some 6% of this mileage is of Portland cement concrete somewhat similar to the surfaces tested in Maryland, although soil conditions, drainage, and other factors impose new variables. Test data now being accumulated in the new WASHO (Idaho 1953) Test Road will give, at a future date, comparable data for black top surfaces as affected by truck weights. In addition, data on the effect of weights on maintenance costs are being studied. Those interested in the effect of truck weights on our highways will, from time to time, find progress reports on the WASHO tests released through such readily available publications as:

ENGINEERING NEWS-RECORD (Published weekly by McGraw-Hill)

CIVIL ENGINEERING (Published monthly by American Society of Civil Engineers)

Since many heavy trucks operate up to 20,000-25,000 miles per year in interstate commerce, it is obvious that there would be many advantages in a national standard code for vehicle dimensions and weights. With this in view, the American Association of State Highway Officials as early as 1932, through commmittee studies, recommended certain limitations on vehicle size and weight. These standards which have been revised from time to time have been adopted (with some modifications) by some 33 states. Virginia's present law is *not* in conformity with these standards.

The current AASHO gross weight formula is designed to distribute the gross weight to the road without exceeding a set maximum axle load. This formula is based on distance between axles. These standards, which also recommend maximum speeds for various types of vehicles, also set the maximum allowable dimensions of vehicles or combinations of vehicles (tractor and semi or full trailer).

The Virginia Department of Highways has testified before the special Commission appointed under Senate Joint Resolution No. 48 that they

would *NOT OPPOSE* the adoption by Virginia of the so-called AASHO formula, subject to the following limitations.

(1) Maximum single axle weights of 18,000 pounds (no increase).

(2) Maximum tandem weight of 32,000 pounds (a decrease from present 36,000). The above would carry the present TOLERANCE of 5% in enforcement.

(3) A maximum gross weight of 56,800 pounds based on wheel base of 35′ and axle spacing of the AASHO formula (increase of 6,800 pounds).

(4) No combination of vehicles (tractor plus semi or full trailer) to have an over-all length (out to out) of more than 50′. Under present law actual lengths on the road are not limited to 50′ over-all. The load may extend several feet beyond the end of the vehicle. Eliminate the term "exclusive of coupling" from length specifications. (This is an increase of 5′, but no TOLERANCE would be allowed on lengths which now actually closely approach 50′ on a number of vehicles.)

(5) Such weights to be allowed ONLY on such routes as to be specifically designated by the State Highway Commission.

(6) That the current policies with respect to load limitation on older bridges be maintained.

Let us consider the effect of such recommendations, if enacted and enforced, on:

(1) Allowable dimensions and weights of existing and future "commercial vehicles" (both trucks and buses).

(2) Such changed weights on our highways and streets.

(3) The "highway users" themselves (commercial trucks and buses).

(1) Effect of such recommendations, if enacted and enforced, on allowable dimensions and weights of existing and future "commercial vehicles" (both trucks and buses).

Let us first consider the effect on the weights and dimensions of a typical long-bodied "over-the-road" heavy tractor semi-trailer combination. The maximum dimensions which would be allowed on such a unit under the proposed recommendations are shown below (Figure 7).

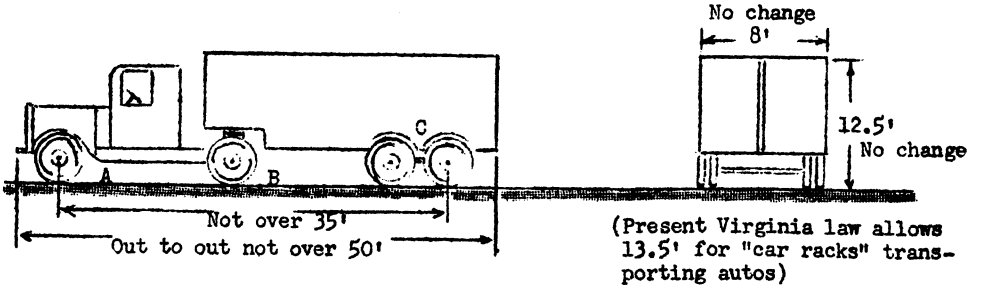


Figure 7

Maximum Gross and Axle Weights

Virginia law covers what might be called four separate categories with respect to the allowable gross weights on its highways. Under the *basic* law, the maximum weight permitted on the road surface through any axle shall not exceed 16,000 pounds. This basic law covers the first two categories and states that:

(1) The maximum gross weight of any two-axle vehicle shall not exceed 24,000 pounds.

(2) The maximum gross weight of any combination of vehicles having three or more axles shall not exceed 35,000 pounds.

This law further stipulates that the axle spacing on tandems shall not be less than 40″ from center to center.

In another section of the present law, the other two categories are covered. This section states that the State Highway Commission may increase the maximum weights permitted on certain highways which are considered capable of carrying these maximum weights. This section of the law pertains to approximately 5,675 miles of the total 8,385 miles of the Primary system, and it is this part of the Virginia Highway System that the adoption of the AASHO formula would affect. In this section, an axle weight is defined as the total weight on all wheels bearing upon the road surface whose axle centers are not more than 48″ apart.

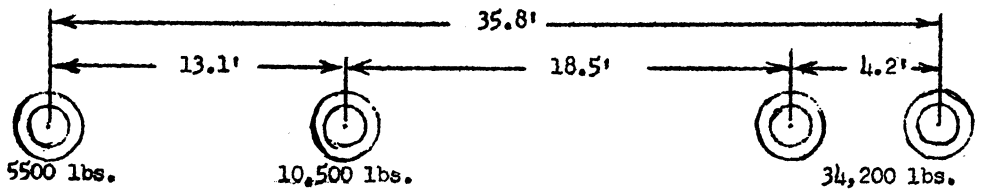
This section states that no axle weight of any vehicle on these designated roads shall exceed 18,000 pounds.

With regard to what might be called the third and fourth category of maximum gross weight, this section states that:

(3) The maximum gross weight of any vehicle or combination of vehicles having three axles shall not exceed 40,000 pounds.

(4) The maximum gross weight of any vehicle, or combination of vehicles, having four axles shall not exceed 50,000 pounds.

It is this last category which covers the four-axle tractor-semi-trailer. Under the present law, as previously stated, this vehicle is limited to a gross of 50,000 pounds and an axle weight of 18,000 pounds. Loading this truck to its maximum capacity, that is, from 47,500 pounds to 52,500 pounds (5% overload allowed) axle weights as shown in Figure 8 below could be obtained.

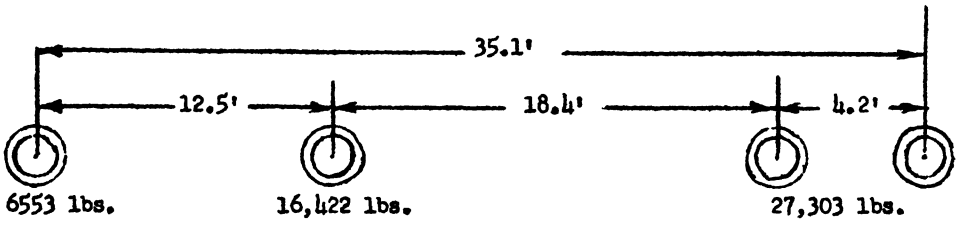


Gross 50,200 lbs.

Figure 8

It will be noticed from the figure above that this truck has two axles at the rear placed approximately 4′ apart. Such a pair of axles is called a tandem axle. Under present law, these axles are considered as separate axles and are allowed to carry 18,000 pounds each, or a total of 36,000 pounds. At the same time, due to the limitation of gross weight, it is not considered practical to attain this axle weight. However, under the present law and with existing equipment, it is possible to obtain the weights as shown under Figure 8 above. They are actual weights as measured by the Virginia Department of Highways' Loadometer Survey.

In actual operations, it has been found that the weights on this tandem range from 21,300 to 34,200, with average values for all trucks in this class and loaded to maximum weight shown in Figure 9 below:



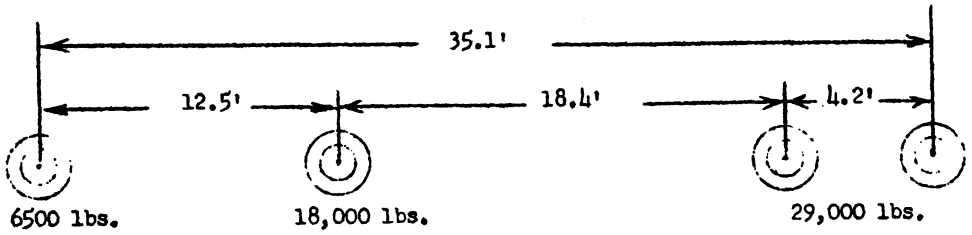
Gross 50,278 lbs.

Figure 9

Although the present law limits the length of such vehicles (vehicle length, not over-all including load) to 45′, the length of the truck is not tied in with the allowable gross loads. Since this is true, it is possible to have a relatively short truck (three axles) with 34,000 to 35,000 pounds on the tandem. This allows a heavy concentrated weight on a short length of road.

Under the AASHO formula, an attempt is made to distribute the weight better over a greater length. Using this as the basis of the formula, the allowable gross weights are tied into the axle spacing of the vehicle.

Under the AASHO formula, for the 35′ spacing shown in the preceding figures, the allowable gross weight would be 56,800 pounds. Only 32,000 pounds are allowed on the tandem as compared with the present 36,000. It has been estimated that, with present equipment, the maximum weight that would normally be carried would be as shown in Figure 10 below:



Gross 53,500 lbs.

Figure 10

This allows better distribution of weight and prevents the tandem from exceeding 32,000 pounds.

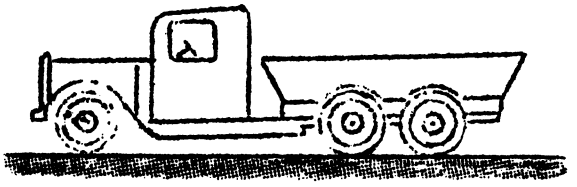
Since the AASHO formula is based on axle spacing and gives better distribution of weight, as the length of the truck decreases and the axle spacing decreases, the allowable load decreases and thus prevents a heavy concentrated weight over a short area.

In the adoption of the AASHO formula as proposed, the maximum wheel base would be 35′ and fix the maximum gross weight at 56,800 pounds. The *over-all* length of 50′ is proposed as compared with a vehicle length of 45′ at present. This last limitation in the *present law* actually allows over-all lengths in excess of 50′. Only on new equipment, specially designed to take advantage of the proposed changes, could the maximum tandem weight be nearly approached.

Since the AASHO gross weight formula is based on *LENGTH* between axles, there are two types of short-coupled trucks whose operators consider

that they would be ADVERSELY affected by the adoption of the proposed maximum weight standards.

These are the "dump trucks", Figure 11, as used by contractors or suppliers of materials to haul materials such as sand, gravel, crushed stone, hot mixed asphalt paving, etc.



Licensed for from 24,000-40,000 lbs.

Figure 11

Truck weight (loadometer) studies show that because of the limited size of the body, even with "side boards", seldom would it be possible to attain the maximum weights under the new code.

The ready-mixed concrete operators have a very special problem due to the nature of their business. In order to deliver their product "on the job" their trucks, Figure 12, must be of short length. Since the chassis usually carries two power units and must be strong and stiff enough to take the racking of driving over rough ground, the deadload of truck and mixer is high in proportion to the load carried. Modern units carry easily up to 5½ cubic yards of concrete at about 4,100 pounds per cubic yards, or a "pay load" up to 11¼ tons.

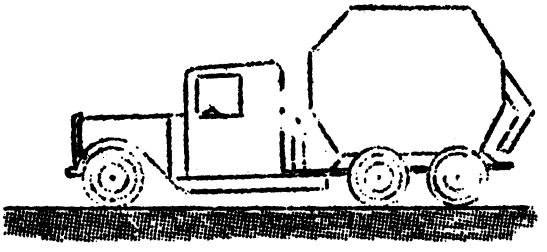


Figure 12

In order to discharge the concrete, the mixer drum and its load must be mounted practically over the rear tandem axles. Loadometer studies

in Virginia show that the AASHO formula would reduce the pay load of such units by about 1,000 pounds if the mixer manufacturer's rated capacity of the drum is not exceeded.

Only some 400 such units are now registered in Virginia. They are *NOT* over the road transportation, but in the nature of their business must deliver their product within a radius of some 12 to 15 miles of their operating base. They drive but very little over Primary highways. A typical route would originate at the batching plant, travel over city or town streets, then over access roads to a real-estate development or industrial construction area, then literally over a plowed field to the point of discharge.

Since the maximum gross allowed on two axles is 24,000 pounds, heavy, cross-country buses of the modern type actually violate the weight limits in Virginia. This was proved by recent sampling. However, the adoption of the AASHO weight formula would actually bring them within the allowable limits and would be to their advantage.

(2) Effect of such recommendations, if enacted and enforced, on such changed weights on our highways and streets.

Adoption of the AASHO limits would not affect that portion of the Virginia Primary system already approved for the 50,000 pound gross and the 18,000 pound single-axle load. At the present time, a number of older bridges need to be replaced. Their replacement cost is estimated at two million dollars. However, these are obsolete bridges which must be replaced in the near future in any event, regardless of the adoption of the AASHO formula. Such cost should be charged against obsolescence rather than a change in allowable weights.

The adoption of the AASHO gross weight formula with the special provisions as indicated above would make Virginia more nearly conform to the other 33 states who have already adopted such standards. Such uniformity tends to reduce overloading on the part of "foreign" trucks entering this State. Records of penalties for such overloading show that 90 odd per cent occur among the heavy out-of-state units passing through Virginia.

Some objections will be raised by the cities to increasing any over-all length of tractor and semi-combinations due to difficulty in turning street corners on narrow city streets. The large bus, with its rigid chassis and 8′ to 10′ overhang on the rear, is often more of a problem at street intersections than the tractor-trailer with its fifth wheel.

Increasing the over-all allowable length of the tractor semi-trailer from 45′ to 50′ would require approximately 1.5′ additional width of pavement in negotiating a 90° turn as compared with 15.5′ presently required by the 45′ vehicle, or an increase of about 10%

(3) Effect of such recommendations, if enacted and enforced, on the "highway users" themselves (commercial trucks and buses).

Such legislation would encourage truck operators to use heavier, more powerful tractors on certain types of trailers. Underpowered tractors now cause dangerous "slow trucks" on the hills. While good in theory, it does not seem practicable to require a minimum horse-power tractor in proportion to the gross weight. Such improvement would come gradually as the older existing equipment is retired.

The enactment of legislation to cover the changes as indicated by adoption of the AASHO weight formula with special provisions would require a "grandfather clause" to allow some types of existing equipment to complete its useful life.

These changes would give the operators of commercial trucks a slight advantage, which in certain cases and with new redesigned equipment

might increase their pay load eventally by some 20% without exceeding weight limits set. This should result in more economical operations, which under their regulatory bodies should eventually result in a lowering of transportation rates to the public. Much of our trucking business in Virginia consists of transportation of perishable vegetables and fruits to city markets. These have a peak demand of relatively short duration. Such an increase of carrying capacity would be of real value in taking care of such peak demand for truck transportation.

Summarizing, it would seem that the proposed changes would be of value to the State of Virginia as a whole. It is hoped that the general background here given may prove to be of some value to anyone studying this problem of trucks and their effect on our highways.

PREAMBLE TO RECOMMENDATIONS

This Commission feels that its prime duty is to protect the many millions of dollars of the taxpayers' money already invested in the highway system of the State of Virginia.

The average citizen does not appreciate the value of these highways nor the fact that our entire life is affected in many phases by highway transportation. Even such factors as development of the H bomb which might require immediate evacuation of the population of our major cities make the preservation of our highway system a "must".

It should be noted that the following recommendations *originated* within this Commission and that the officials of the Virginia Department of Highways served as technical experts only on such points as the Commission requested their advice and testimony.

(1) In highway construction and maintenance, basic theory must be constantly modified in accordance with proved findings of full-scale field tests and research. It is nationally recognized that much valuable data on the effect of load magnitude and number of applications of same to highway surfaces (both concrete and black top) and to highway structures will result from the WASHO (Idaho) test road and future test roads. Provable figures on the costs of maintenance relative to weight of wheel loads are expected to result.

