A STUDY OF COMPETITION IN FREIGHT TRANSPORTATION TO AND FROM BOSTON, MASSACHUSETTS

by

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Signatures of Authors ..... Signature redacted

..... Signature redacted

Professor in Charge of Research..... Signature redacted

Chairman of Departmental
Committee on Graduate Students..... Signature redacted

52 Massachusetts Avenue
Cambridge, Massachusetts
May 27, 1931

Professor A. L. Merrill
Secretary of the Faculty
Massachusetts Institute of Technology
Cambridge, Massachusetts

Dear Sir:

In accordance with the requirements for graduation, we herewith submit a thesis entitled,

" A Study of Competition in Freight Transportation to and from Boston, Massachusetts."

We take this opportunity to express our appreciation for the assistance received from Professor Babcock, the officials of the Boston and Maine Railroad, and the various traffic organizations, manufacturing concerns and transportation companies of Boston.

Very truly yours

Signature redacted

G E McHugh

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A STUDY OF COMPETITION IN FREIGHT TRANSPORTATION TO AND FROM BOSTON, MASSACHUSETTS

INTRODUCTION

The competition for traffic between the various agencies of transportation which exist today is a subject which is being brought more and more to the attention of the public. The situation at present differs in several essentials from that which existed a decade ago. At that time there was competition between railroads and coastwise steamship companies, and all overland freight was carried by railroads, competing among themselves, but all of - fering the same kind of service. In other words, a shipper had the choice of only one type of service, rendered in varying degrees of efficiency. Competitors for overland traffic all had the same rules and regulations to obey, and they all had "an even start," so to speak, in the race for business. Traffic which could best be transported by water, i.e. slow moving, low grade commodities, continued to be carried by boats, in spite of the efforts of the railroads to divert as much of this traffic as possible to the rails. The railroads are still competing for this slow, bulky traffic. With increased

efficiency of railroad operation bringing about reduced operating expenses, and hence the possibility of reducing rates, this traffic is no longer the sole property of the steamship lines.

Another change in the competitive situation has been brought about by the advent of a third party in the campaign, namely the motor truck. The airplane is also said to be a competitor in the transportation field, but it is evident that this agency at present confines its usefulness only to the passenger business, which we are not considering here. There is no longer any question, however, that the motor truck is a part of our transportation system as a whole, just as much as the railroad and the steamship. Also, there is a certain class of traffic which can be most economically handled by the truck, and it is the determination of this class of traffic which is at present vital to the transportation question.

In the long run, every commodity will find its most economical carrier, and will then be considered definitely as belonging to that agency to

which it has assigned itself, although this does not preclude, of course, that the other agencies will always continue to attract as much of the traffic, and as many of the commodities as possible to their respective fields. The various governmental bodies in this country, and their representatives, such as commerce and public service commissions, have evidently this situation in view when they point out the necessity of maintaining competition between parallel railroad lines. Competition between carriers of the same class, water, railroad or highway, will exist always, and will even be fostered in order to insure the best possible service to the public. But competition between these three agencies will diminish as the various commodities find their most economical "mode of travel."

In the meantime, however, this competition between classes is going to bring about marked improvements in each type of service, some of which have already been effected, and which will serve to increase the standard of our transportation system in all branches.

On the other hand, economical improvements cannot be brought about by means of a blind battle for tonnage regardless of whether a given agency is conducting transportation at a profit or at a loss. No business which can not operate at a profit such as to enable it to make improvements commensurate with the advance in business conditions, or to attract to it the ability of the best minds of the business world, can exist very long, or even be a credit to our economic structure. Hence, the determination of where the competition lies between the agencies, and in which direction the economical improvements can be made so as to attract to each the largest possible volume, is a question which should be scientifically and systematically analyzed in order to bring about the least waste from needless competition, and the most effective coordination of our systems.

This determination of the field of competition naturally involves very many, and some quite complicated questions. Many of these in fact, are too extensive to study here. However, among the questions which are at least open to discussion are:

Considering the railroads, steamships and trucks:

1. What is their relative importance in the industrial structure surrounding Boston ?

2. How does the service of the three compare ?

3. How does the reliability and speed of service compare ?

4. What factors influence the shipper in his choice of carrier ?

5. How does the type of commodity determine its method of shipment ?

6. How are these three agencies coordinated around Boston at present ?

7. How does the regulation of each of these agencies compare ?

RESULTS OF THE INVESTIGATIONS

THE RELATIVE IMPORTANCE OF RAILROAD, STEAMSHIP AND TRUCK TRANSPORTATION

There are two factors which indicate the relative importance of the three agencies of transportation named above. They are: first, the tonnages which are carried by each; and second, the utilization as indicated by the manufacturers. (Information was obtained from the manufacturers by means of the questionnaire in Appendix (A)).

Concerning the first source, the tonnages moved, the three agencies, will be considered in the order of the heading: rail, steamship and truck. The tonnages of all railroads are accurately kept for submittal to the various State and Federal commissions requiring this information. However, since the work of compiling these figures for Boston is extremely laborious, and since trucking tonnage must be estimated, an estimate of rail tonnage is sufficient for this purpose. This first estimate, which is explained in more detail below, is 20,000,000 tons of freight shipped into Boston by rail each year. Outward tonnage is not so large but because of the magnitude

of the inward figure, for comparative purposes it is not needed.

By steamship, as presented in Appendix F, the total tonnages moved are: inbound domestic 12,700,000 tons; outbound domestic 1,700,000 tons; total inbound and outbound 14,400,000 tons, which is but 70% of the inbound tonnage by rail.

The tonnage by truck, as mentioned before, was estimated. The details of the estimate are included in Appendix G and show the total tonnage moved by truck inbound and outbound to be 1,912,000 tons or but 9.6% of the inbound rail tonnage.

Rail is by far the most important agency of transportation serving the City of Boston, its inbound tonnage alone exceeding the total tonnages of the other agencies by substantial amounts. The tonnage which is hauled by trucks however, though low in its relation to that of rail and water, must not be considered too lightly, for practically all of this movement is concentrated within a radius of fifty miles of Boston.

From the second source of data on this subject Fig. 1 was plotted showing the utilization of the three

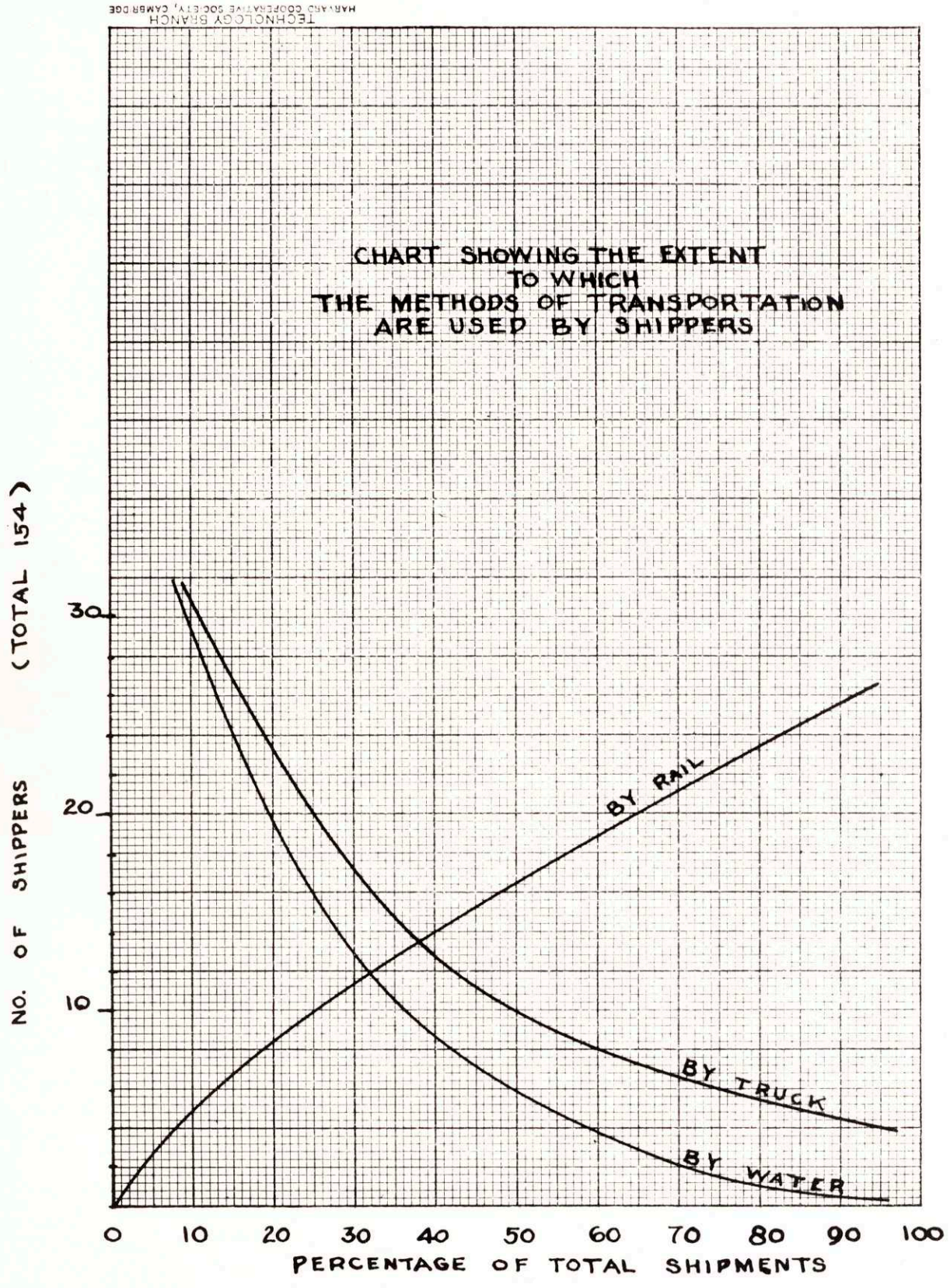


Fig. 1.

methods of transportation by the shippers answering the questionnaire. The tabulation of the data from which this is drawn is contained in Appendix A. This presents a graphical picture, which needs no further explanation, of the relative use which is made of rail, steamship and trucks.

