HIGHWAY MATTERS

Report of the

COMMISSION

To

THE GOVERNOR

and

The GENERAL ASSEMBLY *of* VIRGINIA

SENATE DOCUMENT No. 13 A

COMMONWEALTH OF VIRGINIA
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Richmond
1954

COMMONWEALTH OF VIRGINIA

JOHN B. BOATWRIGHT, JR.
DIRECTOR

DIVISION OF STATUTORY RESEARCH AND DRAFTING
TELEPHONE 3-3072
STATE CAPITOL
RICHMOND 19

G. McIVER LAPSLEY
W. R. MILLER
ASSISTANT DIRECTORS

January 8, 1954

To:

Honorable John S. Battle, Governor of Virginia

and

The General Assembly of Virginia

Pursuant to direction, I am forwarding herewith a report made to the Commission created under Senate Joint Resolution No. 48, passed by the General Assembly of 1952, regular session.

The Commission made its report on November 9, 1953 and therein, on page 59, requested the Department of Highways, with the aid of consultants, to make a detailed study of rates and yields of a weight-distance tax in Virginia. The Department was requested to have the study completed for submission to the General Assembly of 1954. The attached report constitutes compliance with that request.

Remaining at your service, I am

Sincerely yours,

John B. Boatwright, Jr.
Secretary to the Commission

JBBjr:abb

COMMONWEALTH OF VIRGINIA

DEPARTMENT OF HIGHWAYS
RICHMOND 19, VA.

January 8, 1954.

ROUTE NO._____PROJECT NO._____

Legislative Studies
Senate Joint Resolution 48.

Mr. John B. Boatwright, Jr.,
Division of Statutory Research & Drafting,
State Capitol,
Richmond, Virginia.

Dear Mr. Boatwright:

This refers to the Marr Commission report on S.J.R. 48. On Page 59 of the report the Department of Highways is requested, with the aid of consultants, to make a detailed study of rates and yields of a weight-distance tax in Virginia. This study to be available for submission to the General Assembly in 1954.

Pursuant to this request, an agreement was entered into with Griffenhagen and Associates, Consultants in Management, to make this study.

Copies of Griffenhagen and Associates' study are attached.

It is a pleasure to be of service to this Commission.

With best wishes,

Sincerely yours,

J. A. Anderson, Commissioner.

DEPARTMENT OF HIGHWAYS

COMMONWEALTH OF VIRGINIA

ESTIMATES RELATING TO TOTAL VIRGINIA HIGHWAY TRAFFIC AND WEIGHT-DISTANCE TAX YIELD

December 19, 1953

Prepared by
Griffenhagen & Associates
Consultants in Management

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GRIFFENHAGEN & ASSOCIATES

Established in 1911

CONSULTANTS IN MANAGEMENT

New York 36, December 19, 1953.

General James A. Anderson
Commissioner, Virginia Department of
Highways
1221 East Broad Street
Richmond 19, Virginia

Dear Sir:

Pursuant to the understanding set forth in our letter dated November 17, 1953, we are submitting herewith 500 copies of our final report including the following:

(1) A weight-distance tax rate schedule designed so as to yield from for-hire carriers, over 18,000 pounds gross weight, the equivalent of what the Virginia two percent gross receipts tax brings from such carriers.

(2) Estimates of what such a weight-distance tax rate schedule would yield in total if applied to both private and for-hire carriers licensed in Virginia and also to carriers using Virginia's highways but licensed in other states.

(3) Additional estimates as in Item 2 on the assumption that traffic within cities would not be exempt from the weight-distance tax.

(4) Additional estimates as in Item 2 on the assumption that the tax would be applicable only to vehicles weighing in excess of 24,000 pounds gross weight.

(5) Additional estimates as in Item 2 of the yield of the tax based on the tax rates now contained in the New York State weight-distance tax.

(6) Estimates of the cost of administration of a weight-distance tax in Virginia.

Yours faithfully,

GRIFFENHAGEN & ASSOCIATES

SUMMARY

A weight-distance tax is a tax on distance traveled by heavier vehicles, e. g. over 18,000 pounds. The taxpayer declares and registers the gross weights of his vehicles and keeps records only of mileages traveled, laden and unladen. This tax is not to be confused with a ton-mile tax, which requires much more difficult records of ton-miles of travel. This report presents:

1. A weight-distance tax rate schedule, planned with the intention that the weight-distance tax might be enacted to replace the present gross receipts tax on freight carriers for hire and might be imposed also on owners of private and foreign freight-carrying vehicles using Virginia highways.

2. Estimates of the mileages of travel on Virginia highways which such a tax might reach and of the weight-distance tax yields.

3. An estimate of the cost of administering such a tax.

Distance travelled by heavier vehicles is a logical consideration in highway taxation, and the reasonable assumption in this study uses the $1,000,000 gross receipts tax now paid by Virginia carriers for hire as a measure of the extra tax against heavy vehicles which those carriers should continue to pay while road damage studies are continuing and of weight-distance rates equally appropriate for all heavy vehicles.

The report considers four weight-distance tax rate schedules, two taxing vehicles weighing more than 18,000 pounds and two taxing only vehicles weighing more than 24,000 but at higher rates, all four schedules approximating $1,000,000 yield from Virginia carriers for hire.

For the purpose of most equitably, or considerately, for all groups concerned, promptly replacing the gross receipts tax with a weight-distance tax, the report recommends the tax rate schedule among the four with the lowest yield, taxing vehicles weighing more than 18,000 pounds, at rates lower on lighter taxed vehicles than the estimated present payments of gross receipts tax for such vehicles, progressing to higher rates for heavier vehicles, reaching rates on the heaviest group of vehicles, 40,000 and 50,000 pounds, which would be comparable to the estimated present payments of gross receipts tax for such vehicles. The tax rate graduation from lighter to heavier vehicles would be approximately proportional to weight. Of course, no two present gross receipts taxpayers would be affected by a change to a weight-distance tax in exactly the same way, but the intention would be that the average taxpayer would not have a higher tax with the recommended schedule, and in any cases where the new tax proves to be higher, it would be explained by more than average heavy-vehicle mileage. Three other tax rate schedules considered in the report would have a higher yield, but their higher rates is a reason for not preferring them for the present purpose; one based on gross receipts would increase the yield from lighter vehicles and the other two taxing only vehicles above 24,000 pounds would impose about a third higher rate on the taxed vehicles.

Because some businesses have to have their vehicles travel empty nearly half the time, the applicable rate of weight-distance tax depends upon registered gross weight in case of vehicles traveling with a load, but on the unladen weight when the vehicle is traveling entirely empty. There is no tax on mileages run empty if the unladen weight is less than 18,000 pounds.

The weight-distance tax rate schedule that is recommended is by coincidence either exactly the Oregon and New York State weight-distance tax rate schedule or a schedule with the same yield that is so nearly identical that differences might be confusing to interstate taxpayers. The Oregon-New York schedule is almost exactly proportional to vehicle gross weight, and it is a pure coincidence that the estimated yield with that schedule from Virginia carriers for hire would be $1,000,000 and the estimated payments of weight-distance tax by heavier vehicles would be about the same as estimated gross receipts tax payments.

Assuming that it is preferable to use exactly Oregon-New York rates that interstate operators will be familiar with, the recommended schedule may be described briefly by reference to three sizes of vehicles as follows:

Vehicle Weights	*Legal Rates*	*Estimated Effective Rates Allowing for Empty Vehicles in Va.*
19-20,000 pounds	$ .006	$ .00348
39-40,000 pounds	.0125	.00900
49-50,000 pounds	.0170	.01292

(If exact proportion to weight is preferred to using Oregon-New York rates, the legal rate figures should begin with .0065. The rate would be .0005 lower on 50,000 pounds vehicles and higher on other weights; the three legal rate figures above would become .0065; .0130; and .0165. The yield over-all would be almost unchanged.)

(Since empty vehicles would be taxed on their weight empty, and there are more empty vehicles on Virginia highways than on New York highways, the over-all effective rates and average payments would be lower in Virginia than in New York.)

The estimated yield of the weight-distance tax with these rates on vehicles above 18,000 pounds is $5,000,000. This estimate assumes a limited farm truck exemption but no city zone exemption as now allowed under the gross receipts tax. (A city zone exemption is costly in paper work.)

The annual cost to the State of administering the weight-distance tax is estimated as $300,000 or 6 percent of the estimated yield, not including costs of weight enforcement which is a matter of preventing damage to highways rather than of collecting a tax. There would be some extra costs in the first year or possibly longer, but the cost of collection should be less than six percent of yield after a few years of operation. The most of collecting a dollar of weight-distance tax would be a little more than the cost of collecting a dollar of the present gross receipts tax. The assumption is that motor fuel road tax and weight-distance tax will share the cost of administration; both taxes are measured by mileages of travel in Virginia. The State now spends approximately $150,000 to collect the present two taxes, and it should spend $400,000 for motor fuel road tax and weight-distance tax, or somewhat more than $400,000 if the coverage of the motor fuel road tax is broadened. The Commonwealth of Virginia is in a favorable position to collect weight-distance tax equitably.

Weight enforcement now costs $300,000 annually. The authors of the report recommend spending an additional $90,000 annually for weighing but would regard this cost as additional protection of the highways. If counted as a cost of the tax administration, $90,000 is 1.8 percent of the $5,000,000 estimated yield.

The authors include an estimate of $50,000 for tax administration installation and other non-recurring expenditures in the first year of administration of a weight-distance tax, plus $75,000 for the inexpensive type of weighing installation on practically all highways into the state. These weighing installations would be manned part of the time.

ESTIMATES RELATING TO TOTAL VIRGINIA HIGHWAY TRAFFIC AND WEIGHT-DISTANCE TAX YIELD

Introduction:

With the best of our ability from data available to us, we have prepared, and submit herein, conclusions regarding—

(1) Weight-distance tax rate schedules to yield, from carriers subject to the gross receipts tax, $1,000,000, i. e., and amount equal to the yield of the gross receipts tax.

(2) Estimated yields of weight-distance taxes, pursuant to the rate schedules, on all freight vehicles of more than 18,000 pounds registered gross weight, with and without certain exemptions.

(3) Similar estimates of yields on vehicles above 24,000 pounds gross weight.

(4) Estimates of yield using rates based on the New York State weight-distance tax.

(5) Estimate of the cost of collection.

In order to prepare the rate schedules and estimates, basic estimates were necessary respecting the following—

(1) The tax base, in terms of mileages, weights of vehicles, and earnings per vehicle, of the two percent gross receipts tax on Virginia for-hire carriers.

(2) The freight vehicle mileages traveled on Virginia highways and streets, separately for Virginia for-hire, Virginia privately-owned, and foreign vehicles, all of these mileages by weight brackets.

(3) Ratios of unladen to laden mileages, and average unladen weights, in order to determine the relationship between statutory weight-distance tax rates and effective rates, with unladen mileage taxed at a lower rate, or not at all, when below the minimum taxed weight.

(4) A ratio between city truck mileage and city-zone exempt mileage in order to estimate yields with or without this exemption, which is a feature of the gross receipts tax on Virginia for-hire carriers.

We found in the Department of Highways very adequate traffic volume data respecting the rural primary system, mostly unpublished data on the rural secondary system, and relatively limited but valuable origin-and-destination study traffic data for cities.

Others who contributed information of great value in this study include—

(1) The Division of Motor Vehicles which provided the Marr Commission with a complete analysis of freight vehicle registrations by weight bracket.

(2) The office of the State Corporation Commission which provided a report on mileages and earnings of large carriers.

(3) The statistical faculty of the Virginia Polytechnic Institute which made an indispensable start in the direction of estimating freight vehicle mileages in Virginia, from which point the present study carried the subject further.

(4) The U. S. Department of Commerce, Bureau of Public Roads, which contributed published and unpublished information respecting truck traffic and typical earnings.

Intensive but necessarily brief work was done by our staff in analyzing traffic count files in an attempt to establish what facts we could about foreign vehicles in Virginia and to confirm or deny the validity of the "typical" mileages used in the study of the V. P. I. statisticians. Such confirmation was very general and does *not* lead us to claim any great degree of accuracy in the estimates herein. We may claim rather that most of the figures from different sources fit together in a manner that is convincing and they should serve the purpose intended.

Brief intensive work was done by our staff in estimating urban mileages.

One kind of data needed, but far from adequately obtained, is the ratio of unladen freight-carrying vehicles on Virginia highways. Such information as is available indicates the ratio to be high in relation to the New York experience. We must, therefore, estimate a lower effective tax in Virginia than in New York from a given statutory rate. We cannot accurately express, in legal rate schedules, our conclusions as to the desirable effective rate schedule to accomplish a given purpose, because the percentage of unladen miles and unladen weight have to be known to convert from the one schedule to the other, effective to legal or vice versa.

General Conclusions in Very Broad Terms:

Although holders of permits to carry freight travel upwards of 340 million miles, the estimated travel in Virginia is only 240 odd million miles, and only about 120 million of these miles are taxable or actually taxed under the gross receipts tax. The untaxed 120 million miles is explained by many permit holders not really being in the carrying business, by the exemption of gross receipts less than $5,000, and by the exemption of trips within a city zone (a city plus a five-mile band around it).

Eliminating carrier trucks below 18,000 pounds, gross receipts-taxed mileage is about 100 million miles, the $1,000,000 plus collections are equivalent to about one cent a mile on the average, and taxed carriers' vehicles gross nearly 50 cents a mile on the average, since the tax is two percent.

Total freight vehicle travel in a year on Virginia roads and streets amounts to about 2.1 billion miles, but such travel by vehicles weighing more than 18,000 pounds amounts only to an estimated 740 odd million

miles or perhaps a little less. At a cent a mile there is a theoretical possibility of the latter group of vehicles producing weight-distance tax of $7,000,000. The maximum tax which we offer as an estimate, discounted for any uncollectable amounts, is about $6,000,000. The tax rate schedule which we believe to be desirable should yield about $5,000,000.