However, such data will not be available for a period of some years. The Commission recommends that action on succeeding recommendations be *not* postponed waiting for such data, but that the Virginia Department of Highways, through its Virginia Council of Highway Investigation and Research, be prepared to promptly adapt such findings to our Virginia roads. In the meantime, necessary studies should be made to allow for the difference between the test site of this State in soil, drainage, climate, local materials, and other factors.

(2) The approval by Virginia of certain Primary routes for the maximum of 50,000 pounds gross and 18,000 pound axle loads has been based on studies of the construction standards to which the surface and structures were built, probable soil bearing resistance. A comparatively simple deflection device of the United States Bureau of Public Roads actually measures the recovery from deflection of a black top road under a tandem axle. This has the great advantage of giving some measure of the *actual* weight-carrying capacity of a highway surface at any point and at any season of the year. If a preliminary test now planned by Mr. Woodson in Virginia proves successful, it may be possible to conduct "weight capacity" studies on other existing highways. It is recommended that the Department consider such a comprehensive study.

RECOMMENDATIONS

For the following reasons and with the limitations as listed below, the Commission recommends that the current AASHO weight formula be adopted for Virginia, through legislation contained in Appendix I, because—

(i) It would put Virginia's weight laws more nearly in line with those of 33 other states which have adopted this formula with modifications.

(ii) This formula is based upon the sound engineering principle of load distribution. It establishes the desirability of distributing the gross weight of a vehicle over a greater length of pavement, thus avoiding high concentration of stress. The present weight laws in Virginia do not have this effect.

The specific limitations upon which the adoption of the formula should be conditioned are:

(a) A maximum single axle load of 18,000 pounds. (No change).

(b) A maximum tandem axle load of 32,000 pounds. (A decrease from present 36,000 pounds).

(c) Both theory and tests seem to show that tandem loads equivalent in effect to a single 18,000 pound axle may be somewhat *less* than the proposed 32,000 pounds. The Virginia Department of Highways should further study results of the WASHO tests when available with a view to recommending further reduction on allowable tandem loads if necessary.

(d) Under no condition should single axle loads be increased over 18,000 pounds, and a decrease to 32,000 pounds on the tandem is a step in the right direction. It is felt that the gross weight of 56,800 pounds is the maximum that should be allowed now or in the future.

(e) A maximum gross weight of 56,800 pounds (based on a wheel base of 35′), (nominal increase of 6,800 pounds).

(f) No combination of vehicles (tractor plus semi or full trailer) to have an over-all length (out to out) of more than 50′. Under present law, actual lengths on the road are *not* limited to 50′ over-all. The load may extend several feet beyond the end of the vehicle. Eliminate the term "exclusive of coupling" from length specifications. (This is an increase of 5′, but *no* tolerance would be allowed on lengths which now actually closely approach 50′ on a number of vehicles).

(g) Such weights to be allowed *only* on such routes as to be specifically designated by the State Highway Commission.

(h) That the current policies with respect to weight limitations on older bridges be maintained.

(3) That trucks now registered or registered in Virginia prior to June 1, 1954 be allowed the choice of:

(a) Operation under the present AASHO formula as limited and modified by Virginia law, or

(b) Operation under the present Virginia law, with no exceptions, for the life of the truck, upon application for license and proper verification to the Highway Commission.

This "grandfather clause" shall apply only to those roads designated by the Highway Commission as heavy-duty roads.

This "grandfather clause" is allowed as an exception to the AASHO formula for reasons that it is felt the adoption of the AASHO formula would cause a hardship on the truck transportation industry, due to the design of presently used equipment.

APPENDIX I

A BILL to amend and reenact §§ 46-328 as amended, and 46-336 of the Code of Virginia relating, respectively, to maximum length of motor vehicles and maximum weights which may be permitted on certain designated roads.

Be it enacted by the General Assembly of Virginia:

1. That §§ 46-328 as amended, and 46-336 of the Code of Virginia be amended and reenacted as follows:

§ 46-328. Length.—No passenger bus shall exceed a length of thirty-five feet and no other vehicle a length of thirty-five feet; provided, however, the State Highway Commission may, by general or special order, which may be amended or rescinded from time to time, increase the length of passenger buses permitted on certain highways, or parts thereof, designated by the Commission, to forty feet. The actual length of any combination of vehicles coupled together shall not exceed a total of* *fifty* feet*; provided, however, that the State Highway Commission in cases of emergency may permit combinations in excess of* *fifty* feet*, where the object or objects to be carried cannot be moved otherwise.

§ 46-336. Increase of maximum weights on certain highways.—The State Highway Commission may, by general or special order, which may be amended or rescinded from time to time, increase the maximum weights permitted on the road surface of certain highways, or parts thereof, such as in the opinion of the Commission are capable, from the standpoint of the design, strength and condition, of carrying such maximum weights as prescribed in this section.

(1) For the purposes of this section an axle load shall be defined as the total load on all wheels bearing upon the road surface whose axle centers are not more than forty-eight inches apart.

(2) For the purpose of determining gross weight, no axle shall be considered unless the wheels thereof are equipped with brakes in conformity with §§ 46-283 to 46-286.

(3) * The axle weight of any such vehicle, or combination, *shall not* exceed eighteen thousand pounds.

(4) No group of axles shall carry a load in pounds in excess of the value given in the following table corresponding to the distance in feet between the extreme axles of the group, measured longitudinally to the nearest foot:

Distance in feet between the extremes of any group of axles	*Maximum load in pounds carried on any group of axles*
4	*32,000*
5	*32,000*
6	*32,000*
7	*32,000*
8	*32,610*
9	*33,580*

Distance in feet between the extremes of any group of axles	*Maximum load in pounds carried on any group of axles*
10	*34,550*
11	*35,510*
12	*36,470*
13	*37,420*
14	*38,360*
15	*39,300*
16	*40,230*
17	*41,160*
18	*42,080*
19	*42,990*
20	*43,900*
21	*44,800*
22	*45,700*
23	*46,590*
24	*47,470*
25	*48,350*
26	*49,220*
27	*50,090*
28	*50,950*
29	*51,800*
30	*52,650*
31	*53,490*
32	*54,330*
33	*55,160*
34	*55,980*
35	*56,800*

(5) Provided, however, that motor vehicles, which are registered in this State prior to July one, nineteen hundred fifty-four, may be permitted to operate under (a) the preceding paragraphs of this section in conformity therewith or (b) under the provisions of this section as in force on January one, nineteen hundred fifty-four but such operation shall only be permissible during the period in which the motor vehicle remains in operating condition. When such vehicle ceases to be operable the option to operate under this provision shall terminate. All vehicles, operation of which is desired under the provisions of subsection (b) of this paragraph, shall be registered with the State Department of Highways and obtain a permit so to do.

And in the event a valid regulation of interstate commerce, recognized by the State Highway Commission, permits the use in interstate commerce over the highways in Virginia, or any of them, of a greater size, weight or load limit than may be prescribed as hereinabove provided, then the Commission may prescribe a similar size, weight and load limit for vehicles operated in intrastate commerce over the same highways.

PART I

QUESTION 1-B

"Improvements required if increased maximum weights be allowed on the highways and the cost of such improvements."

FOREWORD

The deterioration of a highway surface or structure may be caused by *either* or *both*:—

(1) Natural weathering (or aging) effects, particularly repeated freezing and thawing. Abnormally severe winters greatly hasten such deterioration.

(2) Loads repeatedly applied to the surface and structure by traffic, which cause stresses and deflections.

In considering the effect of applied wheel loads, one must consider not merely the *intensity* of the load but also the *number* of applications of same. As vehicles roll over the pavement surface or a bridge, their wheels cause repeated stresses which can eventually lead to a "fatigue failure". Materials, like people, can become tired and worn out.

We have all, as children, bent a strip of tin or a piece of wire back and forth until it broke.

If the material is bent completely back upon itself, (Figure 1), high stresses are caused and only a few repetitions (often less than a dozen) will break the material.

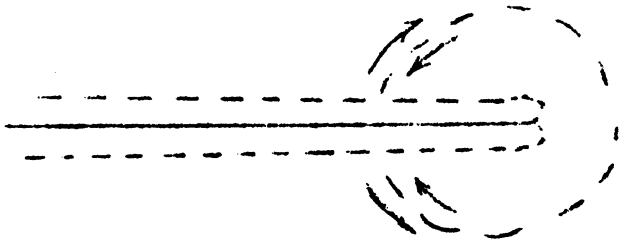


Figure 1

However, the same material, if repeatedly bent through the relatively small angle A, (Figure 2), may require several hundred or even thousand such repetitions before it fails under "fatigue stress".

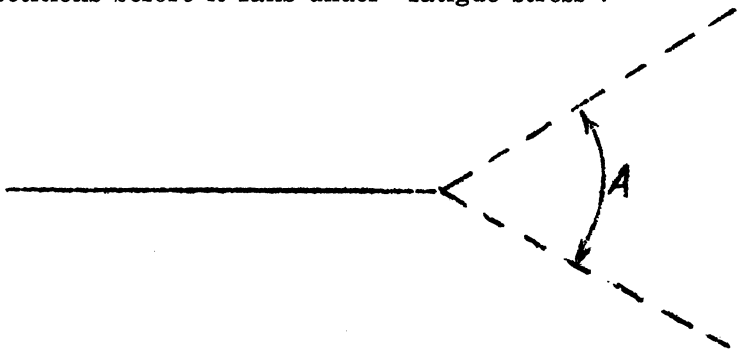


Figure 2

At the same time that our wheel loads have been steadily increasing in allowable weight, we have had a tremendous increase in the *number* of such heavy tractor-semi-trailer units, many of which drive up to 60,000 miles per year. Thus a *smaller* number of very heavy wheel loads may cause as much damage as several thousand very light units, such as passenger cars.

The WASHO and Illinois test roads should, in the future, provide badly needed data on such fatigue stresses for road surfaces, both concrete and black top, as well as bridge structures.

Again, in considering the effect of possible "increased maximum weights", it must be emphasized that the "gross weight" affects the stress and design of only the longer bridge structure, while it is the axle (single or tandem) weight which determines the thickness of the highway surface (whether concrete or black top) and the required supporting power of the subgrade. Likewise, it is the axle weight which determines the design of short span bridges.

In too many discussions of "allowable axle loads", the emphasis is placed upon limiting the allowable weight on a *single* axle. Research shows the damaging effect of the tandem axle such as used on the larger units with higher gross load. The appendix attached to this draft seems to show that the Virginia black top surface and subgrade which can successfully carry a single axle of 18,000 pounds allowable can also support the 32,000 pound maximum tandem proposed under AASHO, provided the tandem axles are not spaced closer than 48″ on centers.

Conclusions

Other states allow single axle loads heavier than Virginia's maximum 18,000 pounds. There is evidence that attempts will be made in North Carolina to raise such limit to 22,400 pounds.

Evidence by the Virginia Department of Highway shows that to adopt the AASHO current weight formula with the special provisions as indicated (see recommendations under 1-A) would *not* increase the cost to the Primary System since the maximum single axle load would be retained at 18,000 pounds and the allowable tandem reduced from 36,000 pounds to 32,000 pounds. It should be noted that these recommendations point toward possible further reductions in such allowable tandem loads if shown desirable by results of the WASHO tests.

However, if single axle loads were increased to a value such as the 22,400 pounds allowed in some states and if the tandem axles were increased *over* the current 36,000 pounds (with or without a corresponding increase in the gross load) this would definitely require "beefing up" the existing Primary System at a cost of $20,000 to $30,000 per mile of road. Older bridges would have to be replaced at a cost of some $75 million dollars.

APPENDIX TO PART I

QUESTION 1-B

Comparison of Flexible Pavement Design for 18,000 Pound Single Axle Load with 32,000 Pound Tandem Axle Load

As has been previously stated, the design of flexible pavements in Virginia is based on the C. B. R. of the natural soil in grade, the C. B. R. of the pavement material and the wheel loads to be imposed on the pavement.

There is much to be learned about the proper design of flexible pavements and it is hoped that the results being obtained at the WASHO road test will aid in establishing a more rational method of design for this type pavement.

It is assumed that there is no flexural strength in a flexible pavement. It is also assumed that the pavement thickness must be great enough to distribute the imposed load over a large enough area by the time it reaches the subgrade so that the applied unit load on the subgrade will not cause a deflection of more than one tenth of an inch. Hence the greater the load the thicker the pavement on the same type subgrade using the same pavement materials.

In designing for an 18,000 pound axle load, we first determine the wheel load. Since it is on one axle which has two wheels the wheel load would be 9,000 pounds (whether dual or single wheels). In designing for a 32,000 pound tandem axle load where the axles are spaced 4 feet apart, we consider that we have two axles each having two wheels and each acting independently of the other. Here we would have four wheels with each exerting an 8,000 pound wheel load on the pavement. In checking the C. B. R. design chart, and assuming that the bearing value of the subgrade soil to be the same, (in this case we will assume a value of 10) we find that we will need approximately 9.5 inches for the 9,000 pound wheel load and approximately 9.25 inches for the 8,000 pound wheel load. Considering the above, we would design the same pavement thickness for the two loadings.

Of course, there have been data obtained on rigid type pavements that indicated that there was a load transfer between axles due to the beam action of the rigid pavement. However, in flexible pavements, this is not assumed to take place.

In summing up all of the above and considering all of the information that we use in designing flexible pavements, it is believed that a pavement designed under our methods to carry the 18,000 pound axle load will be adequate to carry the 32,000 pound tandem axle load as long as the two axles are spaced 4 feet or more apart. Axle spacings closer than 4 feet could possibly cause an overlap of unit pressure on the subgrade, but if the spacing is kept at least 4 feet, this overlapping is not possible.

PART I

QUESTION (1-C)

"The effect of the cost of such improvements (See 1-B) on the funds available for the Secondary System of highways; and in such connection whether the secondary highway funds might be allocated upon a more equable basis."

FOREWORD

For discussion this Question 1-C has been sub-divided into *two* parts as follows:—

(A) "The effect of the cost of such improvements (See 1-B) on the funds available for the Secondary System of highways—

AND

(B) ". . . In such connection whether the secondary highway funds might be allocated upon a more equable basis."

It is important that the reader clearly understand *first* the *source* of the highway funds of Virginia and second the method of allocation of such funds.

The attached pictorial representation shows all sources of Virginia Highway Funds estimated for the current fiscal year.

There follows a partial summary of a doctoral dissertation prepared under the supervision of the Department of Economics at the University of Virginia by Mr. R. B. Goode, Highway Finance Research Associate of the Virginia Council of Highway Investigation and Research. This clearly outlines current methods of allocation in Virginia. (This study was initiated in 1951 and completed in 1953).