It is evident from the above that rail transportation is without doubt the most vital of all agencies serving Boston.

SERVICE OFFERED

The service offered by the railroads is the most complete and the most diversified of the three agencies. Considering the number of points reached, water service is limited to seaports and towns near the coast, and trucks are limited in the distance that it is economical for them to travel. Thus we may set up the following table:

Agency	Points Reached
Truck	Towns within an average of a few hundred miles from Boston .
Steamship	Seaports and towns along the coast.
Railroad	All stations on the American continent.

For handling large quantities of bulk material, the steamship and railroad offer better service than the truck. This is evidenced by the fact that raw materials and coal come into New England and to Boston entirely by rail or boat. The truck, on

the other hand, is a more flexible unit, and can therefore be used much more quickly and economically for the short haul of the small shipment. The demand for each of these facilities may be judged from the schedules operated by each agency, as follows:

Rail: (Appendix B). Three Railroad Companies, the Boston and Maine, the Boston and Albany and the New Haven, operating thirty-two through freight trains inbound and thirty-one outbound per day, plus forty local trains in and out of Boston daily.

Water: (Appendix F). Twenty steamship companies with a rough average of twenty-five to thirty sailings per week.

Truck: (See Trucking, below). 976 contract trucking companies plus private truckers operating 50,000 truck movements in and out of Boston per day.

Some of the special service which is offered by the railroads which cannot be offered by either of the other agencies is as follows:

1. Warm car service for perishables in the winter time.

2. Refrigerator car service with the ability to hold under ice awaiting the consignee's disposition.
3. Scheduled through merchandise cars to cities in the west.
4. Loading and unloading of heavy, bulky material at private side track.

In addition there are many other advantages applying to specific commodities. The steamship companies have only their lower rates to substitute for these advantages, and trucking concerns offer greater speed and greater convenience for the short haul.

RELIABILITY AND SPEED

From the point of view of responsibility there is no doubt that railroads and steamship companies are more reliable than trucking companies in general. This is not to be considered as an aspersion on the character of the larger trucking companies. It is the vast majority of small irresponsible one-truck owners which lowers the average standing of motor truck carriers generally.

Claims for loss and damage are paid by the railroads with the minimum of delay, and this action has won the approval of the shipping public. Evidence of good-will is always evidence of responsibility and reliability, and in this respect the railroads at the present time hold the highest position. In answer to Question 6 of the questionnaire in Appendix A which asked for comments upon the degree of cooperation which was being proffered by railroad personnel, the answers were almost unanimous in declaring it to be of the highest order.

Damage and delay are also indices of reliability, information concerning which may be derived from the questionnaire. The results of this interrogation, however do not favor the rail carriers. They indicate definitely that in the movement of goods trucking is the least offender, by a large margin, and rail by an equally large margin, the greatest. Steamship damage is intermediate in magnitude but approximates more closely the truck. The reasons for the large amount of damage done in rail transportation is blamed by many shippers upon the modern

hump yard operations (often termed "jump yard" by shippers.) This latter term is not without some justification as it is true that in some cases freight is roughly handled in hump classifying. It must be kept in mind however, that the invention of the car retarder, which is the fundamental fundamental mechanism of concentrated yard operations, is a recent development and is yet in the stage of improvement. It must also be borne in mind that it is the car retarder and the hump yard which have been fundamental factors in raising the efficiency and speed of railroad service to the present high point which is lauded by shippers in this country. That the least amount of damage reported is by truck is a tribute to the truckers, drivers, motor truck manufacturers, and the Government of Massachusetts which has improved the highway systems to the present stage of perfection. The truck is an instrument which might easily be conceived as causing untold damage to property due to improper driving and rough roads. The contrary, however, is seen to be the case.

The replies to the questionnaire relative to delays show the same results, namely that the

truck is responsible for the least and the rails for the most. That the truck should be responsible for the least delay is not contrary to natural expectations. The average haul of trucks is well within 100 miles, and in addition a large percentage of the truck business is emergency shipments.

In regard to speed there are definite limits of distance, which at the present time have never yet been determined, within which the truck, and in some cases the steamship, may operate on a faster time between given points than the rail carrier, and outside of which train service is definitely faster. For example, between Boston and Lynn, a distance of approximately ten miles, it is definitely faster to ship by truck in preference to rail; although Lynn has a harbor there is no water service between Boston and Lynn. Again between Boston and Lawrence, a distance of twenty-five miles, or between Boston and Worcester, a distance of fifty miles, it is faster to ship by truck. (These figures are based on the statements of shippers answering the questionnaire). However, from Boston to New York, a distance of approximately 250 miles, there is

considerable doubt as to the fastest method of shipment.

Many shippers claim that to New York and other north eastern Atlantic ports the time by water is faster than by rail. The train, as a unit in road haul, travels at a speed much greater than that of the steamship, but other factors are encountered which have a decided effect upon the total time of shipment. At New York one of these is met with in the necessity of lighterage which must be performed by railroads to make deliveries on Manhattan Island. Only one road, the New York Central, has direct freight rail connections with this, the most highly concentrated population center in the world. The difficulties encountered in the way of congestion of rail operations and the daily service to New York given by the Eastern Steamship Lines explain the differences between rail and water carriers at this port. (Steamships dock at Manhattan Island). However this situation cannot exist at other Atlantic seaports, as is also charged, for there are no lighterage problems of such magnitude nor is a daily

service given by water carriers to any other ports from Boston (see Steamships, below).

Many factors, therefore, other than the actual speed in miles per hour which is made over the road, must be taken into consideration. The length of the haul, the differences in the competitive routes, the necessity of changes of equipment, and many other factors, must be considered in determining the limits within which each agency can operate at greatest average overall speed.

THE SHIPPER'S CHOICE

Let us assume that the shipper makes his own choice as to the routing of freight, and that he does not merely route according to instructions from the consignee. Likewise we will not consider here the part that pure good-will and friendly relations with any particular carrier plays, admitting nevertheless that this is a most important factor. In this latter respect, however, each agency and each concern has at least the same opportunity to influence a shipper's mind.

It is always the shipper's purpose to get the best service as regards speed, reliability, or

whatever other factors may be of importance to him, at the lowest possible cost. As a matter of fact, in the majority of cases, as is pointed out below, the cost of transportation is the prime factor in determining a route, the shipper accepting along with that the best service he can get. The next largest group of shippers, however, is that which requires the fastest service consistent with reasonable economy, accepting with that the best price that can be obtained.

In modern business, shipping for large concerns is usually done by a traffic manager who is responsible to an executive above him. This has removed a great deal of the personal element in the solicitation of traffic by the carriers, since the traffic manager of an industry has to justify any choice he makes in dollars and cents. Carriers can therefore no longer add to the attractiveness of their wares by means of personal favors. The important thing for carriers to consider, therefore, is not the disposition of the shipper himself (although this of course should never be ignored) but the requirements of the commodity to be shipped.

The only way of influencing shippers or traffic managers is by educating them to the existing facilities.

THE TYPE OF COMMODITY

The routing of freight is determined almost entirely by the requirements imposed by the nature of the commodity. This question is discussed in Appendix D, which contains the results of information gathered through many interviews with shippers and others, directly and indirectly in the transportation business. It was found that there are three major factors which determine the agency by which a given commodity is transported, and a fourth factor which applies in relatively few instances. These factors are, in descending order of their importance:

Cost

Speed

Reliability

Convenience

This order of importance is borne out by the results of the questionnaire described in Appendix A.

We must of course be careful not to carry our generality too far. It cannot be said that a given commodity will always be handled to best advantage by any given agency. It depends from where and to where this commodity is moving, in what quantities it moves, what peculiar requirements the shipper may have which are not inherent in the commodity, how regularly the particular shipments are made, and even the season of the year may be a deciding factor. Assuming that all these elements are constant, a commodity is never definitely removed from the field of competition. The facilities offered by each of the different types of carriers are always subject to improvement, and as a matter of fact are constantly being improved. A given commodity, which has an alert traffic manager or shipper to guide its routing, will never be hauled for a long time by one agency, if there is another which can offer a better or more economical service.

