

## APPENDIX A

## TRUCK AND BUS OPERATIONS OF RAILROADS, ELECTRIC RAILWAYS, AND CARRIERS BY WATER AS REPORTED IN QUESTIONNAIRE

*(a) Intercorporate relationships of rail and motor carriers*

There are four ways in which carriers subject to the act engage or participate in motor-vehicle operations, (1) directly as part of their other operations, (2) through subsidiary companies, organized for the purpose or acquired by purchase of existing operations, (3) through acquiring a stock interest in independent companies, and (4) by means of contracts with independent operators.

Direct operations are limited in number and are illustrated by certain minor operations of the Monongahela Railway and Chicago, Milwaukee, St. Paul and Pacific Railroad. Here the investment in motor-vehicle facilities and the results of operations are merged with and made a part of the rail operations.

The second type is the most common. Examples are Boston and Maine Transportation Company of the Boston and Maine Railroad, New England Transportation Company of the New York, New Haven and Hartford Railroad, Southwestern Transportation Company, subsidiary of the St. Louis Southwestern Railroad, and Interstate Transit Lines, jointly owned by the Union Pacific and the Chicago and North Western. In this case the general practice is to maintain separate investment and operating accounts for the subsidiary, only the final results being taken into the books of the parent company. However, as indicated by part (d) below, there are instances in which the accounting is merged with that of the rail carrier. Provisions for the distribution of joint expenses and for intercompany payments for services rendered vary considerably. In some cases the subsidiary itself enters into contracts with independent operators.

The third type is illustrated by the interests which railroads have acquired in various of the Greyhound companies, as set forth in Appendix D. In some instances the interest is held through the agency of a holding company. Thus through Pennsylvania Greyhound Lines, Incorporated, the Pennsylvania Railroad has a half-interest in eight bus lines whose property investment totals \$5,935,067, and through American Contract and Trust Company it has substantial interests in seven trucking companies.

Operations by contract with independent truck companies are especially numerous on the New York Central and the Pennsylvania. The expense incurred is entered in the operating accounts of the railroads.

Descriptions of the types of operation conducted under the foregoing arrangements are found in Section V of text of report.

*(b) Extent of truck operations of Class I<sup>1</sup> railroads, January 1 to June 30, 1930*

During the period January 1 to June 30, 1930, 18 Class I railroads engaged in intercity or terminal motor trucking operations on one or more of the three

<sup>1</sup> Class I companies are those having annual operating revenues above \$1,000,000; Class II companies are those having annual operating revenues from \$100,000 to \$1,000,000; and Class III companies are those having annual operating revenues below \$100,000.

bases first indicated in (a) above. Operations were over about 8,865 miles of intrastate and 1,547 miles of interstate route. Some 551 trucks and 115 trailers were used.<sup>3</sup> The traffic reported by 13 of these companies totaled 413,259 tons, on which revenue of \$1,385,369 was earned. Complete separation between State and interstate traffic is not possible from the information at hand. The details by companies are shown in the accompanying table. In addition, there are contract operations of the character previously indicated.

TABLE I.—Motor-truck operating data of Class I railroads for period January 1 to June 30, 1930

Carrier	Number of trucks	Number of trailers	Miles of route:		Tons		Freight revenue	
			Intra-state	Inter-state	Total	Inter-state	Total	Inter-state
<b>New England region:</b>								
Boston & Maine R. R.	131	44	1,779	178	177,859	2,500	\$409,865	(1)
Maine Central R. R.	3		50		375		4,334	
New York, New Haven & Hartford R. R.	109		1,364	537	96,363	(1)	128,686	(1)
<b>Total</b>	<b>243</b>	<b>44</b>	<b>3,193</b>	<b>715</b>	<b>274,597</b>		<b>672,885</b>	
<b>Central-eastern region:</b>								
Baltimore & Ohio R. R.	25		21	18	12,078	1,279	24,067	(1)
Central R. R. Co. of New Jersey	2	1	65		1,029	(1)	10,104	
Pennsylvania R. R. system	158	40	2,484	513	97,236	15,658	498,081	\$64,020
Reading Co. and Atlantic City R. R.	2		56					
<b>Total</b>	<b>187</b>	<b>41</b>	<b>2,627</b>	<b>531</b>	<b>110,343</b>		<b>532,252</b>	
<b>Great Lakes region:</b>								
Monongahela Ry.	3		43			2,206		3,922
<b>Southern region:</b>								
Central of Georgia Ry.	4		111			2,642		7,757
<b>Northwestern region:</b>								
Chicago, St. Paul, Minneapolis & Omaha Ry.	38	1	953	225	13,888	3,531	92,933	24,291
Great Northern Ry.	1		74		54		37	
<b>Total</b>	<b>39</b>	<b>1</b>	<b>1,027</b>	<b>225</b>	<b>13,942</b>	<b>3,531</b>	<b>92,970</b>	<b>24,291</b>
<b>Central-western region:</b>								
Chicago, Rock Island & Pacific Ry. (Including Chicago, Rock Island & Gulf Ry.)					3,897		5,449	
Denver & Rio Grande Western R. R.	16		541		5,056		64,943	
Southern Pacific Co.	16		135		476		5,191	
<b>Total</b>	<b>32</b>		<b>676</b>		<b>9,529</b>		<b>75,583</b>	
<b>Southwestern region:</b>								
St. Louis Southwestern Ry.	42	29	1,179	76		(1)	195,403	(1)
Texas & Pacific Ry.	1		9					
<b>Total</b>	<b>43</b>	<b>29</b>	<b>1,188</b>	<b>76</b>			<b>195,403</b>	
<b>Total United States</b>	<b>551</b>	<b>115</b>	<b>8,865</b>	<b>1,547</b>	<b>413,259</b>		<b>1,580,802</b>	

<sup>1</sup> Information not reported.

<sup>2</sup> Excludes \$14,305 compensation received on mail contracts.

(c) *Extent of bus operations of Class I railroads, January 1 to June 30, 1930*

During the above period 34 Class I railroads conducted bus operations, directly, through subsidiary companies or through companies in which a financial interest is held. Some 3,105 busses were used and operations were over 38,169 miles of intrastate and 27,632 miles of interstate route compared with

182 I. C. C.

<sup>3</sup> In 1927, 114 trucks and 34 trailers were in use.

745 busses operated over 2,856 miles of intrastate and 1,051 miles of interstate route in 1927. In all, 35,931,000 passengers were carried<sup>a</sup> or, excluding city operations, 20,007,554. The total passenger revenue accrued, including that from city service, was \$16,182,029.<sup>b</sup> Complete separation between State and interstate traffic is not possible from the information at hand. The details by companies are given in the accompanying table. In addition, there are operations conducted under contract with independent companies.

TABLE II.—Motor-bus operating data of Class I railroads for period January 1 to June 30, 1930

Carrier	Number of busses	Miles of route		Passengers		Passenger revenue	
		Intra-state	Inter-state	Total	Interstate	Total	Interstate
<b>New England region:</b>							
Boston and Maine R. R.....	95	338	598	715,338	246,315	\$229,611	\$183,415
Maine Central R. R.....	5	39	-----	12,130	-----	7,184	-----
New York, New Haven and Hartford.....	638	1,788	2,175	22,329,569	3,782,269	3,156,013	1,149,830
Rutland R. R.....	2	-----	67	4,439	-----	1,215	1,101
<b>Total.....</b>	<b>740</b>	<b>2,145</b>	<b>2,840</b>	<b>23,061,276</b>	<b>4,032,866</b>	<b>3,304,023</b>	<b>1,334,346</b>
<b>Central-eastern region:</b>							
Baltimore & Ohio R. R.....	27	603	60	153,813	653	102,496	788
Central R. R. Co. of New Jersey.....	9	44	287	59,918	( <sup>1</sup> )	30,239	( <sup>1</sup> )
Pennsylvania R. R. system.....	430	4,501	3,328	3,325,524	447,512	2,954,611	633,014
Reading Co. and Atlantic City R. R.....	73	504	275	448,311	101,250	215,861	111,853
<b>Total.....</b>	<b>539</b>	<b>5,652</b>	<b>3,950</b>	<b>4,017,566</b>	-----	<b>3,303,207</b>	-----
<b>Poconantas region:</b>							
Richmond, Fredericksburg & Potomac R. R.....	16	53	113	99,809	61,997	127,559	122,317
<b>Southern region:</b>							
Atlanta & West Point R. R.....	4	136	-----	26,065	57	9,720	56
Central of Georgia Ry.....	5	145	-----	7,612	-----	3,803	-----
Georgia R. R., Lessee Organization.....	4	136	-----	26,065	57	9,720	56
Illinois Central R. R.....	1	99	-----	5,096	-----	7,901	-----
Nashville, Chattanooga & St. Louis Ry.....	3	27	-----	5,432	-----	3,664	-----
Norfolk Southern R. R.....	8	36	-----	101,211	-----	24,347	-----
Seaboard Air Line Ry.....	7	166	-----	14,251	-----	24,202	-----
Southern Ry.....	3	131	-----	6,187	-----	5,585	-----
<b>Total.....</b>	<b>31</b>	<b>740</b>	-----	<b>165,806</b>	<b>57</b>	<b>79,223</b>	<b>56</b>
<b>Northwestern region:</b>							
Chicago and North Western Ry.....	198	1,356	4,674	493,360	( <sup>1</sup> )	1,006,537	( <sup>1</sup> )
Chicago, Milwaukee, St. Paul & Pacific R. R.....	4	107	-----	11,354	-----	5,457	-----
Great Northern.....	218	4,981	4,593	1,817,450	( <sup>1</sup> )	1,568,018	-----
Spokane, Portland & Seattle Ry.....	34	209	-----	83,338	-----	78,857	-----
<b>Total.....</b>	<b>250</b>	<b>5,297</b>	<b>4,563</b>	<b>1,912,178</b>	-----	<b>1,652,332</b>	-----
<b>Central-western region:</b>							
Chicago and Alton R. R.....	10	114	-----	23,251	-----	14,140	-----
Chicago, Burlington and Quincy R. R.....	38	623	193	119,958	23,054	121,713	27,458
Colorado and Southern Ry.....	23	269	-----	77,625	-----	93,011	-----

See footnotes at end of table.

<sup>a</sup> Excluding Southwestern Transportation Company, which did not report the number of passengers carried.

TABLE II.—Continued.

Carrier	Number of busses	Miles of route		Passengers		Passenger revenue	
		Intra-state	Inter-state	Total	Interstate	Total	Interstate
<b>Central-western region.—Cont.</b>							
Denver and Rio Grande Western R. R.	39	1,151	.....	45,068	.....	120,872	.....
Southern Pacific Co.	648	13,153	6,443	4,383,250	335,761	4,007,634	1,056,637
<b>Union Pacific system:</b>							
Los Angeles and Salt Lake R. R.	73	534	105	9,115	( <sup>1</sup> )	45,041	( <sup>1</sup> )
Oregon Short Line R. R.	87	1,554	1,703	276,943	( <sup>1</sup> )	447,374	( <sup>1</sup> )
Union Pacific R. R.	188	1,356	4,574	493,360	( <sup>1</sup> )	1,006,537	( <sup>1</sup> )
<b>Total</b>	<b>1,106</b>	<b>18,754</b>	<b>13,408</b>	<b>5,428,600</b>	.....	<b>8,944,331</b>	.....
<b>Southwestern region:</b>							
Missouri Pacific R. R.	192	2,341	1,488	605,408	76,495	557,772	68,048
St. Louis Southwestern Ry.	74	995	1,195	.....	( <sup>1</sup> )	177,423	( <sup>1</sup> )
Texas and New Orleans R. R.	147	2,192	35	505,313	10,916	940,680	16,874
Texas and Pacific Ry.	4	.....	.....	44,891	.....	3,450	.....
<b>Total</b>	<b>417</b>	<b>5,528</b>	<b>2,728</b>	<b>1,245,612</b>	.....	<b>1,679,355</b>	.....
<b>Total United States</b>	<b>3,105</b>	<b>38,160</b>	<b>27,632</b>	<b>35,930,847</b>	.....	<b>16,182,029</b>	.....

<sup>1</sup> Includes 15,923,203, representing fares collected in city service.

<sup>2</sup> Includes 130,305 representing fares collected.

<sup>3</sup> Information not reported.

<sup>4</sup> Returns duplicated in report of Georgia R. R. Lessee Organization; eliminated from totals.

<sup>5</sup> Returns duplicated in report of Union Pacific R. R.; eliminated from totals.

(d) *Financial results of truck and bus operations of Class I railroads, year ended December 31, 1929*

Returns of the carriers to our questionnaire do not in all cases make it possible to show separately the results of their freight and passenger operations. The accompanying table gives the names of the operating companies, their investment in motor facilities, the extent of the railroad's interest in each, the net operating income, and the net income. The total investment on December 31, 1929, was \$46,114,891. Of the companies for which complete information was returned 20 reported operating incomes ranging from \$457 to \$866,356 and aggregating \$2,036,054, while 27 reported operating deficits ranging from \$672 to \$264,285 and aggregating \$868,185. After making various corporate adjustments, 21 companies had net income totaling \$1,547,967, and 26 had net deficits totaling \$942,268. Offsetting many of the deficits shown are savings resulting from the removal of unprofitable train service.