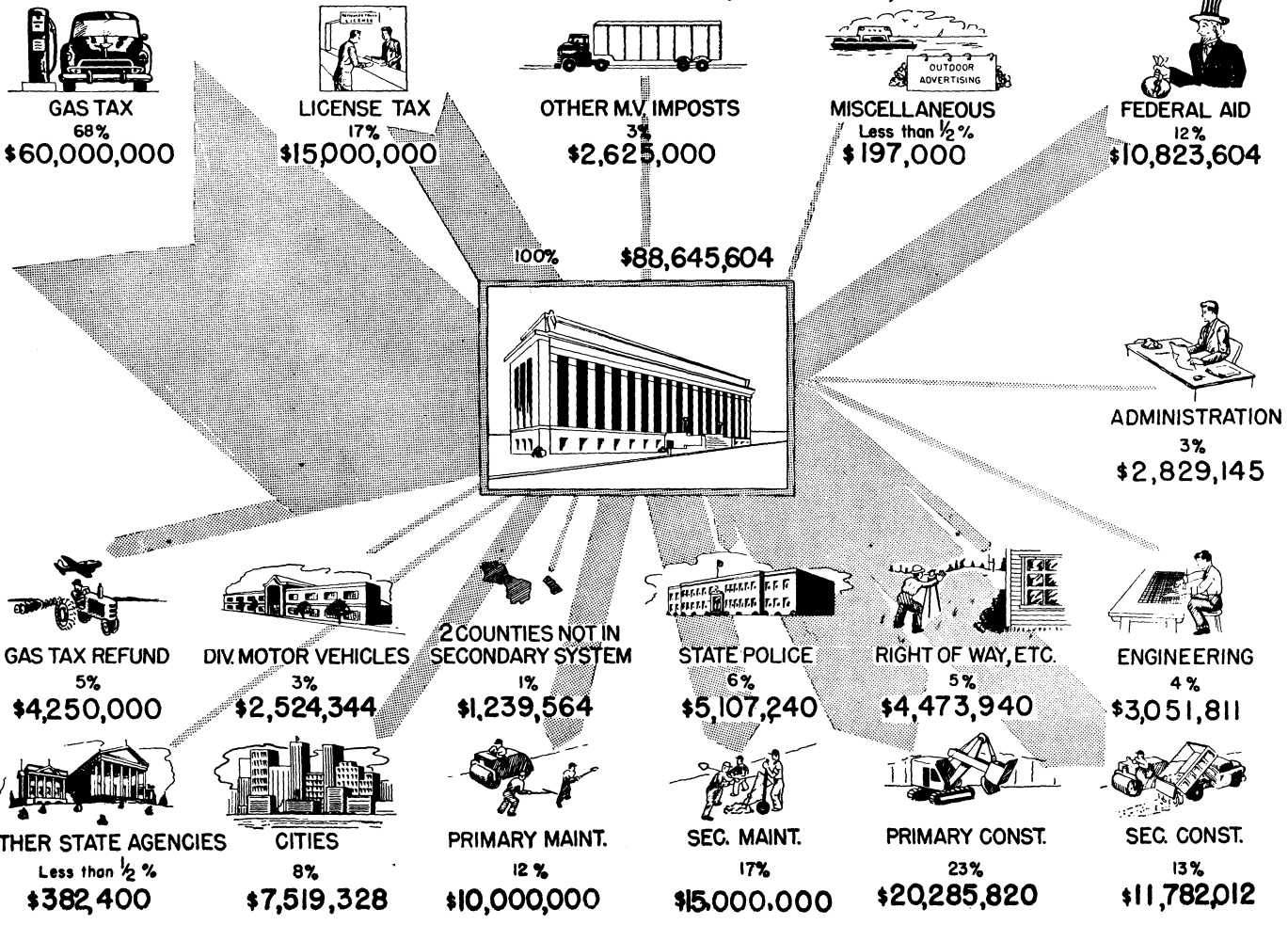
"The utilization of public funds usually involves the preparation of an expenditure program, which in turn requires the "allocation of funds". This allocation process is expected to provide answers to two separate, though interdependent, questions. 1. For what purposes are the available funds to be used? (What are to be the functional uses of the funds?) 2. What is to be the distribution of the funds among the various geographic subdivisions of the allocating level of government?

"Before outlining the expenditure program of the Virginia Department of Highways, it is desirable to recapitulate the sources of highway funds. First, and of prime importance, is the motor vehicle fuel tax. For the fiscal year 1953-54, the net revenue from this source is estimated at $54,510,000. This amount excludes the authorized refunds and the payments to the counties not in the Secondary System. For the same fiscal year, the motor vehicle license and registration fees are expected to provide about $15,000,000. The estimated receipts from the motor carriers' road tax are $1,500,000. The Federal Aid appropriations for all programs for 1953-54 total about $10,823,000. The total net revenues and Federal Aid appropriations for fiscal 1953-54 come to about $83,000,000.

"All of this amount, however, will not be available for use by the Department of Highways, let alone for use on the State's highways. Over $8,000,000 will be required for other agencies which render services to the Department of Highways and to the public. Included in this sum is something over $5,000,000 for the Department for State Police, and $2,524,000 for the Division of Motor Vehicles. Other agencies receiving portions of this appropriation will be the State Corporation Commission, the Department of Agriculture and Immigration, the Division of Grounds and Buildings, and the Office of Attorney General. After the appropriations to other State agencies, the remaining funds, aggregating about $75,000,000 will be available for use by the Department of Highways.

"The first claim against the State highway funds is for the maintenance and construction of the Secondary System. Several statutory requirements are applicable to this item of expenditure, but the only one which is currently effective is that at least thirty percent of the available road funds plus $2,500,000 (from the 1946 increase in the motor vehicle fuel tax) be devoted to the Secondary System. In recent years, the State Highway Com-

HIGHWAY REVENUE
WHERE IT COMES FROM AND WHERE IT GOES
ESTIMATED FOR FISCAL YEAR JULY 1, 1953—JUNE 30, 1954



mission has seen fit to allot about thirty-seven percent of the total road funds to the Secondary System. For the 1953-54 fiscal year, $28,000,000 has been allotted to the Secondary System. It is necessary to note the composition of this Secondary System allotment because of the different apportionment formulae applied to the different portions. The Secondary System allotment includes seventy percent of the Secondary Federal Aid appropriated to the State. The balance is composed of State funds. The Secondary Federal Aid funds are allotted among the eligible counties on a three factor basis: rural area (excluding incorporated places of 3,500 and over, rural population (excluding the population of incorporated places of 3,500 and over), and secondary road mileage. Each factor is given equal weight. For those counties of the State included in the Secondary System, the State Highway Commission provides the 100% matching funds required for the use of these federal funds. The federal funds and the matching funds must be used for the construction of that portion of the State Secondary System included in the Federal Aid Secondary System. The portion of the Secondary System allotment remaining after the apportionment of the Secondary Federal Aid and the matching funds is distributed among the Secondary System counties on a four factor basis. To the three factors noted above, a fourth factor, vehicle miles of travel on the Secondary System, is added. Each of these factors has equal weight. These allotments are to be used for Secondary System maintenance, replacements, construction, and administration and engineering.

"After determining the total Secondary System allotment, the amount required for Primary System Maintenance and Replacements is estimated. This amount is determined on the basis of anticipated needs. Then the amount required for Administration and Engineering and other purposes is set aside. Again, anticipated needs furnish the basis for determining these amounts. Following these allotments, one-third of the grants to cities for Primary System extensions is withheld. (The determination of the amount of municipal grants is noted below).

"After all of the above allocations have been made, the funds remaining constitute Primary System (rural and urban) Construction Funds. This balance includes the Primary Federal Aid appropriation, thirty percent of the Secondary Federal Aid appropriation, the Urban Federal Aid appropriation the Interstate Federal Aid, and the remaining State funds. The Urban Federal Aid is apportioned among the eight construction districts according to urban population (population in cities of 5,000 and over). Of the remaining funds, $2,000,000 is distributed to the construction districts on a basis of uncompleted Primary System mileage. After the allocation of the Urban Federal Aid and the $2,000,000 on an uncompleted Primary System mileage basis, the remaining Primary System funds are distributed among the eight construction districts by a three factor formula. The factors are: total area, total population, and rural Primary System mileage. Each factor has equal weight. Out of these district allocations comes the State's half of the 100% Urban Federal Aid matching funds required, two-thirds of the grants to municipalities for Primary System extensions, and all of the funds required for the municipal grants for non-Primary System (secondary) streets. After these items are covered, the remaining funds are used for rural Primary System construction, rights-of-way, landscaping, planning, surveys and plans, and urban construction when no Urban Federal Aid is available and the cities agree to share one-half the costs. It might be noted that although the total Primary Construction appropriation for fiscal 1953-54 is over $32,000,000, less than $20,000,000 of this amount will be available for actual rural Primary System construction work.

"The grants to cities and incorporated towns of 3,500 and over are determined as follows. For each mile of municipal roads and streets serving

as approved Primary System extensions, the municipality was to receive $4,000 for the fiscal year ending June 30, 1948. In subsequent years, the amount was to increase in the same proportion as total road funds increased. For the 1953-54 fiscal year, the amount of the Primary System extension grants is estimated at $5,810 per mile. (Nearly 500 miles of roads and streets will be eligible to receive these grants). For the approved non-Primary System (secondary) roads and streets, the base amount of $300 per mile was provided for the fiscal year 1947-48. Subsequent grants were to be increased on the same basis as the other type of municipal grant. For the 1953-54 fiscal year, these grants are expected to be about $436 per mile. It was noted above that two-thirds of the Primary System extension grants and all of the other grants were to come from the construction funds allotted to the district in which the locality was situated.

"In appraising the allocation pattern, it can be noted that when funds are distributed, formulae embodying the essential factors contributing to road use are used. And while no specific formula may be perfectly satisfactory to all persons under all conditions and at all times, there is no basis for questioning the formula presently used. Certainly population, area, and mileage are the basic determinants of road use; and these factors provide for an equitable distribution of funds. These are the factors used in the distribution of Primary and Secondary Federal Aid funds among the several states.

"A difficulty arises in the use of population since official population data are available only at ten year intervals (U. S. Census) and during that time, shifts in population may cause some discrepancy between the official population and actual population data. It can be pointed out, however, that cases of large population shifts are not usual in our economy and that when they occur, there is usually some major factor underlying the shifts.

"In the case of the Secondary System and its smaller units, a fourth factor of vehicle miles of travel has been included to remove any discrepancies which might arise from the unavoidable use of areas as small as counties. When this equitable distribution of funds is coupled with the comprehensive and thorough programming activities of the Department, it can be seen that the State's highway funds are used in an efficient and economical manner."

As indicated in Part I, Question 1-A, adoption of the AASHO load formula with special provisions as recommended would not increase the cost to the Primary System and hence would not cause a demand for increased Primary Funds at expense of Secondary.

Under the existing system of allocation as currently administered by the State Highway Commission, there is no tendency to improve the Primary System at the expense of the Secondary.

Sub-Question 1-C (B)—Allocation on a more equitable basis. The current allocation formulas are based on logical factors which measure directly or indirectly "road use". These factors are readily ascertainable with a reasonable degree of accuracy.

Following the laws of human nature, each County Board of Supervisors feels that their own county "needs" more funds than are allocated. Such *needs* are hard to prove and as interpreted locally would tend to benefit *one* county at the expense of others.

RECOMMENDATIONS

This Commission recognizes that the current allocation formulas are *not* ideal, but are defensible. The Chairman of the State Highway Commission has himself defined a "better fromula" as—

"One that can be adopted by the Highway Commission and passed by the General Assembly."

The League of Virginia Counties has, in conjunction with their own economic consultant, prepared a detailed statistical study of the allocation of Secondary funds, analyzing each of the factors now used. Like all such analyses, revisions suggested would take from some counties and give to others.

This study was submitted to this Commission at too late a date for it to make corroborative studies of its own. It is recommended, therefore, that the League and the Highway Department continue this line of study with a view to arriving at final recommendations which can be endorsed by the League of Virginia Counties as a body and which the Highway Department will accept as practical and workable.

PART I

QUESTION (3)

"The extent, if any, to which commercial trucks affect highway safety, and what changes, if any, should be made in this connection."

Testimony before the Commission developed that Highway Safety is dependent upon —

1. *The driver, or human element*—his *selection, training, supervision,* including reward for safe driving and punishment for violation of safety rules and laws.
2. *Speed of operation of vehicle*—which must through the judgment of the individual driver be limited to that safe for fixed hazards as well as local conditions of the moment such as icy surface, poor visibility, etc.
3. *The mechanical equipment of the vehicle*—motor, tires, brakes, lights, etc.
4. *The cargo carried*—solid or fuel, flammable, explosive or caustic, etc.
5. *The highway itself*—with both fixed hazards, such as bad curves, improper super-elevation, and changing hazards due to weather effects.

Studies of accident records since 1925 on a National basis show that only 6% to 8% of all such accidents are properly chargeable against *unsafe vehicles* or *mechanical failures.* Unfavorable *road character* and *condition* account for some 7% to 8%. This leaves driver failure, through poor judgment (including speeding) accountable for some 84% to 87% of all such highway accidents.

Let us then consider the records of operation of *commercial* trucks from the standpoint of the aforenamed five headings.

1. The driver—The professional driver is screened, selected, trained and, with most large companies, is given supervision. Since accident rates determine insurance costs, the companies rapidly eliminate the driver with a bad "accident record". Loss of a driving permit may be no more than a nuisance to the ordinary citizen, but it literally puts the professional driver out of work.
   Company rewards, by bonus and prizes, competition in Roadeos at State and National levels, tend to raise the standards of the truck driver. The members of the Virginia Highway Users Association enforce warnings and penalties for infringement of safe driving laws. One hundred per cent of the member companies (103) of the Virginia Highway Users Association conform to the minimum safety requirements as recommended by Markel Service (a national consultant on highway safety) or similar service.
   In general, the Virginia companies do a good job of self-policing and should be encouraged to continue such action. In general, the standards of training and supervision of the professional truck driver are superior to that of the ordinary citizen driving his own car.

2. *Speed* is still the prime killer on the highways today. The truck enters into the picture from *two* standpoints. Underpowered tractor units, unable to make more than 15 to 20 miles per hour on steep grades, tempt other drivers to pass regardless of danger. As previously noted, it is hoped that adoption of the AASHO formula will encourage gradual replacement of these older, low-powered units. (See also remarks on "Creep Lanes").
   High Speed—The desirability of a speed differential between the truck and the car that wants to pass it is apparent. This is evidenced by the fact that 33 states set up such a differential between the legal speed of the passenger car and the truck. Here

in Virginia we hear frequent complaints that few trucks obey the 45 mile-per-hour legal speed limit.

Effective enforcement of this limit on a state-wide basis, plus prevention of "tail gating" and other undesirable practices is difficult to achieve. The professional driver becomes adept at detecting "the law" even if in unmarked cars.

The State Police feel, at this time, that no consideration should be given to a change in the present 45-55 MPH limits until they have been tried out for at least two years. However, the public complain strongly of speeding and the State Police feel that an active enforcement program must be continued against *all* speeding and unsafely operated vehicles, including all passenger cars.

From the standpoint of "finality of accident" the heavy tractor trailer at high speed constitutes a major menace on the highways. They are unfortunately also the hardest unit to detect.

States to both the north and south of Virginia have, or are installing, radar cars and equipment to control speed upon their highways. Only the constant threat of detection and arrest through radar can consistently hold down the speed of *all* vehicles upon our highways.

No enforcement program of any law can be really successful without popular sentiment and support. Roadside markers of "speed limits—radar enforced" prevent loss of public support through cries of "speed trap" or resentment against the old idea of the motorcycle cop hiding behind the billboard.

Virginia will shortly be situated between two states (Maryland and North Carolina) with such radar-equipped police. Unless proper legislation is passed in 1954 to authorize the use of such equipment in this State, Virginia can easily become a "speedway" where the through trucks will be tempted to gain time which they were unable to do in the radar-controlled state which they have just left.

The general public is pleased by the "teeth" put into the enforcement laws which give the power to suspend drivers licenses for speeding offenses. Loss of drivers' permit is dreaded by *all* drivers, but particularly by the professional.

3. *Mechanical Equipment*—Safety is well engineered into all larger automotive units. No special drive for legislation for extra equipment seems necessary at this time, except for one item. Many complaints are received concerning the rocks, stream of water, and mist thrown back by the rear wheels of trucks. Although manufacturers admit that fully effective guards have not yet been devised, our State Police think well of a bill (Senate Bill 113, Amendment to the Code of Virginia 46-294.1) to require "mud flaps" on heavy equipment. This Bill was not passed at the last legislature, but its re-introduction in 1954 should be encouraged.

4. *Cargo Hazards*—The transportation of "permissible" explosives and flammable liquids by trucks would seem to cause no undue hazard to the traveling public or property if the recently effective regulations of the State Corporation Commission are enforced and obeyed. The few violations reported would seem to result from the lack of responsibility of a few individual drivers.

   The recognition of the special hazards created by such irresponsible drivers and a method to eliminate them is shown by the underlined capitalized portion of recent special legislation by the State of Maryland.

From the Maryland Motor Vehicle Law:

"Art. 66½, Section 264, sub-section D, effective June 1, 1953.

Any person operating any motor vehicle transporting any explosive as a cargo, or part of a cargo, shall at all times comply with the following provisions: Said vehicle shall be marked or placarded on each side, front and rear with the word "EXPLOSIVES" in letters not less than 8 inches high and each stroke shall be not less than one inch in width. Said marks or placards shall be so affixed as to *reflect light.* Said vehicle shall be equipped with not less than two fire extinguishers, filled and ready for immediate use and placed at a convenient point on the vehicle so used. Any such vehicle shall NOT be operated at a speed greater than 40 miles per hour. Any person *CONVICTED OF A MOVING VIOLATION OF THE MOTOR VEHICLE LAWS WHILE DRIVING A VEHICLE TRANSPORTING EXPLOSIVES, IN ADDITION TO PAYING THE FINE IMPOSED, SHALL HAVE HIS LICENSE SUSPENDED FOR NINETY DAYS."*

5. *The Highway*—Sometimes we find the paradox of a super-highway allowing a speed, due to elimination of cross traffic and other hazards, to the point that the speed itself becomes the prime cause of accidents.
   Construction of "Creep Lanes" and even short "Pull-outs" on the inside of two-lane highways on steep grades largely eliminates the hazard of the "slow truck" with the resultant "impatient passer". The Highway Department should be encouraged to enlarge such safety construction particularly on those mountain two-lane truck routes which cannot in the near future be widened to four-lane divided.