The point to be made, however, is that a given freight movement, which usually can be classed in one of the four groups mentioned in Appendix D,

has of itself inherent characteristics which determine its most satisfactory agency under any given set of circumstances. If it falls to a shipper to decide which way his goods shall be transported, the question will eventually be decided for him by the nature of the commodity shipped, and not by any personal whim or preference that he may have. A shipper may not be able to determine before-hand which will be the best way for his goods to move. The only way to determine the deciding factors will, in the majority of cases, be by experiment. But the all important conclusion is that the agency of freight transportation is determined by facts of service. And in order to meet competition it is to improvements of the service itself that a carrier must look.

COORDINATION

The opinion generally expressed here in Boston, as well as throughout the entire country, is favorable towards the coordination of all carriers of freight to the best advantage of the public. Methods of bringing this about however, and very few steps in this direction have been taken, are scarce. Notable among the first steps is the

establishment of truck service in conjunction with rail haul by the managements of the Boston and Maine and the New Haven Railroads. Efforts were first made in 1925 to establish a regular store door delivery system, but this was made impractical by Interstate Commerce Commission regulations. At the present time the coordinated trucking is being used widely as a feeder service and as a substitution for unprofitable road hauls. (Appendix E).

The coordinated rail and steamship facilities at Boston have for a long time been operated efficiently and favorably to all concerned. There is competition between water carriers and the railroads, but it is not of an irreconcilable nature. Each rail line has its own connections with water carriers at the docks, and through rail and water rates are set up by the traffic associations in which both are represented.

The combination of the truck and steamship company in Boston is still undeveloped. Only one case of this type of coordination was found to be in existence at present in Boston. However, no details

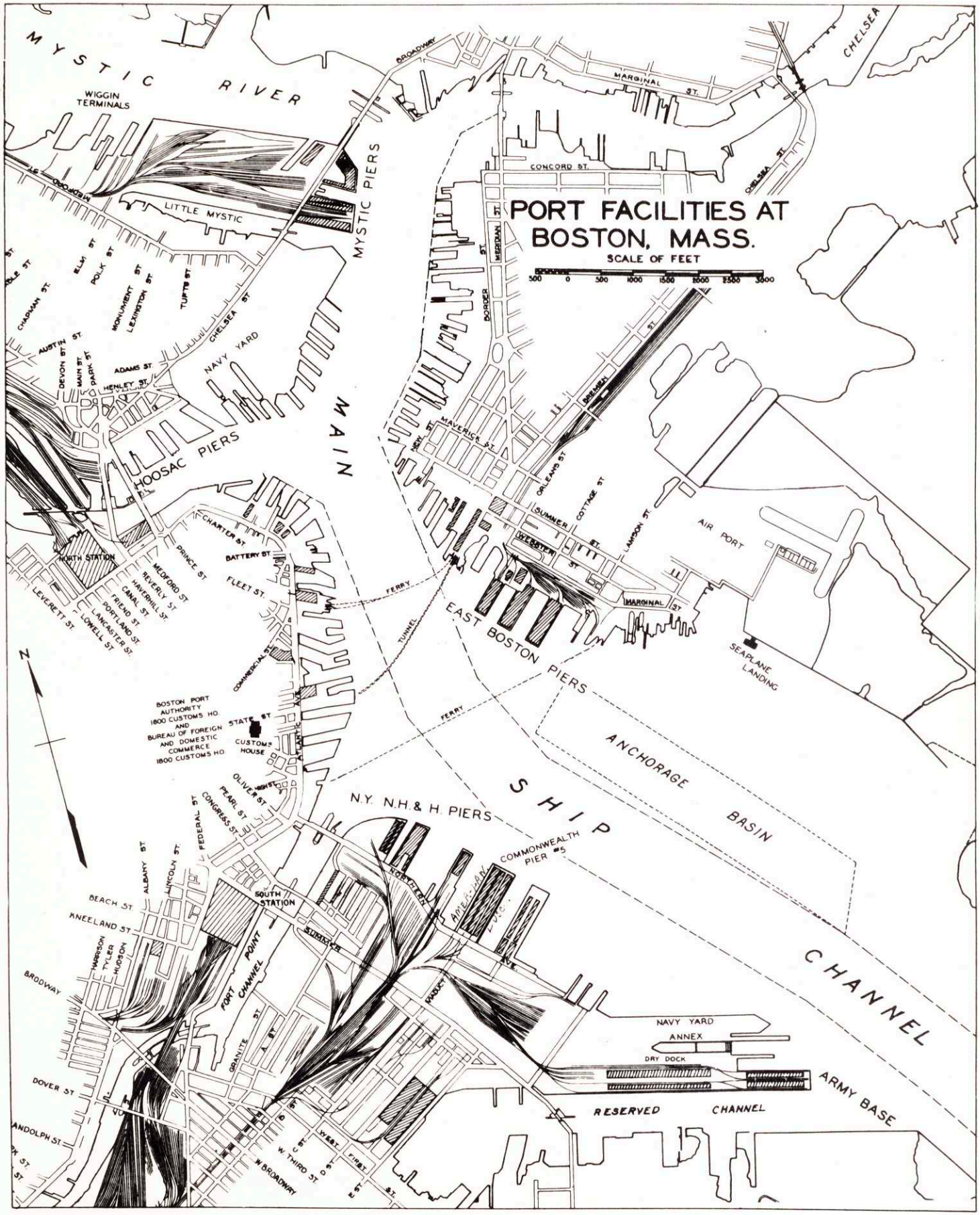

PORT FACILITIES AT
BOSTON, MASS.
SCALE OF FEET
500 0 500 1000 1500 2000 2500 3000
MYSTIC RIVER
WIGGIN TERMINALS
LITTLE MYSTIC
MYSTIC PIERS
MAIN
CHELSEA
BROADWAY
MARGINAL ST.
CONCORD ST.
CHELSEA ST.
BORDER ST.
MERIDIAN ST.
NAVY YARD
HOOSAC PIERS
MAVERICK ST.
ORLEANS ST.
COTTAGE ST.
LAMSON ST.
SUMNER ST.
WEBSTER ST.
AIR PORT
SEAPLANE LANDING
EAST BOSTON PIERS
TUNNEL
FERRY
NORTH STATION
CHARTER ST.
BATTERY ST.
FLEET ST.
PRINCE ST.
MEDFORD ST.
BEVERLY ST.
HAVERHILL ST.
CANAL ST.
FRENO ST.
PORTLAND ST.
LANCASTER ST.
LOWELL ST.
LEVERETT ST.
COMMERCIAL ST.
BOSTON PORT AUTHORITY
1800 CUSTOMS HO.
AND
BUREAU OF FOREIGN AND DOMESTIC COMMERCE
1800 CUSTOMS HO.
STATE ST.
CUSTOMS HOUSE
ATLANTIC AVE.
OLIVER ST.
PEARL ST.
FEDERAL ST.
CONGRESS ST.
N.Y. N.H. & H. PIERS
SHIP
ANCHORAGE
BASIN
CHANNEL
COMMONWEALTH PIER #5
NORTHERN AVE.
SOUTH STATION
SUMMER ST.
BEACH ST.
KNEELAND ST.
ALBANY ST.
LINCOLN ST.
HARRISON
TYLER
HUDSON
BRODWAY
FORT POINT CHANNEL
GRANITE ST.
DOVER ST.
ANDOLPH ST.
W. THIRD ST.
W. BROADWAY
D ST.
WEST
FIRST
E ST.
NAVY YARD ANNEX
DRY DOCK
RESERVED CHANNEL
ARMY BASE

Fig. 2.

could be obtained, although both parties to the contract were interviewed, due to the fact that the competition in motor trucking is of such a "cut-throat" nature. Both parties however, were of the opinion that the venture was successful and would continue to be so. The remaining trucking and steamship companies in Boston from which information was sought either had not considered the plan or were adverse to it.

Among the reasons offered in the nature of disadvantages to such operation were: 1. Steamship tonnage is so small and so widely distributed to points outside of Boston that it would be unprofitable for any trucker to do the work at reasonable prices, and 2. The fact that the railroads and the steamship lines are so closely allied at present in regard to an anti-truck movement that trucking companies cannot obtain the necessary wharfage privileges. These disadvantages, however, seem to be more or less fictitious.

The future coordination of these three agencies will probably be carried on under the control,

direct or indirect, of the railroads. Motor trucking at the present time is in such a state that even the truckers themselves are beginning to favor legislation controlling rates and operations. Thus it can be foreseen that the impending change is not far distant, in view of the numerous investigations and attempts at legislation. When the change comes, if any coordination is effected, it will be neither under the steamship lines nor under trucking companies, for the former are not interested and the latter are not strong enough. The railroads have shown themselves to be both strong enough and interested enough in the problem to undertake the gigantic task of coordinating all methods of transportation. In the very near future it is more than likely that some developments will be forthcoming in this direction.