The yield depends upon the rate schedule, exemption, and both maximum weight enforcement and tax enforcement.

The Weight-Distance Tax Rate Schedule:

It is the assumption of this study that the for-hire freight carrying gross receipts taxpayers are to be reached by a weight-distance tax, viz. those whose vehicles weigh more than 18,000 pounds or those with vehicles weighing more than 24,000 pounds, and they are to pay $1,000,000. The rates so figured for the new tax may be applied also to vehicles competing with those owned by the carriers, privately-owned in Virginia, and foreign. The gross receipts tax on carriers would be repealed.

If the purpose of a weight-distance tax rate schedule is to replace most equitably a gross receipts tax schedule, the tax rate will vary from small vehicles to large in proportion with average gross earnings per mile of the taxed vehicles or with gross weight of the vehicles. (A very different approach and kind of equity basing weight-distance tax on damage to highways is indicated as a logical one whenever sufficiently reliable information regarding such damage is available, but this subject is not within the scope of this study.)

Four schedules are submitted in Table 1, any one of which should produce $1,000,000 approximately, from present gross receipts taxpayers.

Columns (2) and (5) in Table 1 present rates dictated by the estimates of gross receipts tax collections by vehicle weight brackets as developed in Appendixes of this report. Columns (2) and (3) are concerned with the tax on all vehicles weighing above 18,000 pounds and columns (4) and (5) with vehicles weighing above 24,000 pounds.

TABLE 1

WEIGHT-DISTANCE TAX RATE SCHEDULES DESIGNED TO YIELD FROM FOR-HIRE CARRIERS OVER 18,000 POUNDS AND 24,000 POUNDS GROSS WEIGHT, RESPECTIVELY, THE EQUIVALENT OF THE YIELD OF THE EXISTING 2% GROSS RECEIPTS TAX, VIZ. $1,000,000

	Tax Rate Schedule Based on Estimated Rates Paid in Gross Receipts Tax by Weight Brackets by For-Hire Vehicles				Tax Rate Schedule Based on the Principle of Progression Proportional to Gross Weight			
	Vehicles Over 18 M lbs.		Vehicles Over 24 M lbs.		Vehicles Over 18 M lbs.		Vehicles Over 24 M lbs.	
Vehicle Weights 1/ (1)	Effective Rates 2/ (2)	Legal Rates 2/ (3)	Effective Rates 2/ (4)	Legal Rates 2/ (5)	Effective Rates 2/ (6)	Legal Rates 2/ (7)	Effective Rates of Col.(6) plus 36.4% 2/ (8)	Legal Rates of Col.(7) plus 36.4% 2/ (9)
(000 lbs.)								
19 M	$.0077	$.0122	$ ---	$ ---	$.00348	$.0060	$ ---	$ ---
20	.0082	.0130	---	---	.00348	.0060	---	---
21	.0082	.0130	---	---	.00406	.0070	---	---
22	.0082	.0130	---	---	.00406	.0070	---	---
23	.0086	.0135	---	---	.00464	.0080	---	---
24	.0086	.0135	---	---	.00464	.0080	---	---
25	.0086	.0135	.0114	.0180	.00522	.0090	.00712	.012
26	.0091	.0145	.0120	.0190	.00522	.0090	.00712	.012
27	.0091	.0145	.0120	.0190	.00551	.0095	.00752	.013
28	.0091	.0145	.0120	.0190	.00551	.0095	.00752	.013
29	.0095	.0150	.0126	.0200	.00580	.0100	.00791	.014
30	.0095	.0150	.0126	.0200	.00580	.0100	.00791	.014
31	.0095	.0150	.0126	.0200	.00609	.0105	.00831	.014
32	.0100	.0150	.0132	.0200	.00609	.0105	.00831	.014
33	.0100	.0150	.0132	.0200	.00638	.0110	.00870	.015
34	.0100	.0150	.0132	.0200	.00638	.0110	.00870	.015
35	.0104	.0150	.0138	.0200	.00667	.0115	.00910	.016
36	.0104	.0150	.0138	.0200	.00828	.0115	.00129	.016
37	.0104	.0150	.0138	.0200	.00864	.0120	.00178	.016
38	.0109	.0150	.0144	.0200	.00864	.0120	.00178	.016
39	.0109	.0150	.0144	.0200	.00900	.0125	.01228	.017
40	.0109	.0150	.0144	.0200	.00900	.0125	.01228	.017
41	.0113	.0150	.0150	.0200	.00988	.0130	.01348	.018
42	.0113	.0150	.0150	.0200	.00988	.0130	.01348	.018
43	.0113	.0150	.0150	.0200	.01064	.0140	.01451	.019
44	.0113	.0150	.0150	.0200	.01064	.0140	.01451	.019
45	.0113	.0150	.0150	.0200	.01140	.0150	.01555	.020
46	.0113	.0150	.0150	.0200	.01140	.0150	.01555	.020
47	.0115	.0150	.0153	.0200	.01216	.0160	.01659	.022
48	.0115	.0150	.0153	.0200	.01216	.0160	.01659	.022
49	.0115	.0150	.0153	.0200	.01292	.0170	.01762	.023
50	.0115	.0150	.0153	.0200	.01292	.0170	.01762	.023
		Continues at .0150		Continues at .0200		Continues up 1 mill per ton to 64 M; 1½ mills to 76 M; 2 mills thereafter.		Continues up 2 mills per ton.

1/ By 1,000 lb. brackets; for example; 19,000 lbs. includes weights from 18,001 to 19,000 lbs., inclusive.

2/ Considering empty vehicles on Virginia highways.

TABLE 2.

ESTIMATES OF THE YIELD OF A WEIGHT-DISTANCE TAX ON VEHICLES ABOVE 18,000 POUNDS AT RATES BASED ON THE RATES ON VEHICLES FOR HIRE, YIELDING $1,000,000[1]

	Total Mileage	Total Above 18M	Distribution by Weight Bracket: Above 35M	25M to 35M	19M to 24M	18M & Under
1. App. Effective Rate of Tax (Average)			$.0112	$.0095	$.0082	
2. Vehicle Miles	(Figures are in millions of miles.)[2]					
a. "Carrier" (permit holders)						
(1) Now paying gross receipts tax	123	102	60	10	32	21
(2) Exempt Virginia Mileage						
(a) City zone	40	18	1	1	16	22
(b) Below $5M	42	20	....	2	18	22
(c) Not For Hire	40	17	....	1	16	23
Sub-total (1) and (2)	245	157	61	14	82	88
Sub-total minus a(2)c	(205)	(140)	(61)	(13)	(66)	(65)
(3) Out of state	(100)	(90)	(71)	(7)	(12)	(10)
Total (1), (2), & (3)	(345)	(247)	(132)	(21)	(94)	(98)
b. Va. Reg. Privately-owned and operated freight vehicles						
(1) Virginia Mileage	1554	345	100	63	182	1209
(add 2a(2) (c)	(40)	(17)		(1)	(16)	(23)
(adj. total)	(1594)	(362)	(100)	(64)	(198)	(1232)
(2) Out of state	(331)	(197)	(156)	(16)	(25)	(133)
Sub-total (1) and (2)	(1885)	(542)	(256)	(79)	(207)	(1342)
Total Virginia Vehicles	(2230)	(789)	(388)	(100)	(301)	(1440)
c. Foreign Reg. Vehicles Va. Mileages	390	246	186	23	37	144
Total vehicle miles in Virginia	2189	748	347	100	302	1440

[1] Tax rates in Table 1, columns (2) and (3).

[2] Some of the figures herein do not add to exactly the totals given because they are rounded figures.

TABLE 2—Continued

	Total Above 18M	Distribution by Weight Bracket		
		Above 35M	25M to 35M	19M to 24M
	(Figures are in thousands of dollars.)[2]			
3. Estimated yield (effective rate of tax times mileages)				
a. "Carriers" (permit holders)				
(1) Now paying gross receipts tax	1,029	672	95	262
(2) Exempt Virginia mileage				
(a) City zone	152	11	10	131
(b) Below $5M	167	....	19	148
Total (1) and (2) [1]	1,348	683	124	541
b. Va. Reg. Privately-owned and operated vehicles Virginia mileage [1]	3,352	1,120	608	1,624
c. Foreign Reg. Vehicles Va. mileage	2,605	2,083	219	303
Total yield (a, b, and c)	7,305	3,886	951	2,468
Estimated uncollectable	1,151	194	143	814
Estimated probable collection	6,154	3,692	808	1,654
Total yield allowing city zone exemptions	6,984	3,875	903	2,206
Estimated uncollectable	1,057	194	135	728
Estimated probable collection	5,927	3,681	768	1,478

[1] Adjusted to move the tax on carrier mileage "not for hire" into the tax on Virginia privately-owned and operated vehicles.

[2] Some of the figures herein do not add to exactly the totals given because they are rounded figures.

TABLE 3.

ESTIMATES OF THE YIELD OF A WEIGHT-DISTANCE TAX ON VEHICLES ABOVE 24,000 POUNDS AT RATES BASED ON THE RATES ON VEHICLES FOR HIRE, YIELDING $1,000,000[1]

	Vehicle Mileages			Yield of Weight-Distance Tax		
	Total Above 24M	Above 35M	25M to 35M	Total Tax	On Miles Above 35M	On Miles 25M-35M
App. Effective Rate of Tax					.0149	.0126
	(Millions of Miles)[2]			(Thousands of Dollars)[2]		
a. "Carriers" (permit holders)						
(1) Now paying gross receipts tax	70	60	10	1,020	894	126
(2) Exempt Va. Mileage						
(a) City zone	2	1	1	27	15	13
(b) Below $5M	2	....	2	25	....	25
Total (1) and (2)	74	61	13	1,072	908	164
b. Va. Reg. Privately-owned and operated vehicles	164	100	64	2,296	1,490	806
c. For. Reg. Vehicles Va. mileage	209	186	23	3,061	2,771	290
Total miles and yield (a, b, and c)	447	347	100	6,430	5,170	1,260
Estimated uncollectable				448	259	189
Estimated probable collection				5,982	4,911	1,071
Total yield allowing city zone exemption	445	346	99	6,352	5,155	1,197
Estimated uncollectable				438	258	180
Estimated probable collection				5,914	4,897	1,017

[1] Tax rates in Table 1, columns (4) and (5).

[2] Some of the figures herein do not add to exactly the totals given because they are rounded figures.

TABLE 4.

ESTIMATES OF THE YIELD OF A WEIGHT-DISTANCE TAX ON VEHICLES ABOVE 18,000 POUNDS AT RATES PROPORTIONAL TO GROSS WEIGHT TO YIELD $1,000,000 FROM CARRIERS[1]

	Total	Above 35M	25M to 35M	19M to 24M
Legal Rates of Tax		.011 to .017	.009 to .011	.006 to .008
Approximate Effective Rate of Tax		.01116	.00573	.00389
a. Tax on carriers	$1,011,990	$ 680,760	$ 74,490	$ 256,740
b. Tax on Va. Reg. privately owned and operated vehicles	2,252,940	1,116,000	366,720	770,220
c. Tax on Foreign Registered vehicles Va. mileage	2,351,480	2,075,760	131,790	143,930
Estimated total	5,616,410	3,872,520	573,000	1,170,890
Estimated uncollectable	665,970	193,626	85,950	386,394
Estimated probable collection	4,950,440	3,678,894	487,050	784,496
Estimated total if vehicles 19M to 24M are not taxed	4,445,520	3,872,520	573,000	
Estimated uncollectable	279,576	193,626	85,950	
Estimated probable collection	4,165,944	3,678,894	487,050	
The tax on carriers would then be	775,250	680,760	74,490	
Estimated uncollectable	45,212	34,038	11,174	
Estimated probable collection	730,038	646,722	63,316	
The above yields allowing city zone exemption				
Estimated total including vehicles 19M to 24M	5,531,410	3,872,520	550,000	1,108,890
Estimated uncollectable	643,060	193,626	83,500	365,934
Estimated probable collection	4,888,350	3,678,894	466,500	742,956
Estimated total excluding vehicles 19M to 24M	4,422,520	3,872,520	550,000	
Estimated uncollectable	276,176	193,626	82,500	
Estimated probable collection	4,146,344	3,678,894	467,500	

[1] Tax rates in Table 1, columns (6) and (7).

TABLE 5.

ESTIMATES OF THE YIELD OF A WEIGHT-DISTANCE TAX ON VEHICLES ABOVE 18,000 POUNDS AT RATES PROPORTIONAL TO GROSS WEIGHT RATES OF TABLE 4 PLUS 36.4 PERCENT[1]

	Total	Above 35M	25M to 35M	19M to 24M
Legal Rates of Tax		.015 to .23	.012 to .15	.008 to .11
Approximate Effective Rate of Tax		.01522	.00781	.00531
a. Tax on carriers	$1,380,354	$ 928,557	$ 101,604	$ 350,193
b. Tax on Va. Reg. privately owned and operated vehicles	3,073,010	1,522,224	500,206	1,050,580
c. Tax on Foreign Registered vehicles Va. mileage	3,207,419	2,831,337	179,762	196,320
Estimated total	7,660,783	5,282,118	781,572	1,597,093
Estimated uncollectable	908,383	264,106	117,236	527,041
Estimated probable collection	6,752,400	5,018,012	664,336	1,070,052
Estimated total if vehicles 19M to 24M are not taxed	6,063,689	5,282,117	781,572	
Estimated uncollectable	381,342	264,106	117,236	
Estimated probable collection	5,682,347	5,018,011	663,346	
Tax on carriers would then be	1,030,161	928,557	101,604	
Estimated uncollectable	61,669	46,428	15,241	
Estimated probable collection	968,492	882,129	86,363	
The above yields allowing city zone exemption				
Estimated total including vehicles 19M to 24M	7,544,783	5,282,118	750,572	1,512,093
Estimated uncollectable	875,683	264,106	112,586	498,991
Estimated probable collection	6,669,100	5,018,012	637,986	1,013,102
Estimated total excluding vehicles 19M to 24M	6,032,689	5,282,117	750,572	
Estimated uncollectable	376,692	264,106	112,586	
Estimated probable collection	5,655,997	5,018,011	637,986	

[1] Tax rates in Table 1, columns (8) and (9).