The study by Safety Engineers of actual accident records often reveals causes of accidents and methods of eliminating same. At the request of this Commission, Captain Wm. L. Groth, Safety Engineer, State Police, prepared an elaborate statistical analysis based on a period of nine months in 1952 of the accident involvement of trucks, tractor trucks, and semi-trailers in Virginia. His conclusions follow:

"CONCLUSIONS—Types of Accidents"

1. Truck involvement primarily with
   (a) Other motor vehicles
   (b) Ran off roadway
   (c) Large number of accidents occur on Secondary routes with proportionate share of deaths
2. Tractor trucks and semi-trailer involvement primarily with
   (a) Other motor vehicles
   (b) Ran off roadway
   (c) Vast majority of both accidents and fatals occur on Primary System
3. Age of drivers
   (a) Truck drivers are well spread over the 16 to 64 year age bracket, with a number of accidents occurring to drivers 16 to 20.
   (b) Tractor truck drivers involved seem to fit into a younger pattern 21-44 years.

4. Sex and race
   (a) Male drivers predominate with white drivers showing more involvement in both truck and tractor-truck operation. No figures are available as to numbers employed.
5. License of drivers
   (a) The vast majority of truck drivers involved hold Virginia licenses.
   (b) Tractor truck and semi-trailer operators involved have a noticeable majority licensed in other states.
6. Experience of drivers
   (a) Both groups show involvement of experienced drivers with tractor truck and semi-trailer drivers showing more with experience of 11 years or more.
7. Occupation of drivers
   (a) Truck drivers involved show a wide variation of occupations, showing that truck driving is of secondary importance to many drivers involved.
   (b) Tractor truck and semi-trailer on the other hand show vast majority consider driving their prime job duty.
8. Violations
   (a) Violations indicated show that both groups are guilty of violations which cause accidents.
9. Driver's condition
   (a) Both groups show relatively few defects. It is noticeable, however, that a relatively large group of both are reported to be asleep at the wheel.
10. Age and condition of vehicles
   (a) Both groups show relatively recent model equipment in good condition as being involved. Trucks do not, however, appear to be kept in as good condition as the tractor-trailer units.
11. Registration
   (a) Virginia-registered trucks predominate in the accident picture.
   (b) Tractor truck and semi-trailer involvement shows foreign registered equipment has a slight edge in involvement.
12. Conditions
   (a) Study shows majority of accident involvement is during daylight hours with clear weather, in open country, on dry, level, straight roadway, with no traffic control present.

CONCLUSIONS

1. That trucks—tractor trucks and semi-trailers—do have an effect on Highway Safety as shown by their involvement.
2. That the accident experience of the operators on a "miles-operated basis"* is as good as, or better than, the average driver's.
3. That the operation of trucks with both professional and unprofessional drivers does not appear to be as satisfactory as the operation of tractor truck and semi-trailer equipment by trained drivers.

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* Note: According to PUBLIC ROADS' figures, the average truck travels yearly at least two to three times as many miles as the average passenger car, and the average tractor-trailer unit four to six and one-half times as much as the average passenger car.

4. That the trucking industry and private operators must strive for better trained drivers.
5. There must be greater effort made for self-policing in order to eliminate violations which are prevalent in truck and trailer truck semi-trailer accidents.

It is obvious that our Virginia highway accident record can be bettered only by improved driving practices, not only by the drivers of our commercial vehicles, but also the average citizen operating his own passenger car.

Also, our State and local police should be aided by any necessary supplementary legislation.

RECOMMENDATIONS

1. The Interstate Commerce Commission (performs a valuable service) in standardizing safety regulations for truck operators, both for mechanical equipment and for working conditions for drivers. The Federal Economy Drive eliminated funds from the budget for such control. This cut was restored with difficulty. The Virginia delegation in Congress should be advised of the value to *all* states of such I.C.C. safety regulations and their rigid enforcement.
2. The reckless driver of a commercial truck transporting either explosives or flammable fuels constitutes a greater hazard to the life and property on the highway than the average truck. It is recommended that legislation be enacted so that any person convicted of a moving violation, such as speeding or reckless driving, while driving a vehicle transporting explosives or flammables, in addition to paying the fines and costs imposed, shall have his driver's license suspended for ninety (90) days. Proposed legislation is attached to this draft as Appendix I.
3. It is felt that the use of radar equipment and other electrical devices by the State Police to enforce existing speed limits not only gives evidence which "stands up" in court, but provides a threat of punishment which no sensible person will challenge. It is recommended that the State Police, after study of equipment and legislation in neighboring states, be authorized to proceed to the purchase and installation of such equipment. It is felt that the highways where such control is used should be prominently marked to show speed limits are radar or electrically enforced. The Committee recommends the adoption of legislation to carry out these ends and proposes the legislation which is attached as Appendix II to this draft.
4. It is felt that after the current speed limits of 45 MPH for trucks and 55 MPH for passenger cars have been enforced for a period of two years, the State Police should report to the Governor's Safety Committee any changes in speed limits deemed advisable.
5. It is felt, at this time, that no legislation requiring additions to or changes in mechanical equipment of trucks is required, other than the possible re-introduction of Senator Robert Baldwin's bill (Senate Bill 113, Amendment to the Code of Virginia, 46-294.1) to require "mud flaps" on heavy equipment.
6. While familiar with the safety programs and training of the truck associations and members, many members of this Commission have had personal experience with unsafe and discourteous driving practices by truck drivers. The Virginia Highway Users Association should realize that one careless driver can imperil their entire public relations. Such conditions should be remedied by more vigorous enforcement of the law by both State and local police, as well as by the self-policing of the truck operators.

APPENDIX I

A BILL to amend the Code of Virginia by adding a section numbered 46-219.2 providing a penalty for the operation of certain motor vehicles under certain conditions.

Be it enacted by the General Assembly of Virginia:

1. That the Code of Virginia be amended by adding a section numbered 46-219.2 as follows:

§ 46-219.2. When the driver of any motor vehicle is convicted of a violation of any of the provisions of §§ 46-208, 46-209, 46-229, 46-238, 46-239 or 46-240, or of any of the applicable speed limits prescribed in § 46-212, and such violation was committed while operating a motor vehicle, tractor truck trailer or semi-trailer, transporting explosives or any inflammable gas or liquid, in addition to any other penalty imposed, the court may suspend the operator's or chauffeur's license of such person so convicted for a period of ninety days from the date of conviction, this penalty shall be in addition to any other penalties for such violation.

APPENDIX II

A BILL to amend the Code of Virginia by adding a section numbered 46-215.2 to provide for checking the speed of motor vehicles by certain methods, the use in evidence thereof, the arrest of motor vehicle operators under certain conditions, and how certain highways should be marked.

Be it enacted by the General Assembly of Virginia:

1. That the Code of Virginia be amended by adding a section numbered 46-215.2 as follows:

§ 46-215.2. (a) The speed of any motor vehicle may be checked by the use of radio-micro waves or other electrical device. The results of such checks shall be accepted as prima facie evidence of the speed of such motor vehicle in any court or legal proceedings where the speed of the motor vehicle is at issue.

(b) The driver of any such motor vehicle may be arrested without a warrant under this section provided the arresting officer is in uniform or displays his badge of authority; provided that such officer has observed the recording of the speed of such motor vehicle by the radio-micro waves or other electrical device, or has received a radio message from the officer who observed the speed of the motor vehicle recorded by the radio-micro waves or other electrical device; provided in case of an arrest based on such a message that such radio message has been dispatched immediately after the speed of the motor vehicle was recorded and furnished the license number of the vehicle and the recorded speed to the arresting officer.

(c) No operator of a motor vehicle may be arrested under this section unless signs have been placed at the State line on the primary highway system, and outside cities and towns having over 3500 population, on the primary highways, to indicate the legal rate of speed and that the speed of motor vehicles may be measured by radio-micro waves or other electrical devices; provided that the burden of proof that such signs have or have not been placed along the highway on which the violation is alleged to have occurred, or elsewhere, shall rest upon the defendant.

(d) Nothing herein shall affect the powers of cities or towns to adopt and use such devices to measure speed under such conditions as they deem proper.

PART I

QUESTION (5)

"The method of weighing commercial vehicles and the assessment of penalties for overloading thereof, with regard to the fairness of such methods of weighing and the assessment of penalties to both the State and the owner of such commercial vehicle."

No serious complaints were raised by either the truckers who pay the fines or the police who enforce the laws. An apparent gap in this legislation was developed by discussion and remedial legislation is proposed by this Commission.

The present scale of fines seems to have had the desired effect of taking the profit out of overloading. When, as in the past year, less than 1% of all units so weighed were found to be overloaded, the law and its enforcement can be considered effective.

No longer are trucks unduly detained by this activity.

RECOMMENDATIONS

1. The driver of a commercial truck, when stopped at an official weighing station, should be required by law to drive his vehicle up on the scale in proper position for weighing when ordered to do so by properly constituted authority. Current legislation does not cover this point. Attached as Appendix I is the type of legislation suggested by the Superintendent of the State Police to cover this omission.

2. For the smaller operator with no pit scales to check his wheel loads at his own loading dock or warehouse, the 5% tolerance currently allowed on both gross and wheel loads is of real importance. Likewise, such tolerance in enforcement make a reasonable allowance for accumulated weight of ice or sleet on a truck or increase in an axle load due to accidental shifting of cargo in transit. It is recommended that should changes be made in allowable loads on our highways, that such tolerance be continued in the enforcement of any new limits. No justification can be seen, however, in extending any such tolerance to any old or new limits on the enforcement of over-all length.

APPENDIX I

A BILL to amend and reenact § 46-342 of the Code of Virginia relating to weighing of vehicles and loads so as to impose a penalty for failure or refusal of an operator to drive his vehicle upon weighing devices.

Be it enacted by the General Assembly of Virginia:

1. That § 46-342 of the Code of Virginia be amended and reenacted as follows:

§ 46-342. Any officer authorized to enforce the law under this title, having reason to believe that the weight of a vehicle and load is unlawful, is authorized to weigh the same either by means of loadometers or scales. *Any operator who fails or refuses to drive his vehicle upon such scales or loadometers upon the request and direction of the officer so to do shall be guilty of a misdemeanor and upon conviction thereof shall be fined not less than ten dollars nor more than one hundred dollars, which penalty shall be in addition to any other penalties prescribed for exceeding the maximum gross weight permitted or for any other violation.* Should the officer find that the weight of any vehicle and its load is greater than that permitted by this title or that the weight of the load carried in or on such vehicle is greater than that which the vehicle is licensed to carry under the provisions of this title, he may require the driver to unload, at the nearest place where the property unloaded may be stored or transferred to another vehicle, such portion of the load as may be necessary to decrease

the gross weight of the vehicle to the maximum therefor permitted by this title. If the driver of an overloaded vehicle is convicted, forfeits bail or purchases an increased license as a result of such weighing, the court *in addition to all other penalties* shall assess and collect a weighing fee of two dollars from the owner or operator of the vehicle and shall forward such fee to the State Treasurer. Upon receipt of the fee, the State Treasurer shall allocate the same to the fund appropriated for the administration and maintenance of the Department of State Police.

PART II

QUESTION 2

"Whether or not commercial trucks[1] *of all classes are paying in property*[2]*, gross receipts and gasoline taxes an amount sufficient fairly to compensate the Commonwealth for the highway facilities it provides."*

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[1] Commercial vehicles may be carriers of property (trucks) or of persons (buses). Since the bus lines operating in Virginia filed through their Association briefs to cover Question 2, the Commission extended its consideration to include the bus lines.

[2] The Commission and the interested parties appearing before it have interpreted "property" as meaning "license fees" on motor vehicles, which was obviously the intent of Senate Joint Resolution No. 48.

It should be recognized from the beginning in reading this report, particularly this section, that this Commission was *NOT* given a mandate to find sources of the additional funds obviously needed by our Highway Department to meet the demands of ever increasing highway traffic. However, Question 2 asks for a ruling on the relative burden of highway user taxes *paid* by the different classes of highway users.

This *limitation* of the problem has in many ways made the work of the Commission difficult in comparing our results with those in other states.

The more usual approach in other states has been to start with a "highway-use study" made to develop needs for the future, similar to the former Virginia "Twenty-Year Plan". This is usually followed by an integrated study to determine how such *increased* costs should equitably be assessed against the various classes of highway users, both private cars and commercial vehicles. This point will be taken into account by the recommendations which will close this section.

Also, this Commission has not attempted to adjust apparent differences, due to capital structure, between conflicting and competing forms of commercial transportation.

The economist or statistical analyst approaching this problem will find that our State agencies, notably the Highway Department, maintain excellent files of cost data and cooperate with study groups to the highest extent. It is when the analyst begins to allocate these costs to various classes of vehicles that he must make certain basic *assumptions*. Some of these assumptions, such as miles per gallon of fuel and annual mileage driven for each type of vehicle, have been well standardized by a Nationwide analysis made by the United States Bureau of Public Roads. While the *totals*, such as total collection of highway fuel tax in Virginia, are ascertainable, allocations to classes of vehicles and results may vary with different approaches.

In general, three different approaches (plus some variations thereof) to allocation of highway user costs have been studied by this Commission and deserve here a brief explanation. These are:—

(1) *The Ton-Mile Approach*—The gross weight for which a vehicle is licensed is easily ascertained. Also, actual payments of fuel taxes give a control over assumptions as to miles driven per year. Modern highway analysts have somewhat discredited the "ton-mile theory", since many of our highway costs of construction and/or maintenance are not directly *proportional* to weight of vehicle. The commercial highway users do not like this form of analysis since it very often results in showing that the average private passenger car pays from two to four times as much as the heavy commercial vehicle. In some other states such *analyses* have been followed by a *ton-mile* or *weight-distance* third level highway use tax. In the "incremental method" and "cost-function method", described later, *some* of the costs are best distributed on a "ton-mile" basis.

(2) *The Cost-Function Approach*, often referred to in the older Economics texts as the "Standard Method" has been used in studies leading to the setting of public utility rates. Under this approach, all highway costs are distributed under three headings:

(a) General Overhead
(b) Weight Functions
(c) Non-Weight Functions

(3) *The Incremental Approach*—This method has as its foundation the undeniable fact that vehicles of different dimensions and weights differ in the extent of their requirements for highway facilities. Since existing roads and streets are, with very few exceptions, designed for a mixture of traffic of varying characteristics, the problem becomes one of determining successive requirements of cost which may be associated with an ascending scale of vehicle sizes and weights, beginning with a basic or passenger car type, and ending with the heaviest weight group permitted on the roads. The analysis takes up in turn various elements of road cost, including pavement and sub-base thickness, width, grade and alignment, structures, and maintenance; and attempts to determine the extent which the cost requirements of each element vary with the size of the vehicle.

Unfortunately, many assumptions must often be made which in great measure affect the end results and conclusions drawn. Eventually, test results of the WASHO and other cooperative test roads will give valid data to replace many of these questionable assumptions, which are now a matter left to the judgment and experience of the individual making the study. This is particularly true for the destructive effect of tandem and single axles on black top roads and for the relationship between vehicle weight and surface maintenance costs.

In addition to many other pamphlets and publications bearing on highway user taxes and payments generally, this Commission has studied in great detail and discussed:

I. The article "Road User and Property Taxes on Selected Motor Vehicles 1953" by Cope and Meadows, PUBLIC ROADS, Volume 27, No. 7, and an analysis of same by the Virginia Department of Highways. This gives a summary at the National level and allows taxes on Virginia vehicles to be compared with the same class in other states.

II. A brief filed by the Virginia Highway Users Association entitled—"Testing the Equity of Virginia's Motor Vehicle Tax Structure", applying all three approaches to this problem.

All, however, were based on *actual* highway expenditures in Virginia for the past fiscal year. Sources of data were the files of costs of the Virginia Department of Highways.