REGULATION It has been said that "every possible phase of regulation assumed to be in the public interest has been, and is being, applied to the railroads..." It is common knowledge that the Interstate Commerce Commission keeps very close supervision over

the railroads of the United States, and in addition the carriers have regulations imposed by the various state legislative bodies which must be complied with. These regulations control practically all the actions of the railroads which are in direct connection with the public. Rates charged for freight hauls, and also for various services incidental to receiving or delivering freight, must be filed with and approved by the various regulating commissions. Classifications must be strictly adhered to, and packing requirements are rigidly enforced. There are regulations concerning train operation, and regulations concerning the hours men may work. These rules are all necessary, and they are a good thing, but the fact nevertheless remains that the railroads are regulated more than any of the other agencies. Regulation, no matter how wise, always has the effect of decreasing the incentive for the managements to exercise initiative. The reason for this is obvious. Under the present methods of regulation of the railroads, whenever a new experiment is tried in the line of service, the chances are very great that there will be something

which will be found to be at variance with the letter of the regulations, with the result that some of such experiments as have been failures have been an unwarranted expense.

Water carriers are regulated by the Interstate Commerce Commission only where through rail and water rates are in effect. Otherwise the coastwise steamers come under the United States Shipping Board. This Board imposes regulations on the ships for the safety of passengers and crews, but says very little about the method of operation.

Motor trucks in Massachusetts are at present entirely without regulation except for registration requirements and maximum weights. The shippers as well as the large trucking concerns are beginning to favor the regulation of the motor truck. The trucking business is being harmed considerably by the irresponsible independent truck owner, and the more reliable concerns realize that there is no way to eliminate the unfair competition that these truck owners offer other than by regulation. There has been some opposition to truck regulation on the part of

those who fear that the railroads will get a monopoly on freight traffic, but those who are familiar with the railroad policies of the last ten years or so, know that this fear is unfounded. There is no doubt that there will be truck regulation before very long, although many problems concerned therewith are still awaiting solution.

INVESTIGATIONS

RAILROAD TRANSPORTATION

It has been said that in this country three quarters of all the freight that is transported is moved on the rails. How this figure compares with a similar figure for Boston alone it is practically impossible to ascertain. In the last few years the percentage of all the freight that is transported by truck has increased steadily, and since in New England the short haul is more predominant than in other parts of the country, there is here a field particularly adapted to truck transportation. Therefore it seems logical that not quite 75% of all the freight is transported by rail in this part of the country. As a matter of fact the percentage should be a great deal lower, considering the fact that Boston is a seaport and that there is a great deal of coast-wise shipping done.

SCHEDULED SERVICE

Since there are no records of tonnage that is moved in and out of Boston by truck at all, and any figure which may be obtained for that movement is at best only an estimate, it seems sufficient to make only an approximation of the tonnage

that moves by rail. Referring to Appendix B there are a total of thirty-two scheduled freight trains moving into Boston daily on the railroads: the Boston and Maine, the Boston and Albany, and the New Haven, and thirty-one outbound. Since the scheduled trains represent as a rule the minimum service, a number of extra trains being run when the business demands it, the total tonnage moved is probably more than could be handled by these scheduled trains. Assuming an average net tonnage of 2000 tons per scheduled train (this is a high average train load, but is compensated for by the fact that the extras are not counted), and 330 days in the year, since less than half of the trains do not run on Sundays, we have a total of about 20,000,000 tons shipped into Boston by rail per year. This is not all for consumption in Boston, a great deal of it is distributed to the smaller manufacturing towns in the vicinity.

Outbound tonnage cannot be figured in the same way because, as is shown by Fig. 3, about 80% of the total rail tonnage moved is inbound, while the

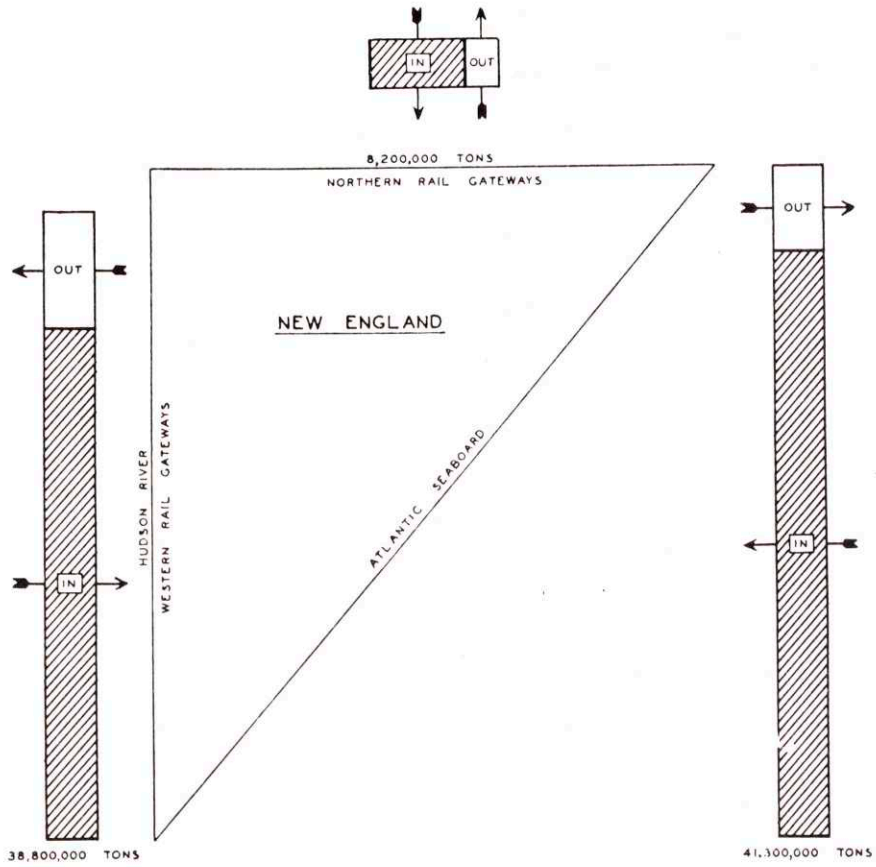
number of outbound scheduled trains on the three railroads is only one less. This is due to the fact that empty cars have to be moved back to the west, and these are used to fill out the tonnage on the schedule trains so as to make a regular service possible. In 1929 the ratio of loaded cars delivered to loaded cars received from connecting carriers by New England Roads was about 47%.

Another factor which aids in making the outbound tonnage from New England less than the inbound, a discrepancy which is not reflected in the train service, is that most of the inbound traffic is raw materials for manufacture, coming in in large lots, being bulky and heavy, and easy to handle in carload lots. The outbound shipments from New England however, consist of a much larger percentage of merchandise, which brings about a much larger percentage of L.C.L. shipments. This fact is illustrated in Figs. 4 and 5.

THE MOVEMENT OF FREIGHT TRAFFIC INTO AND OUT OF NEW ENGLAND OVER ALL BOUNDARIES

BY RAIL AND BY WATER

1929



TOTAL MOVEMENT OVER ALL BOUNDARIES

SHIPPED INTO NEW ENGLAND	73,600,000 TONS
SHIPPED OUT OF NEW ENGLAND	14,700,000 TONS

Fig. 3.