182 I. C. C.

TABLE III.—Investment in property and results of operations of motor companies controlled in whole or in part through stock ownership by Class I railroads (year ended December 1, 1929)<sup>1</sup>

Name of railroad and motor company (1)	Property investment (2)	Extent of control (3)	Operating revenues (4)	Operating expenses (5)	Taxes (6)	Equip- ment rents (7)	Net oper- ating in- come <sup>2</sup> (8)	Other income items <sup>3</sup> (9)	Net in- come <sup>1</sup> (10)
Atlanta & West Point R. R.:		<i>Per cent</i>							
Georgia Highway Transp. Co.-----	\$24,769	50	\$8,813	\$9,863	\$508	\$22	\$1,580	\$139	\$1,441
Baltimore & Ohio R. R.:									
Blue Line Transfer Co. <sup>4</sup> -----	63,596	100	( <sup>5</sup> )	( <sup>5</sup> )	( <sup>5</sup> )	( <sup>5</sup> )	( <sup>5</sup> )	( <sup>5</sup> )	( <sup>5</sup> )
Public Service Coordinated Trans. <sup>4</sup> -----	19,956	100	( <sup>5</sup> )	( <sup>5</sup> )	( <sup>5</sup> )	( <sup>5</sup> )	( <sup>5</sup> )	( <sup>5</sup> )	( <sup>5</sup> )
West Virginia Transportation Co.-----	387,316	100	135,966	150,820	10,389	( <sup>5</sup> )	25,243	10,158	35,401
Boston & Maine R. R.:									
B. & M. Transportation Co. <sup>4</sup> -----	728,921	100	( <sup>5</sup> )	( <sup>5</sup> )	( <sup>5</sup> )	( <sup>5</sup> )	( <sup>5</sup> )	( <sup>5</sup> )	\$ 25,006
Central of Ga. Ry.:									
C. of Ga. Motor Transport.-----	42,929	92	25,043	33,244	1,890	( <sup>5</sup> )	10,091	1,588	11,679
Central R. R. of N. J.:									
Jersey Central Transp. Co.-----	35,632	100	30,693	25,383	1,030	52	4,228	68	4,296
Chicago & Alton R. R.:									
Alton Transp. Co.-----	90,000	100	36,604	47,748	2,112	12	15,228	9	13,259
Gadberry Transp. Co.-----	6,485	100	7,309	11,151	260	6	4,108	-----	4,108
Ritter Motor Bus Co.-----	6,443	100	9,951	14,815	569	16	5,449	-----	5,449
Chicago & North Western Ry.:									
Interstate Transit Lines (see Union Pacific R. R.)-----									
Chicago, Burlington & Quincy:									
Burlington Transp. Co.-----	299,109	100	89,425	156,592	6,237	( <sup>5</sup> )	73,404	5,816	67,588
Chicago, Milw. St. P. & Pac. R. R.:									
C. M. St. P. & Pac. (rail operations)-----	44,305	100	( <sup>5</sup> )	( <sup>5</sup> )	( <sup>5</sup> )	( <sup>5</sup> )	( <sup>5</sup> )	( <sup>5</sup> )	( <sup>5</sup> )
Chicago, St. P. M. & O. Ry.:									
Wilson Transp. Co.-----	257,837	100	65,443	64,647	1,980	156	1,540	-----	1,540
Colorado & Southern Ry.:									
Denver & Interurban Co.-----	115,293	100	108,004	80,565	5,939	766	14,724	2,960	17,694
Denver, Col. Springs, Pueblo Motor Way (see Denver & R. G. Western)		25							
Denver & Rio Grande Western:									
Denver, Col. Springs, Pueblo Motor Way-----	94,596	50	95,394	80,084	4,458	( <sup>5</sup> )	10,852	-----	10,852
Rio Grande Motor Way-----	39,615	80	58,632	41,771	2,523	( <sup>5</sup> )	14,338	-----	14,338
Rio Grande, Motor Way of Utah-----	62,185	80	7,695	9,187	246	( <sup>5</sup> )	1,728	-----	1,728
Western Slope Motor Way-----	69,276	( <sup>5</sup> )	108,298	80,970	5,560	( <sup>5</sup> )	21,768	-----	21,768
Georgia Railroad:									
Georgia Highway Transp. Co. (see Atlanta & West Point R. R.)-----		50							
Great Northern Ry.:									
Northland Transportation Co. <sup>4</sup> -----	3,707,164	30	( <sup>5</sup> )	( <sup>5</sup> )	( <sup>5</sup> )	( <sup>5</sup> )	( <sup>5</sup> )	( <sup>5</sup> )	( <sup>5</sup> )
Northland Greyhound Lines, Inc. of Ill. <sup>4</sup> -----	1,650,646	30	( <sup>5</sup> )	( <sup>5</sup> )	( <sup>5</sup> )	( <sup>5</sup> )	( <sup>5</sup> )	( <sup>5</sup> )	( <sup>5</sup> )
Great Northern Ry. <sup>4</sup> -----	2,273	100	( <sup>5</sup> )	( <sup>5</sup> )	( <sup>5</sup> )	( <sup>5</sup> )	( <sup>5</sup> )	( <sup>5</sup> )	( <sup>5</sup> )
Illinois Central R. R.:									
Central Transp. Co. (Iowa)-----	11,466	100	10,524	8,126	( <sup>5</sup> )	3,070	678	-----	678

See footnotes at end of table.

TABLE III.—Investment in property and results of operations of motor companies controlled in whole or in part through stock ownership by Class I railroads (year ended December 1, 1929)<sup>1</sup>—Continued

Name of railroad and motor company (1)	Property investment (2)	Extent of control (3)	Operating revenues (4)	Operating expenses (5)	Taxes (6)	Equipment rents (7)	Net operating income <sup>2</sup> (8)	Other income items <sup>3</sup> (9)	Net income <sup>4</sup> (10)
Maine Central R. R.: The SamOset Co. <sup>1</sup> .....	49,703	100	30,700	40,583	512	(9)	10,395	.....	10,395
Missouri Pacific R. R.: Mo. Pac. Transp. Co.....	1,491,505	100	1,011,607	1,031,520	74,745	(9)	94,658	2,103	96,568
Monongahela Ry.: Monongahela Ry. Trucks <sup>1</sup> .....	7,490	100	(9)	(9)	(9)	(9)	(9)	(9)	(9)
Nashville, Chattanooga & St. L.: M. C. & St. L. Motor Transit.....	42,949	100	10,996	23,651	2,309	174	16,138	.....	16,138
New York, New Haven & Hartford R. R.: Berkshire Street Ry. <sup>1</sup> .....	69,107	100	(9)	(9)	(9)	(9)	(9)	(9)	(9)
County Transp. Co. (Inc.).....	509,384	100	949,675	468,164	33,359	(9)	148,152	131,602	16,350
Connecticut Co. <sup>1</sup> .....	1,538,219	100	(9)	(9)	(9)	(9)	(9)	(9)	(9)
New England Transp. Co.....	4,822,584	100	3,257,581	2,958,870	207,328	(9)	91,383	171,269	79,886
Soundview Transp. Co. <sup>1</sup> .....	803	99.6	81,067	32,142	2,255	54,014	7,344	693	8,037
Springfield St. Ry. <sup>1</sup> .....	592,635	99.9	(9)	(9)	(9)	(9)	(9)	(9)	(9)
Worcester Consol. St. Ry. <sup>1</sup> .....	864,435	61.7	(9)	(9)	(9)	(9)	(9)	(9)	(9)
Norfolk Southern R. R.: Norfolk Southern Bus Corporation <sup>1</sup> .....	41,226	100	48,511	51,403	2,122	(9)	8,014	142	8,156
Pennsylvania R. R. <sup>1</sup> : Buffalo Interurban Bus Lines.....	97,353	50	108,156	87,747	4,078	(9)	14,331	747	13,584
Buffalo Storage & Carting Co. (Inc. Keystone Trans. Co.).....	287,627	84.9	240,223	213,629	3,902	(9)	22,692	.....	22,692
Cambria Bus Co.....	71,038	(9)	35,721	35,459	3,701	(9)	3,489	5,692	2,233
Greyhound Lines, Inc.....	2,400,322	50	4,287,189	3,735,838	(9)	(9)	551,351	282,648	268,703
Interstate Highway Limited.....	163,547	50	336,378	280,438	(9)	(9)	58,940	11,458	44,505
Kane, Mt. Jewett Transit Co.....	25,025	(9)	15,142	14,224	461	(9)	457	1,008	1,465
Merchants Trucking Co. (Norfolk).....	18,136	69.1	7,863	6,235	(9)	(9)	1,628	.....	1,628
Montgomery Bus Co., Inc.....	252,622	50	244,707	207,430	10,627	(9)	26,650	6,777	19,873
Penna. General Transit Co.....	374,149	50	118,288	119,302	6,781	(9)	7,793	10,537	2,742
Penna. Indiana General Trans.....	7,124	50	5,529	10,776	106	(9)	5,353	5,977	624
Penna. Illinois Gen. Trans.....	54	60	(9)	(9)	(9)	(9)	(9)	(9)	(9)
Penn. Transfer Co. of Pgh.....	240,194	59.2	225,582	230,701	802	(9)	4,079	1,454	5,537
Peoples Rapid Transit Co.....	1,567,949	50	1,339,992	1,161,747	51,457	(9)	126,788	78,258	48,530
Phila. Suburban Transit Co.....	139,024	50	83,320	121,000	4,569	(9)	48,249	2,594	44,643
Penna. Virginia Transit Co.....	97	50	(9)	(9)	(9)	(9)	(9)	(9)	(9)
Del. Mar. Va. Transport Co.....	277	100	(9)	(9)	(9)	(9)	(9)	(9)	(9)
Reading Co.: Reading Transp. Co.....	744,739	100	434,287	492,202	(9)	(9)	32,085	2,443	34,628
Rich. Fred. & Potomac R. R.: R. F. & P. Transp. Co.....	125,000	100	(9)	(9)	(9)	(9)	(9)	(9)	(9)
Richmond-Greyhound Lines.....	105,000	49	(9)	(9)	(9)	(9)	(9)	(9)	(9)

Rutland R. R.:										
Rutland Transp. Corp.....	15, 110	100	2, 781	9, 685	433	(9)	7, 337	303	7, 034	
St. Louis Southwestern Ry.:										
Southwestern Transp. Co.....	1, 048, 558	100	722, 674	952, 140	34, 819	(9)	264, 285		264, 285	
Seaboard Air Line Ry.:										
Motor Transp. Co. of the South.....	55, 191	100	59, 195	65, 490	665	425	7, 375	5, 898	18, 871	
Southern Pacific Co.:										
Pacific Greyhound Corp. and subsidiaries <sup>1</sup> <sup>11</sup>	10, 390, 867	(1)	9, 336, 894	7, 981, 081	539, 457	(9)	866, 356	124, 685	991, 041	
San Jose Railroads <sup>1</sup> <sup>11</sup>	5, 693	100	(9)	(9)	(9)	(9)	(9)	(9)	(9)	
Stockton Electric R. R. <sup>1</sup> <sup>11</sup>	11, 139	100	(9)	(9)	(9)	(9)	(9)	(9)	(9)	
Pacific Electric Ry. <sup>1</sup>	1, 890, 301	100	(9)	(9)	(9)	(9)	(9)	(9)	(9)	
Pacific Motor Transp. Co. <sup>1</sup>	2, 214	100	(9)	(9)	(9)	(9)	(9)	(9)	(9)	
Motor Transit Co. <sup>1</sup>	2, 497, 379	66.7	567, 533	611, 445	(9)	(9)	45, 918	5, 174	38, 738	
Los Angeles Motor Coach Co. <sup>11</sup>	(9)	50	(9)	(9)	(9)	(9)	(9)	(9)	(9)	
Spokane, Portland & Seattle Ry.:										
S. P. & S. Transp. Co.....	274, 464	100	239, 472	210, 014	20, 567	(9)	8, 891	9, 405	514	
Texas & New Orleans R. R.:										
Southland Greyhound Lines, Inc.....	2, 158, 102	35.21	1, 023, 187	1, 001, 136	<sup>11</sup> 2, 700	(9)	19, 351	14, 687	4, 824	
Texas & Pacific Ry.:										
Hollywood Transp. Co.....	5, 343	50	3, 844	8, 341	297	(9)	4, 774		4, 774	
Texas-Pacific Coaches, Inc.....	26, 473	100	1, 839	7, 244	324	100	5, 829		5, 829	
Union Pacific system:										
Interstate Transit Lines <sup>11</sup>	1, 745, 373	78	650, 195	718, 186	41, 697	(1)	100, 688	1, 668	108, 350	
Union Pacific Stage, Inc.....	1, 016, 577	100	558, 892	606, 317	47, 922	10, 360	105, 717	1, 081	106, 798	
Union Pacific Stage Co. <sup>1</sup>	118, 140	100	(9)	(9)	(9)	(9)	(9)	(9)	(9)	
Utah Parks Co. <sup>11</sup>	438, 935	100	(9)	(9)	(9)	(9)	(9)	(9)	(9)	
Total, United States.....	46, 114, 891									

<sup>1</sup> Includes direct operations of motor vehicles by Chicago, Milwaukee, St. Paul & Pacific R. R., Great Northern Ry., and Monongahela Ry.

<sup>11</sup> Italics indicates deficit.

<sup>1</sup> Investment as of June 30, 1930.

<sup>1</sup> Investment included in railroad company's accounts.

<sup>1</sup> Data not available.

<sup>1</sup> Not segregated in income statement.

<sup>1</sup> Includes \$717,287 carried in miscellaneous physical property accounts of Boston & Maine Railroad Company.

<sup>1</sup> Results of operations of B. & M. Transportation Co. as reported by Boston & Maine R. R. Co. in annual report to Interstate Commerce Commission.

<sup>1</sup> Motor-coach service is operated jointly as a part of regular street-car service; investment figures represent motor-coach proportion of total property investment.

<sup>11</sup> Investment figures represent owned property only; practically all equipment in use is rented.

<sup>11</sup> In addition to the investments in motor transportation companies shown above as controlled by the Pennsylvania R. R. the carrier through the American Contract & Trust Co. owns stock in the following-named motor companies: Baltimore Transfer Co. of Baltimore, 36.7 per cent; Cleveland Cartage Co., 45 per cent; Edwards Transfer Co., 40 per cent; Moreton Truck Co., 40 per cent; Scott Bros., Inc., 25 per cent; Union Transfer Co., 30 per cent; Willett Co., 33.3 per cent; Greyhound Corporation (common), 8.6 per cent; and (preferred) 10.9 per cent. Investment figures, revenues, and expenses of these motor companies not available.

<sup>11</sup> No operations.

<sup>11</sup> Operating companies as of June 30, 1930, were Pacific Greyhound Lines, Inc., California Parlor Tours Co., and Union Transportation Co.

<sup>11</sup> From Jan. 1, 1929, to Apr. 1, 1930, holding company was styled "Pacific Transportation Securities, Inc.," name changed Apr. 1, 1930, to Pacific Greyhound Corporation. Southern Pacific Company, Pickwick Corp., and Greyhound Corp., each own 33½ per cent of stock of Pacific Greyhound Corporation.

<sup>11</sup> Investment in motor vehicles only.

<sup>11</sup> Not a corporation, but an agency operating coaches for the Pacific Electric Ry. and Los Angeles Ry. Corporation; each railway owns one-half interest in equipment.

<sup>11</sup> Federal taxes only; other taxes not segregated in income statement.

<sup>11</sup> Operating figures applicable to the six months ended Dec. 31, 1929.

(e) Summary of motor operations of Class II and Class III steam railroads, electric railways, and carriers by water

The information returned by these carriers was incomplete in many particulars. The following summary gives the number of companies conducting truck and bus operations under one or more of the arrangements indicated in (a) above:

Class of carrier	Truck operations		Bus operations	
	Dec. 31, 1927	June 30, 1930	Dec. 31, 1927	June 30, 1930
Class II railroads.....	0	8	5	12
Class III railroads.....	1	6	6	11
Electric railways.....	4	10	43	47
Carriers by water.....	6	9	2	2

## APPENDIX B

## ESTIMATES OF VOLUME AND DISTRIBUTION OF TRUCK TRAFFIC

## (a) Estimates of volume of intercity truck traffic

In the absence of comprehensive information as to the volume of highway trucking, resort must be had to estimates. The earliest estimate appears to have been that of a representative of the Bureau of Public Roads, according to which all trucks in 1925 performed 10,356,000,000 ton-miles of service. In making this estimate it was assumed, according to the information then available, that trucks made an average of 10,000 miles per year, that their average capacity was 1.25 tons, that they moved under load two-thirds of the time, and that their average loading was 80 per cent of capacity. As it was further estimated that one-half of the truck mileage was made in local service, to obtain the volume of intercity trucking the above amount would have to be reduced by one-half or to 8,178,000,000 ton-miles. The latter figure is 1.96 per cent of the revenue ton-miles of all railroads in the same year.

This estimate has frequently been extended to more recent dates by allowing for the increase in the number of trucks. Thus the total for 1928 has been set at 10,276,000,000 ton-miles. This figure has been used along with other information to obtain the following distribution of traffic between the various agencies of transportation in that year. Corresponding figures for 1929 are also given.