The first column in each case ((2) and (4) respectively) shows "effective rates," i.e., the rates to produce the collection necessary to match gross receipts tax against the estimated mileage. The second column ((3) and (5) respectively) is a higher rate, called "Legal Rate," giving effect to estimates of travel unladen.

Since some taxpayers are engaged in a kind of business which requires their trucks to travel about half the time empty, it is assumed that the feature of other laws of taxing unladen weight instead of gross weight, when the vehicle is entirely empty, will be preserved in a Virginia law. The "legal rate" with this feature in the law will be considerably higher than the "effective" rate.

It is an unfortunate circumstance that the calculated "legal rates" for the purpose of approximating the collections of gross receipts tax by weight brackets (Cols. (3) and (5)) have the appearance of not being progressive on vehicles above 36,000 pounds. The effective weights on the average vehicles are not regressive, but the unladen weight ratio is smaller for heavy vehicles, and the result is a "legal rate" which does not rise for large vehicles. Believing that this appearance of regression and actual lack of progresson on laden vehicles might disqualify the tax schedules in question, the authors looked for another solution to the problem of devising a rate schedule.

Specifically they looked for and discovered a progressive legal rate schedule with rates closely proportional to gross weight of the vehicles taxed which would yield $1,000,000 from carriers now taxed, as presented in column (7). The estimates for this schedule, based on effective rates in column (6), indicate almost exactly the same total yield from large vehicles as the schedule presented in columns (2) and (3) but considerably less yield from smaller vehicles. The very real superiority of this schedule, as compared with columns (2) and (3), lies in the fact that it is moderately progressive for the laden vehicles as well as for the average mixture of laden and unladen vehicles and thus for all taxpayers. The only reasons which might be offered for preferring legal rates from column (3) are their higher yield, resulting from higher rates on smaller vehicles, and the closer approximation to the yield by weight bracket of vehicle to the gross receipts tax. Neither of these reasons seemed sufficient to justify a weight-distance tax schedule with a progression less than weight.

It is purely a coincidence that the schedule proportional to weight with an estimated yield of $1,000,000 from carriers now taxed happens to be the same as the New York State weight-distance tax schedule which was copied from the Oregon law or is so nearly identical that the difference is too small to be considered. To avoid meaningless duplication in the number of estimates herein, the calculations are presented for the New York schedule. From a practical viewpoint it would be desirable for Virginia to overlook very trivial peculiarities in this schedule in deviating from exact proportion to weight and to accept exactly the Oregon-New York schedule as being proportional to weight or better. (Any schedule has to have peculiarities due to rounding.)

Assuming the weight-distance taxation of vehicles weighing above 18,000 pounds, as a substitute for the gross receipts tax, we recommend the legal tax rate schedule presented in column (7). The yields, as presented in Table 4, are discussed under the next heading.

Assuming the weight-distance taxation of vehicles weighing more than 24,000 pounds, not taxing vehicles weighing 18,001 to 24,000 pounds, as a substitute for the gross receipts tax, higher rates would be necessary to yield $1,000,000 from taxed carriers for hire. Columns (4) and (5) in Table 1 show these higher rates with the relatively small progression of effective rates, and in part no progression of legal rates, based on the estimated gross receipts tax collections by weight brackets. Columns (8) and (9) show the comparable higher rates to yield $1,000,000 from taxed car-

riers with legal rates closely proportional to gross weight. The effect of not taxing vehicles 18,001 to 24,000 pounds (columns (8) and (9)) is to increase the rates (as compared with columns (6) and (7)) by 36.4 percent, assuming that carriers for hire will pay $1,000,000. Evidently taxing a much smaller group of vehicles at considerably higher rates is not necessary in adopting a weight-distance tax, and the higher rates are a reason for not preferring these schedules.

Estimates of Weight-Distance Tax Yields:

Tables 2, 3, 4, and 5 present short-cut calculations regarding yields. Yields are developed further in Appendix C, using one thousand pound brackets, with substantially the same answers.

Table 2, corresponding to Columns (2) and (3) in Table 1, includes some of the particulars as to estimated taxable mileages as developed in Appendix A. On the second page of this Table, the estimated yield is stated and analyzed. We may accept $7,000,000 as a theoretical possible yield from weight-distance taxation of all categories of freight vehicles on Virginia highways above 18,000 pound weight, with no exemptions. More than half of this yield would come from 40 and 50 thousand pound vehicles ("above 35M"). More than two million dollars of the theoretical collection would come from vehicles weighing 24,000 pounds and less, the specially difficult part to collect. Furthermore, these two millions include any large farm vehicle mileages, the extent of which we have not been able to estimate. With good administration, a strictly worded farm exemption, and no city-zone exemption, we believe such a tax should actually yield more than $6,000,000, but not much more. However, this yield implies the use of the tax rate schedule that may be criticized as not progressive for laden vehicles as explained above in discussing tax rate schedules.

The same criticism may be made of the tax for which yields are estimated in Table 3, not taxing vehicles weighing 24,000 and under. This Table gives effect to the rate schedule from columns (4) and (5) of Table 1, and it uses higher rates of tax to produce $1,000,000 from carriers paying gross receipts tax. Eliminating vehicles below 25,000 pounds would be administratively preferable, and the yield nearly $6,000,000. The yield from foreign vehicles becomes relatively greater with this rate schedule. However, the lack of progression in the legal tax rates is not desirable, and a change making a smaller group pay higher rates would not be welcomed.

Table 4 applies the desirable progressive rates approximately proportional to gross weight, to the same mileage figures as given in Table 2. The corresponding rate schedules are those presented in Table 1 in columns (6) and (7). Because progression is obtained by taxing smaller vehicles at lower rates, the estimated yield is $5,000,000, a million less than the yield shown in Table 2 where closer approximation to rates equivalent to the gross receipts tax is attained. Since carriers for hire have a relatively high percentage of heavy vehicles, the rates and yields for heavy vehicles are substantially the same in the two tables.

As explained earlier, it is a coincidence that the New York rates meet the requirements as to yield from carriers for hire, producing $1,000,000, they are almost exactly proportional to gross weight, and they are the basis for the calculations in Table 4. Therefore, Table 4 serves a second purpose, that of presenting the estimated yield using the New York rate schedule, giving consideration in the estimated effective rate to the relatively large percentage of unladen vehicles on Virginia highways.

The estimated actual collections in Table 4 and other tables are believed to be conservative enough to allow farm exemption, i.e., an exemption for the grower of agricultural products in carrying such products grown by him to market or the place where they are processed and in carrying agricultural supplies. We do not recommend allowing the city zone exemption, for which a calculation is also given in Table 4 and other tables. If the legislature felt that such an exemption were necessary or appropriate for such a tax, the difference in yield would not be great, but the administrative problems of tax collections would be complicated, both for the state and the taxpayer.

Table 5 presents estimated yields using rates in Table 1 columns (8) and (9), namely, rates reflected in Table 4 plus 36.4 percent. If it were decided that vehicles weighing 18,001 to 24,000 pounds should not be taxed, this considerable increase in rates on the remaining taxed vehicles would be necessary in order to continue to collect $1,000,000 from carriers for hire. The yield from foreign vehicles would be relatively great. However, as stated earlier, higher rates are not necessary in adopting a weight-distance tax.

Estimate of the Cost of Collection:

New York State has estimated the cost of collecting $12,000,000 of weight-distance tax, in the second year of operation, as $1,055,000, not including the cost of operating weighing stations. Actual collections will probably be somewhat higher. A report of a legislative committee suggests "forebearance in reaching a conclusion on the permanent level which the cost of collection ratio may be expected to attain." The lesson to be learned from New York is that a high cost of collection is to be expected in the early years of such a tax. Even so, good enforcement may not be attained in the first years.

The essential activities in weight-distance tax administration are:

(1) Registered weight enforcement by all carriers, Virginia registered vehicles and foreign; obtaining registrations of gross weights that are accurate and adequate, as they will be if any uncooperative or careless taxpayers know that their vehicles are going to be weighed; doing enough weighing and inspection of vehicles to prevent any operation of a carrier with a presumption that Virginia will be careless in weight inspection and enforcement.

(2) Field audit of taxpayers' records, to see that accurate, adequate records are being kept and used in making tax returns; offering instruction in the initial setting up of recordkeeping by carriers; in case of necessity taking action to penalize willful negligence and make the facts known.

(3) Office routine (in large volume but not the principal element of cost) of permit issuance and control, tax return and remittance handling and checking, accounting, filing, and follow-up of delinquents and corrections of taxpayers' errors, including assessments of penalties and legal action to enforce payments when necessary.

(4) Tying in with the other activities, test checking trips in Virginia and special investigating when necessary.

Virginia, as much as or more than any other state, has been enforcing weight regulations and thereby teaching its own and foreign carriers who might be inclined to be careless that Virginia is not indifferent or careless respecting weights. (This is not a matter of tax collection, but is necessary to prevent damage to the highways.) After enacting a weight-distance tax, foreign taxpayers will have to observe one additional comparatively simple weight regulation, namely, loading limited to the declared maximum weights which the carrier elects to register. Thus the first essential activity of weight-distance tax enforcement in this state will be little more than the continuation of a present highway protection activity.

Field auditing will take in many foreign carriers but will be comparable to the gross receipts tax and motor fuel road tax field auditing. The nucleus of experienced and competent men to do the auditing exists in the office of the State Corporation Commission. Initially there will be a great many difficult problems of organization and also of establishing an understanding by carriers, but the latter kinds of problems will be less severe because New York has been telling many or most of the same foreign carriers what they require respecting a weight-distance tax. Also many Virginia carriers will be familiar with weight-distance taxation by New York.

Without meaning to belittle the difficulties of beginning to administer any tax, it can be asserted that Virginia's problems will be simpler than New York's. All elements of cost can be lower, even the handling of paper and auditing respecting out-of-state carriers.

Making an allowance for auditing out-of-state which is believed to be liberal in relation to New York's out-of-state auditing, it is estimated that taxpayers who should receive regular visits by field auditors might be five times as numerous with a weight-distance tax on vehicles weighing more than 18,000 pounds than with the present gross receipts tax on freight carriers for hire.

However, the increase in auditing as compared with the accounts that are or should be audited, including the present motor fuel road tax accounts, would be relatively small. With more taxpayers and with no auditing of gross receipts, the costs of travel and time necessary for each audit should be considerably less than they have been. Out-of-state travel expenses should be charged to the taxpayers. When taxpayers keep good records, only brief spot audits should be made. As has been done in case of the gross receipts tax, in the first year or two, emphasis in the work of the auditors should be on enlisting taxpayer cooperation in proper record-keeping.

Of the present expenditure by the State Corporation Commission relating to taxes on carriers, about $150,000 per annum, less than half has been regarded as cost of gross receipts tax administration with respect to freight carriers, and more than half as the cost of motor fuel road tax administration. Of course, either tax administered by itself would be more expensive. Even greater economies should be realized with the combination of administration of weight-distance tax and motor fuel road tax. Since motor fuel road tax depends upon miles of travel in Virginia, and carriers for hire, whether Virginian or foreign, are road tax taxpayers, a considerable segment of weight-distance tax mileage is already actually checked by the state's auditors or ought to be for road tax purposes. If the motor fuel road tax coverage is broadened, all weight-distance taxpayers might be subject to motor fuel road tax. Heretofore motor fuel road tax auditing clearly has not been adequate, but in connection with weight-

distance taxation, the collections of that tax should be audited more adequately. The return upon the motor fuel road tax can be increased with a relatively very small expenditure with the two tax administrations combined.

Our combined estimate for the two taxes is $400,000, of which not more than $300,000, or about four times the gross receipts tax administration expenditure, should be attributed to the weight-distance tax and $100,000 to the motor fuel road tax. The number of field audits per annum should be more than trebled. If the base of the motor fuel road tax is broadened, the appropriation for the two taxes should be somewhat greater than $400,000, probably $450,000.

This estimate for the weight-distance tax administration, $300,000, is six percent of the estimated yield of $5,000,000, not including receipts from permits issued. If the two taxes were not administered together the cost for the weight-distance tax alone would be almost as high as that for the two taxes, $400,000, or almost eight percent of the yield. The cost in relation to yield should be a little lower after two or three years of operation. These figures do not include weight enforcement or non-recurring costs of installation.

The Department of Highways has a conservative and realistic program for weighing which costs the Commonwealth an estimated $300,000 per annum and results in great saving in preventing highway destruction by overweight vehicles. In our judgment, this basic program is most of what is needed, but some additional weighing, particularly near the state borders, should be carried out if a weight-distance tax is approved. A total of $90,000 per annum to provide for six additional loadometer turnout weighing crews, and an initial outlay of $3,000 times 25 for turnout installations, in all an outlay of $75,000, would achieve the weighing we believe to be necessary for weight-distance tax enforcement, and a far better weight enforcement in Virginia than in New York or perhaps any other state.[1]

It may be seriously questioned whether the additional weighing should be regarded as a cost of collecting a weight-distance tax since it achieves an important purpose in preventing damage to the state highways, but if

[1] List of recommended new turnout weighing locations:

Routes 170 and 17, south of Norfolk.
32 and 13 south of Suffolk.
25B at N. C. line.
35 and 301 near N. C. line.
15 and 501 near N. C. line.
86 south of Danville.
220 south of Martinsville.
8 south of Stuart.
21 near N. C. line.
58 near W. tip of state.
23 near Norton.
Alt. 58 east of intersection with 72.
21/52 near Bland.
220 near W. Va. border.
33 near W. Va. border.
50 near W. Va. border.
522 near W. Va. border.
11 near W. Va. border.
340 near W. Va. border.
9 near W. Va. border.
15 near Maryland border.