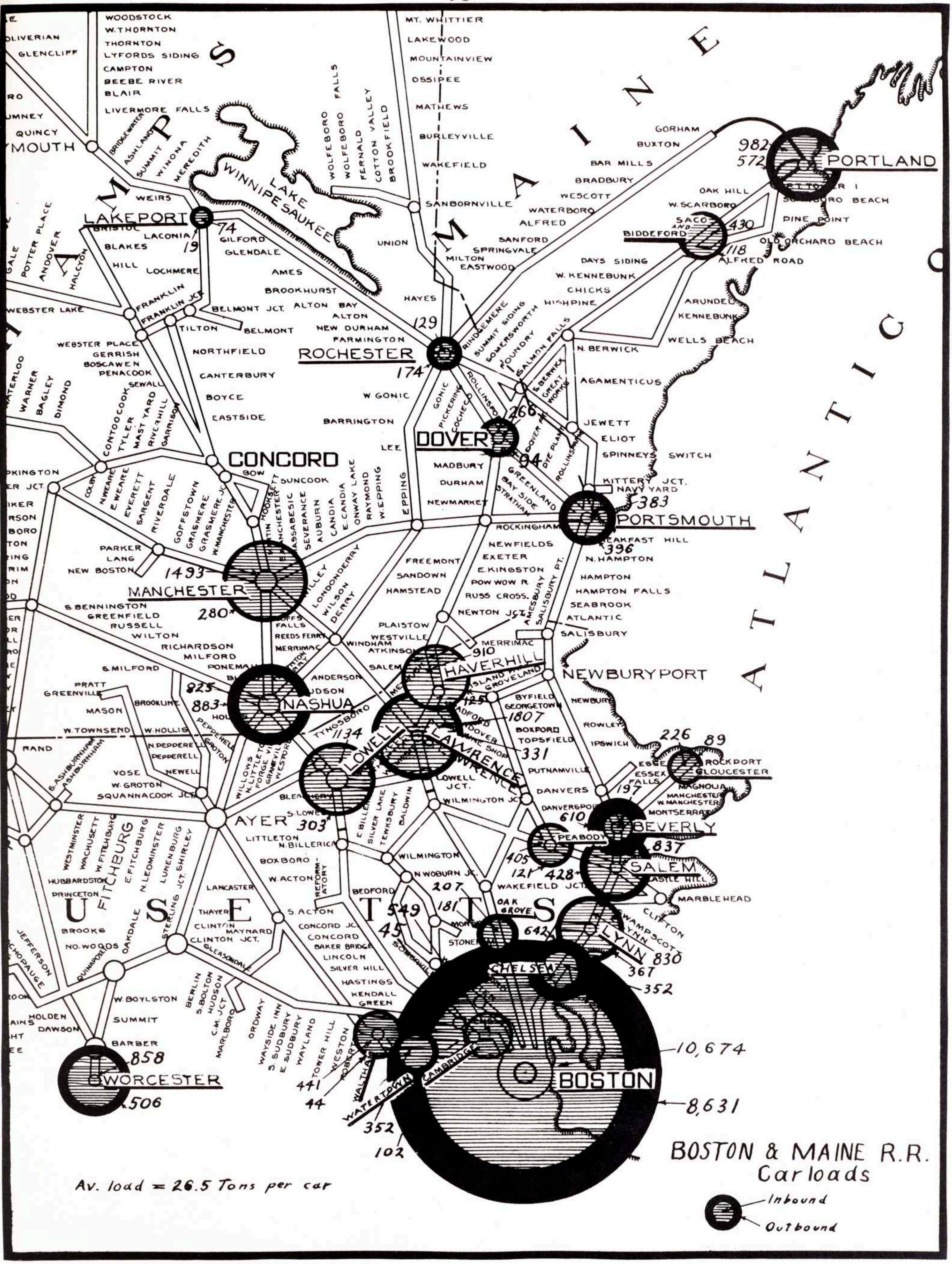

BOSTON & MAINE R.R.
Carloads
Inbound
Outbound
Av. load = 26.5 Tons per car
MAINE
ATLANTIC
PORTLAND
982
572
BIDDEFORD
SACO
430
118
ROCHESTER
129
174
DOVER
266
94
PORTSMOUTH
383
396
CONCORD
LAKEPORT
74
19
MANCHESTER
1493
280
NASHUA
825
883
HAVERHILL
910
LAWRENCE
1807
331
125
LOWELL
1134
303
GLOUCESTER
226
89
BEVERLY
610
837
197
PEABODY
405
121
SALEM
428
LYNN
830
367
CHELSEA
352
BOSTON
10,674
8,631
CAMBRIDGE
WATERTOWN
WALTHAM
441
44
352
102
549
45
207
181
642
OAK GROVE
STONEHAM
WORCESTER
858
506
FITCHBURG
AYER
NEWBURYPORT
LAKE WINNIPESAUKEE

Fig. 4.

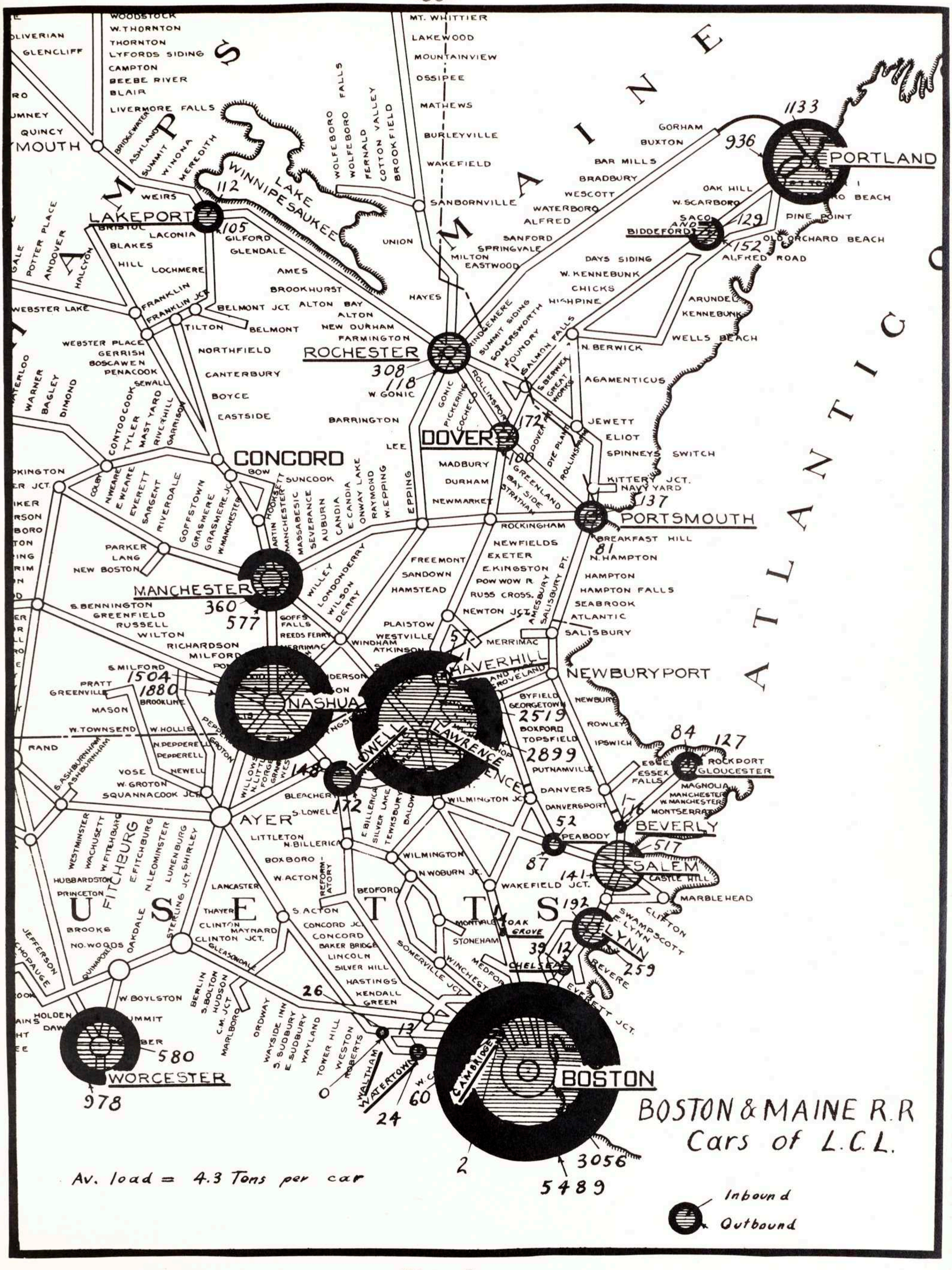

BOSTON & MAINE R.R
Cars of L.C.L.
Av. load = 4.3 Tons per car
Inbound
Outbound
MAINE
ATLANTIC
PORTLAND
1133
936
BIDDEFORD
129
152
LAKEPORT
112
105
LAKE WINNIPESAUKEE
ROCHESTER
308
118
DOVER
172
100
CONCORD
PORTSMOUTH
137
81
MANCHESTER
360
577
NASHUA
1504
1880
HAVERHILL
LOWELL
148
172
LAWRENCE
2519
2899
NEWBURYPORT
GLOUCESTER
84
127
BEVERLY
16
PEABODY
52
87
SALEM
517
141
LYNN
192
259
CHELSEA
39
12
AYER
FITCHBURG
WORCESTER
580
978
WALTHAM
26
12
WATERTOWN
24
60
CAMBRIDGE
BOSTON
2
3056
5489

Fig. 5.

HIGH COST OF L.C.L.

Fig. 4 shows the number of cars of carload shipments received and originated at each one of the stations indicated on the Boston and Maine. In each circle, the shaded area represents the number of cars received, and the solid black area represents the number of cars shipped. Comparing this with Fig. 5 which gives the same information about the cars of L.C.L. freight at these same stations, it can be seen that a greater percentage is outbound than is the case with the carloads. These two diagrams do not indicate the relative tonnage of C.L. and L.C.L. freight moved. In order to convert the quantities shown into tonnage, carloads (Fig. 4) average 26.5 tons per car, and L.C.L. cars (Fig. 5) average 4.3 tons per car. The data from which Figs. 4 and 5 are constructed is found in Appendix C. That L.C.L. tonnage in New England is high is indicated by the fact that 7% of the total tons carried by New England roads is L.C.L. whereas for the other roads in the Eastern District this percentage is only about 2. This means that the L.C.L. cars in New England are about 33% of the

total, as against 9.5% for the other Eastern roads. This is one of the factors producing a high cost of operation in New England, since for L.C.L. traffic the ratio of net to gross tons is naturally much lower than for carload traffic.

The average cost, in train wages, fuel, and locomotive repair costs, of hauling freight for the last quarter of 1930 was 87¢ per 1000 gross ton miles. If the tonnage were all carload traffic, this would reduce to $1.53 per 1000 net ton miles, whereas if it were all L.C.L. it would be $4.91 per 1000 net ton miles. In addition to this cost of hauling there are the yard and station costs. Assuming that the cost of handling a car through a yard is 72.5¢, whether it is heavily loaded or not, the cost per ton for carload freight is 2.7¢. L.C.L. freight would cost 16.9¢ per ton for yard costs plus 61.4¢ per ton for freight house handling, amounting to a total of 78.3¢ per ton.