III. A brief covering Part II (Question 2) filed by the Virginia Railway Association.

IV. Counter brief filed in rebuttal by the Virginia Railway Association and a supplementary brief on reciprocity by the Virginia Highway Users Association after hearings conducted on their *original* briefs.

V. An independent study conducted for this Commission by Dr. Boyd Harshbarger, using the staff and laboratory of the Department of Statistics and the statistical laboratory of the Virginia Agricultural Experiment Station of the Virginia Polytechnic Institute at Blacksburg, Virginia.

This study, consisting of 134 pages of statistical tables, summary, and conclusions, is released as an integral part of the report of this Commission. Those interested may secure a copy of same from the Secretary of this Commission.

All the briefs and studies listed above in connection with Question 2 are factual and statistical analyses based largely on the engineering aspects of our highways as affecting costs of both construction and maintenance. That is, in considering distribution of highway costs, great emphasis has

been placed upon the well known fact that the heavy axle loads of commercial vehicles require thicker pavements, better supporting subgrade, stronger bridges and increase to some extent costs of surface maintenance. Such emphasis is natural, since engineering design is centered around the LOAD to be carried by the structure or road surface. Also the points raised by Question 1A and B color to some extent the thinking on the remainder of this report.

Reaction of the traveling public and much verbal and written testimony would seem to show this Commission that there are *other* aspects than *engineering* in connection with commercial truck use of our highways which should be given consideration in any allocation of costs to this class of vehicles.

One truck occupies as much space in a traffic lane as several passenger cars. If we mix trucks with passenger cars on a busy two-lane highway, the capacity of that road in thousands of cars per day may be reduced by as much as 25%. Such aspects of "occupancy" and "lane capacity" are often buried in the details of an "incremental study", but are daily apparent to the driving public who soon clamor for additional lanes on such roads.

Our Virginia cities and towns are fast finding that these large commercial units, two-thirds of which are NOT EVEN VIRGINIA TRUCKS, choke traffic on their streets, congest intersections, and soon require an expensive by-pass.

While fully cognizant of the vital part that truck transportation plays in the commerce of our State and Nation, we must also in fairness recognize the "nuisance value" of the heavier trucks.

Some authorities feel that the ton-mile approach actually indirectly makes some allowance for what we might consider "intangible charges" assessed against the trucks.

The study of this Commission convinces its members that there is as yet no single, accurate, absolute measure by which to allocate highway costs to vehicles by class. The incremental method, following a needs study and as modified by results of future test roads holds out the most promise of an approach acceptable to both highway engineers and economists. At present, one type of analysis may show a certain class of vehicle as paying *more* than their fair share, while the same data analyzed from a different approach may prove *underpayment.*

Attention is invited to the results of Dr. Harshbarger's report in which he used *SEVEN* different methods of analysis varying from a simple weight-distance approach to the derivation of a highly mathematical theoretical formula with a wide range in results as to be expected.

This Commission feels that it has utilized all approaches to this problem which for a number of years will be used by both engineers and economists. While none of these approaches give an absolute yardstick, each develops certain phases of this economic problem.

We feel that the following conclusions can be drawn from our studies—That we have here in Virginia a highway user tax structure built at three levels—

1—A graduated license fee based on gross weight

2—An "over the road" fuel tax

3—A 2 per cent gross receipts tax on for-hire carriers

The cost of collection of these taxes here in Virginia — averaging 3 per cent—is remarkably low when compared to the costs in other states.

According to all evidence available to the Commission, passenger buses are now paying in taxes an amount sufficiently to compensate the State fairly for their use of the highways.

The theory behind the tax structure is sound. The steeply increased license fees of the heavier trucks (see curve) and their higher fuel consumption tend to compensate for their effect on our roads. The 2 per cent gross receipts tax is more nearly a service charge for the use of our roads for commercial purpose rather than a highway tax. Though the theory be sound, inequities arise in the *application* of these three level taxes. Reciprocity largely prevents the out of state or "foreign" truck from paying its fair share and the private carriers are NOT subject to the 2 per cent gross receipts tax.

Our *Virginia* common and contract carriers are *in general* paying their fair cost for their mileage driven over our Virginia highways. Recent surveys show that more than two-thirds of all *heavy* trucks traversing certain portions of our primary system are "foreign" trucks which very largely escape ANY payment for the use of our Virginia highways. The *private* haulers of Virginia, exempt from the 2 per cent gross receipts tax have an advantage in competition with our own for-hire carriers. The "foreign" private hauler escapes in Virginia not only the gross receipts tax but also the fuel tax. It is evident that more and more major industries will find it to their financial advantage to lease or to purchase trucks and trailers and thus escape the 3rd level tax of 2 per cent.

While this Commission was NOT (as before noted) given a mandate to find additional sources of highway funds, it is felt that our studies have revealed certain inequities in highway user taxes in Virginia. To remedy these inequities will yield additional badly needed revenue to the amounts indicated.

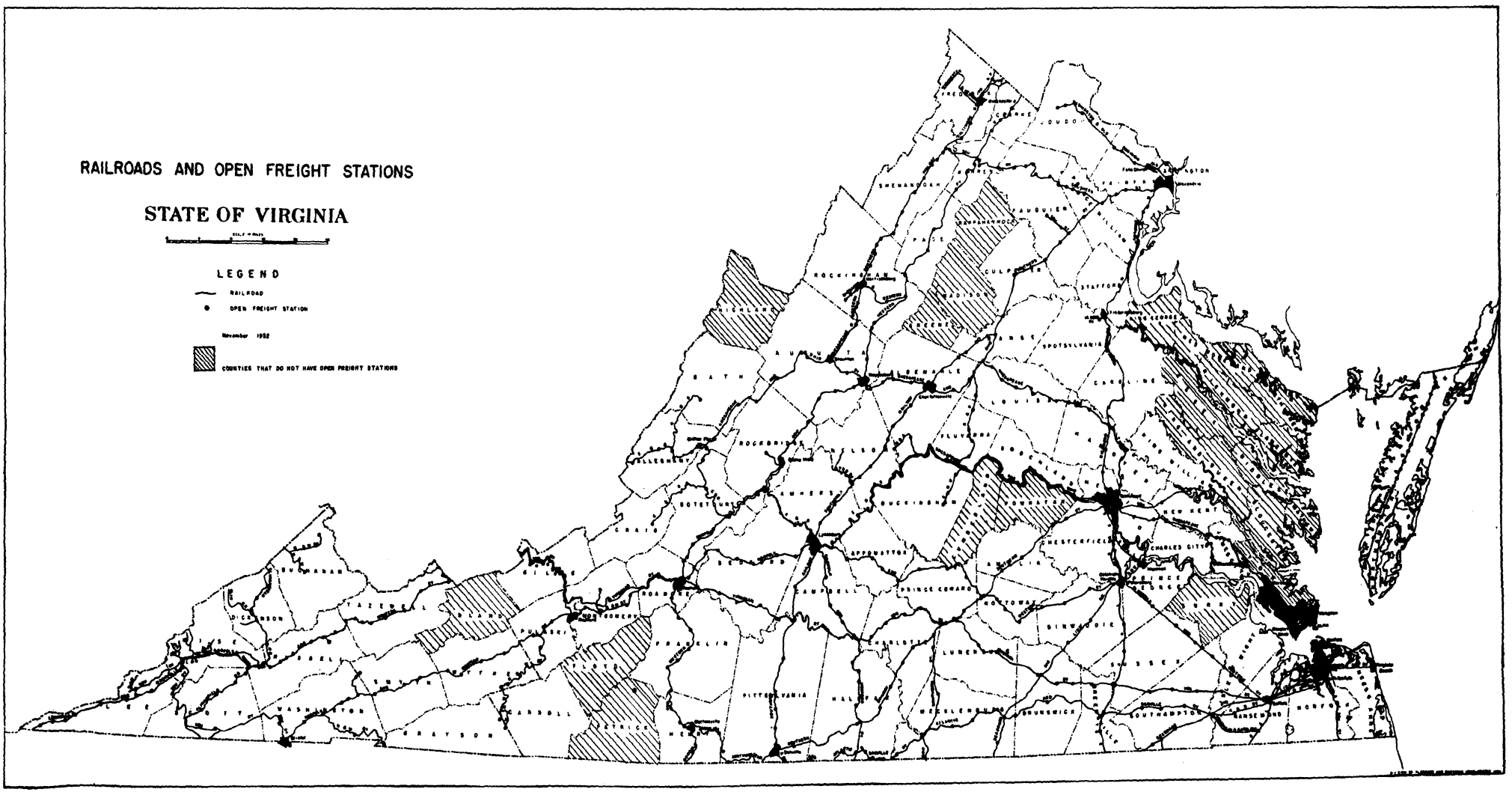
The Commission recommends immediate "plugging the leaks" in the current three level tax structure thru its recommendations Nos. 1, 2, 3 and 4 which follow and a solution jointly of the problems posed by the reciprocity and the private hauler by No. 5. In making these recommendations, this Commission feels its responsibility to help protect and conserve the highway system for the benefit and use of ALL citizens. The Commission also fully realizes the extent to which the trucking industry serves the agricultural interests and the industry of our State. (See map showing counties which have truck service but no railroad service.) It is felt that the taxes on this young and growing form of transportation industry should be such that they pay their fair share of highway costs but not so burdensome that our heavy commercial vehicles will find it more profitable to domicile in neighboring states rather than Virginia.

IT IS THEREFORE RECOMMENDED:—

(1) That if the AASHO weight formula be adopted, embodying an increase in gross weight to 56,800 lbs. (max. axle length of 35 ft.) that an additional top bracket for license fees be established from 50,001 to 56,800 lbs. at an increased cost per 1,000 lbs. See letter from C. H. Lamb, Acting Commissioner, Division of Motor Vehicles and suggested Bill, Appendix I of this section.

(2) That further study should be made of revision of the methods of levying fees on TRACTORS as well as trailer units (now licensed separately). See letter from C. H. Lamb, Acting Commissioner, Divn. of Motor Vehicles, Appendix II.

(3) That in view of the proven efficiency of the Diesel engine over that of the gasoline type (amounting to some 40 to 50 per cent greater mileage per gallon of fuel) that the tax on over the road DIESEL fuel be in-


RAILROADS AND OPEN FREIGHT STATIONS
STATE OF VIRGINIA
LEGEND
RAILROAD
OPEN FREIGHT STATION
November 1952
COUNTIES THAT DO NOT HAVE OPEN FREIGHT STATIONS

creased to 2 cents per gallon over and above the then current tax on over the road gasoline fuel. See suggested bill, Appendix III.

(4) That collection from ALL private carriers (gross weight 24,000 lbs. and over) of road taxes commensurate with fuel consumed (whether purchased inside or outside Va.) be facilitated by the adoption of the bill set out in Appendix IV.

It is estimated that passage of the measures should yield an additional 1 to 2 million dollars of highway funds per annum.

(5) Reciprocity, except for vehicle tags, is not tenable as a public policy. Reciprocity has already been lost with New York, Ohio and Pennsylvania due to passage of third level weight-distance tax laws. Other states will doubtless adopt such sources of highway revenue in the future. If they do so, reciprocity will play a less and less important part. However, reciprocity as to license tags should be continued.

When a weight-distance tax is adopted in Virginia, which this Commission recommends as a substitute for the current third level tax of 2% on the gross receipts of certain carriers, it will solve the two major problems confronting this Commission, viz: the "foreign" truck and the private hauler. This tax is the only form of highway user tax which, applied to the heavy units, treats them all alike whether foreign or domestic, for-hire or private.

This Commission recommends the adoption of a weight-distance tax at the 1954 session of the General Assembly.

The Commission does not have sufficient information available to it to include in this report a specific recommendation as to the rates of such a tax. The Department of Highways has completed a study of highway needs and the amount of money required to meet them. The Department, with this material and the statistical tables prepared by Dr. Harshbarger for the Commission, is in a position to make a study of the entire matter and report to the General Assembly convening in January as to the amount of revenue which can be raised by a weight-distance tax similar to that in use in New York.

For the guidance of the Department the following comments are offered:

(a) The weight-distance tax should produce from the carriers now paying the gross receipts tax at least as much as they now pay.

(b) Each weight group in (a) above should not necessarily pay the same amount of tax under, or even be subject to, the weight-distance tax. That is to say, the tax might begin with trucks licensed to carry in excess of 18,000 pounds.

(c) Tables of estimated collections under various tax rates and with various exemptions, other than reciprocity, should be furnished.

A preliminary study made by the Virginia Department of Highways serves to indicate the revenue that might be raised by such an act. As a tentative yardstick of fairness, the total amounts now paid under the 2 percent gross receipts tax and the annual ton-miles driven by our Virginia Class I common carriers were used as a basis of computation. A weight-distance tax rate was computed which would have raised (from these trucks) the same total amount. If this same rate had been applied to all trucks, foreign and domestic, for-hire and private, the total yield to the State would have probably been some 2½ million dollars MORE than that now raised by the 2 percent tax.

It should be again repeated that this form of weight-distance tax is the only third level highway user tax which treats all alike, foreign and domestic, for-hire and private haulers.

The Department of Highways, with the aid of consultants, is requested to make a detailed study of this matter for submission to the General Assembly in 1954.

APPENDIX I

COMMONWEALTH OF VIRGINIA

DIVISION OF MOTOR VEHICLES

Richmond 10, October 6, 1953

Colonel R. A. Marr, Jr., Chairman

And

Members of Commission
Studying Highway Matters

Gentlemen:

As requested, this Division has attempted to extend the existing license fees relative to property carrying vehicles to a maximum of 56,800 pounds.

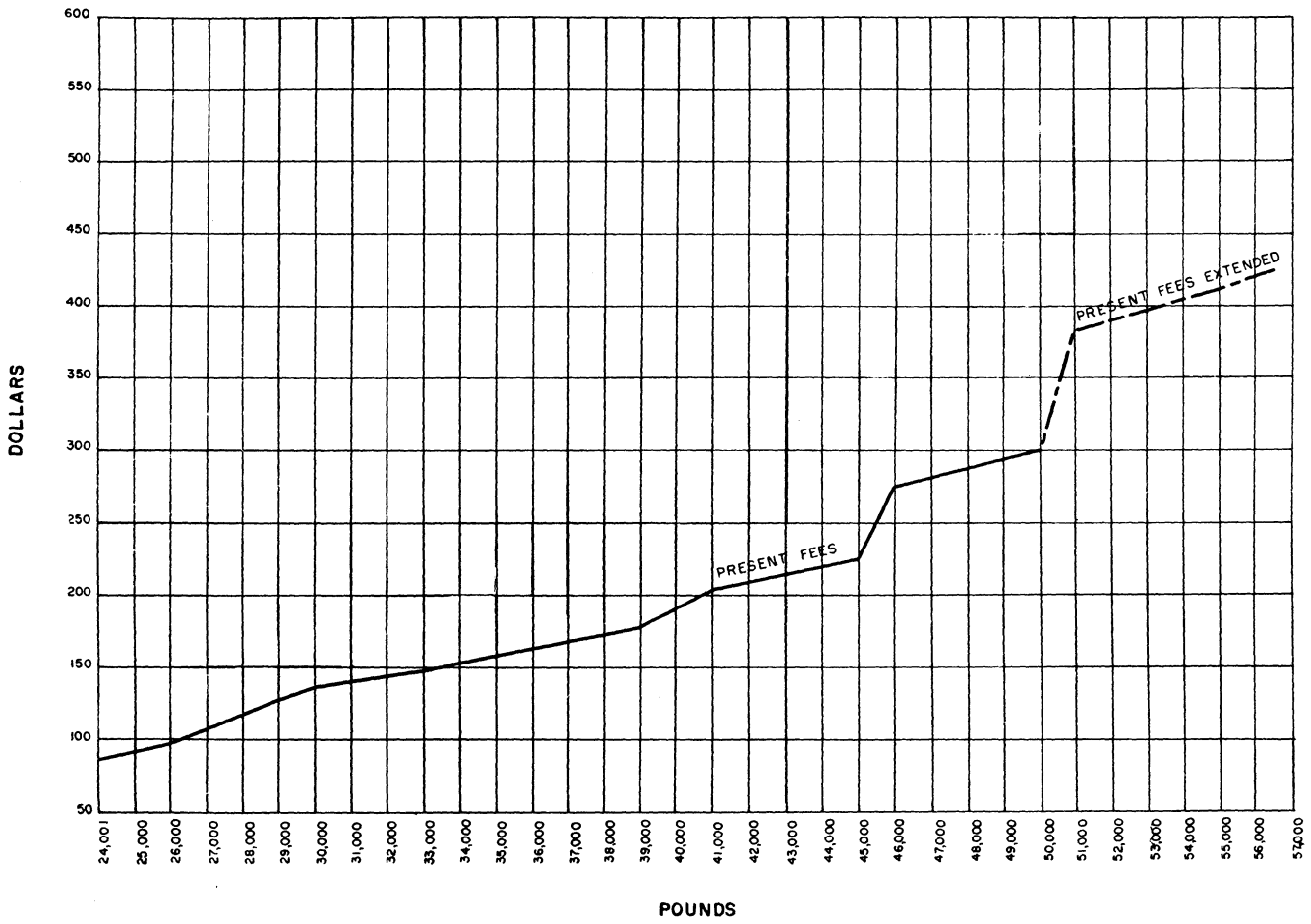
In our effort to arrive at the proper fee to recommend for weights from 50,001 to 56,800 pounds, we have relied heavily on the information contained in the statistical report prepared under the direction of the Commission created by the General Assembly in 1952 to study matters relating to highways.