Agency	1928 <sup>1</sup>	1929 <sup>2</sup>
Steam railroads.....	Per cent 77.55	Per cent 75.8
Great Lakes.....	14.17	15.0
Pipelines.....	4.87	4.9
Inland waterways (rivers and canals).....	1.52	1.8
Motor trucks (intercity).....	1.87	2.5
Electric railways and airplanes.....	.21	.5
Total.....	100.00	100.00

<sup>1</sup> From Bureau of Railway Economics, "An Economic Survey of Inland Waterway Transportation in the United States," 1930, page 28.

<sup>2</sup> From article by J. H. Parmelee in Mechanical Engineering, March, 1931.

<sup>3</sup> Represents revenue and nonrevenue freight. For the purpose in hand, nonrevenue freight should be excluded.



These estimates understate the present volume of truck traffic. (a) The average capacity of trucks engaged in intercity operations is greater than the 1.25 tons assumed. A survey of traffic on the main highways of 11 western States, made in 1929 and 1930 by the Bureau of Public Roads in cooperation with the State highway departments, indicates a weighted-average capacity of 1.82 tons. The States embraced in the survey are predominantly agricultural in character and use, for the most part, trucks of smaller capacity than are required in industrial sections. In California, whose traffic is more nearly akin to that of highly populated eastern States, the average capacity is 2.20 tons. For more general information, use may be made of the average capacity of trucks produced. In 1924 this average was 1.45 tons, in 1927, 1.44, and in 1930, 1.64; for the three years the average is 1.52 tons. Assuming that all trucks of 0.75 ton capacity and one-half of those of 1 to less than 1.5 tons capacity are used in city service exclusively, the average capacity of the remaining trucks produced in 1927 and 1930 is 1.88 tons. A survey of traffic in 42 States being made jointly by the Department of Commerce and the Bureau of Public Roads and confined to common and contract-carrier trucks indicates much higher average capacities. Only 11 per cent of the 2,909 trucks surveyed were of 1.5 to 3 tons capacity, 60 per cent being from 3.5 to 5 tons capacity, and 29 per cent of over 5 tons capacity. Had privately operated trucks and trucks used on the less important highways and by smaller operators been included, the average would have been considerably less. In view of all the foregoing, it is reasonable to assume that the average truck of every class used in intercity service has a capacity of 2.25 tons. To allow for the operation of trailers, this figure will be increased to 2.50 tons.

(b) Capacity does not measure actual loading. Loading beyond rated capacity is characteristic of many truck operations. Data available for a group of trucks indicate an average overloading in this sense of 22 per cent. Overloading was found to occur principally as to the intermediate sizes of trucks, being absent in the case of the smallest and largest vehicles. The sample is not, however, representative of general conditions and, in any event, the overloading would tend to occur at points of departure and to diminish progressively to the extent that deliveries are made en route. Further, it is a matter of general observation that truck operators commonly experience difficulty in securing full loads, particularly on return trips. Increased truck operations in recent years have added to this difficulty. It therefore is reasonable to continue the assumption of the 1925 estimate that trucks under load average an 80 per cent loading in terms of capacity.

(c) Closely related to the foregoing is the amount of empty mileage. Much truck traffic (as cotton, coal, petroleum products, assembled automobiles, and sand, gravel, and other deliveries direct to job) is practically one-way traffic, and much other traffic (as livestock and fruits and vegetables) is poorly balanced as to outbound and return loads. In the absence of any convincing proof to the contrary, the assumption of the earlier estimate that one-third of all intercity truck mileage is empty mileage will be continued.

(d) The improvement of highways and trucks and particularly the increased use of pneumatic tires in recent years indicate that the assumption of 10,000 miles of operation per annum is low under present conditions. In the Department of Commerce and Bureau of Public Roads survey referred to above the annual mileage of 66 trucks in common and contract-carrier service ranged

from 4,200 to 61,930 miles and averaged 27,044 miles.<sup>1</sup> The average would be considerably lowered if privately operated trucks were included. A statement of record places the average mileage of private trucks at 5,000 miles per annum, of contract trucks at 15,000, and of common-carrier trucks at 20,000. These figures were stated to be conservative. Allowing for idle equipment, particularly that held in reserve for peak loads, and for other factors, such as time lost for repairs, which decrease the period of effective utilization, 15,000 miles per annum appears to be a high average mileage for every class of truck used in intercity operations.

(c) A final factor is the proportion of all trucks which are used in intercity service, excluding suburban operations in those instances where trucks simply displace team deliveries. In the 1925 estimate it was assumed that 50 per cent of all trucks were engaged in intercity work. No competent information on this point is of record in this proceeding. Considering, however, the large use of trucks in making city and suburban deliveries and in terminal work, as well as the considerable number of farm trucks which are used exclusively in farm and local-delivery work, it seems reasonable to conclude that not over 40 per cent of all trucks should be embraced in this estimate.

Gathering the foregoing findings together, the truck traffic of the year 1929, the last year of normal rail traffic, is about 25,975,000,000 ton-miles, derived as follows: 15,000 miles per truck per annum by 2.50 tons per truck equals 37,500 capacity ton-miles per annum. Reduced by one-third for empty mileage this figure becomes 25,000, and again reduced by 20 per cent for light loading, it becomes 20,000. The latter figure multiplied by two-fifths of the number of trucks owned at the middle of 1929 (obtained by averaging truck registrations for December 31, 1928, and December 31, 1929) or 1,298,770 gives 25,975,400,000 ton-miles. This figure is equivalent to 5.8 per cent of the rail traffic of that year.

A different basis on which an estimate of the volume of truck traffic could be made is by using the information available of record as to the extent of trucking of particular commodities. Thus the percentage of livestock, fruits, and vegetables, cotton, and assembled automobiles which are trucked is fairly definitely known<sup>2</sup> and it is equally known that in the case of some commodities, as iron ore, there is no trucking, and in the case of certain other commodities, as coal, trucking is of minor extent. To the relative amounts of truck and rail traffic obtained from existing data of this kind may be added the results of estimates of the volume of trucking of other classes of traffic. Such estimates, to be satisfactory, must be based on broad information as to the trucking industry. So far as this method of analysis could be carried for the purpose of this report, it appeared to yield about the same results as those obtained by the first method.

A third method of estimating the volume of highway truck traffic starts with information available in this record as to the volume of trucking by certificated highway carriers in various States and may be explained in detail as follows:

<sup>1</sup> The average mileage of 39 trucks of 1.5 to 3 tons capacity was 20,847 miles, of 19 trucks of 3.5 to 5 tons capacity, 27,214 miles, and of 8 trucks of over 5 tons capacity, 32,547 miles.

<sup>2</sup> See analysis beginning at page 287.

In the five States of Ohio, Minnesota, Washington, California, and Texas certificated (common-carrier) trucks carried in 1929<sup>a</sup> approximately 5,378,000 tons of traffic. These States, which have been so chosen as to avoid duplications, are predominantly agricultural in character. On the assumption that certificated carriers handle, in terms of tons and miles, 15 per cent of the total truck traffic,<sup>b</sup> the total truck traffic of these States amounted to 35,853,000 tons in 1929. The population of these States in 1929 was 17.8 per cent of the total population of the country. Assuming that truck traffic is proportionate to population, the total becomes 201,303,000 tons, equal to 14.2 per cent of the revenue freight tonnage originated by all steam railroads in 1929. The average haul of truck traffic is probably in the vicinity of 100 miles, or approximately 32 per cent of the average haul of steam railroads treated as a system. Therefore, in ton-miles, truck traffic in 1929 was 32 per cent of 14.2 per cent, or practically 4.5 per cent of rail traffic.<sup>c</sup> As the railroads in 1929 carried three-fourths of all inland traffic, the proportion of the total carried by trucks was about 3.4 per cent.

Using the higher estimate derived above, omitting nonrevenue railroad freight, and continuing the estimates of the traffic of other carriers mentioned at page 101, the following distribution of inland traffic in 1929 is obtained:

	Per cent
Steam railroads.....	72.9
Great Lakes.....	15.8
Pipe lines.....	5.2
Inter-city trucks.....	4.2
Inland waterways.....	1.4
Electric railways and airplanes.....	0.5
Total.....	100.0

While all forms of transportation have felt the effects of the business depression, known developments in the trucking field in the past two years indicate that the percentage of truck traffic is greater to-day than it was in 1929.

The percentages of truck traffic given heretofore are in terms of volume. In terms of revenue they would run from a third to a half higher,<sup>d</sup> becoming therefore about 8 per cent in terms of rail traffic and about 6 per cent in terms of all inland traffic.

(b) *Derivation of proportion of interstate to total freight and passenger highway traffic*

Any estimate of the ratio of interstate to total highway traffic is necessarily subject to qualification, owing to the elements of judgment which must enter into making it. A beginning may be made with respect to truck traffic by using the finding of the Bureau of Public Roads that in 11 western States in 1930 interstate common-carrier trucks constituted 19.6 per cent of the total common-

<sup>a</sup> Year 1930 in case of Texas.

<sup>b</sup> Use of a lower ratio than that indicated at page 407 is due to the lesser proportion of common-carrier operations in agricultural than in industrial sections.

<sup>c</sup> An estimate submitted in the proceedings leading to our decision in the *Fifteen Per Cent Case, 1931*, Ex parte No. 103, 178 I. C. C. 539, puts the volume of truck traffic in 1930 at from 15 to 20 billion ton-miles, the equivalent of 3.9 to 5.2 per cent of rail traffic.

<sup>d</sup> See page 303.

182 I. C. C.

carrier trucks enumerated. The range in the individual States was from 7 to 50 per cent, as follows:

	Per cent		Per cent
Nebraska -----	7	Washington, <sup>1</sup> Wyoming-----	83
Oregon -----	14	New Mexico-----	40
Colorado-----	17	Idaho-----	43
California-----	20	Nevada, Utah-----	50
Arizona-----	25		

In using the average percentage indicated above for purposes of generalization, it is necessary to determine (1) whether the survey was representative of actual conditions in the States covered; (2) how far the proportion of interstate tonnage varies with the class of truck (i. e., whether used in common carrier, contract, or private service); (3) whether there is a difference in the average loading of the trucks used in the three types of service; and (4) how far traffic conditions vary in the different sections of the country.

(1) *How far did the traffic checks used in this survey represent actual conditions in the States covered?*—The checks were made on the Federal-aid highways and to a less extent on other important State highways. None were made on county and local roads. The percentage of intrastate traffic on the latter class of road would be very much higher than on the more important highways. Therefore, in terms of total traffic, the percentage given above is overstated. However, for the purpose of this analysis, less interest attaches to local traffic and in any event the great bulk of all traffic occurs on the more important State and Federal highways.

(2) *Is the proportion of interstate to total traffic the same in the case of contract and private trucks as in the case of common-carrier trucks?*—The only way of attacking this question is to reason from the relative average haul of the three types of truck, on the assumption that the greater the haul the greater the percentage of interstate traffic. Classification of operations was by self-declaration and therefore is likely in some cases to have been erroneously made. Many so-called contract truckers are actually engaged in common-carrier operations and should be treated as such. Trucks used in bona fide contract service probably have a less extensive range of operation than do common-carrier trucks, though there are important exceptions. Private opera-

<sup>1</sup> A check on the figures of the Bureau of Public Roads is provided by data relating to certificated operators in Washington supplied from other sources. In 1929 about 28 per cent of all such operators were engaged in interstate transportation and one-sixth of the trucks and one-fourth of the trailers were so used. The equipment used in interstate movements is larger than average size, as is indicated by the fact that from 1926 to 1929 the interstate tonnage carried by the same operators averaged 30.7 per cent of the total, being 31.7 per cent in 1929. In terms of revenue, interstate traffic averaged 38.3 per cent of the total for the years 1928 to 1931. The higher percentage of revenue than of tons reflects the greater average haul of interstate traffic and the greater selectivity of traffic as distance increases. The data cited support the finding of the Bureau of Public Roads.

In Colorado, on the other hand, judged by receipts from the ton-mile tax, the ratio of interstate to total tonnage was 2.6 per cent in 1929, a figure very much less than the 17 per cent found by the Bureau of Public Roads. The total would include, however, all local movements in the State. The tax is computed on the maximum capacity of trucks, and, as interstate trucks would tend to load more heavily than intrastate trucks, owing to the greater distances involved, the ratio of interstate to total tonnage would be higher than that indicated by the percentage shown. A reconciliation of the two figures is probably possible.

tions would generally be over shorter distances than the other two types.<sup>8</sup> Bearing in mind that common-carrier trucks represented 16.4 per cent of the truck usage of the highways of these States, contract trucks 19.5 per cent, and private trucks 64.1 per cent,<sup>9</sup> it is concluded that in this respect the percentage of interstate to total truck movements is somewhat less in the aggregate than is indicated by the 19.6 per cent shown above.

(3) *What difference is there in the average loading of the three types of truck?*—The contract truck engaged in interstate traffic has the heaviest average loading, followed by the common-carrier and the private truck. Again bearing in mind the proportions of the different classes of truck, it is reasonable to conclude that the figure given above, 19.6 per cent, requires reduction, though of moderate degree.

(4) *How far are the results found in the 11 western States typical of conditions in other sections of the country?*—The witness who presented the data was not clear on this point. The States included in the survey were all of above average size. The normal expectation that the smaller the State the larger the percentage of interstate traffic is not supported by the findings of the survey. Some of the States, as Idaho, Nevada, and Utah, show high ratios of interstate traffic because of their small populations and their commercial dependence on neighboring States. California is largely self-contained. The fact that Washington has nearly double the percentage of interstate traffic of Oregon probably reflects in part the greater opportunities in eastern Washington than in eastern Oregon for traffic interchange with bordering States. There is a very large volume of traffic exchanged between the coast States by combined boat-truck movements, but the trucks so used doubtless were classified as intrastate.

Most of the great cities in the territory east of that embraced in the Bureau of Public Roads' survey are on or near State boundaries (New York, Philadelphia, Cleveland, Toledo, Detroit, Chicago, Cincinnati, Louisville, Memphis, St. Louis, Kansas City, Omaha, and the Twin Cities), and many other large cities are on or near the sea coast, where junction of rail and motor transportation is occurring in increasing degree. Also, the average size of these States is considerably below that of the 11 western States. It is likely that in official-classification territory the percentage of interstate tonnage runs higher than in the West and that in the South and Southwest, including movements to and from the ports, it runs somewhere between the percentages for the other two.<sup>10</sup>

Bearing in mind the reductions of the original 19.6 per cent indicated under items 1, 2, and 3, and the increase required under item 4, it is concluded that approximately 20 per cent of the total truck traffic of the country, expressed in ton-miles, is interstate traffic. The percentage of interstate traffic has increased considerably in the last few years and is still increasing. In reaching the foregoing conclusion tonnage moving by truck to or from ports has been

<sup>8</sup> This assumption is apparently supported by the bureau's testimony that 20,000, 10,000, and 5,000 are the respective annual mileages of common-carrier, contract, and privately operated vehicles.

<sup>9</sup> Page 407.

<sup>10</sup> Random bits of information are that of the Norfolk Southern's loss of freight revenue to trucks, 54 per cent was to interstate trucks; and that of the certificated highway express operators who are members of the Massachusetts Club, 29.3 per cent are engaged in interstate operations.

treated as interstate; purely local traffic (that which would have moved by wagon if trucks has not been available) has been disregarded; through shipments by rail and truck under forwarding company auspices have been treated solely in terms of the originating or distributing truck haul; and traffic moving under interline arrangements between two or more truck operators has been considered to be in continuous movement.