Weighing would be done at weighing installations and at other locations near the state borders.

the $90,000 is counted in the cost of enforcement, the estimated total recurring enforcement expenditure would be $300,000 for tax administration proper, plus $90,000 for weighing, or $390,000 per annum. There would be a non-recurring outlay related to weighing of $75,000, and a similarly non-recurring amount of $50,000 should be anticipated for installation of procedures and equipment for tax administration proper, including special services to help carriers comply with the law.

Supporting Data Respecting Vehicle Mileages by Weight Brackets and Kind of Operation and Respecting Yields:

The appendixes to this report, A to D, contain particulars respecting the estimates of vehicle mileages and calculations in detail of tax yields assuming full collection. Tabular exhibits and annexed statements, are identified by letters according to the appendix to which they belong and are found in front of the text which explains them.

Appendix A presents the basic traffic data used in the study and incidentally average earnings figures attributed to Virginia-registered vehicles for hire.

Appendix B presents the estimates of mileages taxed by the gross receipts tax on carriers for hire and detailed estimates of weight-distance tax on the same mileages.

Appendix C presents detailed estimates of weight-distance tax on all vehicles on Virginia highways, rural and urban, in the weight brackets above 18,000 pounds and 24,000 pounds respectively.

Appendix D presents the study whereby urban truck mileages were estimated.

APPENDIX A

VIRGINIA HIGHWAY TRAFFIC OF FREIGHT-CARRYING VEHICLES

Some of the figures herein do not add to exactly the totals given because they are rounded figures.

EXHIBIT A-1

CHARACTERISTICS OF FREIGHT CARRYING VEHICLES REGISTERED IN VIRGINIA[1]

Weight Brackets	Number of Units			Annual Miles Per Vehicle		Annual Miles of Travel						Earnings of Vehicles For Hire	
	Total	For Hire	Private	For Hire (000)	Private (000)	Total (000,000)		For Hire (000,000)		Private (000,000)		Annual	Per Mile
(1)	(2)	(3)	(4)	(5)	(6)	(7)	%	(8)	%	(9)	%	(10)	(11)
10,000 lbs. & under	118,940	2,298	116,642	8	8	952	43	18	5	933	49	$1,600	$.20
10,001-15,000 lbs	16,477	1,407	15,070	20	12	209	9	28	8	181	10	5,600	.28
15,001-20,000 lbs.	26,607	3,984	22,623	25	15	439	21	100	29	339	18	8,000	.32
20,001-24,000 lbs.	6,509	1,710	4,799	27	20	142	6	46	13	96	5	9,720	.36
24,001-30,000 lbs.	2,355	453	1,902	30	30	71	3	14	4	57	3	12,000	.40
30,001-35,000 lbs.	891	213	678	33	33	29	1	7	2	22	1	14,520	.44
Sub-Total	171,779	10,065	161,714			1,842	83	213	61	1,629	86		
35,001-40,000 lbs.	4,375	1,009	3,366	38	38	166	7	38	11	128	7	18,240	.48
40,001-50,000 lbs.[2]	4,197	1,773	2,424	53	53	222	10	94	28	128	7	27,030	.51
Sub-Total	8,572	2,782	5,790			388	17	132	39	256	14		
Total	180,351	12,847	167,504			2,230	100	345	100	1,885	100		

[1] Sources are explained in the text. Number of miles and amounts in columns (5) to (11) are estimated.

[2] Mainly but not entirely tractor trucks. The next group consists entirely of tractor trucks.

EXHIBIT A-2

ANNUAL TRAVEL OF FREIGHT CARRYING VEHICLES ON VIRGINIA HIGHWAYS
(Reconciliation of figures from Exhibit A-1 with those from traffic counts and from Appendix D)

Weight Brackets From	To	Use	Estimated Annual Miles of Travel by Va. Trucks	Estimated Annual Miles of Travel in Va. by Va. & Foreign Trucks			Distribution of Truck Travel in Virginia by Highway System							Virginia Vehicles Out-of-State Travel
							State Systems of "Rural" Highways				"Urban" Systems			
							Primary			Secon				
				Va.	For.	Total	Va.	For.	Total	-dary	Total	City	Town	
(1)		(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
			(All figures in columns (3) to (14) are in millions of miles)											
--	10,000	Total	952	857	95	952								95
		For Hire	18	16	2	18								2
		Private	933	840	93	933								93
10,001	15,000	Total	209	188	21	209								21
		For Hire	28	25	3	28								3
		Private	181	163	18	181								18
15,001	20,000	Total	439	395	44	439								44
		For Hire	100	90	10	100								10
		Private	339	305	34	339								34
20,001	24,000	Total	142	121	21	142								21
		For Hire	46	39	7	46								7
		Private	96	82	14	96								14
24,001	30,000	Total	71	57	14	71								14
		For Hire	14	9	5	14								5
		Private	57	48	9	57								9
30,001	35,000	Total	29	20	9	29								9
		For Hire	7	5	2	7								2
		Private	22	15	7	22								7
Sub-Total		Total	1,842	1,638	204	1,842	857	92	949	386	506			204
		For Hire	213	184	29	213								29
		Private	1,629	1,454	175	1,629								175
35,001	40,000	Total	166	82	69	150	81	68	149		2			84
		For Hire	38	23			23							15
		Private	128	59			58				2			69
40,001	50,000	Total	222	79	117	196	78	116	194		2			143
		For Hire	94	38			38							56
		Private	128	41			40				2			87
Sub-Total		Total	388	161	186	346	160	182	343		4			227
		For Hire	132	60			61							71
		Private	256	100			98				4			156
Total Freight Vehicle Miles		Total	2,230	1,799	390	2,188	1,017	274	1,293	386	510	377	133	431
		For Hire	345	245										100
		Private	1,885	1,554										330
Total vehicle miles (@12.62 miles per gallon of vehicle fuel)						11,598			6,473	1,619	3,506			
Ratio of total freight vehicle miles to total vehicle miles						.19			.20	.24	.14½			
Miles of highway									8,119	40,567	4,289	2,857	1,432	
Freight vehicle miles per annum per mile of highway									159 M	1 M	119 M	132 M	93 M	

ANNEX A-21

BASIC TRAFFIC MILEAGE DATA FROM VEHICLE COUNTS BY THE DEPARTMENT OF HIGHWAYS

Primary System	Daily Vehicle Miles		Annual Vehicle Miles	
	1951-52 (000)	1952-53 (000)	1951-52 (000,000)	1952-53 (000,000)
Trucks				
Small and medium	2,369	2,601	865	950
of which Virginia registry	(2,141)	(2,349)	(782)	(857)
Foreign registry	(228)	(253)	(83)	(92)
Trailer and semi-trailer	863	940	315	343
of which Virginia registry	(416)	(439)	(152)	(160)
Foreign registry	(447)	(500)	(163)	(182)
Other vehicles				
Passenger cars	13,157	13,975	4,802	5,102
Buses	197	215	72	78
All vehicles on the primary system	16,586	17,734	6,054	6,473

Secondary System	1952	1952
All vehicles	4,436	1,619

	Annual 1952-53
Motor fuel consumption	918,989,324 gals.

ANNEX A-22

COMPUTED (ESTIMATED) VEHICLE MILEAGES IN ONE THOUSAND POUND BRACKETS

Weight Brackets (1)	Total		For Hire (Va. Vehicles)		Private	
	Of Vehicles Registered in Virginia (2) (000)	Of Vehicles Operated in Virginia (3) (000)	Of Vehicles Registered in Virginia (4) (000)	Of Vehicles Operated in Virginia (5)	Of Vehicles Registered in Virginia (6) (000)	Of Vehicles Operated in Virginia (7)
10 M and Under	951,520	Assumed to	18,384	Assumed to	933,136	Assumed to
11 M	20,064	be the same	2,040	be the same	18,024	be the same
12	39,528		4,680		34,848	
13	36,168	as Col. (2)	5,220	as Col. (4)	30,948	as Col. (6)
14	53,776		6,100		47,676	
15	59,444	up to 36 M	10,100	up to 36 M	49,314	up to 36 M
Group Totals	208,980		28,140		180,840	
16	112,515		16,800		95,715	
17	79,775		16,325		63,450	
18	86,830		18,250		68,580	
Group Totals	279,120		51,375		227,745	
18 M & Under	1,439,620		97,899		1,341,721	
19	68,990		21,575		47,415	
20	90,835		26,650		64,185	
Group Totals	159,825		48,225		111,600	
21	29,557		10,557		19,000	
22	43,321		13,581		29,740	
23	33,788		12,528		21,260	
24	35,484		9,504		25,980	
Group Totals	142,150		46,170		95,980	
19 M to 24 M	301,975		94,395		207,580	
25	20,220		3,600		16,620	
26	12,450		1,830		10,620	
27	7,800		990		6,810	
28	10,050		1,560		8,490	
29	5,190		1,020		4,170	
30	14,940		4,590		10,350	
Group Totals	70,650		13,590		57,060	
31	3,036		825		2,211	
32	6,402		1,221		5,181	
33	5,115		957		4,158	
34	4,389		1,122		3,267	
35	10,461		2,904		7,557	
Group Totals	29,403		7,029		22,374	
25 M to 35 M	100,053		20,619		79,434	
36	7,524	6,787	1,482	Not sepa-	6,042	Not sepa-
37	4,636	4,182	1,216		3,420	
38	4,750	4,285	874	rately esti-	3,876	rately esti-
39	3,116	2,811	456		2,660	
40	146,224	131,894	34,314	mated for	111,910	mated for
Group Totals	166,250	149,959	38,342		127,908	
				Foreign For-		Foreign Pri-
42	1,007	887	53		954	
43	530	467	106	Hire Vehicles	424	vate Vehicles
44	159	140	-		159	
45	1,113	981	-		1,113	
46	318	280	-		318	
47	265	233	-		265	
48	159	140	-		159	
50	218,890	192,842	93,810		125,080	
Group Totals	222,441	195,970	93,969		128,472	
Above 35 M	388,691	345,929	132,311		256,380	
Grand Total	2,230,339	2,187,577	345,224		1,885,115	

ANNEX A-23

RATIOS INDICATED BY SAMPLING PRIMARY AND SECONDARY SYSTEM TRAFFIC COUNT DATA

Comment: This sampling was not adequate to furnish a basis for the distribution of mileages by weight brackets generally, but ratios help greatly to substantiate the conclusions reached in Exhibit A-2.

VIRGINIA REGISTERED VEHICLES

1. PRIMARY SYSTEM — No. of Vehicles: 1,192,264 — No. of Samples: 200

Total	Pass. Cars	Buses	Trucks	Single Trucks Total	Pick-up Panel	Other 2-Axle	3-Axle	Trailer Truck Total	3-Axle	4-Axle
1,192,264	975,714	17,441	199,109	156,648	104,732	47,591	4,325	42,461	22,861	19,600
100%	82%	1%	17%							
			100%	79%	53%	24%	2%	21%	11%	10%

Interpretation in Terms of Weight Brackets

Weight Bracket	Percent	Weight Bracket	Percent	Weight Bracket	Percent
10 M and Under	51	25-30	2	36-40	8
11-15	8	31-35	1	41-50	13
16-20	14	Sub-Total	79	Sub-Total	21
20-24	4			Total	100

2. SECONDARY SYSTEM — No. of Vehicles: 11,784 — No. of Samples: 27

Total	Pass. Cars	Buses	Trucks	Single Trucks Total	Pick-up Panel	Other 2-Axle	3-Axle	Trailer Truck Total	3-Axle	4-Axle
11,784	7,297	250	4,237	4,185	2,941	1,229	15	52	33	19
100%	62%	2%	36%							
			100%	99%	69%	29%	-	1%		

Interpretation in Terms of Weight Brackets

Weight Bracket	Percent	Weight Bracket	Percent	Weight Bracket	Percent
10 M and Under	65	25-30	2	36-40	-
11-15	10	31-35	1/	41-50	-
16-20	17	Sub-Total	100	Sub-Total	-
20-24	6			Total	100

3. URBAN SYSTEM — No. of Vehicles: 267,754 — No. of Samples: 15

Total	Pass. Cars	Buses	Trucks	Single Trucks Total	Pick-up Panel	Other 2-Axle	3-Axle	Trailer Truck Total	3-Axle	4-Axle
267,754	233,400	5,093	29,261	27,314	20,824	6,198	292	1,947	1,024	923
100%	87%	2%	11%							
			100%	93%	72%	21%	-	7%	4%	3%

Interpretation in Terms of Weight Brackets

Weight Bracket	Percent	Weight Bracket	Percent	Weight Bracket	Percent
10 M and Under	72	25-30	1	36-40	1/
11-15	9	31-35	1/	41-50	1/
16-20	13	Sub-Total	99	Sub-Total	1
20-24	4			Total	100

1/ Less than 1 percent.