The recommended fee of $7.50 per 1,000 pounds, in our opinion, appears to be very well in line with the fees up to 50,000 pounds now in use.

There is attached a graph showing the weight fee relation in the present scale of license fees and its extension on the proposed rate. There is also attached two weight charts, one covering the existing fees from 10,000 pounds and under up to and including 50,000 pounds. The second weight chart carries the fees from 50,001 to 56,800 pounds.

Respectfully submitted,
C. H. LAMB,
Acting Commissioner

FEES APPLICABLE TO TRUCKS AS SINGLE UNITS, TRACTOR TRUCKS AND SEMI-TRAILERS



PROPOSED CONTINUATION OF PRESENT SCALE

Weight	Rate Rate per 100 lbs.	Full Year Fee March 15th to Sept. 30th.	Half Year Fee October 1st to Jan. 15th.	One Third Fee Jan. 16th to Mar. 31st.
50001-50499	7.50	375.00	187.50	125.00
50500-51000	7.50	382.50	191.25	127.50
51001-51499	7.50	382.50	191.25	127.50
51500-52000	7.50	390.00	195.00	130.00
52001-52499	7.50	390.00	195.00	130.00
52500-53000	7.50	397.50	198.75	132.50
53001-53499	7.50	397.50	198.75	132.50
53500-54000	7.50	405.00	202.50	135.00
54001-54499	7.50	405.00	202.50	135.00
54500-55000	7.50	412.50	206.25	137.50
55001-55499	7.50	412.50	206.25	137.50
55500-56000	7.50	420.00	210.00	140.00
56001-56499	7.50	420.00	210.00	140.00
56500-56800	7.50	427.50	213.75	142.50

Form Auto 223

COMMONWEALTH OF VIRGINIA
DIVISION OF MOTOR VEHICLES
RICHMOND, VIRGINIA

RATE SCHEDULE SHOWING FEES APPLICABLE TO TRUCKS AS SINGLE UNITS, TRACTOR TRUCKS AND SEMI-TRAILERS

SEE FOOT-NOTE FOR TRACTOR TRUCK FEES.

THIS SCHEDULE EFFECTIVE MARCH 15, 1949

WEIGHT	Rate per 1000 lbs.	Full Year Fee March 15th to Sept. 30th	Half Year Fee October 1st to Jan. 15th	One Third Fee Jan. 16th to Mar. 31st
10000 and under		12.00	6.00	4.00
10001 - 10499	1.30	13.00	6.50	4.33
10500 - 11000	1.30	14.30	7.15	4.77
11001 - 11499	1.40	15.40	7.70	5.13
11500 - 12000	1.40	16.80	8.40	5.60
12001 - 12499	1.50	18.00	9.00	6.00
12500 - 13000	1.50	19.50	9.75	6.50
13001 - 13499	1.60	20.80	10.40	6.93
13500 - 14000	1.60	22.40	11.20	7.47
14001 - 14499	1.70	23.80	11.90	7.93
14500 - 15000	1.70	25.50	12.75	8.50
15001 - 15499	1.80	27.00	13.50	9.00
15500 - 16000	1.80	28.80	14.40	9.60
16001 - 16499	2.00	32.00	16.00	10.67
16500 - 17000	2.00	34.00	17.00	11.33
17001 - 17499	2.20	37.40	18.70	12.47
17500 - 18000	2.20	39.60	19.80	13.20
18001 - 18499	2.40	43.20	21.60	14.40
18500 - 19000	2.40	45.60	22.80	15.20
19001 - 19499	2.60	49.40	24.70	16.47
19500 - 20000	2.60	52.00	26.00	17.33
20001 - 20499	2.80	56.00	28.00	18.67
20500 - 21000	2.80	58.80	29.40	19.60
21001 - 21499	3.00	63.00	31.50	21.00
21500 - 22000	3.00	66.00	33.00	22.00
22001 - 22499	3.20	70.40	35.20	23.47
22500 - 23000	3.20	73.60	36.80	24.53
23001 - 23499	3.40	78.20	39.10	26.07
23500 - 24000	3.40	81.60	40.80	27.20
24001 - 24499	3.60	86.40	43.20	28.80
24500 - 25000	3.60	90.00	45.00	30.00
25001 - 25499	3.80	95.00	47.50	31.67
25500 - 26000	3.80	98.80	49.40	32.93
26001 - 26499	4.00	104.00	52.00	34.67
26500 - 27000	4.00	108.00	54.00	36.00
27001 - 27499	4.20	113.40	56.70	37.80
27500 - 28000	4.20	117.60	58.80	39.20
28001 - 28499	4.40	123.20	61.60	41.07
28500 - 29000	4.40	127.60	63.80	42.53
29001 - 29499	4.50	130.50	65.25	43.50
29500 - 30000	4.50	135.00	67.50	45.00
30001 -- 30499	4.50	135.00	67.50	45.00
30500 - 31000	4.50	139.50	69.75	46.50
31001 - 31499	4.50	139.50	69.75	46.50
31500 - 32000	4.50	144.00	72.00	48.00
32001 - 32499	4.50	144.00	72.00	48.00
32500 - 33000	4.50	148.50	74.25	49.50
33001 - 33499	4.50	148.50	74.25	49.50
33500 - 34000	4.50	153.00	76.50	51.00
34001 - 34499	4.50	153.00	76.50	51.00
34500 - 35000	4.50	157.50	78.75	52.50
35001 - 35499	4.50	157.50	78.75	52.50
35500 - 36000	4.50	162.00	81.00	54.00
36001 - 36499	4.50	162.00	81.00	54.00
36500 - 37000	4.50	166.50	83.25	55.50
37001 - 37499	4.50	166.50	83.25	55.50
37500 - 38000	4.50	171.00	85.50	57.00
38001 - 38499	4.50	171.00	85.50	57.00
38500 - 39000	4.50	175.50	87.75	58.50
39001 - 39499	4.50	175.50	87.75	58.50
39500 - 40000	4.50	180.00	90.00	60.00
40001 - 40499	5.00	200.00	100.00	66.67
40500 - 41000	5.00	205.00	102.50	68.33
41001 - 41499	5.00	205.00	102.50	68.33
41500 - 42000	5.00	210.00	105.00	70.00
42001 - 42499	5.00	210.00	105.00	70.00
42500 - 43000	5.00	215.00	107.50	71.67
43001 - 43499	5.00	215.00	107.50	71.67
43500 - 44000	5.00	220.00	110.00	73.33
44001 - 44499	5.00	220.00	110.00	73.33
44500 - 45000	5.00	225.00	112.50	75.00
45001 - 45499	6.00	270.00	135.00	90.00
45500 - 46000	6.00	276.00	138.00	92.00
46001 - 46499	6.00	276.00	138.00	92.00
46500 - 47000	6.00	282.00	141.00	94.00
47001 - 47499	6.00	282.00	141.00	94.00
47500 - 48000	6.00	288.00	144.00	96.00
48001 - 48499	6.00	288.00	144.00	96.00
48500 - 49000	6.00	294.00	147.00	98.00
49001 - 49499	6.00	294.00	147.00	98.00
49500 - 50000	6.00	300.00	150.00	100.00

NOTE: 1. THE FEE FOR ALL TRACTOR TRUCKS IS A FLAT CHARGE OF $30.00.

2. TO DETERMINE SEMI-TRAILER FEES - DEDUCT $30.00 FROM FEES APPLICABLE TO THE GROSS WEIGHT OF THE COMBINATION.

A BILL to amend and reenact § 46-162 of the Code of Virginia, relating to fees for certificates of registration and license plates for certain motor vehicles, trailers and semi-trailers.

Be it enacted by the General Assembly of Virginia:

1. That § 46-162 of the Code of Virginia be amended and reenacted as follows:

§ 46-162. Except as hereinafter otherwise provided, the fees for certificates of registration and license plates to be paid by owners of all motor vehicles, trailers and semi-trailers not designed and used for the transportation of passengers shall be determined by the gross weight of the vehicle or combination of vehicles of which it is a part, when loaded to the maximum capacity for which it is registered and licensed, according to the schedule of fees herein set forth. For each thousand pounds of gross weight, or major fraction thereof, for which any such vehicle is registered and licensed there shall be paid to the Commissioner the fee indicated in the following schedule immediately opposite the weight group into which such vehicle, or any combination of vehicles of which it is a part, falls when loaded to the maximum capacity for which it is registered and licensed; provided, that in no case shall the fee be less than twelve dollars.

Gross Weight Groups (Pounds)	Fee Per Thousand Pounds of Gross Weight
10,000 and less	$1.20
10,001 — 11,000	1.30
11,001 — 12,000	1.40
12,001 — 13,000	1.50
13,001 — 14,000	1.60
14,001 — 15,000	1.70
15,001 — 16,000	1.80
16,001 — 17,000	2.00
17,001 — 18,000	2.20
18,001 — 19,000	2.40
19,001 — 20,000	2.60
20,001 — 21,000	2.80
21,001 — 22,000	3.00
22,001 — 23,000	3.20
23,001 — 24,000	3.40
24,001 — 25,000	3.60
25,001 — 26,000	3.80
26,001 — 27,000	4.00
27,001 — 28,000	4.20
28,001 — 29,000	4.40
29,001 — 40,000	4.50
40,001 — 50,000	6.00
50,001 — 56,800	*7.50*

APPENDIX II

COMMONWEALTH OF VIRGINIA

DIVISION OF MOTOR VEHICLES

Richmond 10, October 6, 1953.

Colonel R. A. Marr, Jr., Chairman

And

Members of Commission
Studying Highway Matters

Gentlemen:

There is submitted for your consideration a proposal to shift the major portion of the license fee from the semi-trailer, as at present, to the tractor-truck or power unit of tractor-truck semi-trailer combinations. We are prompted to make this suggestion by the thought that such a change would work to the advantage of both the Commonwealth and the majority of the operators in several ways.

In our opinion if the major portion of the licensing fee was placed on the tractor-truck, it would be easier to work out a simple and effective method of semi-trailer interchange between carriers licensed in different jurisdictions. It is also our belief that better control could be exercised by the State over the power unit. We feel that it would also correct certain inequities where a person or firm owns more trailers than tractors.

We are not submitting with this suggestion a proposed schedule of license fees. It is our thought that before a proposed schedule is offered, considerable study should be given to this matter to determine three things:

(1) What effect would the change have on the Commonwealth's revenue.

(2) Would the change result in increasing the license fees of a tractor truck semi-trailer combination out of proportion to a straight truck of similar gross weight.

(3) Would it create certain inequities where a person or firm owns an equal number or more tractors than trailers.

It appears to be advisable to first determine what would be the ratio of tractor-trucks to semi-trailers before suggesting any schedule of fees. It may be necessary to field check or to sample by forwarding questionnaires to the owners before information could be assembled from which a schedule of fees could be drawn. We are of the opinion that if the present semi-trailer fee was imposed on the tractor-truck and the present tractor-truck fee was imposed on the semi-trailer, considerable loss of revenue to the Commonwealth would result.

There are three reasons to anticipate this loss of revenue:

First; five (5) semi-trailers to three (3) tractor-trucks appear to be the average, and there is no reason to believe that the registration in Virginia would not follow this pattern.

Second; there are a number of tractor-trucks along the borders of Virginia presently licensed in Virginia because of the low tractor-truck fee, which could not be required to have Virginia registration, and which we believe would be withdrawn from Virginia if the proposed change was adopted.

Third; is that under the flat fee of $30.00 for a tractor-truck of any gross weight combination, the owners have registered the greatest major-

ity of their tractor-trucks at the maximum gross weight of 50,000 pounds. A very considerable number of these tractor-trucks would be re-registered at lower gross weights in keeping with actual gross combination weights.

All of these factors should be considered in the development of any proposed schedule of license fees.

Respectfully submitted,

C. H. LAMB,

Acting Commissioner.

APPENDIX III

A BILL to amend and reenact §§ 58-628 and 58-629 and 58-744 as amended, of the Code of Virginia, relating to certain road taxes on motor carriers and taxes upon certain motor fuel and refunds thereof in certain cases.

Be it enacted by the General Assembly of Virginia:

1. That §§ 58-628 and 58-629 and 58-744 as amended, of the Code of Virginia be amended and reenacted as follows:

§ 58-628. Every motor carrier shall pay a road tax equivalent to six cents per gallon calculated on the amount of gasoline * *and equivalent to eight cents per gallon on the amount of any fuel taxable under Chapter 14 of this Title,* used in its operations within this State.

§ 58-629. Every motor carrier subject to the tax hereby imposed shall be entitled to a credit on such tax equivalent to six cents per gallon on all gasoline * *and eight cents per gallon on any fuel taxable under Chapter 14 of this Title* purchased by such carrier within this State for use in its operations either within or without this State and upon which gasoline or other motor fuel the tax imposed by the laws of this State has been paid by such carrier; *provided, that any refunds received under the provisions of said Chapter 14 of this Title shall be deducted from the credit allowed such carrier.* Evidence of the payment of such tax in such form as may be required by, or is satisfactory to, the Commission shall be furnished by each such carrier claiming the credit herein allowed. When the amount of the credit herein provided to which any motor carrier is entitled for any quarter exceeds the amount of the tax for which such carrier is liable for the same quarter, such excess may under regulations of the Commission be allowed as a credit on the tax for which such carrier would be otherwise liable for another quarter or quarters; or upon application within one hundred and eighty days from the end of any quarter, duly verified and presented, in accordance with regulations promulgated by the Commission and supported by such evidence as may be satisfactory to the Commission, such excess may be refunded if it shall appear that the applicant has paid to another state under a lawful requirement of such state a tax, similar in effect to the tax herein provided, on the use or consumption in said state of gasoline or other motor fuel purchased in Virginia, to the extent of such payment to said other state, but in no case to exceed the rate per gallon of the then current gasoline or other motor fuel tax of this State.

The Commission shall not allow such refund except after an audit of the applicant's records and shall audit the records of an applicant at least once a year. Such refund may be allowed without a formal hearing if the amount thereof is agreed to by the applicant. Otherwise, a formal hearing on the application shall be held by the Commission after notice of not less than ten days to the applicant and the Attorney General. Whenever any refund is ordered it shall be paid out of the highway maintenance and construction fund.

Chapter 14

§ 58-744. A tax at the rate of * *eight* cents per gallon is hereby imposed upon all fuel sold or delivered by any supplier to any user-seller for resale or use by such user-seller for consumption in a motor vehicle, or used by any such supplier in any motor vehicle owned, leased or operated by him, or delivered by such supplier directly into the fuel supply tank of a motor vehicle, or imported by a user-seller into this State for resale or use for the propulsion of a motor vehicle; *provided that in the case of every common carrier by motor vehicle, trailer or semi-trailer of passengers whose operations are under license or franchise from a city and are wholly within such city and a zone five miles wide measured in air miles from city limits, surrounding the city, any such carrier shall be allowed, on application, a refund of two cents per gallon of the tax paid under this section on that portion of the fuel on which the tax has been paid and which has been consumed within such area of operations, including such five-mile zone.*

* Fuel sold to the United States or any of the governmental agencies thereof shall not be subject to tax hereunder, when sales are made in quantities of five hundred gallons or more at any one time for use in motor vehicles.