All truck traffic is represented in the above percentage. If private trucks with their shorter average hauls are excluded, the percentage of interstate to total truck traffic would rise to and possibly a little above 25 per cent.

The percentage last indicated is confirmed by a review of the movements of the principal items of truck traffic, some of which, as cotton and livestock, probably run considerably higher in percentage of total movement that is interstate, and some, as brick and cement, considerably lower. Less-than-car-load traffic probably runs nearly as high as the average shown.

Data supplied us by Class I railroads relative to trucking under railroad auspices may seem to disqualify the conclusions which have been reached. Of the route-miles of rail operations on June 30, 1930, 14.9 per cent were interstate, of the truck-miles 14.3 per cent, of the tons carried 7.3 per cent, and of the revenue 12.7 per cent.<sup>11</sup> However, as indicated elsewhere, a large part of the trucking under rail auspices is in substitution for local trains or in terminal services and in these respects is not representative of general conditions.

The information required in estimating the proportion of interstate to total common-carrier bus traffic is somewhat more adequate than that which has just been reviewed. The Bureau of Public Roads survey used above indicates that in 1929 and 1930 some 36.8 per cent of the busses in the States surveyed were engaged in interstate carriage. The range is marked, as the following figures show:

	Per cent		Per cent
California .....	10.9	New Mexico.....	42.3
Nevada .....	25.2	Utah.....	50.0
Oregon.....	26.4	Arizona .....	51.6
Colorado .....	29.4	Wyoming.....	59.4
Nebraska .....	34.8	Idaho.....	69.7
Washington.....	41.4		

There doubtless is duplication between States in the above figures.

Class I railroads reported as of June 30, 1930, that 47 per cent of the route-miles covered by their bus operations were interstate, 28 per cent of the bus-miles, 15.5 per cent of the passengers carried, and 26.1 per cent of the passenger revenue.<sup>12</sup> These figures show that interstate routes are relatively lightly serviced by rail busses and that the passengers per bus are relatively fewer than those carried per intrastate bus of all descriptions other than intracity. Revenue per passenger is, of course, higher, owing to the greater distances traveled, but undoubtedly is lower per passenger-mile than intrastate revenue except commutation. Density of intrastate traffic also tends to pull down the percentage that is interstate, as witness California above.

Weighing the above factors and geographic considerations similar to those previously mentioned, it is concluded that from 20 to 25 per cent of the total intercity common carrier bus travel is interstate.

<sup>11</sup> In deriving these percentages incomplete returns were eliminated.

<sup>12</sup> Only complete returns were used in these calculations.

(c) *Estimate of the proportions of common-carrier, contract, and private trucking*

Much confusion exists as to the proportions in which common-carrier, contract, and private operations figure in the intercity transportation of freight. This confusion will persist until there is adequate reporting of truck operations or until official classification according to some accepted principle takes the place of self-declaration of status.

The most comprehensive survey of this subject is that of the Bureau of Public Roads, which in 1929 and 1930, in cooperation with the respective State highway departments, made traffic counts on the principal highways of 11 western States. Some 180,000 different trucks were inventoried, of which 85.8 per cent were stated to be privately operated, 8.7 per cent operated under contract, and 5.5 per cent operated in common-carrier service. The accuracy of the classification can not be tested but it is substantially certain that a considerable portion of the so-called contract operators were in reality common carriers operating without appropriate certificate or permit.<sup>13</sup> In any event, a factor of correction must be applied for the relative use made of the highways by the different classes of operator. The only basis for such correction is the relative annual mileage made by each type of truck.<sup>14</sup> The bureau conservatively estimates that common-carrier trucks in these States average 20,000 miles per annum, contract trucks 15,000 miles, and private trucks 5,000 miles. The ratio is 4:3:1. Weighting on this basis, common-carrier trucks account for 16.4 per cent of the use of the highways in terms of truck mileage, contract trucks for 19.5 per cent, and private trucks for 64.1 per cent. These percentages would reflect the relative volume of traffic actually handled over the highways only if the various types of truck carry equal loadings. The evidence indicates, however, that on outbound trips contract trucks load most heavily, followed by common-carrier and private trucks. The relative amount of back hauling which is achieved by the three classes of truck operator is not known. Since data necessary for full correction are not available, it will be conservatively estimated that nearly 20 per cent of the truck traffic, in terms of ton-miles, is handled by common-carrier operators, 30 per cent by bona fide contract operators, and 50 per cent by privately operated trucks. This conclusion probably overstates the proportion of private trucking and understates the proportion of contract trucking.

---

<sup>13</sup> "When load and truck were owned by the same agency, it was classified as owner operated. Trucks operating for hire over a fixed route, on regular schedule and at published rates, were classified as common carriers. Those operating essentially as common carriers but not over fixed routes or upon fixed schedules, and those operating under a hauling agreement with a few agencies, were termed contract haulers." Report of a Survey of Traffic on Federal-Aid Highway Systems of Eleven Western States, 1930, by the Bureau of Public Roads, page 29.

<sup>14</sup> The bureau estimated on the basis of the ratio of common-carrier to all truck registrations in 8 of the 11 States that common-carrier trucks used the highways 3.52 times as much as the remaining trucks. This finding, while helpful, does not make the desired separation between contract and private operations.

## APPENDIX C

Data relative to financial operations of independent motor-vehicle operators compiled from official reports of certain States which publish statistics reported to them by certificated motor-vehicle operators

State	Total carriers reporting	Profitable operations			Operations with deficit		
		Number	Investment	Net operating income	Number	Investment	Deficit
California: <sup>1</sup>							
Bus.....	141	87	\$6,193,500	\$739,577	54	\$1,094,000	\$1,070,212
Truck.....	270	192	8,233,500	911,525	78	2,633,800	222,130
Connecticut: <sup>1</sup>							
Bus.....	37	17	\$ 8,903,253	426,581	20	\$ 771,900	799,417
Truck <sup>4</sup> .....							
Iowa: <sup>1</sup>							
Bus.....	43	25	4,537,775	268,578	18	1,133,278	110,304
Truck.....	85	79		144,643	6		1,565
Minnesota: <sup>1</sup>							
Bus.....	25	15	4,471,500	425,704	10	1,753,100	72,802
Truck.....	63		686,986	123,382			
New Hampshire: <sup>1</sup>							
Bus.....	30	22	89,432	15,244	8	170,599	29,244
Truck <sup>4</sup> .....							
Ohio: <sup>1</sup>							
Bus.....	234	108	( <sup>5</sup> )	744,702	126	( <sup>5</sup> )	869,787
Truck.....	1,350	1,108	( <sup>5</sup> )	1,464,766	242	( <sup>5</sup> )	416,971
Oregon: <sup>1</sup>							
Bus.....	45	25	5,564,226	672,253	20	4,139,954	186,107
Truck.....	97	70	1,574,792	202,338	27	588,444	49,837
Utah: <sup>1</sup>							
Bus.....	22	12	599,920	43,120	10	5,603,222	273,201
Truck.....	15	11	134,899	27,165	4	61,211	19,704
Vermont: <sup>1</sup>							
Bus.....	67	46	\$ 180,300	64,959	21	\$ 858,600	91,360
Truck <sup>4</sup> .....							
Wisconsin: <sup>2</sup>							
Bus.....	59		\$ 6,696,638	\$ 4,561			
Truck.....	140		\$ 1,149,170	\$ 187,238			

<sup>1</sup> For year 1928.<sup>2</sup> For year 1929.<sup>3</sup> Incomplete.<sup>4</sup> Data not available.<sup>5</sup> No separation between "Profit" and "Deficit" carriers.

## APPENDIX D

## CONTROL OF COMPANIES COMPRISING GREYHOUND LINES SYSTEM AS OF MARCH 16, 1931

The Greyhound Lines system has been built up since 1927 largely through the purchase of existing lines. The original unit was Safety Motor Couch Lines of Michigan. At the head of the system is:

(1) Greyhound Corporation, a holding company. Its 620,000 shares of outstanding common stock are largely held by the men who developed the system and by Twin Cities and Duluth financiers. The Pennsylvania Railroad, through American Contract and Trust Company, holds 53,193 shares, the Chicago, Aurora & Elgin Corporation 22,400 shares, and the Southern Pacific Railroad, through Southern Pacific Land Company, holds 12,000 shares. There is also preferred stock outstanding.

(2) Eastern Greyhound Lines, 65 per cent of whose stock is held by Greyhound Corporation, controls (3) Eastern Greyhound Lines of Michigan, (4) Eastern Greyhound Lines of Ohio, and (5) Eastern Greyhound Lines of New York.

(6) Pennsylvania Greyhound Lines, whose stock is owned equally by Greyhound Corporation and Pennsylvania Railroad (through American Contract



& Trust Company), controls (7) Greyhound Lines of Indiana, (8) Pennsylvania General Transit Company, and (9) Peoples Rapid Transit Company. Operations of the Pennsylvania Greyhound Lines are conducted by the Greyhound organization. All lines in this group are in Pennsylvania Railroad territory.

(10) Central Greyhound Lines, owned by Greyhound Corporation, operates south from Detroit, having taken over operations of Greyhound Lines of Indiana not adjacent to Pennsylvania Railroad.

(11) Capital Greyhound Lines, owned jointly by Greyhound Corporation and Blue and Gray Transit Company, operates east from St. Louis through Cincinnati to Washington, D. C.

(12) Richmond-Greyhound Lines, owned by Greyhound Corporation, 51 per cent, and Richmond, Fredericksburg & Potomac Railroad 49 per cent, operates between Washington, D. C., and Richmond, Va.

(13) Illinois Greyhound Lines, owned by Greyhound Corporation, operates between Chicago and St. Louis.

(14) Northland Greyhound Lines, 30 per cent of whose stock is held by Greyhound Corporation, 30 per cent by Great Northern Railroad, and 40 per cent by individuals, operates northwest from Chicago through Wisconsin and Minnesota.

(15) Pickwick-Greyhound Lines, controlled by Greyhound Corporation and owned jointly with Pickwick Corporation, operates west of Chicago and south of St. Louis.

(16) Southland Greyhound Lines, Incorporated, of Texas, controlled by (17) Southland Greyhound Lines, Incorporated, of Delaware, in which Greyhound Corporation has a large interest and Southern Pacific Railroad a 35.21 per cent interest, operates in the State of Texas.

(18) Pacific Greyhound Lines, whose stock is owned one-third by Greyhound Corporation, one-third by Southern Pacific Railroad, and the remainder by Twin Cities interests, operates along the Pacific coast and East to Salt Lake City and El Paso.

(19) Canadian Greyhound Lines, controlled within Canada with remainder of stock held by Greyhound Corporation, operates between Detroit and Buffalo through Ontario, Canada.

South of Richmond, Va., Washington, D. C., and Covington and Louisville, Ky., traffic of Greyhound Lines is handled through connecting companies, among them Camel City Coach Lines of Winston-Salem, N. C., Blue and Grey Transit Company of Charleston, W. Va., and Consolidated Coach Corporation of Lexington, Ky.

Greyhound Management Company, whose 500 shares of common stock are owned by Greyhound Corporation, acts in an auditing, traffic, advertising, and maintenance capacity and attends to legal and safety work. Its activities are limited to the lines east of the Mississippi River.

## APPENDIX E

*Investment, operating revenues and operating expenses, and net railway operating income, Class I Railroads, 1921-1931, stated in thousands*

	Investment in road and equipment (book value)	Freight revenue	Passenger revenue	Operating revenues	Operating expenses	Net railway operating income
Year 1921.....	\$19,842,576	\$3,911,277	\$1,151,771	\$5,516,568	\$4,562,695	\$953,873
Year 1922.....	20,170,093	3,992,441	1,074,105	5,559,063	4,414,823	760,187
Year 1923.....	21,114,594	4,005,730	1,143,099	5,299,580	4,803,167	961,955
Year 1924.....	21,964,425	4,333,585	1,075,039	5,921,496	4,507,893	973,577
Year 1925.....	22,543,653	4,541,646	1,050,395	6,122,510	4,534,980	1,121,078
Year 1926.....	23,204,182	4,797,780	1,041,816	5,592,940	4,669,337	1,213,000
Year 1927.....	23,789,733	4,632,321	974,951	6,136,300	4,874,178	1,067,966
Year 1928.....	24,259,639	4,680,456	901,019	6,111,735	4,477,995	1,172,864
Year 1929.....	24,884,675	4,815,448	872,466	6,279,530	4,508,066	1,251,666
Year 1930.....	25,485,623	4,073,698	729,498	5,291,197	3,930,929	869,879
Year 1931.....	(1)	3,254,809	1,551,060	4,188,505	3,239,791	1,619,829

<sup>1</sup> Not available.

<sup>2</sup> Preliminary.

## APPENDIX F

SUMMARY OF STATE REGULATION OF COMMON AND CONTRACT CARRIERS BY MOTOR VEHICLE

A survey of the statutes of the 48 States (excepting Delaware, which has no regulatory body nor regulatory act dealing with carriers) reveals that 47 States and the District of Columbia have laws regulating the operation of motor vehicles as common carriers of passengers, 39 States and the District of Columbia have laws regulating the operation of common carriers of property, and 34 States have enacted laws dealing with the operation of contract carriers. Concerning this last group, 23 States have laws dealing with the operation of contract carriers which are in effect, 4 States have made attempts which have been declared invalid by the courts chiefly because of an attempt to subject the contract carrier to the same type of regulation applicable to the common carrier, and 7 States have laws which, though not yet attacked in the courts, seem to fall into the same errors as the other voided legislation.

The following table shows separately the name of the State, the date of the first law regulating motor carriers, the date of the present law, and the classes of common carriers regulated (i. e., whether passenger or property, or both, and whether over regular or irregular routes, or both); and a brief résumé of the extent of regulation over the contract carrier:

State	First law in effect	Present law	Classes of common carriers regulated	Remarks as to regulation of contract or private carrier
Alabama.....	1927	1927	Passenger, property, over regular or irregular routes.	Section 11 provides any motor vehicle operating over regular route in competition with certified common carrier may be required to apply for certificate and subjected to regulation. See <i>Smith v. State</i> , 120 Sou. 471 (1928).
Arizona.....	1919	1928	.....do.....	Section 737 requires private carrier to obtain permission to compete with common carrier.
Arkansas.....	1927	1929	.....do.....	Act No. 62 applies to "every motor vehicle carrier" but State court held it applies only to common carriers. <i>Jones v. Ferguson</i> , 27 S. W. (2d) 96 (1929).