FOREIGN REGISTERED VEHICLES

1. PRIMARY SYSTEM No. of Vehicles: 406,699 No. of Samples: 200

Total	Pass. Cars	Buses	Trucks	Single Trucks Total	Pick-up Panel	Other 2-Axle	3-Axle	Trailer Truck Total	3-Axle	4-Axle
406,699	299,820	-	106,879	33,116	23,025	7,219	2,872	73,763	24,496	49,267
100%	74%		26%							
			100%	31%	21%	7%	3%	69%	23%	46%
25%	% Foreign to Total		35%	17%				42%		

Interpretation in Terms of Weight Brackets

Weight Bracket	Percent	Weight Bracket	Percent	Weight Bracket	Percent
10 M and Under	20	25-30	1	36-40	26
11-15	3	31-35	1	41-50	44
16-20	4	Sub-Total	30	Sub-Total	70
20-24	1			Total	100

2. SECONDARY SYSTEM No. of Vehicles: 1,593 No. of Samples: 27

Total	Pass. Cars	Buses	Trucks	Single Trucks Total	Pick-up Panel	Other 2-Axle	3-Axle	Trailer Truck Total	3-Axle	4-Axle
1,593	1,312	-	281	273	190	83	-	8	8	-
100%	81%		19%							
			100%	97%	68%	29%	-	3%		
12%	% Foreign to Total		6%	6%				13%		

Interpretation in Terms of Weight Brackets

Weight Bracket	Percent	Weight Bracket	Percent	Weight Bracket	Percent
10 M and Under	81	25-30	1/	36-40	-
11-15	7	31-35	1/	41-50	-
16-20	8	Sub-Total	100	Sub-Total	-
20-24	3			Total	100

3. URBAN SYSTEMS No. of Vehicles: 42,569 No. of Samples: 15
(as judged by traffic in selected parts of the secondary system)

Total	Pass. Cars	Buses	Trucks	Single Trucks Total	Pick-up Panel	Other 2-Axle	3-Axle	Trailer Truck Total	3-Axle	4-Axle
42,569	38,128	-	4,441	4,078	3,236	797	45	363	191	172
100%	89%	-	11%							
			100%	92%	73%	18%	1%	8%	4%	3%
14%	% Foreign to Total		13%	13%				16%		

Interpretation in Terms of Weight Brackets

Weight Bracket	Percent	Weight Bracket	Percent	Weight Bracket	Percent
10 M and Under	75	25-30	1	36-40	1/
11-15	8	31-35	1/	41-50	1/
16-20	11	Sub-Total	99	Sub-Total	1
20-24	4			Total	100

1/ Less than 1 percent.

ANNEX A-24

TRAFFIC COUNT AT WOODBRIDGE BY WEIGHT BRACKETS, 24 HOURS, JULY 22-24, 1953.

This unusual count was analyzed by the authors of the report. It was made pursuant to instructions written by the V. P. I. statistical group, but was received too late to be used by them. It is of very limited interest or value because it represents the through-traffic stream and little else.

Part I VIRGINIA REGISTERED VEHICLES

Weight Bracket	For-Hire ST	For-Hire TT	For-Hire Total	Private ST	Private TT	Private Total	Total ST	Total TT	Total[1]
10 M lbs. and under	....	....	....	19	....	19	19	....	19
10-15 M lbs.	....	....	....	13	....	13	13	....	13
15-18 M lbs.	....	....	....	17	....	17	17	....	17
18-20 M lbs.	....	....	....	21	....	21	21	....	21
20-24 M lbs.	7	....	7	50	....	50	57	....	57
24-30 M lbs.	4	....	4	20	2	22	24	2	26
30-35 M lbs.	....	....	....	5	....	5	5	....	5
Sub-total	11	....	11	145	2	147	156	2	158
35-40 M lbs.	1	62	63	13	73	86	14	135	149
40-50 M lbs.	....	247	247	....	89	89	....	336	336
Sub-Total	1	309	310	13	162	175	14	471	485
Total	12	309	321	158	164	322	170	473	643

[1] In these column headings, ST means single unit trucks, and TT means tractor trailers.

ANNEX A-24—Continued

TRAFFIC COUNT AT WOODBRIDGE BY WEIGHT BRACKETS, 24 HOURS, JULY 22-24, 1953

Part II FOREIGN REGISTERED VEHICLES

These vehicles do not carry a registered weight and, therefore, are not classed by weight bracket, except for the distinction between weights up to 35,000 pounds, 35,001 to 40,000 pounds, and 40,001 to 50,000 pounds. This latter distinction was made for single trucks based on the gross weight determined by weighing the vehicle. In case of tractor trucks, all three-axle vehicles were classed as gross weight 40,000 pounds and all four-axle tractor trucks were classed as 50,000 pound vehicles, which is a very close approximation to the fact, that is to say, exceptions in either direction are not many and are likely to be compensated, judged by the Virginia registered vehicles.

Weight Bracket	For-Hire ST	For-Hire TT	For-Hire Total	Private ST	Private TT	Private Total	Total ST	Total TT	Total[1]
Under 10 M lbs. to 35 M lbs.	59	....	59	171	....	171	230	....	230
35-40 M lbs.	4	213	235	23	152	175	27	383	410
40-50 M lbs.	....	1242	1242	....	353	353	....	1595	1595
Total	63	1473	1536	194	505	699	257	1978	2235

Part III TOTAL VIRGINIA AND FOREIGN VEHICLES COMBINING THE FIGURES IN Parts I and II

Weight Bracket	For-Hire ST	For-Hire TT	For-Hire Total	Private ST	Private TT	Private Total	Total ST	Total TT	Total[1]
Under 10 M lbs. to 35 M lbs.	70	....	70	316	2	318	386	2	388
35-40 M lbs.	5	293	298	36	225	261	41	518	559
40-50 M lbs.	....	1489	1489	....	442	442	....	1931	1931
Total	75	1782	1857	352	669	1021	427	2451	2878

[1] In these column headings, ST means single unit trucks, and TT means tractor trailers.

APPENDIX A

VIRGINIA HIGHWAY TRAFFIC OF FREIGHT-CARRYING VEHICLES

Introduction

Estimates of mileages herein include tractor-truck mileages, very nearly equal (net) to mileages of vehicles above 35,000 pounds weight, which are mainly primary system mileages and are adequately verified by traffic count to a degree of accuracy entirely satisfactory for the purpose of estimating tax yields. They include, however, single truck mileages, about equal to mileages in weight brackets below 35,000 pounds, almost half of which is on urban and secondary roads, for which traffic count data has not been compiled. In no case has traffic data given vehicle miles by weight brackets as necessary for the purpose of estimating tax yields.

The only feasible way to estimate single truck mileages by weight brackets is to use vehicle registrations times an estimate of mileage of operation for each size of vehicle. However, the method of study by the authors of this report included various checks on "proofs" of the mileages, including an independent estimation of urban mileages (Appendix D).

Exhibit A-1 Characteristics of Freight-Carrying Vehicles Registered in Virginia

In Exhibit A-1 the "number of units" by weight brackets are factual, for the registration year ended March 31, 1953.

The "Annual miles per vehicle" are estimated, initially in studies by the U. S. Department of Commerce, Bureau of Public Roads (see *Public Roads,* Vol. 27, No. 7, p. 129), but in this study it was necessary for the authors of the report to be more specific as to average mileages in some weight brackets, and it proved to be necessary to make a radical reduction in average mileage attributed to 50,000 pound tractor-trucks, from 65,000 miles per annum to 53,000, in order to reconcile with data submitted in Appendix B.

"Annual miles of travel" in Exhibit A-1 are the product of miles per vehicle times number of units. It is significant that the miles of travel of for-hire vehicles are found to be almost two-fifths or 40 percent tractor-trucks as against 14 percent in case of private vehicles.

The columns showing "Earnings per vehicle for-hire" present estimates by the authors. These are not familar "typical" gross earnings, but are fairly representative averages for Virginia. This subject is considered further in Appendix B.

Exhibit A-2 Annual Travel of Freight-Carrying Vehicles on Virginia Highways

An estimated 431 million miles of travel by Virginia registered freight vehicles is not on Virginia highways, and the offsetting mileage of foreign vehicles in Virginia is only 390 million miles, the difference being important in estimating weight-distance tax. Thus Exhibit A-1 concerning mileages of Virginia vehicles is not the basis for estimates of Virginia mileages, though it is an important means of reconciliation in Exhibit A-2.

The primary system figures in Exhibit A-2 are from official traffic count estimates in detail, except the separation of primary system mileages between the two largest weight brackets which is based on sampling of data on traffic count work sheets. A summary of the sampling is presented in Annex A-23.

The column for "Virginia vehicles out of state" below 35,000 pounds is based on an arbitrary assumption that foreign vehicles in Virginia in the smaller brackets are matched by Virginia vehicles out of the state. In support of this assumption there is the fact that border traffic would explain much of the smaller vehicle traffic. Above 35,000 pounds, the out-of-state figure is a matter of reconciling traffic count data for the primary system with the computed mileages for the large vehicles.

This reconciliation included also arriving independently of the estimate of miles of travel by Virginia vehicles at estimates of secondary system rural traffic and urban traffic. In case of the secondary system, the total vehicle miles including passenger cars in a figure produced by traffic count, and the ratio of 24 percent trucks on the secondary system is consistent with other traffic studies. The comparable urban ratio of about 15 percent is also consistent with other studies, but the urban truck mileage was estimated as described in Appendix D. Thus the total estimated mileage on Virginia highways was estimated independently of the miles of travel by Virginia vehicles.

Annex A-21 Basic Traffic Mileage Data from Vehicle Counts by the Department of Highways

Annex A-21 records the basic official traffic count data used in the study.

Annex A-22 Computed (Estimated) Vehicle Mileages in One Thousand Pound Brackets

As in Annex A-21, Annex A-22 is presented to make a record of mileages used in the following appendixes and throughout the report. The mileages of vehicles registered in Virginia were derived as explained in discussing Exhibit A-1. Heavy vehicle mileages in Virginia were determined in total in Exhibit A-2 and prorated by 1,000 pound brackets.

Annex A-23 Ratios Indicated by Sampling Primary and Secondary System Traffic Count Data

In order to test the validity of the assumptions as to the traffic in various weight brackets with particular reference to foreign and Virginia registered vehicle traffic, an intensive, brief study was made of traffic count working papers which show foreign trucks separately and types of vehicles. Traffic count stations were selected to reveal particularly the ratios of the three systems, primary, secondary, and urban, the latter where state highways are maintained in heavily populated but unincorporated areas. In many ways the ratios support the distributions of traffic made in Exhibit A-2. Perhaps they suggest a possibility that mileages of larger single trucks may be over-estimated, but the number of vehicle miles in question is relatively unimportant.

APPENDIX B

COMPUTATION OF WEIGHT-DISTANCE TAX ON VIRGINIA REGISTERED VEHICLES FOR HIRE

EXHIBIT B

COMPUTATION OF WEIGHT-DISTANCE TAX ON VIRGINIA REGISTERED VEHICLES FOR-HIRE

Part I ESTIMATE OF GROSS RECEIPTS TAX LIABILITY INDICATING THE SOURCE OF $1,000,000 OF COLLECTIONS OF GROSS RECEIPTS TAX BY WEIGHT BRACKETS OF VEHICLES

Weight Brackets (1)	"Typical" (not average) 1/ Miles Per Ann. (2) (000)	"Typical" (not average) 1/ Earnings Per Ann. (3) (000)	"Typical" (not average) 1/ Earnings Per Mile (4)	Average 2/ Earnings Per Mile (5)	Millions of Miles of Travel: Total (From Ex.A1) (6)	Out of State % (7)	Out of State No. (8)	In State (9)	Exempt Miles % (10)	Exempt Miles No. (11)	Taxable Miles (12)	Gross Earnings Per Ann. Col.(5)x Col.(12) (13) (000,000)	Est. Tax Liability @ 2% (14) (000)	Equivalent Tax Per Taxable Mile (15)	Same Yield Spread on Vehicles Above 18 M (16)	Same Yield Spread on Vehicles Above 24 M (17)
10 M lbs. & Under	8	$---	$---	$.20	18	10	2	16	90	14	2	$ .4	$ 8	$.0040	---	---
11-15 M lbs.	20	8	.40	.28	28	10	3	25	80	20	5	1.4	28	.0056	---	---
16-20 M lbs.	25	11	.44	.32	100	10	10	90	70	63	27	8.6	172	.0064	---	---
(18-20 M lbs.) 3/				(.34)	(48)	(10)	(5)	(43)	(70)	(30)	(13)	(4.4)	(88)	(.0068)	(.0077)	---
21-24 M lbs.	27	12.5	.46	.36	46	15	7	39	50	20	19	6.8	136	.0072	.0082	---
25-30 M lbs.	30	15	.50	.40	14	20	5	9	30	3	6	2.4	48	.0080	.0091	.0120
31-35 M lbs.	30 or 33	17	.56	.44	7	30	2	5	10	1	4	1.8	36	.0088	.0100	.0132
	Sub-Totals				213	15	29	184	66	121	63 (42) 4/ (10) 5/	21.4 (15.4) (4.2)	428 (308) (84)			
36-40 M lbs.	38 or 40	23	.57	.48	38	40	15	23	3	1	22	10.6	212	.0096	.0109	.0144
41-50 M lbs.	53 or 65	50	.77	.51	94	60	56	38	1	0	38	19.4	388	.0102	.0115	.0153
	Sub-Totals				132	53	71	61	1	1	60	30.0	600			
	Totals				345	29	100	245	50	122	123 (102) 4/ (70) 5/	51.4 (45.4) (34.2)	1,028 (908) (684)			

1/ In this study, the so-called "typical" earnings figures are not regarded as typical of Virginia vehicles and they seem not to reflect the experience of Class I carriers reporting to the I.C.C. We include them because substantially similar figures, called "typical," are of record in a study of vehicle characteristics (Public Roads, Vol. 27, No. 7, p. 129). The underscored figures for miles per annum are regarded as typical and average for the purposes of this study, and they seem to be consistent with carriers' reports to the I.C.C.

2/ Estimated.

3/ Figures in parentheses on this line give earnings and mileages for the portion of the bracket above 18 M pounds.

4/ Totals for vehicles above 18 M pounds.

5/ Totals for vehicles above 24 M pounds.