To offset this, according to the annual Commodity Report of the Boston and Maine for 1930, for all freight carried the revenue per ton of carload traffic was $2.03 as against $5.82 for L.C.L.

Applying the average haul per ton of 133 miles (figure for the Boston and Maine for 1930) the total cost per ton for carload freight is about 23.1¢, and for L.C.L. 143.5¢. In other words, the cost per ton of L.C.L. is about 6.2 times that of carload, whereas the revenue per ton is only about 2.9 times as great. These calculations do not take into account the greater investment in rolling stock which is tied up in the transportation of L.C.L., nor the investment in freight stations, nor the large amount of claims resulting from L.C.L. shipments. This all tends to show that the larger the percentage of L.C.L. the worse the effect on the operating ratio.

In this respect, no railroad management is as yet prepared to say that L.C.L. traffic is definitely unprofitable, but that there is less profit in it than in carload, there is absolutely no doubt. That is one of the reasons more is not being done to meet the truck competition for merchandise freight, and it is also perhaps an argument in favor of the trucker in deciding where this merchandise really "belongs."

There are a number of forwarding companies in Boston which consolidate L.C.L. shipments into carload lots. By this plan the shipper pays a rate slightly lower than the regular L.C.L. rate, and the forwarder pays the railroad only the carload rate, the difference between these rates forming the basis for revenue to the forwarding company. This scheme has the advantage of relieving the carriers of a great deal of freight house and clerical work besides giving them the more profitable carload business, while the shipper has his goods transported at a lower than L.C.L. rate. There are some shippers, however, who claim a disadvantage in that shipments sometimes have to wait several days before enough shipments of the proper classification are gathered together to make up a carload.

SPECIAL SERVICE

One of the peculiarities, if we may call it that, of railroads is that they offer nearly all of the specialized service that exists, and always do so at the lowest cost. The fundamental specialty of railroads is the ability to handle

exceptionally large units of freight, and also their ability to handle large quantities of bulk material at very low costs. Whenever any shipment of raw materials, for instance, is to be shipped in quantities of carloads or more, rail handling is practically always the cheapest. This factor is aided by the ability of the railroads to reach the door of the manufacturer by means of side tracks. Industrial locations along a railroad right of way are more numerous, and hence cheaper and easier to acquire, than industrial sites along the water front. Cases where raw materials are handled from railroad car into the plant, and where finished products are handled from the plant into cars, each in one movement, are numerous and common. Where industries are located on the waterfront it is seldom, however, that handling is done from ship to plant, or vice versa, without an intermediate handling.

Tank cars are a specialty of the railroad. The economy of tank ships is undisputed, but whether tank trucks, such as have been operating during only the last few years, are economical or not is a subject

open to considerable discussion.

Refrigerator service and warm car service is not only nearly exclusively the field of the railroad, but it is a service for which the railroads are absolutely depended upon.

Advertised scheduled merchandise car service is another feature of rail accommodation. On the three railroads running out of Boston there are hundreds of merchandise cars scheduled to leave in the various through trains daily. That these cars run according to schedule is exceptionally important in that schedules are depended upon, and schedules that are failed to be kept are a source of immeasurable adverse publicity. A typical schedule of through merchandise cars is shown in Appendix B, which is an abstract of a Boston and Maine schedule published May 1, 1930.

Appendix B contains the schedules of local freight service as it was offered by the Boston Railroads at the end of 1930 (with minor changes due to alterations in the schedules on account of the exceptionally light business during that season). The reason that so few trains are shown for the New

Haven, as compared with the schedules of locals on the Boston and Maine and the Boston and Albany, is that these schedules show only the locals out of Boston, whereas on the New Haven much of the local work is centered about other points.

FEEDER SERVICE

The main function of local trains is to assemble cars from local stations to be sent out on through trains, and to distribute the cars that come in on through trains to the local stations. In order to provide the desired service these naturally have to run daily, with the result that local trains usually haul very light tonnage. The engines are hardly ever used to capacity, and this, added to the fact that local trains of necessity must be operated uneconomically on account of the many stops and waits for passenger trains and through freight trains, causes local operation in general to be expensive in relation to the net tonnage handled. It has therefore been the aim, in train operation to reduce the number of local trains as much as possible, consistent with rendering adequate service.

In this connection the truck has already been used to a great extent by the railroads, but it seems that there is still possibility of much improvement by increased coordination between rail and truck. One of the things which hampers the railroads in the elimination of local trains is the fact that it is not free to throw the crews of the local trains out of work without good and sufficient reason, and to this extent it is often a problem to secure the immediate cooperation of the railroad labor organizations. The brotherhoods in the last few years however have done all they can to increase the efficiency of operation, because they realize that they must help in creating prosperity for the railroads which are their means of gaining a livelihood.

TRUCK COORDINATION

The Boston and Maine and the New Haven have each a cooperating trucking service in the Boston and Maine Transportation Company and the New England Transportation Company respectively. These companies now perform for the railroads much of the work that was formerly done by

local trains for two reasons. One is the increased economy effected by their use, and the other is the faster and superior service that can be given by their means. At present the trucks only haul freight between stations, or else perform ferry car service (hauling directly to or from the shipper's plant if he has a side track, and a minimum load of 4000 pounds), which is exactly the service that the trains and switchers would perform. The reason for this is that the railroads have not yet found it possible to perform service other than that which is provided for in their regular published tariffs. The superiority of the service, however, lies in the fact that the trucks, being smaller units than trains, can call at stations several times a day, and can bring goods from outlying points to the concentration points in a much shorter time than could be done by train. The result is that a great majority of the shipments which formerly would be moved in a through train the day following the day in which it was delivered to the local station, can now be shipped in the through train on the same day.

The operation of the Boston and Maine Transportation Company, as it was at the end of 1930, is described more or less in detail in Appendix E.

INCREASED SPEED

Probably the greatest change that the present competition in the transportation business has brought about in railroad service is the increase in the speed with which freight moves from its origin through to its destination. Cars which used to take a week to reach destination now arrive practically overnight, and service which is now regularly performed in three or four days sometimes took as long as three or four weeks.

This increase of speed of service has been brought about by many things, not the least of which is a general increase in the supervision of operation and a realization by all the workers on the railroads that there is serious competition to be met, and that everyone has a hand in turning out the best service possible to the public. In addition improved power, and improved roadbeds, facilities and equipment, especially such as has been acquired by the Boston

and Maine and the New Haven in the last five or ten years, have all helped to speed up service and increase its quality. Freight trains now take a quarter to a fifth as long to cover a 100 mile division as they formerly took.

Cars also move through yards without delay. It is a common thing for a car to be made into a local an hour after it arrives in a yard in a through train, and practically no car remains in a yard as long as twenty-four hours. "In the old days" cars were sometimes in yards for days, or even almost a week just waiting for a switcher to get hold of it and classify it according to its destination.

Along with this improvement of service, there has also been a marked reduction in operating expenses, and it is a fortunate thing that these reductions have been possible, because traffic has not increased. and the revenue has not been provided in the way that was expected. This speeding up of the service has not been a factor in the reduction of expenses. On the contrary, it is probable that if the railroads could afford to operate now (from a competitive

viewpoint) the way they did ten and twenty years ago, moving freight when it was convenient to do so, always keeping direct operating costs down to a minimum, and smoothing out the peaks of business by letting some of the traffic wait until the lines were not so crowded, operating expenses might be made even less than they are. However, the shipping public has been given a taste of the service that the railroads can give when driven by competition, and it now demands not only a continuation of that service, but also an improvement thereon; and what the shipping public demands at the present time it gets. If the railroads won't supply it, others will. Therefore, the railroads supply what is wanted.

In spite of all this, however, there is a certain class of traffic which requires no speed, and on which the rate is the prime consideration. In this group are those commodities designated as Class A in Appendix D. Among the most important of these commodities is coal. The routing of coal from the coal fields in and around Virginia and Pennsylvania destined to the vicinity of Boston is determined purely by the

cost of the transportation. At present most of the coal comes to Boston by boat, although a considerable amount comes in by rail, depending on the distance from the mines to the coast, and also on the distance from Boston to the consignee. It is an undisputed fact that the railroad cannot reduce rates unless traffic is thereby increased to such an extent that there will at least be no net loss in revenue. Therefore the question should be seriously considered whether it would be possible to not only lower rates on a certain class of traffic, but also to reduce operating expenses on that particular class, so as to minimize the effect of the loss of revenue to be offset by the increase in traffic. In the theoretical case this might be accomplished by giving a service which would be slower and therefore perhaps cheaper, on the above mentioned Class A commodities. The writers admit, however, that such a scheme, even if feasible anywhere, would be more difficult to work out on the New England roads than anywhere else, on account of the high percentage of L.C.L. traffic and specialized manufactures that are transported here.

Nevertheless, that the possibility of such a scheme exists is indicated by the Canadian differential rates which exist on westward movements. Freight can be shipped to the middle or far west either by rail and lake, or by circuitous routing over the Canadian lines at a lower rate than that obtained on the direct rail routes, purely on the theory that a slower service warrants a lower rate. This service is made use of to a great extent, and it is continuing to be offered, which seems to indicate that it must be successful to a certain degree either from the shipper's or the operator's point of view, or both.