State	First law in effect	Present law	Classes of common carriers regulated	Remarks as to regulation of contract or private carrier
California.....	1917	1930	Passenger, property, regular route only.	Earlier act applying to private carriers construed to force them to become common carriers and held unconstitutional. <i>Frost v. R. R. Comm.</i> , 271 U. S. 583 (1926).
Colorado.....	1915	1928	Passenger, property, over regular or irregular routes.	Rule 1 (a) G. O. 39 (1928) of Colorado Public Utilities Comm. holds act applies to all "who indiscriminately carry or hold themselves by advertising or otherwise."
Connecticut.....	1921	1927	Passenger, over regular route only.	
Delaware.....				
District of Columbia.....	1913	1913	Passenger, property, over regular or irregular routes.	"Common carrier" as used in this act, paragraph 2 section 8, 37 Stat. 974, construed in <i>Hill v. Harlan</i> , 20 F. (2) 271 not to include a for-hire car where owner made individual contracts for its use, citing <i>Terminal Cab Co. v. D. C.</i> , 241 U. S. 252.
Florida.....	1929	1931	Passenger, property, over regular routes only.	Regulation of contract carriers held unconstitutional for (1) failure to separate sections applicable to common and contract carriers and (2) discriminatory in relieving carriers of agricultural products from scheme of regulation. <i>Smith v. Cahoon</i> , 283 U. S. 553 (1931).
Georgia.....	1929	1931	Passenger, property, over regular or irregular routes.	State and Federal courts have divided on whether the provision regulating contract carriers is unconstitutional. <i>Ga. P. U. Com. v. Saye</i> , 154 S. E. 439,506 (1931), held regulation valid. <i>McIntyre v. Harrison</i> , 157 S. E. 499 held regulation invalid by 3-to-2 decision, one judge not participating in judgment but dissenting in opinion. Federal courts have held act requiring private carrier to get certificate of public convenience and necessity is valid, <i>Johanson v. Perry</i> , 47 Fed. (2d) 900, 902 (1931); <i>So. Motor Ways v. Perry</i> , 39 Fed. (2d) 145 (1931).
Idaho.....	1925	1929	Passenger, property, over regular routes only.	Contract carriers over regular routes, <i>Smallwood v. Jester</i> , 244 Pac. 149 (1926); <i>Sanger v. Lukens</i> 26 Fed. (2d) 855 (1927).
Illinois.....	1921	1924	Passenger, property, over regular or irregular routes.	Section 55 (a) defines common carrier as one "indiscriminately accepting and discharging such persons (freight) as may be offered."
Indiana.....	1925	1923	do.....	Contract carriers are specifically exempt from regulation but a subsequent provision declares to be common carriers all motor vehicles transporting persons or property for a railroad.
Iowa.....	1923	1929	Passenger over regular routes only, property over regular or irregular routes.	Chapter 129 provides that contract carriers must get a permit but are not required to show public convenience and necessity and subjects them to all regulations except as to rates and service.
Kansas.....	1925	1931	Passenger, property, over regular routes only.	Chap. 236 (1931), section 5, provides commission vested with power to license, supervise, and regulate contract carrier, to prescribe accounting and require reports. <i>Louis v. Boynton</i> , 53 F (2) 471, held a tax on gross ton mileage valid and as to contract carriers said: "Section 5 undertakes to vest the public service commission with broad powers and duties with respect to the regulation of the several carriers defined in section 1. It may be that contract carriers and private carriers are not subject to regulation to the full extent provided by the section, as for example, regulations as to service. However, the regulations * * * have not yet been promulgated. Plaintiffs can not complain until regulations * * * invalidate their constitutional rights." <i>Continental Baking Co. v. Woodring</i> , 55 F (2) 347 held act valid as to attacks on interstate private carriers (2-to-1 decision). Regarding regulation court said: "As far as private carriers are concerned this power is limited to such regulations as will protect other travelers and shippers on the highways."
Kentucky.....	1924	1930	Passenger, over regular or irregular routes.	Language broad enough to cover contract carriers.
Louisiana.....	1926	1926	Passenger, property, over regular or irregular routes.	

State	First law in effect	Present law	Classes of common carriers regulated	Remarks as to regulation of contract or private carrier
Maine.....	1921	1923	Passenger, over regular routes only.	Chapter 211 gives jurisdiction to commission "over every person . . . operating any motor vehicle . . . for the carrying of persons for hire."
Maryland.....	1916	1927	Passenger, property, over regular or irregular routes.	Section 256 vests jurisdiction over "each owner of a motor vehicle used in the public transportation of merchandise or freight" (sec. 251 "of passengers for hire"). Construed in <i>Rutledge v. Heughmen</i> , 133 Atlantic 2d; 56 A. L. R. 1043 (1927) to apply to contract carriers. Held that the commission may determine that public convenience and necessity does not require operation and deny permission to contract carrier.
Massachusetts....	1919	1931	Passenger, over regular or irregular routes, property when operated by a railroad (acts 1931, chap. 159, sec. 3A).	
Michigan.....	1923	1931	Passenger, property, over regular routes only.	The earlier act applying to contract carriers was held unconstitutional in <i>Dutz v. P. U. Com.</i> , 246 U. S. 570. The 1931 act, chapter 212, requires private or contract carriers by truck to obtain permits from and conform to the rules and regulations of the commission. Federal court held regulation of contract carrier valid in <i>Ogden &amp; Moffet Co. v. Com.</i> , 6 U. S. Daily 2014 (11-4-31) as a regulation of the highways, with a substantial classification between common and private carriers. On appeal to U. S. Supreme Court, 1931 term, docketed No. 357.
Minnesota.....	1925	1925	.....do.....	
Mississippi.....	1926	1930	.....do.....	
Missouri.....	1927	1931	.....do.....	Contract carriers subject to complete regulation of certificates, rates, service, accounting, and taxation.
Montana.....	1923	1931	Passenger, property, over regular or irregular routes.	Chapter 184, section 1 (h), divides the carriers into three classes and subjects the contract carrier to regulation. Regulation held valid by <i>Ed. e Ry. Com. of Montana in Doctrie 1101 and 1102</i> decided October 5, 1931. 6 U. S. Daily 1572 (10-17-31). Certificate of convenience denied to certain private carrier applicants.
Nebraska.....	1927	1931	Passenger and baggage, over regular or irregular routes.	Act of 1927 (H. R. 97) declares that any person or corporation engaged in the business of carrying or transporting persons and baggage for hire over any public streets between fixed terminals is a motor transportation company and is declared to be a common carrier.
Nevada.....	1923	1925	Passenger, property, over regular or irregular routes.	
New Hampshire...	1919	1926	Passenger, over regular routes only.	
New Jersey.....	1921	1926	.....do.....	
New Mexico.....	1926	1931	Passenger, property, over regular or irregular routes.	Act 1931, chapter 52, H. B. 205, sections 1 and 2, provide for the licensing of all persons engaged in the transportation of persons or property for hire under contract.
New York.....	1915	1930	.....do.....	
North Carolina...	1923	1929	.....do.....	Act of 1927, section 1 (k), "Transporting persons or property for compensation" is subject to regulation. Section 2 excepts "casual trips under contract" but prohibits contract carriers from picking up additional traffic en route or on return "other than that included on original trips."
North Dakota....	1923	1931	.....do.....	Act of 1931, chapter 183, section 1 (d) and (d-1) applies only to common carriers defined as any company "which offers to the public to carry persons and/or property for compensation."
Ohio.....	1921	1929	.....do.....	Act of 1929, sections 614 (84), provides "motor transportation company should include every corporation engaged in the business of transporting persons or property for hire."
Oklahoma.....	1923	1929	.....do.....	A classification is set up which includes contract carriers. <i>Barbour v. Walker</i> , 259 Pac. 552; 56 A. L. R. 1049 (1927) decided under an earlier act held a private carrier came within the provisions of the earlier act and is subject to control and regulation.

State	First law in effect	Present law	Classes of common carriers regulated	Remarks as to regulation of contract or private carrier
Oregon.....	1925	1929	Passenger, property, regular or irregular routes.	G. L. 1929, chapter 384, vests jurisdiction over contract carriers but does not regulate them.
Pennsylvania.....	1914	1920	Passenger, property, over regular or irregular routes.	P. L. 905, No. 403, section 102, and P. L. 1647, No. 513, section 1, provides for registration only but not regulation of all property carriers.
Rhode Island.....	1922	1923	Passenger, regular routes only.	
South Carolina.....	1925	1930	Passenger, property, over regular or irregular routes.	Act No. 170, amended in 1930, requires certificates for contract carriers and section 4 requires that they file proposed rates.
South Dakota.....	1925	1931	do.....	Act 1931, chapter 224, sections 1(f) and 2(a), provide that contract carriers must be registered.
Tennessee.....	1929	1929	do.....	Act 1929, chapter 58, section 1, extends full regulation over contract carriers.
Texas.....	1927	1931	do.....	Act 1931 extends complete regulation over contract carriers. Held valid by Federal court (2-1) in <i>Stephenson v. Binford</i> , 53 F. (2) 509.
Utah.....	1917	1927	do.....	Act 1927, section 1, provides a certificate must be obtained before transporting for compensation by contract or otherwise.
Vermont.....	1919	1925	Passenger, property, over regular routes only.	
Virginia.....	1923	1930	Passenger, property, over regular or irregular routes.	Chapter 419, sections 1, 2, 3, provide that any person transporting "for compensation" is "deemed to be a common carrier" and "must obtain a certificate."
Washington.....	1921	1929	Passenger, property, over regular routes only.	Comp. Stat. (Remington, 1922), §6387, as amended, 1927, §6390, is slightly ambiguous, but held to apply only to common carriers. <i>Big Bend Auto Freight v. Ogers</i> , 269 Pac. 802 (Wash. 1928).
West Virginia.....	1921	1931	Passenger, property, over regular or irregular routes.	Act of 1931 seems to cover contract carriers but in <i>Buckland v. State Road Com.</i> , 6 U. S. Daily 1873 (10-17-31), Federal 3-judge court held the statute does not require a certificate of public convenience and necessity of private carriers; that if there is ambiguity the same must be accorded a constitutional construction; and that if the statute is interpreted to require certificate of private carriers, complainants are not threatened with an injury on account of this unconstitutional provision, because officials of the State prior to institution of suit notified them that no such certificate would be required.
Wisconsin.....	1915	1930	Passenger, property, over regular routes only.	
Wyoming.....	1925	1931	Passenger, property, over regular or irregular routes.....	Act 1931, chapter 183, section 1, div. 3, sections 1-4, provide that contract carriers must obtain an annual permit.

## APPENDIX G

FINANCING THE HIGHWAYS<sup>1</sup>

Before the present period of extensive highway improvement, the funds used for road construction and maintenance were largely provided by the general property tax, directly or through contributions from this tax to funds required to meet interest and amortization charges on highway bonds. To finance expenditures of the magnitude known to-day, reliance has been increasingly placed on special taxes and fees paid by operators of motor vehicles, though the property tax, supplemented in some States by other general taxes, continues of importance, and Federal aid has been added as a large source of highway revenue.

It is urged by certain parties to this proceeding that the whole cost of providing highway facilities should fall on and be equitably distributed among the

<sup>1</sup> The discussion in this appendix is by C. S. Morgan, economist, Bureau of Statistics. 182 I. C. C.

users of the highways and that such a result can be achieved only by large increases in the payments made by those who use the highways for business purposes. It is further urged that those who use the highways for business purposes should pay a rental for the user value enjoyed and that highway carriers do not but should contribute equally with the railroads to the general expenses of Government. The railroads urge that they are and always have been among the country's largest taxpayers and that much of the money paid by them as taxes has found its way into rural highways. They stress the fact that in return for the taxes they pay they receive only the right to do business and general Government protection, and that even this protection has to be supplemented by private expenditures. It is, in fact, urged that the principal and even controlling advantage of their highway competitors lies in their use of a publicly provided right of way. More specifically, the railroads state that in 1929 they paid nearly \$400,000,000 in taxes or 6.31 cents of each dollar of revenue to secure Government protection and the right to do business, and approximately 25 cents of each dollar of revenue in providing and maintaining their right of way, while carriers by highway secure like benefits<sup>1</sup> in return for only \$250,000,000 of taxes, or 7 to 8 cents of each dollar of their revenue.

On the other hand, users of the highways are generally of the view that their taxes are adequate and some feel that they are excessive.

The issues stated present questions of both policy and fact. The former fall outside the limits of this discussion, which is aimed at stating the essential facts developed of record. These facts may be surveyed in three stages.

#### QUESTIONS OF FACT—FIRST OR GENERAL STAGE, DEVELOPMENT AND EXTENT OF HIGHWAY SYSTEMS

In this first stage of the inquiry the facts required relate essentially to the development and present extent of our highway systems and, in a general way, to the means used in procuring these facilities. For most purposes, the period covered will be that since 1921. It should be recognized, however, that parts of our present highways are of considerable age and that a very large part are built on earlier ones, making use of grading, cuts, fills, and materials in substructures. This survey of the facts will embrace county and local roads (of which there were 2,710,000 miles in 1929) as well as State highways (315,000 miles in 1929).<sup>2</sup> To confine the analysis to the latter would result in an incomplete picture of the present situation.

*Development of highway systems.*—The following table<sup>3</sup> traces the development of rural highways as a whole in the past quarter of a century:

<sup>1</sup> It is further urged that highway operations for hire put the Government to added expenditures for purposes of protection.

<sup>2</sup> State roads are those highways designated by the States as making up their State highway systems and include Federal-aid highways. Rural highways are all public highways lying outside the limits of incorporated communities.

<sup>3</sup> All tables are taken or adapted from publications of Bureau of Public Road, United States Department of Agriculture.

TABLE I.—Rural highway mileage, 1904-1930

Year	Total	Surfaced	High-type surface <sup>1</sup>	Year	Total	Surfaced	High-type surface <sup>1</sup>
1904.....	2,151,379	153,530	144	1925.....	3,006,083	521,260	76,342
1909.....	2,199,045	190,476	726	1926.....	3,000,190	550,064	82,987
1914.....	2,445,761	257,201	14,442	1927.....	3,013,584	588,721	91,935
1921.....	2,941,294	387,760	35,874	1928.....	3,016,281	626,137	102,559
1922.....	2,960,000	410,000	-----	1929.....	3,024,233	662,435	112,454
1923.....	2,995,727	439,341	54,217	1930.....	3,030,000	700,000	128,000
1924.....	3,004,411	471,668	63,707				

<sup>1</sup> Includes bituminous macadam by penetration, and higher types.

<sup>2</sup> Estimated.

Total mileage increased about 41 per cent from 1904 to 1930, the increase being greatest, 43,884 miles per year, from 1904 to 1921, compared with 8,900 miles per year thereafter. The mileage surfaced increased 356 per cent in this quarter of a century, and that highly surfaced increased from practically nothing in 1904 to about 128,000 miles in 1930. The surfaced highways increased 234,230 miles, or 152.6 per cent, from 1904 to 1921, and 312,240 miles, or 80.5 per cent, from 1921 to 1930. Highly surfaced highways increased 85,730 miles in the earlier period and about 93,000 miles in the latter. The surfaced mileage is about 63 per cent more than the mileage of tracks of every description, including some duplications, used by all railroads in 1929.

The above information is general. The following table shows the type of highway in service in 1929 and a comparison with 1921.