EXHIBIT B—Continued

COMPUTATION OF WEIGHT-DISTANCE TAX ON VIRGINIA REGISTERED VEHICLES FOR-HIRE

Part II CALCULATION BY 1000 POUND BRACKETS

Weight Brackets[1] (1)	Vehicle Miles (2)	% Taxable (3)	Taxable Vehicle Miles (4)	Effective or Average Tax Rates		Tax Yield	
				Above 18M (5)	Above 24M (6)	Above 18M (7)	Above 24M (8)
19M	21,575	27.3	5,890	$.0077	$	$ 45,353	$.....
20	26,650	27.3	7,275	.0082	.....	59,655	.....
21	10,557	41.3	4,360	.0082	.....	35,752	.....
22	13,581	41.3	5,609	.0082	.....	45,994	.....
23	12,528	41.3	5,174	.0086	.....	44,496	.....
24	9,504	41.3	3,925	.0086	.....	33,755	.....
25	3,600	42.6	1,534	.0086	.0114	13,192	17,488
26	1,830	42.6	780	.0091	.0120	7,098	9,360
27	990	42.6	422	.0091	.0120	3,840	5,064
28	1,560	42.6	665	.0091	.0120	6,052	7,980
29	1,020	42.6	435	.0095	.0126	4,133	5,481
30	4,590	42.6	1,955	.0095	.0126	18,573	24,633
31	825	57.1	460	.0095	.0126	4,370	5,796
32	1,221	57.1	697	.0100	.0132	6,970	9,200
33	957	57.1	546	.0100	.0132	5,460	7,207
34	1,122	57.1	641	.0100	.0132	6,410	8,461
35	2,904	57.1	1,658	.0104	.0138	17,243	22,880
36	1,482	57.9	858	.0104	.0138	8,923	11,840
37	1,216	57.9	704	.0104	.0138	7,322	9,715
38	874	57.9	506	.0109	.0144	5,515	7,286
39	456	57.9	264	.0109	.0144	2,878	3,802
40	34,314	57.9	19,868	.0109	.0144	216,561	286,099
42	53	40.4	21	.0113	.0150	237	315
43	106	40.4	43	.0113	.0150	486	645
50	93,810	40.4	37,899	.0115	.0153	435,839	579,855
Totals	247,325		102,189			$1,036,107	$1,023,107
			Above 18M lbs. 69,956				
			Above 24M lbs.				

[1] Vehicles by 1,000 lbs. brackets. 19M means 18,001 to 19,000 inclusive.

EXHIBIT B—Continued

Part III CALCULATION OF A LEGAL RATE PER MILE OF TRAVEL TO TAKE INTO ACCOUNT THE TAXING OF EMPTY VEHICLES ON THEIR WEIGHT EMPTY

A. Where the Weight Empty is Less than the Minimum Taxable Weight

Weight Brackets (1)	Percent L. (2)	Percent E. (3)	Tax Rates Above 18 M lbs. Effective Rate (4)	Tax Rates Above 18 M lbs. Equivalent Legal Rate (5)	Tax Rates Above 24 M lbs. Effective Rate (6)	Tax Rates Above 24 M lbs. Equivalent Legal Rate (7)
19M	63	37	$.0077	$.0122	$	$ .....
20	63	37	.0082	.0130	.....	.....
21	63	37	.0082	.0130	.....	.....
22	63	37	.0082	.0130	.....	.....
23	63	37	.0086	.0136	.....	.....
24	63	37	.0086	.0136	.....	.....
25	63	37	.0086	.0136	.0114	.0180
26	63	37	.0091	.0144	.0120	.0190
27	63	37	.0091	.0144	.0120	.0190
28	63	37	.0091	.0144	.0120	.0190 [1]
29	63	37	.0095	.0150	.0126	.0199(.0200)
30	63	37	.0095	.0150 [1]	.0126	.0199(.0200)
31	70	30	.0095	.0136(.0150)	.0126	.0180(.0200)
32	70	30	.0100	.0143(.0150)	.0132	.0189(.0200)
33	70	30	.0100	.0143(.0150)	.0132	.0189(.0200)
34	70	30	.0100	.0143(.0150)	.0132	.0189(.0200)
35	70	30	.0104	.0148(.0150)	.0138	.0197(.0200)
36	77	23	.0104	.0134(.0150)	.0138	.0178(.0200)
37	77	23	.0104	.0134(.0150)	.0138	.0178(.0200)
38	77	23	.0109	.0141(.0150)	.0144	.0186(.0200)
39	77	23	.0109	.0141(.0150)	.0144	.0186(.0200)
40	77	23	.0109	.0141(.0150)	.0144	.0186(.0200)
42	82	18	.0113	.0137(.0150)	.0150	.0182(.0200)
43	82	18	.0113	.0137(.0150)	.0150	.0182(.0200)
50	82	18	.0115	.0139(.0150)	.0153	.0185(.0200)

B. Where the Weight Empty is Taxable—Above 18,000 Pounds

Weight Brackets (1)	Percent E. (2)	Percent L. (3)	Effective Rate (4)	Av. Weight Empty (5)	Legal Rate for Wt. Empty (6)	(1)x(2) (7)	(1)x(4) (8)	(3)x(5) x(6) (9)	Legal Rate (8)-(9)÷(7) (10)
42M	82	18	$.0113	23	$.0136	34.4	$474.60	$56.30	.0122
43	82	18	.0113	23	.0136	35.3	485.90	56.30	.0122
50	82	18	.0115	23	.0136	41.0	575.00	56.30	.0127

[1] Suggested rounding.

ANNEX B-1

SUMMARY OF TABLE B-1 PREPARED BY THE COMMONWEALTH OF VIRGINIA, STATE CORPORATION COMMISSION, FOR THE MARR COMMISSION, RELATING TO VIRGINIA MOTOR CARRIERS OF PROPERTY THAT OPERATE IN VIRGINIA

Line No.	Items	Vehicle Miles 1951	Vehicle Miles 1952
1.	Trucks-Owned-Miles operated in intercity service	4,494,419	5,005,180
2.	Tractors-Owned-Miles operated in intercity service	71,781,263	67,683,134
3.	Total miles operated-owned vehicles	76,275,682	72,688,314
4.	Trucks-Rented without drivers-Miles operated in intercity service	None	None
5.	Tractors-Rented without drivers-Miles operated in intercity service	249,463	4,199,710
6.	Total miles operated vehicles rented without drivers	249,463	4,199,710
7.	Trucks-Rented with drivers-Miles operated in intercity service	.....	4,989,598
8.	Tractors-Rented with drivers-Miles operated in intercity service	27,158,127	17,802,073
9.	Total miles operated-vehicles rented with drivers	27,158,127	22,791,671
10.	Driveaway-Miles operated in intercity service	None	None
11.	Total miles operated-all vehicles in intercity highway service	103,683,272	99,679,695
35.	Freight revenue from intercity service (accounts 3100 and 3110)	$48,342,757	$48,983,212
42.	Freight revenue per intercity vehicle-mile (divide line 35 by line 11)	$ .4663	$ .4914

Compiled from

Schedule 9005, page 72 of ICC Annual Report—Form A—of Trucks and Tractors used in intercity service and on hand on the last working day of each quarter, and the average number used during year.

	1951	1952
Average number of power units owned..	1,604.6	1,590.6
Average number of miles per year per unit	47,535.6	45,698.7
Total number of carriers	43	44

Comment: These are the larger taxpayers, and they pay the larger part of the gross receipts tax derived from large vehicles. Only ten percent of their mileage is single truck mileage, the rest being tractor truck. The authors of the report can find no reason to regard these figures as misleading.

ANNEX B-2

SUMMARY TO TABLE J PREPARED BY THE COMMONWEALTH OF VIRGINIA, STATE CORPORATION COMMISSION, FOR THE MARR COMMISSION, RELATING TO MILEAGES REPORTED TO THE STATE CORPORATION COMMISSION BY CARRIERS SUBJECT TO THE GASOLINE TAX ON MILEAGES OPERATED IN VIRGINIA

Virginia Carriers of Property

		1951	1952
(1)	Total miles operated	91,186,654	92,060,009
(2)	Total miles operated in Virginia	43,233,484	41,595,716
(3)	Total gallons motor fuel used	21,424,809	21,718,941
(4)	Total number of carriers reporting	40	40
(5)	Percent of miles operated in Virginia	47.4	45.2
(6)	Miles (av.) per gallon of fuel	4.2	4.2

Comment: Again these are reports of larger taxpayers, and they operate larger tractor-trucks principally. The authors of the report have no reason to question the 45.2 percent as being representative of their operations in Virginia.

APPENDIX B

COMPUTATION OF WEIGHT-DISTANCE TAX ON VIRGINIA REGISTERED VEHICLES FOR HIRE

Introduction

In order to determine weight-distance tax rate schedules on vehicles for hire above 18,000 pounds or 24,000 pounds now paying gross receipts tax, it was necessary to account for a great deal larger number of miles of travel by permit-holding vehicles than that from which gross receipts tax is collected, namely, a little more than 100 million miles, and it was necessary to make a distribution by weight brackets that would explain taxed earnings as well as miles. Unfortunately, the State Corporation Commission's office that collects gross receipts tax does not receive gross receipts tax returns which reveal vehicle weights generally.

Exhibit B, Part I Estimate of Gross Receipts Tax Liability Indicating the Source of $1,000,000 of Collections of Gross Receipts Tax by Weight Brackets of Vehicles

In Exhibit B, Part I, 345 million miles of permit-holding vehicle miles, Virginia registered, is distributed, based on the limited amount of information available. The existence of roughly this number of vehicle miles for vehicles having for-hire permits is less questionable than the extent of the inclusion of farm trucks and other mileages not for-hire, and perhaps the extent of out-of-state mileage of larger single trucks. Most of the figures in this Exhibit depend in part upon logic rather than fact.

Nevertheless, they fit into the whole picture of estimated traffic, and are convincing as approximations, and are a means of distributing gross receipts tax which, as to large vehicles. has a remarkable agreement with reports by large carriers to the State Corporation Commission and Interstate Commerce Commission. Any error in this distribution can not be very serious for the purposes of estimating weight-distance tax on vehicles above 24,000 pounds since the estimated mileages aside from tractor-trucks are small. The out-of-state percentage for large vehicles of large carriers is verified as explained later and the exemption is negligible. Error including mileages of vehicles between 18,000 pounds and 24,000 pounds could be considerably greater. However, it is difficult to imagine there being a great enough error to upset the estimates materially.

Exhibit B presents average earnings per mile as estimated by the authors before studying the State Commission's summary of reports to the I. C. C., and the figures were confirmed by that study as explained in commenting on Annex B-1.

From the taxable mileage estimates, the authors computed an "equivalent tax per taxable mile", i.e., simply two percent of the estimated earnings. They then computed the pro-rata slightly higher tax necessary to raise $1,000,000 from the mileages of vehicles above 18,000 pounds and the still higher tax to raise the same amount from mileages above 24,000 pounds.

Exhibit B, Part II Computation of Weight-Distance Tax on Virginia Registered Vehicle for Hire

Part II of Exhibit B is included merely to show the establishment of "effective" rates of weight-distance tax by 1,000 pound brackets for use in Appendix C.

Exhibit B, Part III Calculation of a Legal Rate per Mile of Travel to Take Into Account the Taxing of Empty Vehicles on Their Weight Empty

From August 7 to August 22, 1953, the Department of Highways made traffic counts in which the data as to vehicles empty and loaded, and empty weights, were recorded for 3,475 vehicles. An average percent loaded of 77.30 was established for for-hire vehicles, 22.70 percent wholly empty. Single trucks averaged 37.01 percent empty. Three-axle tractor-trucks are recorded as 22.09 percent empty and four-axle, 16.71 percent. The corresponding percentages for private trucks were 57.17 percent, 40.21 percent, and 61.22 percent empty. Giving consideration to these very unsatisfactory data, the percents empty were entered in Part III with a concession in the middle brackets in favor of a logical smooth progression. Evidently further information regarding empty vehicles is needed in order to feel confident as to the effect that empty vehicles will have on the yield of a tax at any set statutory rate with empty vehicles taxed on weight empty, not at all on unladen mileage if the weight empty is less than the minimum taxed weight. The evidence of these traffic counts is, however, clearly that empty mileage in Virginia will have a great effect. A recent table of New York State weight-distance tax mileage data shows an average mileage empty of less than 15 percent.

Because of the effect of unladen vehicles, an increasing "effective" tax rate on larger vehicles can become a decreasing legal rate, as this Exhibit shows, even without crediting large trucks with the tax many would pay on the trip by an empty vehicle. There should be no disputing this fact when attempting to fix an equitable tax schedule.

Annex B-1 Summary of Table B-2, Prepared by the State Corporation Commission, for the Marr Commission, Relating to Virginia Motor Carriers of Property That Operate in Virginia

The figures in Annex B-1 are consolidated from 44 reports by large carriers whose mileage is 90 percent tractor-truck and 10 percent single truck. Using averages for miles of travel per vehicle and earnings per vehicle from Exhibit A-1, an average number of rented vehicles can be computed and all of the figures for 1952 can be explained in terms of the averages indicated in that Exhibit. They could not be explained if higher average mileages or earnings are used. The authors of this report could find no reason to question the validity of the carriers reports in question.

Annex B-2 Summary of Table J, Prepared by the Corporation Commission, for the Marr Commission, Relating to Mileages Reported to the State Corporation Commission by Carriers Subject to the Gasoline Tax on Mileages Operated in Virginia

A critical percentage bearing on mileage data included in Exhibits A-2 and used in Exhibit B, is the percentage of operations of large vehicles for hire in and out of Virginia. This statement respecting mileages of large carriers is significant and believed to be authoritative.