APPENDIX IV

Motor Fuel Road Tax

The present motor fuel road tax requires for-hire carriers moving in interstate commerce to purchase in Virginia as much fuel as they use in Virginia. If they purchase less than they use they are required to pay six cents a gallon on the difference. The law does not apply to private carriers, with the result that many large foreign private operators use Virginia's highways without contributing a single dollar to their upkeep.

There is attached a bill to extend this motor fuel road tax to private carriers who operate trucks with more than two axles or who operate tractors. Private carriers who operate light and heavy equipment would be taxed only on the operation of heavy equipment. For-hire carriers who operate both light and heavy equipment would be taxed on the operation of both kinds of equipment as at present. For-hire carriers who operate only light equipment would be exempted from the tax.

The bill also makes a number of technical changes to transfer from Title 46 to Title 56 the sections of the Code that are administered by the State Corporation Commission, to clarify and simplify them and to repeal sections that are obsolete or are covered by other existing or by the proposed sections.

The sections in question deal mainly with the identification of for-hire vehicles; and they are identified for three purposes: (1) to administer the motor fuel road tax, (2) to administer the gross receipts road tax, (3) to administer the laws governing the regulation of for-hire operations.

To produce maximum uniformity and simplicity and minimum inconvenience, consequential changes are:

1. Omission of the requirement that trailers be identified.

2. Identification of only the heavy vehicles whose operations are subject to taxation but not to regulation by the State Corporation Commission. (All vehicles of intrastate for-hire carriers will continue to be identified for purposes of regulation).

3. Fees for identification papers are equalized at one dollar and directed to be paid into the highway fund.

4. Annual registration is required because experience has demonstrated the need for it.

5. An incidental but important feature of annual registration is the requirement that each applicant for registration certify that he is up-to-date on his taxes.

6. The penalty section enforced in the local courts is made uniform as to foreign and domestic carriers.

7. The penalty section enforced by the State Corporation Commission omits the requirement that the Commission hear cases involving the failure to make reports to the Department of Taxation and to the Division of Motor Vehicles, and adds the requirement that the Commission enter judgment for taxes found to be due.

A BILL to provide for the transfer from the Division of Motor Vehicles and the Commissioner thereof to the State Corporation Commission, and to confer upon and vest in the latter certain powers, duties and functions in relation to the regulation and taxation of certain carriers of persons and property by motor vehicles; and to this end to amend the Code of Virginia by adding sections numbered 56-279.1, 56-304.1 through 56-304.12, and to amend and reenact §§ 56-304 and 58-627 of the Code of Virginia, the added and amended sections relating to motor vehicle carriers generally, and providing for the filing fees for applicants for certain certificates, the identification of vehicles, warrants, registration cards and markers, defining and providing for the registration and taxation of certain carriers, fees, road taxes, agents for service of process, prohibiting certain acts and providing penalties for violations and the enforcement thereof; and to repeal §§ 46-134 through 46-140, 46-142 through 46-151, 46-153 and 46-153.1 and all amendments thereof, of the Code of Virginia, relating generally to the same matters.

Be it enacted by the General Assembly of Virginia:

1. That the Code of Virginia be amended by adding §§ 56-279.1, and 56-304.1 through 56-304.12, and that §§ 56-304 and 58-627 of the Code be amended and reenacted, the added and amended sections being as follows:

Title 56—Public Service Companies

Chapter 12—Motor Vehicle Carriers Generally

Article 2—Issue of Certificates of Convenience and Rights Thereunder

§ 56-279.1. *Filing Fees.*—Every applicant for a certificate under the provisions of this chapter shall, upon the filing of the application, deposit with the Commission as a filing fee the sum of twenty-five dollars, and for the transfer of any such certificate the sum of twenty-five dollars, and for approval of a lease the sum of five dollars (to be paid by the lessee) and for the issuance of a duplicate certificate the sum of three dollars; said fees to be paid for the purpose of defraying the expenses of administering the provisions of law with respect to the issuance of such certificates, and to be paid into the highway maintenance and construction fund.

Article 8—**Identification of Vehicles*

§ 56-304. * *Warrants, exemption cards, and classification plates.—No person shall operate or cause to be operated for compensation on any highway in this State any self-propelled motor vehicle that is required by law to display license plates issued by the Division of Motor Vehicles unless there has been issued by the Commission to the owner of the vehicle a warrant or an exemption card and a classification plate for each vehicle so operated.*

A warrant shall be issued for each vehicle that is not exempt under § 56-274. An exemption card shall be issued for each vehicle that is exempt under § 56-274 unless all the operations of the vehicle are exempt from the road taxes imposed by Articles 12 and 13 of Chapter 12 of Title 58. A classification plate shall be issued for each vehicle, indicating the purpose for which the vehicle may lawfully be operated, and having on it the same number that appears on the warrant or exemption card issued for the vehicle. At all times the classification plate shall be displayed on the vehicle and the warrant or exemption card carried in the vehicle.

§ 56-304.1. *Registration cards and identification markers.*—No person shall operate or cause to be operated for compensation on any highway in this State any passenger vehicle having seats for more than seven passengers in addition to the driver, or any road tractor, or any tractor truck, or any truck having more than two axles, that is not required by law to display license plates issued by the Division of Motor Vehicles, unless there has been issued by the Commission to the owner of the vehicle a registration card and an identification marker for each vehicle so operated. At all times the registration card shall be carried in the vehicle for which it was issued. The marker shall have on it the same number that appears on the registration card and shall at all times be displayed on the vehicle.

§ 56-304.2. *Private carriers.* No person shall operate or cause to be operated for the transportation not for compensation of property into or out of or through this State on any highway in this State any road tractor, or any tractor truck, or any truck having more than two axles unless there has been issued to the owner of the vehicle a registration card and an identification marker for each vehicle so operated. At all times the registration card shall be carried in the vehicle for which it was issued. The marker shall have on it the same number that appears on the registration card and shall at all times be displayed on the vehicle.

§ 56-304.3. *Numbers in lieu of classification plates or markers.*—A person who owns and operates more than ten vehicles for which warrants or exemption cards have been issued under § 56-304, or for which registration cards have been issued under § 56-304.1 or § 56-304.2, may apply to the Commission for leave to paint on the sides of said vehicles an identifying number; and the Commission, instead of issuing classification plates or markers for said vehicles, may authorize the applicant to paint on them letters and a number as specified by the Commission, which number shall appear on each warrant, exemption card or registration card issued for said vehicles.

§ 56-304.4. *Fees.*—For issuing each warrant, each exemption card and each registration card the Commission shall collect from the applicant a fee of one dollar. The fees shall be paid into the highway maintenance and construction fund.

§ 56-304.5. *Road taxes.*—No warrant, exemption card or registration card shall be issued unless the applicant certifies that he has made all road tax reports and paid all road taxes then due from him under Articles 12 and 13 of Chapter 12 of Title 58 of the Code of Virginia.

§ 56-304.6. *Agent for service of process.*—No warrant, exemption card or registration card shall be issued to any non-resident applicant unless he files with the Commission a power of attorney appointing the Secretary of the Commonwealth or some other suitable person residing in Virginia as his agent on whom process and orders may be served.

§ 56-304.7. *Expiration dates.*—Every warrant, exemption card and classification plate heretofore issued by the Commission shall expire on the fifteenth day of April, 1955. Every warrant, exemption card and classification plate hereafter issued by the Commission shall expire on the fifteenth day of April following the first day of January following the date on which it was issued.

Every registration card and identification marker heretofore issued by the Commission shall expire on the thirtieth day of June, 1955. Every registration card and identification marker hereafter issued by the Commission shall expire on the thirtieth day of June following the first day of January following the date on which it was issued.

§ 56-304.8. *Title to plates and markers.*—All classification plates and identification markers issued by the Commission shall remain the property of the Commission.

§ 56-304.9. *Temporary emergency operation.*—In an emergency, the Commission may, by letter or telegram, authorize a vehicle to be operated without a registration card or identification marker for not more than ten days.

§ 56-304.10. *Application blanks.*—The Commission shall prepare forms to be used in making applications in accordance with this article and the applicant shall furnish all material information called for by such forms.

§ 56-304.11. *Violations declared to be misdemeanors.*—Any person who operates or causes to be operated on any highway in Virginia any motor vehicle that does not carry the warrant, exemption card or registration card that this article requires it to carry, or any motor vehicle that does not display in such manner as is prescribed by the Commission the classification plate or identification marker that this article requires it to display, shall be guilty of a misdemeanor, and, upon conviction thereof, shall be punished by a fine of not less than ten nor more than two hundred dollars.

§ 56-304.12. *Offenses punishable by the State Corporation Commission.*—The Commission may, by judgment entered after a hearing on notice duly served on the defendant not less than ten days before the date of the hearing, if it be proved that the defendant made any misrepresentation of a material fact to obtain a warrant, exemption card or registration card, has made any improper use of any warrant, exemption card, registration card, classification plate, identification marker or identifying number, has violated any law of this State regulating the operation of motor vehicles for compensation on the highways of this State, has failed to make any report required by the Commission, has failed to pay any fee or tax properly assessed against him or has failed to comply with any

lawful order, rule or regulation of the Commission, impose a penalty, not exceeding one thousand dollars, which shall be collectible by the process of the Commission as provided by law.

In addition to imposing such penalty, or without imposing such penalty, the Commission may, in any such case, suspend or revoke any warrant, exemption card, registration card, classification plate, identification marker or identifying number issued pursuant to this article.

If, in any such case, it appears that the defendant owes any fee or tax to the Commonwealth, the Commission shall enter judgment therefor.

Title 58—Taxation

Chapter 12—Public Service Corporations

Article 12—Road Tax on Motor Carriers, Calculated on Fuel Used within State

§ 58-627. *Definitions.*—Whenever used in this article, the term "motor carrier" means every person, firm or corporation who operates or causes to be operated on any highway in this State * *any passenger vehicle that has seats for more than seven passengers in addition to the driver, or any road tractor, or any tractor truck, or any truck having more than two axles.*

The word "operations," when applied to a motor carrier who transports passengers or property for compensation, means operations of all vehicles, whether loaded or empty, regardless of size or kind, for compensation.

The word "operations," when applied to a motor carrier who transports property not for compensation, means operations of all road tractors, tractor trucks, and trucks having more than two axles, whether loaded or empty, for the transportation of property into or out of or through Virginia.

Any motor carrier who operates or causes to be operated any such passenger vehicle, or any road tractor, or any tractor truck, or any truck having more than two axles on one or more days of any quarter is liable for the tax imposed by this article for that quarter and is entitled to the credits allowed for that quarter.

2. §§ 46-134 through 46-140, 46-142 through 46-151, 46-153 and 46-153.1, as severally amended, of the Code of Virginia are repealed.

3. The additions to the Code, the amendments and repeals of sections thereof, are in force on and after July 1, 1954.

PART II

QUESTION NO. 4

"Whether or not commercial truck transportation, with relation to railroads and other forms of transportation, is carrying a fair share of the costs of general government in Virginia."

Any attempt to answer this question requires first that one consider the following:—

(1) What *are* "costs of general government" and who pays them. What contributions, if any, are made *indirectly by* "highway user taxes" to such government services at the State level.

(2) Considered as "operating businesses making a profit from service to the public", railroads and truckers are so entirely different in capital structure that the question must be raised whether any fair comparison can be made between the taxes each pays at the State and/or local level.

Our ideas of what services "Government" should provide the individual at state as well as Federal level have changed tremendously in the past two centuries. Many of our "founding fathers" came to America to escape from "too much government".

In Colonial days the chief demands upon the state were at first for protection from Indians and later marauding French and Tories. From the earliest days representative assemblies provided for enactment of legislation to meet local needs. The acquisition of land soon required provision for courts of law and facilities for registration of deeds and administration of justice in both civil and criminal cases. Since land was, at that time, the principal form of wealth, the chief source of tax revenue was based upon land.

Roads and canals were slowly developed to provide not only military routes for protection but to allow farm products, timber and other raw materials to be moved to local markets or to seaports for export. Early roads other than toll roads were supported by a "road tax" which was levied on land owners with often the provision or requirement that the property owner "work out" such tax on the roads adjoining his land. The great "Public Land System" of the United States, under which the lands of so many of our Central and Western states were laid out, provided for rights of way following the north-south and east-west property lines.

Such road costs were originally paid for from what we would now consider "general funds of the state". Other services to the public demanded by an expanding economy and a civilization constantly striving for a higher standard of living were much slower in developing. Among them should be listed—

1. Free public schools
2. Health service
3. Assistance to the development of a state's resources for both agriculture and industry
4. Police and fire protection to rural areas
5. Recreation, including wildlife and fisheries

Such costs of "general government" have been usually defrayed from general funds made up in large part of taxes upon real estate and other real and/or personal property.

The rapid development of highway transportation since World War I soon led to the philosophy of highway user taxes starting with gasoline and license taxes. In some states such funds were "dipped into" for aid to schools or other public works. Virginia can point with pride to the fact that our Virginia Legislatures have zealously guarded such taxes for highway use.

The average citizen does not realize how our entire economy and way of life is built up around our highway system, both Primary and Secondary, and its year-round use. All of the five phases of government services and government costs listed above are directly tied in with our Virginia highway system, its construction, maintenance and costs. Therefore, in every state a study of annual budgets since the 1930's will show that the portion allotted to highways constitutes a very large per cent of the annual governmental expenditures of any state. The attached "pie chart" shows such expenditures in Virginia under the current fiscal budget. In studying relative proportions of such costs, it must be remembered that highway expenditures make very important *indirect* contributions to many other forms of service by the state to the community and individual taxpayer.

Our system of rural schools is largely based upon consolidated schools located on roads open to traffic and school buses the year-round. In severe winters, our Virginia schools have been able to operate even during heavy snowfalls when the roads of adjacent states were closed for several days by snowdrifts. The Hill-Burton Act has led to many new consolidated public hospitals in Virginia. Due to good roads, these are able to provide hospital and medical services to the adjacent rural and suburban areas. Good roads allow for rapid and safe ambulance service over a long radius. Virginia is still in the main an agricultural state with farm-to-market roads of prime importance to the farmer. The State and local chambers of commerce rate the tourist business in Virginia as the third ranking "industry" in the State in dollar volume and fast approaching second place. Around our roads has grown up a vast business of hotels, restaurants, motels, and amusement resorts such as "drive-in" theatres.

Good roads have made possible better police protection to the rural areas, and Virginia now has the beginning of fire protection to the rural areas. Both of these are made possible by our excellent highway system.

Decentralization of industry has gone hand in hand with highway progress. No longer is it essential that many industries locate on waterways or on railroad main lines. Not only are raw materials and the finished product transported by truck, but also private cars or buses bring the workers to the factory and take them home at night to their rural homes.

Shorter work hours and work week lend greater emphasis to use of such leisure time for recreational purposes. Federal parkways, state parks and recreation centers with provisions for boating, fishing and swimming attract large crowds who make use of the access roads for a day or longer holiday. Virginia has an enviable reputation among other states for good hunting and fishing. Again easy access to such areas is provided by our highways.

Even in the field of religion the highways have their influence. One has only to count the automobiles around our rural churches on a Sunday to realize that due to easy access over improved highways, these churches have again become an important civic, as well as religious, center for our more remote areas.

In summarizing, all such indirect benefits to "phases of general government" are made possible by the *highway user taxes* of those who use our roads.