TABLE II.—Mileage of State, county, and local roads, 1921 and 1929, by type

Type	1921			1929		
	State	County and local	Total	State	County and local	Total
<b>Surfaced:</b>						
Sand clay, top soil.....	8,622	54,717	63,339	15,442	75,547	90,989
Gravel, chert, etc.....	36,458	163,441	199,899	97,838	292,463	390,301
Waterbound macadam.....	18,978	60,367	77,345	19,931	48,760	68,691
Bituminous macadam.....	6,749	3,515	10,264	14,043	16,692	30,735
Sheet asphalt.....	396	1,205	1,601	1,498	1,539	3,037
Bituminous concrete.....	2,444	2,534	4,978	5,722	4,057	9,779
Portland cement concrete.....	10,114	5,497	15,611	50,584	13,254	63,838
Brick and block.....	2,089	1,331	3,420	3,266	1,799	5,065
Miscellaneous.....	1,008	10,295	11,303	-----	-----	-----
	84,858	302,902	387,760	208,324	454,111	662,435
<b>Nonsurfaced.....</b>	<sup>1</sup> 124,384	2,429,150	2,553,534	<sup>2</sup> 105,612	<sup>2</sup> 2,255,986	2,361,798
<b>Total.....</b>	209,242	2,732,052	2,941,294	314,136	2,710,097	3,024,233

<sup>1</sup> Including 21,421 miles improved to grade.

<sup>2</sup> Including 28,553 miles improved to grade.

The mileage of State highways increased about 50 per cent from 1921 to 1929. A third of the mileage of such highways in the latter year was unsurfaced and more than another third was surfaced only with sand clay, top soil, gravel, chert, etc. Roads having such surfacing increased 151 per cent from 1921 to 1929 and those unsurfaced decreased 18 per cent. Of the total State highway mileage in 1929 less than one-sixth was Portland cement concrete. However, such surfacing increased 400 per cent in the period.

The mileage in county and local roads declined slightly from 1921 to 1929, representing in the latter year 89 per cent of the total compared with 93 per cent in the former year. Of such roads only 11.1 per cent were surfaced in 1921 and 16.8 per cent in 1929, and, of the surfaced mileage in 1929, 81 per cent consisted of the two lowest types of surfacing, approximately 11 per cent

of water-bound macadam, and less than 3 per cent of Portland cement concrete. The last type increased 141 per cent in the period, bituminous macadam increased 375 per cent, water-bound macadam mileage fell nearly 20 per cent, and surfacing of the two lowest types increased 69 per cent.

This inventory of highway facilities is still in very general terms. Definitive answers to the questions considered presently require that the highways of given States and their subdivisions be individually catalogued as to age, dimensions, and cost for purposes of comparison with the respective methods of financing observed.

*Cost and present annual carrying charges of highway systems.*—Next there is need for knowing the carrying charges which these highways represent. The total investment in highways to date could be determined only in the form of estimates and at best such a figure could not help much in answering questions now faced.<sup>5</sup> The outlay for new construction from 1921 to 1930 was approximately \$6,227,000,000. For the single year 1929, disbursements for construction, maintenance, and other purposes totaled \$1,718,200,000, or \$1,444,670,000 if disbursements to retire bonds and certain transfers of funds are excluded, as shown in the accompanying table.

TABLE III.—State, county, and local road and bridge disbursements, 1929

Item	State	County and local	Total
Construction.....	\$557,401,000	\$256,582,000	\$813,983,000
Maintenance.....	173,060,000	260,478,000	433,538,000
Equipment, material, etc.....	19,057,000	.....	19,057,000
Miscellaneous.....	5,624,000	149,456,000	54,980,000
Interest on bonds.....	45,835,000	78,277,000	124,112,000
<b>Total.....</b>	<b>799,977,000</b>	<b>644,793,000</b>	<b>1,444,670,000</b>
Retirement of bonds.....	42,384,000	106,033,000	148,417,000
Transfers to counties.....	45,791,000	.....	45,791,000
Other obligations assumed.....	22,433,000	.....	22,433,000
Transfers to States.....	.....	56,899,000	56,899,000
	<b>910,485,000</b>	<b>807,715,000</b>	<b>1,718,200,000</b>

<sup>1</sup> Miscellaneous and overhead.

The true cost attaching to the use of highways in any year is not measured by that year's expenditures, but by that part of the interest, amortization, maintenance, and general expenses attributable to that period in comparison with preceding and succeeding ones. An exhibit of record partially meets the requirements of this more accurate type of analysis. It places the annual carrying

<sup>5</sup> Using figures supplied by the Bureau of Public Roads, the Federal Trade Commission in its report entitled "National Wealth and Income" (1926) placed a value of 850 million dollars on the lands used for rural highway purposes in 1922. This value was estimated by pricing the areas used for highways at going farm-land values. To this sum was added an estimate of the value of improvements, \$6,000,000,000, found by applying average prevailing cost figures to the various types of road then in use. The total, \$6,850,000,000, is said to represent an undervaluation of the property in question. It is to be particularly noted that this figure does not reflect the cost of these highways. An exhibit of record attempts to bring this estimate down to date by adding thereto \$5,000,000,000 as the cost of "the annual additions since that time in the form of new construction." A "present investment" in rural highways of more than \$12,500,000,000 is thereby derived. It is not clear how far deductions for depreciation, changes in cost from period to period, and the inclusion of omitted items would modify this figure. This exhibit also places the investment in public and private garages and bus terminals at \$4,000,000,000 and that in 26,590,000 motor vehicles at \$300 per vehicle at \$7,950,000,000 in 1929. The grand total is about 25 billion dollars or approximately the same as the book value of all railroad property on December 31, 1929. In large part, however, this figure represents investment in facilities used for pleasure purposes.



charges of State highways in 1929 at \$433,836,739, consisting of amortization (on a 15-year life for superstructures and 100-year life for grading, drainage, etc.) of \$4,005,445,000 of State highway investment made in the years 1915-1929, \$191,361,020; interest payments during the year on State highway bonds, \$45,834,531; amortization of and interest on expenditures for equipment and machinery, \$18,056,509; and maintenance and miscellaneous, \$178,584,679. This analysis is not conclusive, however. It represents a combination of straight amortization charges and current outlays; it is confined to State highways, and it excludes interest charges on Federal-aid expenditures and on capital expenditures made from motor vehicle fees and gasoline taxes.

*How 1921 and 1929 outlays were financed.*—However, to indicate in a general way how highway expenditures are being financed and the changes which have occurred in recent years, the following table is introduced. All funds, including those used for the purpose of paying interest on and principal of highway bonds, are included.\*

TABLE IV.—Sources of funds for State, county, and local roads, 1921 and 1929, not including balances at beginning of year (all amounts in thousands)

Item No.	Source	State roads		County and local roads		Total	
		Amount	Percent	Amount	Percent	Amount	Per cent
<i>Year 1921</i>							
1	General taxation and appropriations.....	\$45,262	11.2	\$347,633	46.7	\$392,895	34.2
2	Bond issues.....	113,304	27.9	322,614	43.4	435,918	37.9
3	Motor vehicle fees <sup>1</sup> .....	101,204	25.0	17,738	2.4	118,942	10.3
4	Gasoline tax receipts <sup>2</sup> .....	3,354	.8	329	.1	3,683	.3
5	Federal-aid and forest funds.....	79,031	19.5	302	( <sup>3</sup> )	79,333	6.9
6	Transfers by counties:						
	Funds raised by bond issues.....	2,192	.5			2,192	.2
	Funds raised by county property tax.....	22,785	5.6			22,785	2.0
	Total.....	24,977	6.1			24,977	2.2
7	Transfers by States.....						
8	Not allocated as to source, and miscellaneous.....	38,510	9.5	55,179	7.4	93,689	8.2
	Total.....	405,642	100.0	743,795	100.0	1,149,437	100.0
<i>Year 1929</i>							
1	General taxation and appropriations.....	71,737	7.4	480,171	61.9	560,908	32.0
2	Bond issues.....	161,229	16.8	110,635	14.0	271,864	15.5
3	Motor vehicle fees <sup>1</sup> .....	278,093	28.9	51,836	6.6	329,929	18.9
4	Gasoline tax receipts <sup>2</sup> .....	287,258	29.9	70,493	8.9	357,751	20.4
5	Federal-aid and forest funds.....	77,573	8.1			77,573	4.4
6	Transfers by counties:						
	Funds raised by bond issues.....						
	Funds raised by county property tax.....						
	Total.....	485,917	8.9			85,917	4.9
7	Transfers by States.....			31,715	4.0	31,715	1.8
8	Not allocated as to source, and miscellaneous.....			36,229	4.6	36,229	2.1
	Total.....	901,807	100.0	790,129	100.0	1,751,936	100.0

<sup>1</sup> Does not represent gross receipts, which in 1929 were \$779,155,062. Deduction of collection costs leaves about \$759,000,000, of which \$687,000,000 was appropriated for State and county roads as indicated above and the remainder used to meet payments on State and county road bonds and for miscellaneous purposes, including the improvement of city streets and the construction of public buildings.

<sup>2</sup> Forest road funds.

<sup>3</sup> Less than one-tenth of 1 per cent.

\* Includes miscellaneous.

\* Logically, only revenues required to retire bonds should be included as revenues, for the proceeds of bond issues are not income.

In 1921, 25.8 per cent of the funds raised for State highway purposes came from special charges against motor vehicles. The gasoline tax at that time was of negligible importance. Including bond issues, Federal aid, and transfers from counties, 64.7 per cent of the funds (sum of items 1, 2, 5, 6, and 7) were raised from general sources, including Federal sources. An unascertained item (No. 8) constitutes 9.5 per cent of the total. In the same year 90.1 per cent of the current revenues for county and local roads were similarly derived from general sources, 2.5 per cent from special charges against motor vehicles, and 7.4 per cent from undetermined sources. Of all funds used for rural road purposes in 1921, 81.2 per cent came from general sources, 10.6 per cent from special charges against motor vehicles, and 8.2 per cent from undetermined sources.

Of the funds becoming available for State highways in 1929, 58.8 per cent came from charges against motor vehicles or from gasoline tax receipts (items 3 and 4), 32.3 per cent from general taxation, bonds<sup>7</sup>, and Federal aid (items 1, 2, and 5), and 8.9 per cent by transfers from counties and from miscellaneous sources (item 6).<sup>8</sup> Of the funds raised for county and local highway purposes, 15.5 per cent came from charges against motor vehicles and the gasoline tax, 75.9 per cent from general taxation and bonds (items 1 and 2), and 8.6 per cent<sup>9</sup> from miscellaneous or undetermined sources (items 7 and 8). Of the total revenue raised in that year for rural highways, 30.3 per cent came from motor-vehicle fees and the gasoline tax, 51.9 per cent from general taxation, bonds, and Federal aid (items 1, 2, and 5), and 8.8 per cent from miscellaneous or undetermined sources (items 6, 7, and 8).

It is true that motor vehicles, garages, stations, etc., contribute to or are subject to the general property tax<sup>10</sup> and that highway operators for hire are subject to State and Federal business or income taxes. It is also true that there is a tendency, as yet of minor proportions, to use funds collected from the gasoline tax for purposes other than the construction and maintenance of rural roads.<sup>11</sup> The diversions to other than highway purposes are, however, offset and probably more than offset by amounts raised from general sources inseparably included in items 6, 7, and 8 above. It is therefore reasonable to conclude that in 1929 direct charges against owners and users of motor vehicles contributed about 75 per cent of the funds currently raised for State-highway purposes,<sup>12</sup> 16 per cent of those raised for county and local purposes, and 48.5 per cent<sup>13</sup> of all funds raised.<sup>14</sup>

*Preliminary conclusions as to alleged subsidy.*—The foregoing analysis indicates that the contention of the railroads that they are called upon to contribute to the provision of highways for their competitors to use rests on an increasingly smaller basis as the well-defined tendency to relieve the general taxpayer

<sup>7</sup> Since 1925, principal and interest of most State highway bond issues are being met from special motor-vehicle taxes.

<sup>8</sup> The portion of this item derived by general taxation is not ascertainable.

<sup>9</sup> In some States assessments and collections appear to be lax.

<sup>10</sup> Thus, of the 1929 collections, 60 per cent was distributed for State-road purposes, 20 per cent for local-road purposes, 5 per cent to meet payments on State and county road bonds, and 6 per cent for miscellaneous purposes, including principally the improvement of city streets and the construction of public buildings.

<sup>11</sup> Assuming that all State highway bonds issued in that year were supported, principal and interest, from special motor-vehicle taxes. Credit should also be given for gas-tax receipts used for nonhighway purposes.

<sup>12</sup> There are, of course, great variations in percentages from State to State. In view of the variety of conditions it is impossible to carry the analysis further, but a definitive analysis would have to reckon with these differences.

of levies for State-highway purposes continues.<sup>13</sup> Specific figures are lacking, but such payments by the railroads are probably of minor proportions to-day, though doubtless of importance to some railroads, particularly at a time such as the present. However, the county and local roads of all States receive the major part of their support from the general taxpayer, including the railroads. The amounts contributed thereto by the railroads are very substantial, though only a small part of the aggregate.<sup>14</sup> An estimate made below puts railroad contributions to all roads, but mainly county and local roads, in 1929 at about \$50,000,000, or approximately one-eighth of all their taxes of that year. Against their total taxes of \$400,000,000 they set the \$250,000,000 paid by highway carriers<sup>15</sup> and, as previously indicated, the large and direct benefits which the latter receive in return. It must not be overlooked, however, that the railroads benefit (as do operators for hire over the State highways) from the presence of county and local roads. Railroads also benefit from the development of country and city, from expenditures for educational purposes, and otherwise from expenditures for general Government purposes. Their contention that they contribute largely to the support of State, county, and local Governments is well founded, as is their view that their highway competitors make relatively small contributions for such purposes. However, in comparing the amounts paid by the two forms of transportation, consideration should be given to the relatively small volume of business done by highway operators compared with that done by rail carriers.

#### QUESTIONS OF FACT—SECOND STAGE, DIVIDING HIGHWAY COSTS BETWEEN CLASSES OF USERS

In this second stage consideration may be given to the view that, whether or not users of the highways as a class pay adequately, individual classes of users do not bear their proportionate share of the burden. Thus parties to this proceeding have stressed distinctions between the payments of those who use the highways for business and for pleasure purposes, between taxes paid on vehicles used in city and in intercity operations, between classes of operators using the highways for business purposes (common carriers, contract carriers, and private operators), and between vehicles of large and small size. Clarification will result from such appraisal of these distinctions as is possible with the facts available of record. A statement of present motor-vehicle taxes will serve to introduce this analysis.

Briefly, the tax programs of practically all States vary motor vehicle fees according to kind and size of vehicle (whether measured by weight, capacity,

<sup>13</sup> In 1929, 21 States did not levy general property taxes for such purposes.

<sup>14</sup> The railroads of Atchison County, Mo., are said to have contributed \$4,481.50 in 1930 for road and bridge purposes, while commercial truck lines contributed only \$12.90; all railroads having a property assessment of \$1,000,000 or more in the State of Colorado paid the State for rural-road purposes \$432,937 in 1930; all the railroads in Florida paid \$1,377,037 for such purposes in 1928; in Georgia \$411,876; and in 33 Tennessee counties \$289,050. All railroads in 12 of the 14 States served by the Chicago, Rock Island and Pacific Railway Company are said to have paid \$80,351,183 in taxes (other than Federal) in 1928-1929, of which \$13,855,498, or 16.05 per cent, was apportioned for road use. If this ratio held the country over, the railroad contributions would have totaled \$49,312,000 in 1929 or approximately 8.1 per cent of the gross highway expenditures of that year, excluding transfers between States and their subdivisions, and 6.6 per cent of those for county and local roads.