REGULATION

Probably the greatest handicap that the railroads are under, in the matter of meeting competition, is the regulation by various governing bodies of practically all of its acts. It is not our intention to say that regulation is bad, or even undesirable, because it is necessary, and in the opinion of some noted economists it is even a blessing in disguise. This latter is in reference to a statement made by an authority on the subject concerning a proposal made by the railroads at one

time to raise rates. It was his opinion that the raising of the rates in question would have diverted more traffic away from the rails than would have been accounted for by any possible additional revenue. The Interstate Commerce Commission did not allow this rate increase, with the result that the railroads were alleged to be better off than if they had been allowed to do as they wanted to. This, however, is a moot question, and cannot be argued here.

The fact remains, nevertheless, that regulation removes from the railroads the ability to meet competition in many ways that it might otherwise employ. One instance is in the case of local rates. Here the railroads have to meet the keen trucking competition which is entirely unregulated. The railroads can change their rates, and as a general rule the Interstate Commerce Commission does not object to the lowering of rates, provided sufficient cause is shown. The time required, however, to file tariffs and to have them approved, usually completely nullifies their efficacy for competitive purposes.

In another instance, it was for a long time

a great handicap that the minimum weight for ferry car service was 8000 pounds, making it impossible for the B.M.T. trucks to call at a shipper's door for aload of any smaller weight (the shipper having side track facilities of course). There are cases where this caused considerable hard feeling on the shipper's part, especially if he was not fully aware of the strict regulations under which the railroads operate. This minimum weight has now been reduced to 4000 pounds, making possible more satisfactory service in many instances.

It is the question of rate regulation which made it impossible for the Boston and Maine Transportation Company to continue its projected store door delivery service which was inaugurated in 1925. In order to make this service successful, it was necessary to compete with small independent truckers, who charged as little as they liked, and often charged a rate so low that it was impossible that operation under it could be economical. However, for competitive purposes the B.M.T. was willing to meet

these rates, but the time required to make a change in the tariffs completely removed the effectiveness of any change.

The railroad tariffs also contain strict packing requirements, from which the commission will not allow carriers to deviate. There is no doubt that these requirements reduce the number of claims for damages which the railroads would otherwise incur, but the risk assumed is sometimes valued rather high. The result is that the railways are losing large quantities of traffic to the trucks. One commodity on which this is particularly true is machinery. In order to prevent breakage the railway tariffs require elaborate and expensive crating. The shippers naturally, therefore, choose to transport by truck, without spending much money on crating, and the truckers seem to manage to handle such machinery without causing damage enough to bring excessive claims. The same holds true in the shipment of chemicals such as acids and similar dangerous materials. The railroads require such packing that the price of rail shipment practically is prohibitive. The shippers on the other hand find no difficulty at all in assuming

the risk of damage that may be done by trucks, without going to such extensive crating. These shippers say there is possibility for a great deal of damage in case of mishap. As long as they prevent the occurrence of such mishaps, as they do, there is no doubt that it is more economical for them to assume that risk themselves.

A relief from such strict packing requirements would, of course, require a much closer supervision in order to eliminate rough handling on the rails. Much has already been done in this direction, and there is no reason why there could not be more. Supervision of this nature costs money, but the object is to bring additional revenue. This is another debatable question.

Regulation, as has been said, is a desirable thing. Regulations, however, which through changes in conditions, become merely restrictions must be quarded against, for purely artificial restriction, no matter what the form, is always detrimental to the general interests of all concerned.

STORE DOOR DELIVERY

One of the largest subjects under the heading of "What can the railroads do to improve the service" is Store Door Delivery. It is recognized by many railroad men that it will come. The question is, when. It is needed now, and the fact has been realized as is indicated by the attempt made at such a service by the Boston and Maine in 1925. The attempt, however, did not last long because the obstacles to overcome were evidently too large to be set aside at that time.

To help consider the feasibility of any plan of store door delivery one should look into some of the problems which arise in trying to put into operation such a plan. For this purpose it would be well to investigate some of the specific difficulties, and also how this service has been performed in other countries.

A.E. Beck of the Merchants' and Manufacturers' Association of Baltimore in 1920 asked if this service should be operated by the carriers proper. We believe it should for the simple reason that to be

of any value it must be coordinated closely and in every respect with the rail movement of these carriers. In 1921 the Federal Highway Commission recommended that only platform freight should be handled by a store door delivery service. It is true that that is where it is needed most, and perhaps in order not to take too big a bite at once that would be wise.

With the development of a system, however, there is no reason why this should not include delivery from bulk tracks. The saving of equipment to the roads, and on demurrage bills to the consignee would be great.

In England store door delivery has been in service a long time. The plan is very satisfactory, and the trucking operations are performed entirely by the railways themselves. Those Americans who have studied the English system, however, maintain that congestion is so much greater there, that there would not be the same advantages to such a system over here. In England about 80% of the less carload freight is handled by the service.

In New York a cartage system has been used

by the Erie Railroad, namely having it all done by contract trucking. There are material disadvantages to this plan in that the roads have not enough control over the movements of the trucks, and the responsibility can naturally not be absolute.

In Canada the contract trucking plan is used, and seems to work well. The officials, however, admit that if they owned the trucks themselves more business would probably be handled by them. That is, the trucking companies have no direct incentive toward solicitation. This is evidenced by the fact that about 40% more freight is delivered than is collected by this service.

The question of tariffs and regulations is probably one of the most disturbing ones in this whole question. In Canada the railways have held that the Board of Railway Commissioners have no jurisdiction over trucking rates. The Interstate Commerce Commission has required railroads to publish tariffs for their trucking service. Authorities declare that these tariffs should be the same for different railways in the same localities. That is

sound. The question of the unregulated independent trucking concern, however, is not touched by the Interstate Commerce Commission. The Commission, in fact, denies the power to regulate these concerns. As was the experience of the Boston and Maine Railroad, competition from these small independent truckers was decidedly unfair. They (the truckers) operated on an economically unsound basis just long enough to remove the traffic from the railway's trucks. The former might not remain in existence long, but their number was great enough so that it was impossible for the railroad to enter a campaign of exterminating the weak and unfair competition by trying to outlive it. Besides, when one weak company died a new one, just as unsound, would spring in its place, thus making a sort of perpetual chain of thorns in the side of the railroads.

One of the major problems for the railroads in New England is whether store door delivery should be extended to the small towns or restricted to the large cities only, or even to Boston only. The advantages of such a system are numerous.

A.H . Swayne, at a Transportation Conference of the United States Chamber of Commerce in 1924, stated that more than a billion dollars could be saved in the next five years by the railroads of the country through improvements of terminal facilities by means of an efficient cartage service. He also stated that he believed that that was the only way in which the congested terminal conditions could be improved.

The outstanding benefit would of course be the elimination of freight house space used for storage. Rolling stock would also be reduced since an enormous number of cars wait at team tracks to be unloaded by consignees, and trap cars would also be eliminated releasing another large quantity of cars for road use. Freight terminals could be located farther from commercial centers without objection from the shippers, and a great saving in real estate investment could be effected. Besides these tangible savings, there would also necessarily be an increase in rail tonnage due to the greater convenience to shippers, as will be illustrated below.

It is mainly the saving in time and the greater responsibility of railroads as compared with small trucking concerns which interests the average shipper. Shippers are willing to pay reasonable delivery rates for this added responsibility, and for the convenience of having shipments handled by one concern from their own doors to consignee's. Under proper organization and regulation railways should be able to run a delivery service at less cost than could be done by small trucking concerns. The objections of the laymen who are still afraid of a railroad monopoly will soon disappear when they have a chance to prove to themselves that to the railroads the good-will of the public means more than a small monetary profit. According to Mr. Henry, Director of the Bureau of Economics of the Canadian National Railway, store door delivery is proving quite successful in Canada. In the cities of Montreal, Toronto and Hamilton 63% of less carload freight is being handled by their cartage service.

There is a third point to consider in looking over the advantages of this service. This is

the convenience of the general public. A.E. Beck noticed in 1920 that a consolidation of the trucking to and from a railway terminal would relieve the congestion of traffic in commercial districts of cities considerably. This was admitted by railroad and public men even in the unsatisfactory experiences of the early days in Baltimore and Washington. The number of empty trucks, especially, is greatly reduced. Congestion in cities would naturally also be relieved if terminals were away from the commercial centers.

It seems as though at the present time it is merely a question of doing the necessary amount of studying on the question in order to find a plan whereby store door delivery can be effected. If it can be done elsewhere it certainly can be done in Boston, and it seems safe to say that it is a service which is becoming more and more necessary with the shippers of small lots. Store door delivery should have a decided effect on retaining tonnage which is in danger of leaving the rails if not in bringing back tonnage which has already left.

CONTAINER SERVICE

Closely related to store door delivery is the container car service. If the circumstances are favorable, containers would make delivery service economical in the case where the whole container was used for one shipment from shipper to consignee, the container being transported by truck at each end of the rail haul. The manufacturers of containers naturally claim many advantages to be derived from their use. Among these the most important are: (a) economy in preparing shipments for transportation. (b) Elimination of loss and damage. (c) A means of obtaining complete transportation from originating store door to store door at destination. These advantages can be seen to be purely theoretical, and as a matter of fact there are a great many practical disadvantages.