APPENDIX C

WEIGHT-DISTANCE TAX CALCULATION FOR MILEAGES OF TRAFFIC IN VIRGINIA, FOR-HIRE, PRIVATE, AND FOREIGN COMBINED

EXHIBIT C-1

COMPUTATION OF WEIGHT-DISTANCE TAXES AT RATES BASED ON THE RATES ON VEHICLES FOR HIRE, YIELDING $1,000,000

Part I VEHICLES WEIGHING MORE THAN 18,000 POUNDS

Weight Brackets (1)	All Mileages on Va. Highways (2)	City Zone Exempt Mileages (3)	(2) Minus (3) (4)	Effective or Aver. Tax Rate (5)	Estimated Yield of Wt.-Distance Tax: Taxing All Va. Highway Mileage (6)	Estimated Yield of Wt.-Distance Tax: Taxing Mileage Other Than City Zone Exempt (7)
	(000)	(000)	(000)			
19M	68,990	5,900	63,090	$.0077	$531,223	$485,793
20	90,835	7,800	83,035	.0082	744,847	680,887
21	29,557	2,400	27,157	.0082	242,367	222,687
22	43,321	3,700	39,621	.0082	355,232	324,892
23	33,788	2,900	30,888	.0086	290,577	265,637
24	35,484	3,000	32,484	.0086	305,162	279,362
25	20,220	1,200	19,020	.0086	173,892	163,572
26	12,450	800	11,650	.0091	113,295	106,015
27	7,800	500	7,300	.0091	70,980	66,430
28	10,050	600	9,450	.0091	91,455	85,995
29	5,190	200	4,990	.0095	49,305	47,405
30	14,940	1,000	13,940	.0095	141,930	132,430
31	3,036	100	2,936	.0095	28,842	27,892
32	6,402	200	6,202	.0100	62,020	62,020
33	5,115	200	4,915	.0100	51,150	49,150
34	4,389	100	4,289	.0100	43,890	42,890
35	10,461	400	10,061	.0104	108,794	104,634
36	6,787		6,787	.0104	70,585	70,585
37	4,182		4,182	.0104	43,493	43,493
38	4,285		4,285	.0109	46,707	46,707
39	2,811		2,811	.0109	30,640	30,640
40	131,894	1,000	130,894	.0109	1,437,645	1,426,745
42	887		887	.0113	10,023	10,023
43	467		467	.0113	5,277	5,277
44	140		140	.0113	1,582	1,582
45	981		981	.0114	11,183	11,183
46	280		280	.0114	3,192	3,192
47	233		233	.0114	656	2,656
48	140		140	.0115	1,610	1,610
50	192,842		192,842	.0115	2,217,683	2,217,683
Total	747,957	32,000	715,957		$7,287,237	$7,019,067

EXHIBIT C-1—Continued

COMPUTATION OF WEIGHT-DISTANCE TAXES AT RATES BASED ON THE RATES ON VEHICLES FOR HIRE, YIELDING $1,000,000

Part II VEHICLES WEIGHING MORE THAN 24,000 POUNDS

(Vehicle Mileages are the same as in Part I)

Weight Brackets (1)	Effective or Aver. Tax Rate (2)	Estimated Yield of Weight-Distance Tax: Taxing All Va. Highway Mileage (3)	Estimated Yield of Weight-Distance Tax: Taxing Mileage Other Than City Zone Exempt (4)
25M	$.0114	$230,508	$217,968
26	.0120	149,400	141,000
27	.0120	93,600	87,600
28	.0120	120,600	113,400
29	.0126	65,394	62,874
30	0126	188,244	176,904
31	.0126	38,254	36,994
32	.0132	84,506	81,866
33	.0132	67,518	64,878
34	.0132	57,935	56,615
35	.0138	144,362	138,842
36	.0138	93,661	93,661
37	.0138	57,712	57,712
38	.0144	61,704	61,704
39	.0144	40,478	40,478
40	.0144	1,899,274	1,884,874
42	.0150	13,305	13,305
43	.0150	7,005	7,005
44	.0151	2,114	2,114
45	.0151	14,813	14,813
46	.0152	4,256	4,256
47	.0152	3,542	3,542
48	.0153	2,142	2,142
50	.0153	2,950,483	2,950,483
		$6,390,810	$6,315,030

EXHIBIT C-2

COMPUTATION OF WEIGHT-DISTANCE TAX AT RATES IMPOSED BY NEW YORK STATE

Part I COMPUTATION OF EFFECTIVE OR AVERAGE RATES OF THE NEW YORK WEIGHT-DISTANCE TAX GIVING EFFECT TO THE VIRGINIA RATIO OF LOADED AND EMPTY VEHICLES

Effective Rates When the Empty Weight is Less Than 18,000 Pounds

Weight Brackets (1)	Percent Loaded (2)	Legal Rate (3)	Effective Rate (2)x(3) (4)
19M	58	$.0060	$.00348
20	58	.0060	.00348
21	58	.0070	.00406
22	58	.0070	.00406
23	58	.0080	.00464
24	58	.0080	.00464
25	58	.0090	.00522
26	58	.0090	.00522
27	58	.0095	.00551
28	58	.0095	.00551
29	58	.0100	.00580
30	58	.0100	.00580
31	58	.0105	.00609
32	58	.0105	.00609
33	58	.0110	.00638
34	58	.0110	.00638
35	58	.0115	.00667
36	72	.0115	.00828
37	72	.0120	.00864
38	72	.0120	.00864
39	72	.0125	.00900
40	72	.0125	.00900
41	76	.0130	.00988
42	76	.0130	.00988
43	76	.0140	.01064
44	76	.0140	.01064
45	76	.0150	.01140
46	76	.0150	.01140
47	76	.0160	.01216
48	76	.0160	.01216
49	76	.0170	.01292
50	76	.0170	.01292

EXHIBIT C-2, PART I—Continued

Effective Rates When the Empty Weight is Taxable—Above 18,000 Pounds

Weight Brackets (1)	% Loaded (2)	Legal Rate (3)	Empty Weight (4)	% Empty (5)	Legal Rate on Empty Vehicles (6)	(1)x(2) x(3) (7)	(4)x(5) x(6) (8)	Effective Rate (7)+(8)÷(1) (9)
41M	76	.0130	23	24	.008	405.08	44.16	.01096
42	76	.0130	23	24	.008	414.96	44.16	.01093
43	76	.0140	23	24	.008	457.52	44.16	.01167
44	76	.0140	23	24	.008	468.16	44.16	.01164
45	76	.0150	23	24	.008	513.00	44.16	.01238
46	76	.0150	23	24	.008	524.40	44.16	.01236
47	76	.0160	23	24	.008	571.52	44.16	.01310
48	76	.0160	23	24	.008	583.68	44.16	.01308
49	76	.0170	23	24	.008	633.08	44.16	.01383
50	76	.0170	23	24	.008	646.00	44.16	.01380

EXHIBIT C-2—Continued

COMPUTATION OF WEIGHT-DISTANCE TAX AT RATES IMPOSED BY NEW YORK STATE

Part II CALCULATION OF YIELD OF A WEIGHT-DISTANCE TAX AT RATES IMPOSED BY NEW YORK STATE

	Truck Mileages in Virginia				Yield of Weight-Distance Tax	
Weight Brackets (1)	All Vehicles (2)	City Zone Exempt Mileages (3)	Mileages Excluding City Zone Exempt (4)	Effective or Average Rate of the N. Y. State Tax[1] (5)	On All Vehicles (6)	On Mileages Excluding City Zone Exempt (7)
	(Vehicle Miles in Thousands)					
19M	68,990	5,900	63,090	$.00348	$ 241,465	$ 220,815
20	90,835	7,800	83,035	.00348	317,923	290,622
21	29,557	2,400	27,157	.00406	121,184	111,344
22	43,321	3,700	39,621	.00406	177,616	162,446
23	33,788	2,900	30,888	.00464	155,425	142,085
24	35,481	3,000	32,484	.00464	163,226	149,426
25	20,220	1,200	19,020	.00522	105,144	98,904
26	12,450	800	11,650	.00522	64,740	60,580
27	7,800	500	7,300	.00551	42,900	40,150
28	10,050	600	9,450	.00551	55,275	51,975
29	5,190	200	4,990	.00580	30,102	28,942
30	14,940	1,000	13,940	.00580	86,652	80,852
31	3,036	100	2,936	.00609	18,520	17,910
32	6,402	200	6,202	.00609	39,052	37,832
33	5,115	200	4,915	.00638	32,736	31,456
34	4,389	100	4,289	.00638	28,090	27,450
35	10,461	400	10,061	.00667	70,089	67,409
36	6,787		6,787	.00828	56,332	56,332
37	4,182		4,182	.00864	35,982	35,982
38	4,285		4,285	.00864	36,851	36,851
39	2,811		2,811	.00900	25,299	25,299
40	131,894	1,000	130,894	.00900	1,187,046	1,178,046
42	887		887	.00988	8,781	8,781
43	467		467	.01064	4,950	4,950
44	140		140	.01064	1,484	1,484
45	981		981	.01140	11,183	11,183
46	280		280	.01140	3,192	3,192
47	233		233	.01216	2,843	2,843
48	140		140	.01292	1,708	1,708
50	192,842		192,842	.01292	2,487,662	2,487,662
	747,957	32,000	715,957			
			Yield above 18,000 pounds		$5,613,452	$5,474,511
			Yield above 24,000 pounds		$4,436,613	$4,397,773

[1] Considering empty vehicles on Virginia highways.

EXHIBIT C-2—Continued

COMPUTATION OF WEIGHT-DISTANCE TAX AT RATES IMPOSED BY NEW YORK STATE

Part III CALCULATION OF YIELD OF A WEIGHT-DISTANCE TAX AT RATES IMPOSED BY NEW YORK STATE PLUS 36.4 PERCENT

(Mileages used are the same as those shown on Part II)

Weight Brackets	New York Legal Rate Plus 36.4%	Effective Ave. Rate of the N. Y. State Tax Plus 36.4%	Yield of Weight--Distance Tax	
			On All Vehicles	On Mileages Excluding City Zone Exempt
(1)	(2)	(3)	(4)	(5)
19M	.00818	.00474	$ 327,013	$ 299,047
20	.00818	.00474	430,558	393,586
21	.00955	.00554	163,746	150,450
22	.00955	.00554	239,998	219,500
23	.01091	.00633	213,878	195,521
24	.01091	.00633	224,614	205,624
25	.01228	.00712	143,966	135,422
26	.01228	.00712	88,644	82,948
27	.01296	.00752	58,656	54,896
28	.01296	.00752	75,576	71,064
29	.01364	.00791	41,053	39,471
30	.01364	.00791	118,175	110,265
31	.01432	.00831	25,229	24,398
32	.01432	.00831	53,201	51,539
33	.01500	.00870	44,501	42,761
34	.01500	.00870	38,184	37,314
35	.01569	.00910	95,195	91,464
36	.01569	.01129	76,625	76,625
37	.01637	.01178	49,264	49,264
38	.01637	.01178	50,477	50,477
39	.01705	.01228	34,519	34,519
40	.01705	.01228	1,619,658	1,607,378
42	.01773	.01348	11,957	11,957
43	.01910	.01451	6,776	6,776
44	.01910	.01451	2,031	2,031
45	.02046	.01555	15,255	15,255
46	.02046	.01555	4,354	4,354
47	.02182	.01659	3,865	3,865
48	.02182	.01659	2,323	2,323
50	.02319	.01762[1]	3,397,876	3,397,876
	Yield above 18,000 pounds		$7,657,167	$7,467,970
	Yield above 24,000 pounds		$6,057,360	$6,004,242

[1] Or a little higher if the empty vehicle is taxable, e.g., .01882 if the empty vehicle weighs 23,000 pounds.

APPENDIX C

WEIGHT-DISTANCE TAX CALCULATION FOR MILEAGES OF TRAFFIC IN VIRGINIA, FOR-HIRE, PRIVATE, AND FOREIGN COMBINED

Introduction

Exhibits in this Appendix represent independent calculations and approximate arithmetical proof of weight-distance tax on the over-all freight-carrying vehicle mileage on Virginia highways, distributing the estimated tax by 1,000 pound weight brackets. As to the collectability of the amounts shown in these tables, the comments in the body of the report should be consulted.

Exhibit C-1 Computation of Weight-Distance Taxes at Rates Based on the Rates on Vehicles for Hire, Yielding $1,000,000

Exhibit C-1 presents calculations in detail by 1,000 pound brackets of the tax analyzed in Tables 2 and 3 in the body of the report. The effective rates are those appearing in Table 1, columns (2) and (4).

Exhibit C-2 Computation of Weight-Distance Tax at Rates Imposed by New York State

Exhibit C-2 presents calculations in detail of the tax described in Tables 4 and 5, with effective rates based on the New York State tax rate schedule and that schedule plus 36.4 percent appearing in Table 1, columns (6) and (8).

APPENDIX D

ESTIMATE OF TRUCK MILEAGE OF THE URBAN SYSTEMS

EXHIBIT D-1

ESTIMATE OF TOTAL AND EXEMPT TRUCK MILEAGE FOR THREE SELECTED CITIES

24-Hour Average Volume

Data from Origin and Destination Studies Conducted by
the Commonwealth of Virginia, Department of Highways

		Martinsville	Roanoke	Tricities (Norfolk, Portsmouth, South Norfolk)
1.	Year during which survey was conducted	1949	1952	1950
2.	Population (1950 census)	17,251	91,921	303,986
3.	Trucks traveling beyond 5-mile zone			
	a. Number of trips	1,881	5,673	5,898
	b. Average miles in city per trip	1.75	3.80	3.80
	c. Total number of miles in city	3,292	21,557	22,412
4.	Trucks moving between city and points within 5-mile zone			
	a. Number of trips	1,044	3,849	5,710
	b. Average miles in city per trip	1.75	3.80	3.80
	c. Total number of miles in city	1,827	14,626	21,698
	d. Average miles in 5-mile zone per trip	2.1	2.1	2.1
	e. Total number of miles in 5-mile zone	2,098	8,083	11,991
	f. Total number of exempt miles (c. plus e.)	3,925	22,709	33,689
5.	Intra-city traffic			
	a. Number of trips 1/	3,298	17,349 3/	51,350
	b. Average miles in city per trip	1.5	2.7	2.9
	c. Total number of miles in city (exempt)	4,947	46,842	148,915
6.	Through trips			
	a. Number of trips 2/	720	1,413	709
	b. Average miles in city per trip	4.0	7.6	7.6
	c. Total number of miles in city	2,880	10,739	5,388
7.	Total truck mileage in city for 24-hours at the dates of surveys	12,946	93,764	198,413
8.	Total exempt truck mileage for 24-hours at the dates of surveys	8,872	69,551	182,604
9.	Ratio of exempt to total mileage ((8) ÷ (7))	.69	.74	.92
10.	Percentage increase allowed for rise in volume of truck traffic from date of survey to June 30, 1953	45%	-	30%
11.	Total truck mileage in city adjusted for rise of traffic since date of survey ((7) + (10) x (7))	18,772	93,764	257,937
12.	Total exempt truck mileage adjusted for rise of traffic ((11) x (9))	12,864	69,551	237,385
13.	Adjusted truck mileage in city per capita, 1950 census, ((11) ÷ (2))	1.09	1.02	.85
14.	Adjusted exempt truck mileage per capita ((12) ÷ (2))	.74	.76	.78
15.	Number of miles of streets in city	69	327	618
16.	Average density per street mile ((10) ÷ (14))	278	287	417

1/ Actual counted number of trips was raised by 30 percent to include city trips originating and terminating entirely within one traffic zone.