<sup>15</sup> Motor-truck license fees and gasoline taxes, \$181,500,000, common-carrier bus license fees and gasoline taxes, \$20,500,000, and personal-property tax, municipal levies, etc., \$42,000,000.

horsepower, value, or otherwise), and most of them also make a partial distinction between vehicles for hire and all others, though failing to reach with special taxation the privately owned car used for business purposes. Operators for hire may pay not only additional fees proportioned to size of vehicles but in some cases gross-receipts taxes also. A further distinction is sometimes made between those vehicles for hire which are engaged in common-carrier service and those engaged in other services for hire. The former are thus required to pay a larger part of their gross receipts in taxes or a mileage tax per passenger-mile or ton-mile. Special taxes on for-hire vehicles are sometimes designated as taxes in compensation for use of highways and sometimes are imposed to meet the costs of regulation attributable to such operations. There are also personal-property taxes to be considered and taxes on garages and other facilities used by both private and commercial operators of motor vehicles. According to one estimate, such taxes yielded \$130,000,000 in 1929. Some \$20,000,000 of municipal fees are also reported. The gasoline tax applies equally to all uses of the highways.

*Distinction between users of highways for business and other purposes.—*

It is sometimes urged that those who use the highways for pleasure purposes contribute more than their portion and so underwrite the use of the highways for business purposes. There were 22,948,000 passenger cars, 95,400 busses, and 3,481,000 trucks in service on December 31, 1930, or 80.5 per cent in the first group compared with only 0.4 and 13.1 per cent in the second and third. On the basis of numbers alone there apparently is truth in the contention. Measured in vehicle-miles, passenger cars and busses have been found in 11 Western States to make a relatively greater use of the highways than would be expected on the basis of numbers.<sup>16</sup> However, the differences are not great and moreover the higher fees and gasoline consumption of commercial vehicles must be considered. On the other hand, it should be noted that a very considerable part of the passenger cars found on the highways are used in business pursuits but without differentiation from the pleasure car.<sup>17</sup> Clear-cut distinctions between pleasure and business use of such cars would be difficult to make. As a practical matter, the distinction under examination becomes merged with numerous other ones, including those relating to the size of vehicle.

The distinction is, however, of considerable force in so far as it enters into the planning of highways. Allocation of the expense of providing and maintaining highways should bear some relationship to the purposes which particular highways are intended to serve. In so far as business uses call for more highways or better ones than would suffice for other purposes, a charge is created for business users to bear. The facts are not easily discernible, owing to the variety of considerations which explain particular highway projects. Some urge that there is a tendency to build highways beyond the limits justified by community development and individual user economies. There appears to be evidence of such overbuilding in the scanty use made of expensive highways in some sections, as in the State of Tennessee. Also, as highways are improved a demand for further improvements based on developed use sets in, until a State may become committed to increasingly large expenditures which it had not foreseen.

<sup>16</sup> The Bureau of Public Roads survey made in 11 Western States in 1929 and 1930 indicates that trucks represented 10.4 per cent of the total traffic on the highways surveyed, measured in vehicle-miles, busses 1 per cent, and passenger cars 88.6 per cent, compared with registrations of 13.1, 0.4, and 86.5 in the country as a whole.

<sup>17</sup> The proportion of passenger cars so used is sometimes set as high as 50 per cent of all passenger cars on the highways, but no authoritative data are of record.

*Distinction between users of city streets and rural highways.*—Another distinction which has been urged as a reason for shifting a greater part of highway costs on to those who use the highways for business purposes is that between vehicles used on the city streets and vehicles used on the highways. It is urged that vehicles which do not get off of city streets and city-owned vehicles which use the highways only infrequently pay large amounts in fees and gasoline taxes which are devoted to highway uses.

It is necessarily true that the ownership of motor vehicles rests predominantly in city dwellers. Thus in 1922, 71.0 per cent of the passenger cars, 80.7 per cent of the trucks, and 72.1 per cent of all cars were of other than farm ownership, and in 1929, 78.8, 77.3, and 78.6 per cent, respectively. Such figures do not, however, measure the relative use made of the highways by vehicles of city and other ownership. Traffic tests made on the State highways of Ohio in 1925 put the percentage of city-owned vehicles at 87.6 per cent of the total in the case of passenger cars and at 84.5 per cent in the case of trucks. Similar tests in Vermont and New Hampshire in the year 1926 show that city-owned passenger cars were 89.9 and 93.9 per cent, respectively, of the total passenger cars on the highways and city-owned trucks 81.1 and 88.6 per cent of the total trucks. Farm-owned vehicles therefore make a proportionately less use of State highways than do city vehicles, but the reverse would likely be true of the use of county and local roads. The relative vehicle mileage on urban and rural roadways is also indeterminate.<sup>18</sup>

However, at best the distinction between city-owned and farm-owned vehicles is rather meaningless. City and country are interdependent. Farmers bring products to cities or start them on their way toward cities by using the highways, and they bring city purchases back. Movements of any class of products between cities, involving use of the highways, are also primarily for the benefit of city dwellers. Consumption is roughly in proportion to population. Much highway mileage of passenger cars is also due to employment in cities. To label certain movements as intercity or rural and others as urban and to base taxing programs on such a distinction is therefore not helpful. Also, even though the city dweller uses the rural highways only occasionally, he enjoys a sort of stand-by service which he would dislike to give up. To urge, therefore, that gasoline taxes and license fees paid by city cars are improperly diverted to highway use, and to urge further that intercity or farm-city movements should be charged for the use of city streets, large though the expenditures on the latter must be, is to confuse payments and benefits and to obscure the real issues.<sup>19</sup>

*Distinction between users of State highways and of county and local roads.*—A further distinction, urged in this instance by commercial users of the highways, is that between vehicles using State highways and those using county and local ones. Two-thirds of all highway traffic is said to take place over the State systems. Inasmuch as a third of the mileage of such highways was unsurfaced in 1929 and more than another third only lightly surfaced,<sup>20</sup> it appears that there is a still further tendency to concentrate on the more highly surfaced State roads, which are less than a third of the State mileage and little more than 3 per cent of the total highway mileage of the United States.

<sup>18</sup> An estimate that the division is about equal is found of record.

<sup>19</sup> The interdependence of cities and adjacent countryside is of different degree, as may be illustrated on the one hand by New York City, which draws its food supplies mostly from long distances by rail, and, on the other hand, by a small trading center.

<sup>20</sup> Page 415.

However, accurate details are lacking and doubtless considerably more commercial operations, particularly trucking, take place on lightly surfaced highways than is commonly believed.<sup>21</sup> The lower construction cost but higher maintenance costs of such highways make it important to establish the facts, owing to the destructiveness of heavy vehicles on such highways.<sup>22</sup>

The contention, however, is that, since commercial vehicles make relatively little use of county and local roads, the payments they make should be credited entirely against the cost of providing State highways.<sup>23</sup> The question here is largely one of policy but certain pertinent considerations may be cited. From the point of view of the ultimate purposes which highways serve, all in essential respects are parts of an interrelated system. Trunk-line highways do not exist for their own traffic alone nor do lateral and branch ones; each type also feeds the other in the same sense that branch and main line railroads do. This basic fact has become increasingly ignored in recent years,<sup>24</sup> with the result, as contrary views gain acceptance and as traffic is diverted from railroads, that the public which pays the transportation bill is more and more broken up into segments, some of which gain advantage from the resulting segregation and others of which suffer severely. The tying together of all communities served by a great system of railroads, which relationship, incidentally, benefited local communities further through affording them large tangible railroad assets to tax, is becoming less of a factor in the adjustment of transportation charges.

*Distinction between common and contract carriers.*—The difference in charges paid by common carriers and so-called contract carriers is very great in many States and, coupled with other advantages enjoyed by contract carriers, makes it difficult for common carriers to compete effectively. A tendency to surrender common-carrier permits is noticeable in such States. The question at hand is largely one of policy: Of whether one or the other form of truck operation should be encouraged and, in fact, of whether privately operated vehicles used for business purposes should be made amenable to the same taxation as vehicles used for hire.

Certain generalizations bearing on whether or not for-hire vehicles pay adequately for the use of highways appear of record. According to one statement, the average payment in registration and license fees and gasoline taxes made by motor vehicles of every description was \$29.40 in 1929, whereas the average interstate motor bus paid \$739.27, or 25.1 times the preceding figure, the average intercity bus \$539.68, or 18.4 times, and the average common-carrier bus, including intracity, \$576.04 or 19.6 times. Moreover, it is urged, though busses make more use of the highways than do other vehicles, they make for a more efficient use of the highways. Specifically, it is said if half the bus traffic moved in private cars, the annual highway vehicle mileage would be almost doubled and the gross tonnage on the highways more than doubled.<sup>25</sup> It is urged that this saving more than offsets the added cost

<sup>21</sup> The Wilson Transportation Company, trucking subsidiary of the Chicago, St. Paul, Minneapolis and Omaha Railroad, reports that 76 per cent of its operations take place on gravel roads.

<sup>22</sup> Page 424.

<sup>23</sup> A considerable part of special motor vehicle fees and gasoline taxes now goes to county and local roads. See page 418.

<sup>24</sup> As seen also in relatively small amount of feeder service operated by large bus and truck companies.

<sup>25</sup> This latter part of the statement loses its significance when it is considered that private cars do not put a critical strain on highways. See page 423. The statement also assumes that this half of bus travel would have moved in private cars, which may or may not be the case.

of the roads due to the presence of the larger vehicles. However, allowing for differences in gross weight of busses and private cars, set at 4.17 to 1, it was stated that the average bus was paying 5.6 times its share and the average intercity bus 5.7 times, provided the average of all vehicles on the highways was paying its share. Using national averages for weights of cars and busses and applying the varying special taxes of each State to such average bus and car, the conclusion was further reached that in each State the bus was paying considerably more than its share if the average vehicle was paying adequately. To demonstrate that the average vehicle was paying adequately, it was developed that the carrying charges of State highways were \$433,836,739 in 1929 while motor-vehicle fees and gasoline taxes contributed \$759,000,000, leaving about \$325,000,000 for application to the cost or carrying charges of county and local roads.

Comment has elsewhere been made on the derivation of the item of carrying charges.<sup>26</sup> There is much that is subject to discussion about other features of this analysis. While it contributes to an understanding of the highway tax problem it does not supply the definitive answer required.

Less convincing are estimates relative to truck taxes. To state, as is done on the record, that in 1930 the average passenger car paid \$25.52 in special taxes, the average truck \$53.78, the average privately operated 3-ton truck \$101.27, and the average common-carrier 3-ton truck \$458.78, can lead to no definitive conclusions in the absence of a great amount of essential data and of expressed policy on important points. Among other things, the questions next to be discussed require answer.

#### QUESTIONS OF FACT—THIRD STAGE—QUESTIONS RELATING TO HEAVY VEHICLES

In the two preceding stages of this discussion it has generally been assumed that all vehicles require the same type of highway and that none put a critical strain on the highways provided. In this final stage of the analysis the question to be considered is whether, assuming equitable taxation in all other respects, certain vehicles make special demands for highway facilities for which they should be specifically assessed. This question is a twofold one: Does the presence of heavy vehicles require a better type of surfacing than would otherwise be necessary, and do such vehicles require extra thickness or width of roads of a given surfacing? These questions are largely of an engineering character and in many essentials are not satisfactorily answered by the data at hand.

It is well known that busses and trucks destroyed many miles of pre-war highways of various surfacings which had not been constructed to withstand such heavy wheel loading. However, such occurrences lie outside the period to which attention is chiefly confined in this analysis.

*Weight of vehicle and required type of surfacing.*—It is also a matter of common observation, for which there is support of record, that heavy vehicles are particularly destructive of macadam and gravel and other lightly surfaced roads. In 1929 gravel and macadam surfacing constituted 95 per cent of the total surfaced mileage of county and local roads (other than that of only sand-clay or topsoil surfacing), 68 per cent of the surfaced State highway mileage, and nearly 86 per cent of all surfaced mileage.<sup>27</sup> The more highly surfaced

<sup>26</sup> Page 416. Also, about a third of the taxes are paid by urban busses, a fact possibly entitled to consideration in so far as urban travel is of purely local concern.

<sup>27</sup> Page 415.

182 I. C. C.

mileage in State highways, particularly Portland cement concrete, has, however, increased rapidly in recent years, though the increase in the mileage of bituminous macadam in county and local roads has been practically as great.

The difference in construction costs between macadam surfacing built for the average passenger vehicle and concrete surfacing of the thickness generally prevailing is varyingly estimated at from \$10,000 to \$20,000 per mile, and, while the maintenance cost of macadam roads is greater, a considerable net saving results where such surfacing suffices. It is therefore necessary to determine whether the added cost of higher surfacing is attributable to bus and truck operation or to the demands of the general public for roads adequate and safe for a large volume of high-speed traffic. Both classes of operator profit from the lower cost of operation on well-located and smooth-surfaced highways. Those who emphasize speed and therefore its necessary concomitant, safety, require, in addition to a smooth surface, a small degree of curvature, a limited per cent of grade and other protective features of highway construction. Vehicles are being built to make use of an added demand for better highways. Insofar as this demand for speed, comfort, and safety of passenger travel does not explain the constant increase of surfacing of the highest types, there is a cost which may properly be imputed to those who otherwise use for business purposes vehicles which would destroy a lower grade of surfacing. Such use by heavier vehicles may also require added thickness or strength of macadam roads.<sup>22</sup> There must, therefore, be a clear determination of what size vehicle puts a critical strain on each type of lower-grade surfacing and what the relative commercial and private demands on highways are. It is not unlikely that, assuming proper observance of speed laws, a relatively small number of trucks and busses are doing the major part of the damage to present surfacings or creating the greatest demand for better ones.<sup>23</sup> However, the answer now required for disposing of these questions is largely indeterminate in the absence of information as to the factors which explain particular highway projects and the types of vehicle which use each.<sup>24</sup>

*Weight of vehicle and required thickness of pavement.*—Treatment of the second major question stated above, what thickness of highway is required to meet the different demands of private car and heavy types of bus and truck, is confined to the cement-concrete type of construction. The results of two sets of experimental tests, one in process of completion and hereinafter referred to as the public roads test, and the other, made some 10 years ago and referred to as the Bates test, are of record.<sup>25</sup>

<sup>22</sup> The subsequent discussion of thickness requirements is confined to cement concrete roads, as data of record relate only to this type. The flexibility of macadam foundations makes them less subject to frost action, a factor of importance in Northern States in selecting types of road. See page 425.

<sup>23</sup> Of the 180,000 trucks examined in the Western States traffic survey 07.0 per cent were 1.5 tons' capacity or less, 17.6 per cent from 2 to 2.5 tons' capacity, and 14.5 per cent of greater size, including 2.6 per cent and 5 tons or over. A survey of 2,909 trucks in common and contract service in 42 States showed that only 11 per cent were 1.5 to 3 tons' capacity, 60 per cent being of from 3.5 to 5 tons' capacity and 29 per cent of over 5 tons' capacity. There is a tendency to use lighter trucks in combination with trailers, giving a larger but better distributed gross weight.

<sup>24</sup> See page 420. It is a fact that a considerable part of trucking operations are conducted on highways of the lower types of surfacing, as must of necessity be the case where States have limited mileage of better roads. See page 422.