Question 4 asks us to compare:—

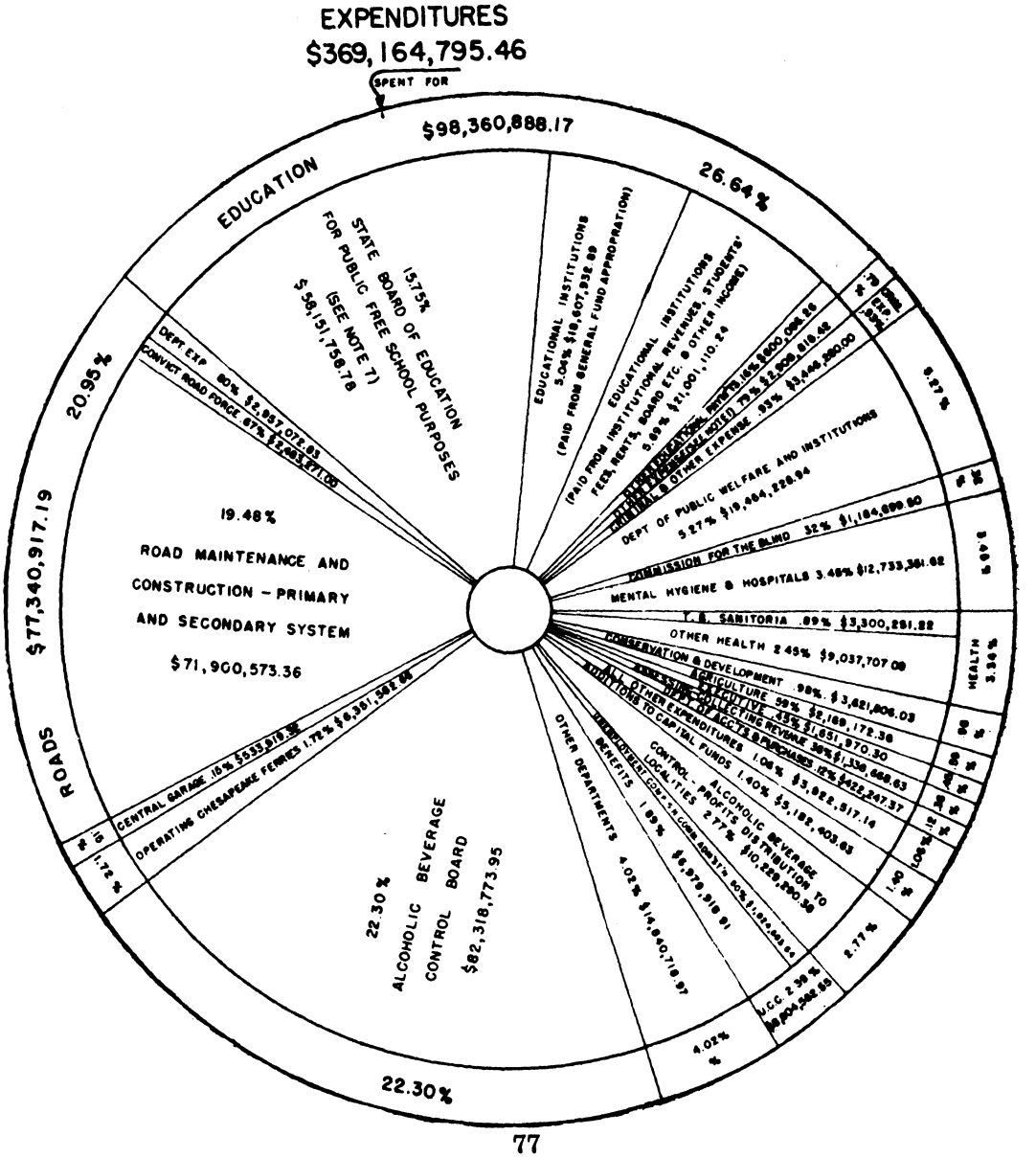
(A) Railroads who have large investments in rolling stock, passenger and freight terminals, yards, warehouses, and shops and who own and maintain *exclusively* their *own* rights of way with roadbeds, bridges, and other structures

COMMONWEALTH OF VIRGINIA

EXPENDITURES

FOR FISCAL YEAR ENDED

JUNE 30, 1952



(B) Truckers who own less expensive rolling stock, have very limited investment in terminal facilities, and who operate their traffic over the public highway along with other users.

The railroads in Virginia paid in 1951 the following provable figures (records of the State Corporation Commission).

For Support of State Government (General Funds)

Gross Receipts Tax	$5,750,977
Rolling Stock	1,556,425
Other	42,904
TOTAL	$7,350,306

For Support of Local Government

Real Estate and Personal Property

To Cities	$1,320,000
To Counties	2,393,067
To Towns	167,931
TOTAL	$3,880,998
GRAND TOTAL	$11,231,304

It is impossible to arrive at similar provable figures for the trucking industry in Virginia, except for the 40 Class I common carriers.

However, it must be remembered that the truckers *pay* for their use of the Virginia highways through "the highway user" taxes. The Virginia Highway Users Association places a figure of $25,228,000 for 1952, as the total Virginia highway user taxes paid on trucks of all classes by weight, including both for-hire and private carriers.

Both the railroads and the truckers pay taxes on—

Real Estate (such as offices, terminal facilities, warehouses, etc.)
Rolling Stock

which taxes go into the general funds of state and local governments.

The chief difference seems to be that the railroads own, operate and maintain their rights of way, roadbeds, and structures for their exclusive use, while the truckers operate over the public highways. However, the trucks pay for such use at three levels—

(1) License fees
(2) Gas or fuel taxes
(3) 2% gross profits (not on all trucks)

These facts seem to narrow Question 4 down to the matter of whether *all* truckers in Virginia are meeting their legal requirements by paying proper taxes on both their real estate holdings and their rolling stock. Real estate taxes are usually paid promptly in these days when local communities are "scraping the barrel" to meet their school needs.

The status of the rolling stock tax on the railroads is clean cut. However, the taxation of the rolling stock of motor carriers is complex and confused as given by the following:

Taxation of Rolling Stock of Motor Carriers

Prior to 1932 the rolling stock of trucking firms, both common and contract carriers, was subject to local taxation as tangible personal prop-

erty. In 1932 the General Assembly imposed a substitute tax upon the rolling stock of common carrier truckers to be assessed and collected by the State Corporation Commission and returned to the various localities on the basis of the miles traveled therein. This tax was designed to tax the rolling stock of motor vehicle common carriers of property on the same basis as that of railroads, and thus it applied to both out-of-state and Virginia trucks operating over the highways of Virginia. The rate was the same as that on railroad rolling stock, $2.50 per hundred, and in the case of trucks operating both in and out of Virginia, the assessment was prorated to Virginia on a mileage basis.

An amendment to the law in 1950 apparently has the effect of eliminating from its coverage all out-of-state trucks and Virginia trucks operating wholly interstate. Thus, under the law as it is interpreted today, the taxable status of the rolling stock of truckers is as follows:

Classification	*Property Tax Status*
Out-of-state trucks (common and contract carriers)	Not subject to taxation by State or localities
Virginia contract carrier trucks	Taxable by localities as tangible personal property
Virginia common carrier trucks (operated intrastate, or intrastate and interstate)	Assessed by State Corporation Commission, on Virginia mileage basis, tax returned to localities.
Virginia common carrier trucks (operated wholly interstate)	Taxable by localities as tangible personal property

The Fenwick Commission recommended in 1942 that the rolling stock of common carrier trucking concerns be taxed by the localities as tangible personal property. In any event, if the common carrier trucking concern is to be taxed generally in the same manner as a private business concern, its rolling stock with a situs in Virginia should be fully taxed in the State without any proration on account of mileage traveled outside of the State.

The varying property tax status of the truck operated for compensation has led to much confusion. Apparently opportunity exists for such rolling stock to escape this tax largely due to the fact that local taxing authorities are not advised as to *what* rolling stock is subject to *local* taxes. This condition should be remedied.

Recommendations

1. The apparent opportunity for certain trucks to escape payment of rolling stock taxes is a matter of concern to this Commission both as an inequity in tax payments and also as a loss of badly needed revenue to our local governments. We feel that this matter should be of equal concern to all Virginia municipalities and counties.

2. It is, therefore, called to the attention of both the League of Virginia Counties and the League of Virginia Municipalities. Both Leagues have sections at their annual meetings devoted to matters of taxation and finance.

3. At the time licenses for motor vehicles are purchased, a record is received by the Division of Motor Vehicles of the address of the person, firm, or corporation in whose name the vehicle is licensed. This would be of great assistance to the local authorities in the collection both of rolling stock taxes and personal property taxes. At a cost to the Division of Motor Vehicles which would be nominal in comparison with the revenues

which might be raised, the Division could furnish to each county and city information as to licenses issued the vehicles owned by residents thereof. There is doubt as to the authority of the Division to do this now, and it is recommended that the bill to confer such authority (attached as Appendix I to this section) be adopted.

APPENDIX I

A BILL to authorize the Division of Motor Vehicles to prepare and distribute, to authorities of counties and cities, certain information as to motor vehicles, trailers, and semi-trailers.

Be it enacted by the General Assembly of Virginia:

1. In connection with the preparation as required by law of registration cards for motor vehicles, trailers or semi-trailers intended to be operated upon highways in this State, the Division of Motor Vehicles is authorized to have prepared and to distribute to the commissioners of the revenue or other assessing officials of the several counties and cities index cards showing for each county or city the motor vehicles, trailers or semi-trailers for which registration cards have been issued to owners giving an address within such county or city.

Respectfully submitted,

R. A. MARR, Chairman

W. MARVIN MINTER, Vice Chairman

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WERT FAULKNER

CARTER GLASS, Jr.

HENRY B. GORDON

WALTER L. GRANT

GEORGE W. PALMER

CHARLES D. PRICE

MINORITY REPORT

of

HENRY B. GORDON

GEORGE W. PALMER

CHARLES D. PRICE

INTRODUCTION

The resolution directing the study required the Commission primarily to report upon the effects on the highways of increasing the maximum weights permitted thereon and the question of whether or not commercial truck transportation is paying its way. All members of the Commission appear to recognize that not all commercial truck transportation is paying its way. Notwithstanding, a majority recommend that this deficiency should be further aggravated by permitting an increase in gross weights which will, with continuation of present weight tolerances, allow the heaviest vehicles to increase their loads from the present 52,500 pounds to 59,640 pounds (including tolerance).

The undersigned members of the Commission desire to call attention to the following specific points, with reference to adoption of the AASHO formula for increased weights:

THE AASHO FORMULA

Effects of proposed uniformity. The argument is made that the adoption of the formula will make for uniformity among the states. The States on both sides of Virginia allow greater axle loads and maximum weights than the majority now proposes. If we now adopt the policy of uniformity the same argument will be later used to justify an additional increase in weights, both axle and gross. The Highway Department has advised the Commission that an increase in axle loads over 18,000 pounds will seriously damage Virginia roads.

Effect of proposed increase in maximum weights. The majority further proposes a limitation on gross weights of 56,800 pounds plus a 5% tolerance. The formula which they recommend has a permissible maximum weight of 73,280 pounds. If we adopt a part of such a formula today, the rest will come tomorrow with the future effect on our roads and bridges being incalculable. The Highway Department now opposes an increase in gross weights beyond 56,800 pounds.

The history of the proposed formula in Virginia. This formula is not new in Virginia nor is the attitude of the Highway Department toward it. Bills have been introduced in previous years to adopt the formula and have the effect of increasing weights as outlined above. The formula contained in these bills, the same as that mentioned in this report, was then said by proponents to be acceptable to the Highway Department. Now the Highway Department states that "it does not oppose the formula". Our roads have not been greatly changed in this four year period nor, according to the majority report, have any of the tests which have been made provided data applicable to Virginia to justify any change with regard to the adoption of the formula. The formula is the same, so are our roads, only the trailer trucks are heavier.

Effect of proposed increased weights on roads and bridges. The recommendations of the majority are based in part on the theory that neither the existing maximum weights nor a considerable increase therein will harm the roads and bridges in the Virginia highway system. The

Commission was advised that older bridges estimated to cost about $2,000,000 would have to be replaced regardless of any increase in the maximum gross load limit. It was stated to the Commission that "There is enough strength in these bridges to carry the load proposed for a limited time." But at one of the hearings it was emphasized that all materials will wear out under stress, and as the stresses are repeated, the wearing out process is accelerated. It was further pointed out that recent research has indicated that "endurance limits less than the designated working stress" may sometimes be encountered, and that present traffic on the Washington highway causes sufficient repetitions of loads to cause failures within a period of three years. In view of these facts, it appears to us that an increase in gross loads must inevitably hasten the day when the bridges referred to must be replaced.

With regard to the highways themselves, it was also pointed out that some of these roads carry loads far in excess of what was originally contemplated. It may be true that present design standards are such that the recommended increases can be carried, on roads of *recent construction,* without causing immediate actual failures. But the Maryland road test was run on an existing road, and it showed conclusively the damaging effect of repeated applications of the presently recommended single axle load. The majority report states that "the results of 'Test Road One—Md.' *cannot* be applied *blindly* to our Virginia roads." To the undersigned it appears that, since this is the only test of this kind which has been completed, it would be unwise to blindly disregard everything that it showed. The majority admit this, in so far as tandem axle loads are concerned, and suggest that "The Virginia Department of Highways should further study results of the WASHO tests when available with a view to recommending further reduction on allowable tandem loads if necessary." The costs of highway damages in the meantime are, presumably, to be written off as the price of the recommended uniformity, and this in spite of the fact that the Department has stated that an additional $20,000,000 is needed annually for the proper maintenance and construction of the system.

The mirage of reducing tandem axle loadings. The majority recommendation as to tandem loads is presented as a 4,000 pound reduction. But as to present Virginia vehicles which exceed the proposed load, it proposes a "grandfather clause" so that they can continue to operate for their effective life. As our law is presently written and enforced it is practically impossible to load most tractor-trailers so that the tandem axle weight is in excess of 27,000 pounds. This statement was made in the course of one of the hearings and subsequently verified by studies of actual loadings by the Department of Highways. Considerable evidence was presented to the Commission to indicate that tandem loads in excess of present loadings would be more destructive to the highways than single 18,000 pound axle loads; and it was suggested that the reason the Virginia roads have stood up as well as they have was that the tandem load is effectually limited by the present maximum gross weight.

Effect on highway safety of increased weights. The hope is expressed by the majority that if the gross weights are increased, the truck lines will go to heavier tractors, with a consequent improvement in highway safety. It is the feeling of the undersigned that, at least in so far as present equipment is concerned, this hope will not be realized; this is borne out by one of the truckers' representatives who stated that the increase in maximum weight would allow a 23% increase in pay-load; the increased weight will go primarily to pay-load to the maximum extent which present equipment can now, or with slight modifications can be made to, carry. The heavier tractor, when and if it comes, will probably be

accompanied by a demand for an upward revision of the permissible weights in line with the formula which it is proposed to adopt.

Effect of proposed increased lengths. The proposed formula will have the effect in most cases of permitting increased lengths for heavy trucks. This will mean that the cities and towns, in addition to the present expenses required of them for maintaining streets for these vehicles to use, will incur further costs in widening intersections to accommodate the increased lengths. In most cases the cities and towns now find the revenues available for street repair and construction inadequate, and the deficiencies must be made up by their general taxpayers.

Conclusion. The undersigned feel that the damage from heavy trucks to our "black top" roads in Virginia should be obvious to anyone who travels the highways. These roads break up at the edges and are pock-marked with repairs to the center surface, in proportion to the extent of heavy traffic upon them. Many millions of dollars are expended every year for maintenance. Little data was presented to the Commission in its study to show the effect of heavy loads on maintenance costs, but it is obvious that a given road will wear out more rapidly when it is subjected to the terrific impacts from the wheels of heavy trucks, driving at fast speeds and heavily loaded, and it should be equally obvious that increases in these loads will bring more rapid deterioration of a highway system which is admittedly in need of additional revenues to keep it up to its present high standard.

In view of General Anderson's statements, made many times, Virginia roads as they now exist are not suited for the present sized vehicles and weights they are called on to carry, the under-signed think it would be grave error to increase either the maximum load limit or length.

In conclusion, we deem it contrary to the interests of the citizens of Virginia to adopt the AASHO Formula, whereby an increase in the weight and length of tractor-trailers will be permitted, because

(a) The Virginia Highway Department does not advocate the formula,

(b) Its adoption will open the door to continued pressure by the truckers for further increases in the future,

(c) The formula will not produce uniformity with Virginia's neighboring states,

(d) It will permit substantial increases in the weight of tandem axles which will cause substantial additional damage to Virginia's concrete heavy duty roads,

(e) The increase in tandem-axle weights will also cause additional damage to Virginia's "black top" roads in the heavy duty system, the extent of which cannot be determined until the completion of tests now being conducted at the cost of millions of dollars,

(f) An increase in gross weight will not result in a general utilization of more powerful tractors with a consequent improvement in highway safety; in fact, the increase will apparently go to pay-load and be detrimental to highway safety,

(g) An increase in length will affect highway safety adversely and, in addition, will aggravate the problems of cities and towns in handling long, over-size trucks,

(h) Additional damage to the heavy duty system will call for additional expenditures thereon at the expense of the remainder of the highway system, including the secondary roads.

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SUPPLEMENT

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