2/ A small but unknown number of "through" trips originated and terminated within the 5-mile zone and, therefore, really should be classified as exempt mileage. However, the error in omitting this exempt mileage is believed to be too small to affect our totals appreciably.

3/ Only total number of vehicles in this category was available; ratio of trucks to total vehicles was estimated to be 25 percent on the basis of the ratio observed for Martinsville.

EXHIBIT D-2

ESTIMATE OF TOTAL AND EXEMPT TRUCK MILEAGE IN ALL CITIES AND OF TOTAL TRUCK MILEAGES IN INCORPORATED PLACES OTHER THAN CITIES
June 30, 1953
Data for Tricities, Roanoke, and Martinsville from Exhibit D-1
24-hour Average Volume

Independent Cities (1)	Population 1950 (2)	Street Miles 1953 (3)	City Truck Mileage Per Capita All (4)	City Truck Mileage Per Capita Exempt (5)	Total Truck Mileage in Cities (6)	Exempt Truck Mileage in Cities (7)	Exempt Ratio (7)÷(6) (8)	Average Density (6)÷(3) (9)
1. Tricities (Norfolk, South Norfolk, & Portsmouth	303,986	618	.85	.78	257,937	237,385	.92	4.17
2. Richmond	230,310	526	.92	.77	211,885	177,339	.83	4.03
3. Roanoke	91,921	327	1.02	.76	93,764	69,551	.74	2.87
4. Alexandria	61,787	132	1.04	.75	64,258	46,340	.72	4.85
5. Lynchburg	47,727	139	1.07	.75	51,068	35,795	.70	3.67
6. Newport News	42,358	72	1.07	.75	45,323	31,769	.70	6.25
7. Danville 1/	35,066	143	1.07	.90	37,521	31,559	.84	2.66
8. Petersburg	35,054	88	1.07	.75	37,508	26,291	.70	4.31
9. Charlottesville	25,969	80	1.08	.75	28,046	19,477	.69	3.50
10. Staunton	19,927	53	1.09	.75	21,720	14,945	.69	4.15
11. Martinsville	17,251	69	1.09	.74	18,772	12,864	.69	2.75
12. Bristol 1/	15,954	66	1.09	.91	17,390	14,518	.81	2.57
13. Winchester	13,841	34	1.09	.74	15,087	10,242	.67	4.41
14. Waynesboro	12,357	78	1.10	.74	13,593	9,144	.67	1.79
15. Suffolk 2/	12,339	33	1.06	.71	13,120	8,790	.67	3.93
16. Fredericksburg	12,158	37	1.10	.74	13,374	8,997	.67	3.51
17. Harrisonburg	10,810	35	1.11	.74	11,999	7,999	.67	3.42
18. Hopewell	10,219	50	1.12	.74	11,445	7,562	.66	2.50
19. Radford 2/	9,026	47	1.62	1.05	14,630	9,510	.65	3.19
20. Falls Church	7,535	24	1.16	.74	8,741	5,576	.63	3.75
21. Williamsburg 2/	6,735	18	.69	.44	4,655	2,933	.63	2.78
22. Colonial Heights	6,077	27	1.16	.74	7,049	4,497	.63	2.59
23. Hampton	5,966	13	1.18	.74	7,040	4,415	.63	5.38
24. Covington	5,860	33	1.18	.74	6,815	4,225	.62	2.19
25. Clifton Forge	5,795	18	1.18	.74	6,954	4,288	.62	3.89
26. Virginia Beach	5,390	43	1.18	.74	6,360	3,943	.62	1.40
27. Buena Vista 2/	5,214	54	1.12	.73	5,840	3,800	.65	1.12
Total cities	1,056,632	2,857	.97	.76	1,031,894	813,754	.79	3.61
Other incorporated places	365,035	1,432	1.20		364,674			2.55
Total cities and other incorporated places	1,421,667	4,289			1,396,568	813,754		3.25

1/ Recognition has been given to the fact that there are border cities with a higher than average proportion of exempt truck mileage.

2/ Exceptional local conditions influencing the density of truck traffic per street mile were taken into account.

APPENDIX D

ESTIMATE OF TRUCK MILEAGE OF THE URBAN SYSTEMS

Introduction

Total truck mileage traveled in the Commonwealth of Virginia in 1953 as obtained from V.P.I. was reconciled with independently estimated truck mileages of Virginia registered and foreign carriers as accumulated on the primary system, the rural secondary system, and the urban system of Virginia highways, streets, and roads.

This section of the report describes in some detail the method underlying the estimates of total and exempt truck mileage for the urban systems. The urban systems may be defined for the purpose of this appendix as that part of the total highway system for which the Department of Highways does not make traffic counts; the urban systems, therefore, consist of streets, roads, and urban extensions of primary highways in independent cities and other incorporated places. As of June 30, 1953 there were 29 independent cities and over 200 other incorporated places in the state. Three of the independent cities—Norfolk, South Norfolk, and Portsmouth—have been combined for the purpose of this study into one metropolitan unit referred to hereafter as the "Tricities."

Some of Traffic Data for Estimating Truck Mileage of Urban Systems

The origin and destination traffic studies conducted by the Commonwealth of Virginia, Department of Highways, were examined to determine if the reports contained data that could be used to estimate mileage traveled by trucks.

a. Within the city on through trips,

b. On intra-city trips,

c. On trips originating or terminating in the city and terminating or originating at points beyond a five-mile radius from the city's corporate boundaries, and

d. On such trips terminating or originating within the five-mile radius.

Data that could be classified in this manner were necessary in order to estimate both the total city truck mileage and total exempt truck mileage. Under present Virginia tax law, the city truck mileage of carriers for-hire accumulated on trips in categories (b) and (d) are exempt from the two percent gross receipts tax on for-hire carriers. It is regarded as a possibility that a weight distance tax may be enacted by the legislature. Such a tax may retain the five-mile radius exemption feature of the present gross receipts tax, but the tax base may be extended to include truck mileage by private and for-hire carriers, both in and out of state. The term "exempt truck mileage" in this appendix is used in this larger sense.

A survey of the material in the traffic reports indicated that completely uniform procedure was not followed in gathering traffic data—some reports gave only vehicle counts, others gave data relating to trips in and out of the city, but failed to give data concerning intra-city traffic. It is reported that in most cases the original tabulating cards containing the raw data obtained from each survey have codes identifying vehicles by

type of vehicle. However, many of the cards were unusable. Time for this study was too limited to have permitted a detailed analysis of basic records in order to break down the data published in the origin and destination reports into the desired categories. Finally, traffic survey reports covering three cities were chosen to make up the sample to be used in obtaining estimates of total and exempt truck mileage for the other 24 cities.

These cities, their population as of 1950 and their street mileage as of June 30, 1953 were as follows:

City	Population	Street Mileage
Tricities	303,986	618
Roanoke	91,921	321
Martinsville	17,251	69

The sample of three urban areas contains the largest metropolitan unit in the state, the third largest, and the eleventh largest city.

The Estimation Procedure for the Three Selected Cities

The calculations made to obtain city and exempt truck mileage for these three cities are shown in Exhibit D-1. The procedure followed is explained in the following paragraphs.

It may be noted first of all that the data underlying the traffic reports for the three urban areas were not collected at the same time—not even in the same year—and they represent the average 24-hour volume of traffic as observed during the week or weeks the survey actually was conducted. The data for the Tricities were gathered in 1950, those for Roanoke in 1952, and those for Martinsville in 1949. Since the estimates of urban truck mileage as derived in this report are to hold as of June 30, 1953, adjustments had to be made to increase actual truck traffic observed at the time of the survey by a factor that reasonably reflects the increase in truck traffic from all causes. This factor was estimated in consultation with members of the Department of Highways on the basis of knowledge of traffic conditions in the locality chosen.

The traffic surveys taken by the Department of Highways for the three cities reveal information relating to the number of trucks making trips of a specified nature; the surveys do not give mileage statistics. To convert the data in the reports into estimates of truck mileage, therefore, the average number of miles per trip had to be calculated for each trip category. Average trip mileages were arrived at by reading the length of typical truck routes through the selected cities from maps and by averaging these readings. An average trip length of 2.1 miles was used for trips in the five-mile radius on the basis of consultations with members of the Department of Highways.

Truck mileage traveled in the three cities and within the five-mile radius as measured from their corporate limits was obtained by multiplying the number of trucks counted by the average number of miles estimated to be required for the trip. This procedure was followed for each category of trip as listed in the trip classification presented previously.

A further adjustment in the number of trips had to be made to allow for the mileage accumulated on intra-city trips not included in the traffic counts. Because counts were made only at the city boundaries and at a cordon around the business center, the number of intra-city trips was increased by 30 percent to account for truck trips made solely within the cities'

business districts or within the zone outside the business district. The 30 percent estimate reflects the best judgment of those consulted.

The origination and destination report for the City of Roanoke did not classify vehicles in intra-city traffic by type of vehicle, i.e., passenger cars and trucks. The proportion of trucks in intra-city traffic to total vehicles was assumed, therefore, to be the same as that observed for intra-city traffic in Martinsville, or 25 percent of total vehicles. (This ratio of truck trips to total vehicle trips (mainly passenger trips) in intra-city traffic is not inconsistent with the finding of an over-all 14½ to 15 percent ratio of urban truck mileage to total urban vehicle mileage because passenger vehicles are very much more predominant in the flow in and out of the cities and towns.)

The procedure described above yielded estimates of total city truck mileage and tax exempt truck mileage. The steps in the procedure are shown line by line in Exhibit D-1.

Derivation of Estimates for the Other Cities and Towns

Next, the estimates were related to available data on population and number of street miles in order to obtain ratios of total city truck mileage and exempt truck mileage. Upon study of the relationships observed among the per capita ratios it seemed reasonable to formulate the following hypotheses:

a. Per capita city truck mileage increases slowly as the population of the cities decreases, and

b. Per capita exempt truck mileage decreases slowly as the population of the cities decreases.

Independent reasoning supports these conclusions. The larger a city the larger the mileage of roads and streets, other than urban extensions of primary highways. Relatively less truck mileage is accumulated, however, on the residential, relatively densely populated streets than on the main thoroughfares. In small cities and towns the network of side streets is relatively small as compared to the major thoroughfares, and the residential areas are not as densely populated as they are in the larger cities. Also the through traffic is generally far greater. The per capita truck mileage, therefore, should increase as the size of the city declines. On the other hand, relatively more exempt truck mileage is accumulated in larger cities than in smaller ones, because more intra-city trips will be made by delivery trucks, moving vans, and other service vehicles in an urban area with densely populated residential areas located some distance from the business district than in a smaller city having only a minor business district directly adjacent to residential areas.

The data in Exhibit D-2 showing total truck mileage traveled in cities and towns and exempt truck mileage for each city were derived by calculating series of per capita ratios of total city truck mileage and exempt truck mileage in accordance with these varying relationships as revealed by the three cities.

Final Adjustments of the Preliminary Results

Preliminary total truck mileage figures were obtained by multiplying the per capita ratio estimate for each city by the city's population, and in the case of the incorporated towns, the estimated average per capita ratio was multiplied by the population of all incorporated towns.

Also average density ratios were calculated by dividing the total street miles of each urban area into the total city truck mileage obtained by using per capita ratios and census population data. The pattern of these average density ratios was discused with members of the Department of Highways who are familiar with local conditions pertaining to truck traffic volume within cities. As the result of these discussions density ratios and, of course, the per capta ratios of the following cities were adjusted to the actual situation as judged by those who knew the city: Suffolk, Radford, Williamsburg, and Buena Vista.

Also the per capita ratio of exempt truck mileage of two border cities, Danville and Bristol, was raised significantly to allow for the relatively higher number of exempt truck trips made across the state line.

Total truck mileage for all cities and towns and total exempt truck mileage in all cities were multiplied by 365 in order to put the average 24-hour mileage estimates on an annual basis. As the result of this calculation these totals were obtained:

Total truck mileage in cities	377 million miles
Total truck mileage in towns	133 million miles
Total truck mileage in the urban systems	510 million miles
Total exempt truck mileage	297 million miles

These totals are distributed by weight bracket as follows:

Distribution of Total Urban and Exempt Truck Mileage by Weight Bracket

	Urban Systems		Exempt Mileage[1]	
Weight Bracket	Millions of Miles	Percent	Millions of Miles	Percent
Under 10M lbs	375 [2]	73	215	73
11-15	42	9	26	9
16-20	61	12	38	12
20-24	20	4	12	4
25-30	7	1	4	1
31-35	1	[3]	1	1
Sub-total	506	99	296	100
36-40	2	[3]	1	....
41-50	2	[3]	....	....
Sub-Total	4	1	1	....
Total	510	100	297	100

[1] "Exempt" is defined in the text and is the total truck mileage wholly within the city zone defined by the present gross receipts tax on carriers for-hire.

[2] The single truck distribution is made according to the limited sampling urban parts of the secondary "rural" system and is not to be considered to be very accurate.

[3] Less than one percent.