<sup>25</sup> Respectively introduced by the chief of the Bureau of Public Roads, United States Department of Agriculture and the engineer in charge of the Bates tests, the former chief of the Illinois State Highway Department.



There has been considerable change in recent years in the views of engineers as to what, other than overloading, actually causes destruction of highways. Such change is attributable in large part to the substitution of pneumatic for solid tires on freight vehicles. Concrete highways are now said to have an indefinite life, provided they are properly constructed and their strength is not overtaxed, and overtaxing is said not to occur until considerably greater weights are reached than were formerly believed safe. Rubber, in other words, is said to wear out faster than concrete. This conclusion therefore throws the responsibility for minimum thickness of highways on to soil and climatic factors, the first of which may cause road failures by reason of soft spots in substructures and the latter through heaving and cracking.

Using the results of the Bates test, which was performed in Illinois, the former highway engineer of that State testified that 4 inches<sup>2</sup> is sufficient thickness to cope with soil and weather conditions, whereas the chief of the Bureau of Public Roads, basing his conclusion on varied national conditions, finds that not much less than 6 inches is required. Further study is being given this question by engineers. As more highway mileage is being cleared each year for winter traffic, leaving the surface unprotected from frost attack, this problem is of increasing importance in climates subject to severe frost conditions. It may be accepted, in the absence of convincing evidence to the contrary, that a minimum thickness of about 6 inches is advisable, subject to some revision downward if both soil and climatic conditions are highly favorable and to some increase where either poor subgrades or severe winter conditions are a consideration. In other words, the factor of safety used by designers to cover these phases of highway construction needs to be carefully related to given conditions and not applied as part of a general formula. It is not unlikely that there are many miles of highway designed with too generous a factor of safety for soil and climatic conditions, though of course the weight of loads may also enter in to explain the thicknesses adopted.

The 6-inch minimum thickness assumed for the purpose of this discussion as generally necessary will, according to the public roads tests, take care of all private passenger vehicles and other vehicles up to 3 tons' capacity. How much additional thickness do heavier vehicles require? According to the Bates tests, "the thickness required to support the load varies as the square root of the load." A somewhat smaller rate of increase is believed necessary by the chief of the Bureau of Public Roads. His conclusions are based on theoretical analyses of the strength of materials checked by actual road tests. The difference of views is doubtless attributable in large part to differences in method and to changes in truck design in the 10 years which have elapsed since the Bates test was made. In the latter the same trucks appeared to have been used throughout, increased wheel loadings being obtained by adding to the loads. In the public roads test different trucks were used for each important variation in load, thus approximating actual present conditions more closely through increasing the size of tire in keeping with the increase in size of truck. Also, the use of pneumatic, including balloon tires, has become general since the Bates test was completed.

The public roads tests have made clearer the importance of proper transmission of loads to the road surface. The ability of a pavement to withstand heavy loads is not a function of the gross weight but of the load on each of the

---

<sup>2</sup> All thicknesses referred to are at the center of the highway; an additional inch is provided at the edges to prevent cracking. The gradation from one thickness to the other assumes generally the form of a parabolic curve.

rear wheels.<sup>22</sup> Thus if a truck has six wheels the weight transmitted through each wheel to the pavement will be less than if it had but four, and if two rear axles are used, placed 46 inches apart, each could be loaded to the maximum for which the concrete is designed without having the stresses overlap. Dual rear wheels are regarded as a necessity for all but the lightest trucks and two rear axles, properly spaced, are regarded as a means of increasing gross loads without overtaxing a given thickness of highway.

In addition to this static load (the load on the wheel of a vehicle standing still) there is the impact load which occurs as a vehicle moves. This load represents the shock on the pavement and the bouncing produced by surface irregularities. Thus for a static wheel load of 9,000 pounds, which is that of a 5-ton truck, the maximum impact load is 12,500 pounds at 30 miles per hour if pneumatic tires are used and 21,000 pounds if solid rubber tires are in use. Speed does not affect the impact load imparted by pneumatic tires within the reasonable limits of 45 miles per hour, but it increases such load greatly where solid tires are used, as shown by the fact that at 20 miles per hour the impact load is 17,400 pounds compared with the above 21,000 pounds at 30 miles per hour. Solid rubber tires are increasingly being removed from the highways.<sup>23</sup>

The size of pneumatic-tire equipment is also an important factor to which State laws are giving greater attention than heretofore. The greater the area of contact between tire and road surface the less the strain produced. Thus if an impact load is concentrated at a theoretical single point the surface stress is 833 pounds, whereas if there is an 8-inch contact the stress is 433 pounds.

In keeping with the foregoing findings the Bureau of Public Roads concludes that the following thicknesses of concrete pavement are required for different sizes of vehicles, assuming the use of pneumatic tires (dual except in case of passenger cars), a speed of 30 miles per hour,<sup>24</sup> and a soft subgrade.

TABLE V

Class of vehicle	Maximum static rear-wheel load	Maximum impact force	Thickness required	
			Center	Edge
	Pounds	Pounds	Inches	Inches
All private passenger vehicles and trucks to 3 tons' capacity.	5,600	9,200	6	7
5-ton trucks	9,000	12,500	6.5	7.5
7.5-ton trucks	11,000	14,600	7	8

Assuming the exclusion of solid-tire vehicles,<sup>25</sup> a 5-ton truck with the usual 8-inch dual tires and operating at speeds not to exceed 45 miles per hour would require about one-half inch or 7.7 per cent more thickness than the minimum which appears to be generally required by soil and climate conditions, though the latter is more than is required by light vehicles.<sup>26</sup> To provide for a 7.5-ton

<sup>22</sup> It was assumed that 80 per cent of the load was on the rear wheels. Trucks of better design are in use.

<sup>23</sup> Only 3.6 per cent of all trucks produced in 1930 had solid tires, and these were largely for use in cities. The proportion is much higher in the case of older trucks.

<sup>24</sup> As stated, increases in speed up to 45 miles per hour have no important effects where pneumatic tires are used.

<sup>25</sup> A 5-ton truck with solid tires would require 38.5 per cent more thickness and a 7-ton truck so equipped 42.3 per cent more.

<sup>26</sup> This thickness would meet the requirements of most military trucks, though much heavier trucks of great military value are being designed.

truck with dual 10.5-inch tires about 1-inch additional thickness must be provided, or 15.4 per cent more than the stated minimum. No indication was given of the increased cost which increased thickness entails, but presumably the increase would not be proportionate to the increase of thickness.

However, the chief of the Bureau of Public Roads regards 9,000 pounds wheel load as about the maximum for which a highway should be designed. Such a maximum would take care of a 5-ton truck as indicated by Table V. Greater truck loadings can be achieved within this limitation by adding to the number of axles. Actually, however, according to this witness, 9 inches is a very ordinary thickness of highway to-day, representing excess costs of several thousands of dollars per mile. Such thickness was presumably built into the roads in part to make them available for heavy trucks but also because of the earlier prevalence of solid tires, or of differences of engineering judgment as to the thickness required. The fact can not be escaped, however, that, in so far as the findings of the Public Roads tests are conclusive, thousands of miles of excessively costly roads are in existence to-day. Since present highway trucks use preponderantly pneumatic tires and are therefore not responsible for highway costs incurred for trucks having solid tires, it becomes a question of public policy to determine whether to charge any or all of the extra thickness not required by the preponderant number of passenger cars (other than that attributable to soil or climatic conditions) against present truck users.

As for highways constructed in the future, the use of the percentages indicated in the above table may be taken to indicate approximately the costs to which use of heavier vehicles puts the public. There are highway designers, however, who appear not to apply these results in the highways for which they are responsible, since highways of greater thickness are being laid down at the present time. This situation may be attributed to failure to subscribe to the findings of the tests or to the recency of such findings. This lack of agreement can not but be expensive and troublesome to the public and to users of the highways.

The number of vehicles of greater than 5-ton capacity is considerable. As the bearing of extra charges of the magnitude indicated would render use of such trucks practically prohibitive, the better course would be to set a rigid maximum to wheel loading and provide no roads in the future to take care of greater loadings. Enforcement of speed limitations is also indicated as necessary for the protection of the highways.

#### GENERAL SUMMARY AND CONCLUSIONS

The following statements sum up the results of the foregoing analysis: (1) In 1929 direct charges against owners and users of motor vehicles contributed about 75 per cent of the funds currently provided for State highways, 16 per cent of those for county and local roads, and 48.5 per cent of all such funds; (2) the railroads are being increasingly relieved of contributing to funds used for State highway purposes, but they contribute very substantially to those used for county and local roads; highway operators make relatively small contributions to the latter funds; (3) distinctions between users of the highways for business and for pleasure purposes are at this time of importance mainly as they bear on the planning of future highway projects; (4) distinctions between the contributions of users of city streets and rural highways are not significant; (5) programs based on distinctions between users of State

182 I. C. O.

highways on the one hand and county and local roads on the other overlook the fundamental interdependence of all highway systems; (6) present distinctions in taxation between common and contract carriers lessen the competitive opportunities of the former group; the distinction in taxation between operations for hire and other operations for business purposes is also of questionable significance; (7) heavy vehicles require more highly surfaced highways than would otherwise be necessary and damage existing highways of low-grade surfacing; however, private passenger vehicles also create demands for highly surfaced roadways; (8) recent tests and experience have shown that required minimum thicknesses of highways are determined largely by soil and climatic conditions and that 6 inches is the minimum most generally required; assuming proper design of vehicles, the exclusion of solid-tire vehicles, and the observance of speed regulations, such minimum thickness will suffice for all private passenger vehicles and trucks up to 3-ton capacity; 5-ton trucks will require about one-half inch greater thickness, and 7.5-ton trucks about 1 inch additional thickness; engineering experience indicates that highways should not be designed for trucks of greater than 5-ton capacity; because of the earlier presence of solid-tired vehicles of less efficient design than those in use to-day and for other reasons, many existing highways greatly exceed these specifications and highways of greater thickness than is now considered necessary are still being constructed; as a practical matter, therefore, there continue to be excessive costs which should be examined for determination of the part thereof which is chargeable against the heavier types of vehicles; only detailed analysis of representative highways would supply the conclusive information required in framing a future taxing program.

## APPENDIX II

## TABLE OF CONTENTS

	Page
STATEMENT OF SCOPE OF INVESTIGATION.....	272
I. THE MOTOR-TRANSPORT INDUSTRY.....	273
Extent of highway trucking operations.....	274
Organization of the trucking industry.....	276
Extent of highway bus operations.....	277
Organization of the bus industry.....	278
Appraisal of highway motor service.....	280
Financial responsibility of highway operators.....	280
Permanence of service.....	281
Maintenance of schedules.....	281
Employment conditions.....	282
II. THE DIVERSIONS OF FREIGHT TRAFFIC FROM RAILWAYS TO HIGHWAYS.....	283
Diversion of less-than-carload traffic.....	283
Factors other than truck competition which explain reduction of less-than-carload traffic.....	284
Effects of truck competition on express business.....	285
Diversion of railroad carload traffic.....	285
The trucking of livestock, meats, and dairy products.....	287
Truck movements of fruits and vegetables.....	291
The trucking of cotton.....	294
Truckaway movements of automobiles.....	296
The trucking of coal.....	297
Other truck movements of carload traffic.....	298

<b>II THE DIVERSION OF FREIGHT TRAFFIC FROM RAILWAYS TO HIGHWAYS—</b>		
<b>Continued.</b>		<b>Page.</b>
Through water-line and truck service.....		300
Basis of competition between railroads and trucks.....		300
Service.....		300
Rates.....		302
Packing requirements.....		307
Conclusions.....		308
<b>III. THE DIVERSION OF PASSENGER TRAFFIC FROM RAILROADS TO HIGH-</b>		
<b>WAYS.....</b>		<b>309</b>
Decline in railroad passenger travel.....		310
Changes in character of railroad passenger traffic.....		310
Where railroad passenger business has gone.....		312
Basis of competition between railroads, private car, and bus.....		314
Service.....		314
Rates.....		315
Conclusions.....		320
<b>IV. EFFECTS OF TRAFFIC DIVERSION ON THE OPERATING AND FINANCIAL</b>		
<b>PROBLEMS OF RAILROADS.....</b>		<b>320</b>
Difficulties in adjusting rail-passenger service to reduce volume		
of travel.....		322
Adjustment to reduced volume of freight traffic.....		324
Vulnerability of short lines and electric railways to motor com-		
petition.....		326
<b>V. EFFORTS OF RAILROADS TO COPE WITH HIGHWAY COMPETITION.....</b>		<b>328</b>
Changing railroad attitudes toward motor competition.....		328
Efforts to meet highway transportation through improved serv-		
ice.....		328
Freight.....		328
Passenger.....		330
Efforts to meet highway transportation through reduced rates.....		331
Freight.....		331
Passenger.....		334
Motor freight transportation by rail carriers.....		336
(a) Substitution of trucks for way trains and terminal		
switching.....		336
(b) Truck operations supplementary to rail.....		338
(c) Meeting the demand for pick-up and delivery service.....		338
(d) Highway truck operations by railroads independent of		
rail operations.....		341
(e) The less-than-carload container.....		341
(f) Devices for line-haul movement of truck bodies.....		343
(g) Forwarding companies and other methods of coordi-		
nation.....		345
Summary of railroad motor operations reported in returns		
to questionnaire.....		345
Attitudes of independent operators toward rail operation of		
motor facilities.....		346
Conclusions as to the use of motor freight facilities by rail-		
roads.....		347
Coordination through railway express companies.....		348
Highway passenger transportation by rail carriers.....		348
(a) Use of busses in substitutional operations.....		348

<b>V. EFFORTS OF RAILROADS TO COPE WITH HIGHWAY COMPETITION—Contd.</b>	
Highway passenger transportation by rail carriers—Continued.	<b>Page.</b>
(b) Use of busses in supplementary operations.....	350
(c) Highway bus operations by railroads independent of rail operations.....	350
Efforts of short lines and electric railways to use motor bus facilities.....	352
Conclusions as to highway passenger transportation by railroads	353
<b>VI. ASPECTS OF THE PUBLIC INTEREST IN HIGHWAY TRANSPORTATION.....</b>	<b>355</b>
Financing the motor carriers' right of way.....	355
Traffic congestion and highway safety.....	355
The economic soundness of the motor transport industry.....	356
The declining unity of transportation service.....	358
Military considerations.....	366
<b>VII. PRESENT REGULATION OF MOTOR TRANSPORTATION.....</b>	<b>367</b>
Under the interstate commerce act.....	367
Intrastate motor regulation.....	371
<b>SUMMARY OF EVIDENCE.....</b>	<b>374</b>
Trucks.....	374
Busses.....	377
<b>CONCLUSIONS.....</b>	<b>379</b>
The remedy to be applied.....	380
Recommendations.....	385

## APPENDICES

A. Truck and bus operations of railroads, electric railways, and carriers by water, as reported in questionnaire.....	393
B. Estimate of volume and distribution of truck traffic.....	400
C. Data relative to financial operations of independent motor vehicle car- riers.....	408
D. Control of companies comprising Greyhound Lines system.....	408
E. Operating statistics from annual reports, Class I railroads.....	410
F. Summary of State regulation of common and contract carriers by motor vehicle.....	410
G. Financing the highways.....	418

182 I. C. C.