Unless there is a regular movement of freight over a certain route which offers itself particularly to this service, it is difficult to see the economies. As a general rule on the Boston and Maine L.C.L. shipments are hardly ever large enough to make use of a whole container. One of the

disadvantages of the container service is that it can only be used between points where there are facilities for handling them. Another disadvantage is the question of rates. Most shippers feel that the rates on container service should be less than the L.C.L. rates. The reason for this is not quite clear, since the service is supposedly a better one. If the container service is merely a means of giving cheaper service, then one should make doubly sure that the service actually does cost less. Hence it should not be installed for convenience to the shipper, but only as an economy to the railroad, and if such is the case, what is the incentive to the shipper to use this service ?

The Boston and Maine formerly maintained a container service between Boston and Worcester, but since this service has been discontinued it was apparently not economical.

It would appear, however, that since New England has such a relatively large percentage of L.C.L. freight, there should be a field here especially adapted to container service. It is clear that without a great deal of study such ventures should not be undertaken.

STEAMSHIP TRANSPORTATION

Steamship transportation was found to be much less competitive than was expected within the points studied. Service between Boston and New York alone is carried on a daily basis. There is no service between Boston and Providence, and Philadelphia and Baltimore have but a bi-weekly or a tri-weekly service. The line to New York does not carry freight exclusively, and due to the large space necessary for the comfort and convenience of the passengers, ships in this service have a freight capacity of but 400 tons. This, coupled with the fact that the list of exceptions is very long, proves that in comparison with rail lines the competition is not formidable. On a yearly basis of 300 days the tonnage carried is but 120,000 tons, while, assuming but one train daily of but 2000 net tons, the corresponding figure for rails is 6,000,000 tons. This is very low since there are several trains per day from Boston to New York. Between the other points the capacity of the ships

is larger, approximately 800 tons, but even this figure, on a daily basis, could not be considered competitive, and the daily basis would be from two to three times the actual figures. Rates too, between these points, do not indicate a differential of sufficient magnitude to result in any great flow of traffic. In view of these facts it must be conceded that steamship service, within a radius of 500 miles from Boston, cannot be considered competitive. Between points of great distances apart where rates show differentials of sometimes one-third of the rail rate and ships plying between these points carry thousands of tons of cargo, real competition is present. But for purposes of this study we feel justified in stating a brief summary of the situation.

Coastwise traffic includes commerce between all ports in the United States. This of itself is a subject too broad for a survey of this kind, and for a comparison with other agencies of transportation as taken up in this report, is too extensive. Therefore this investigation has been limited to

the coastwise traffic between Boston and the larger ports within a radius of 500 miles, which includes only the cities of Portland, New York, Philadelphia, and Baltimore.

Operating in coastwise service there were found to be twenty companies, a list of which is contained in Appendix F. Due to the lack of published material it was necessary to undertake an investigation of these companies to determine the service offered and the ports served. The greater part of the data pertaining to steamship transportation has been obtained from these companies operating in coastwise service.

The companies interviewed are:

The Eastern Steamship Company

The Merchants and Miners Transportation Company

The Maine Coast and Canada Steamship Company

The Ocean Steamship Company

The Moore & McCormack Company, Inc.

The American Hawaiian Steamship Company

The Clyde Steamship Company

In addition, information was obtained from the following sources:

Office of the War Department at Boston

Office of United States Shipping Board at Boston

The Boston Port Authority

Although there are twenty steamship companies operating from the port of Boston in coastwise traffic but three of these engage in traffic between the ports which were chosen for this study. They are: the Eastern Steamship Company, the Maine Coast and Canada Steamship Company and the Merchants and Miners Transportation Company.

EASTERN STEAMSHIP COMPANY

The Eastern Steamship Company among other points, operates service between Boston and New York and Portland. To New York a daily service is maintained throughout the entire year of one ship each way which is increased in the summer to about ten trips weekly with an average of about three trips carrying only freight. Most of the ships plying between these cities carry both passengers and freight. The running time for this trip is fifteen

hours, the ship leaving at 5:00 P.M. and arriving at 8:00 A.M. in both directions.

Between Boston and Portland but three trips are made per week. No passengers are carried on this line, only freight carrying ships being operated.

MAINE COAST AND CANADA STEAMSHIP COMPANY

The Maine Coast and Canada Steamship Company operates but one ship which has no regular schedule, it carries only freight and leaves whenever a load is obtained. Portland is the only port served of those covered in this report. On an average the ship leaves Boston every ten days.

MERCHANTS AND MINERS TRANSPORTATION COMPANY

The Merchants and Miners Transportation Company operates service between Boston and Philadelphia and Baltimore. Between Boston and Philadelphia only freight is carried. The service is offered three times a week, leaving Boston on Tuesdays, Thursdays and Saturdays at 5:00 P.M. and arriving at Philadelphia on Thursdays, Saturdays and Mondays at 7:00 A.M. The running time for this trip is therefore thirty-eight hours or

one day and fourteen hours. Between Boston and Baltimore no direct service is offered as the ship also serves the port of Norfolk. Two ships weekly are despatched in both directions, leaving Boston on Tuesdays and Saturdays at 4:00 P.M. and arriving at Baltimore, after stopping at Norfolk, on Fridays and Tuesdays at 7:00 A.M. The running time for this trip is therefore sixty-three hours including the time of stop-over at Norfolk.

These three companies are theonly ones operating any kind of service between these points, and even this is subject to change without notice. There is no competition among water carriers between these points. Each one serves its own territory, for, with the exception of Portland, which is not especially important to the Maine Coast and Canada Steamship Company, there is no conflict in the routes of the water carriers.

To determine the commodities carried between these points alone was not attempted since it is assumed that it would be proportionally the same as that of the total coastwise traffic of the port

of Boston. This latter tabulation is included in Appendix F, and shows that the greater part of shipments by water are the so-called tonnage commodities: coal, oil, iron, steel and other raw materials. The questionnaire to manufacturers also shows that those companies using or manufacturing tonnage commodities ship or receive large quantities by water. However only eight of the replies stated that over 30% of their commodities moved by water.

The steamship lines reserve the right to accept or reject any commodity for a scheduled sailing. In addition the list of commodities which they do not accept for shipment is very broad, including a great number of articles. This discrimination is brought about by a number of peculiarities in steamship operation. First, many of the lines carrying freight cannot be operated at a profit without also carrying passengers. This limits the freight carrying capacity of ships and also introduces the element of safety and comfort of passengers which prohibits handling any commodities which are either dangerous or disagreeable. There is, furthermore,

the element of the value of the goods, and their susceptibility to breakage, which, because of the dangers of water carriage either due to water soaking, shifting of cargo or shipwreck, would involve very great losses in the payment of claims.

There is very little conflict with other agencies of transportation in the matter of rates, for all of these companies operating are members of the freight traffic associations and as such make their rates in conjunction with rail lines. All freight rates are published with the United States Shipping Board and also with the Interstate Commerce Commission where through rates with rail lines are maintained. With the Shipping Board, on rates which are simply from port to port, only the maximum is required to be filed. This allows a great flexibility in making rates which is not enjoyed by the rail carriers since the exact rate which the latter may charge must be approved before it is put into effect. While steamship companies do not make a practice of varying rates with minor changes in conditions they are free to do so where only port to port rates are concerned. The Transportation Act of 1920 on

this subject reads: (Sec. 15--3) "The Commission may, and it shall whenever deemed by it necessary or desirable in the public interest, after full hearing upon complaint or upon its own initiative without complaint, establish through routes, joint classifications, and joint rates, fares or charges applicable to the transportation of passengers or property .... or in the case of a through route where one of the carriers is a water line, the maximum rates, fares and charges applicable thereto.... but the Commission shall not have the right to establish any route, classification or practice, or any rate, fare or charge when the transportation is wholly by water."

MOTOR TRUCK TRANSPORTATION

EXTENT OF TRUCKING OPERATIONS

The attractiveness of motor trucking which was stimulated by the demand for this agency of transportation during and immediately after the war has induced practically every company to buy and operate trucks. The greater part of the trucks registered are operated by manufacturing and business establishments which, by the use of the motor vehicle, are able to move their goods more cheaply.

Another factor in the growing use of the truck has been the tendency towards the smaller inventory. After the business depression of 1921 when most companies were trapped by falling prices, and suffered great losses because of the enormity of their stores and supplies on hand, the large inventory was abandoned. Since then companies have carried on hand as small a supply as possible. The result has been the rise of the importance of transportation. Speed and service have been demanded and the truck has been able to supply these elements, especially in emergency cases.

At Boston, as in other parts of the country, trucking may be divided into two classes: (1) that operated by shippers owning trucks, and (2) that offered to the public by transportation and trucking companies. The first classification will not be considered since it is a part of manufacturing and is hardly any different than the situation that existed prior to the advent of the motor truck when many companies used horses and wagons for the same purpose. The second classification may be further divided into common carriers and contract carriers.

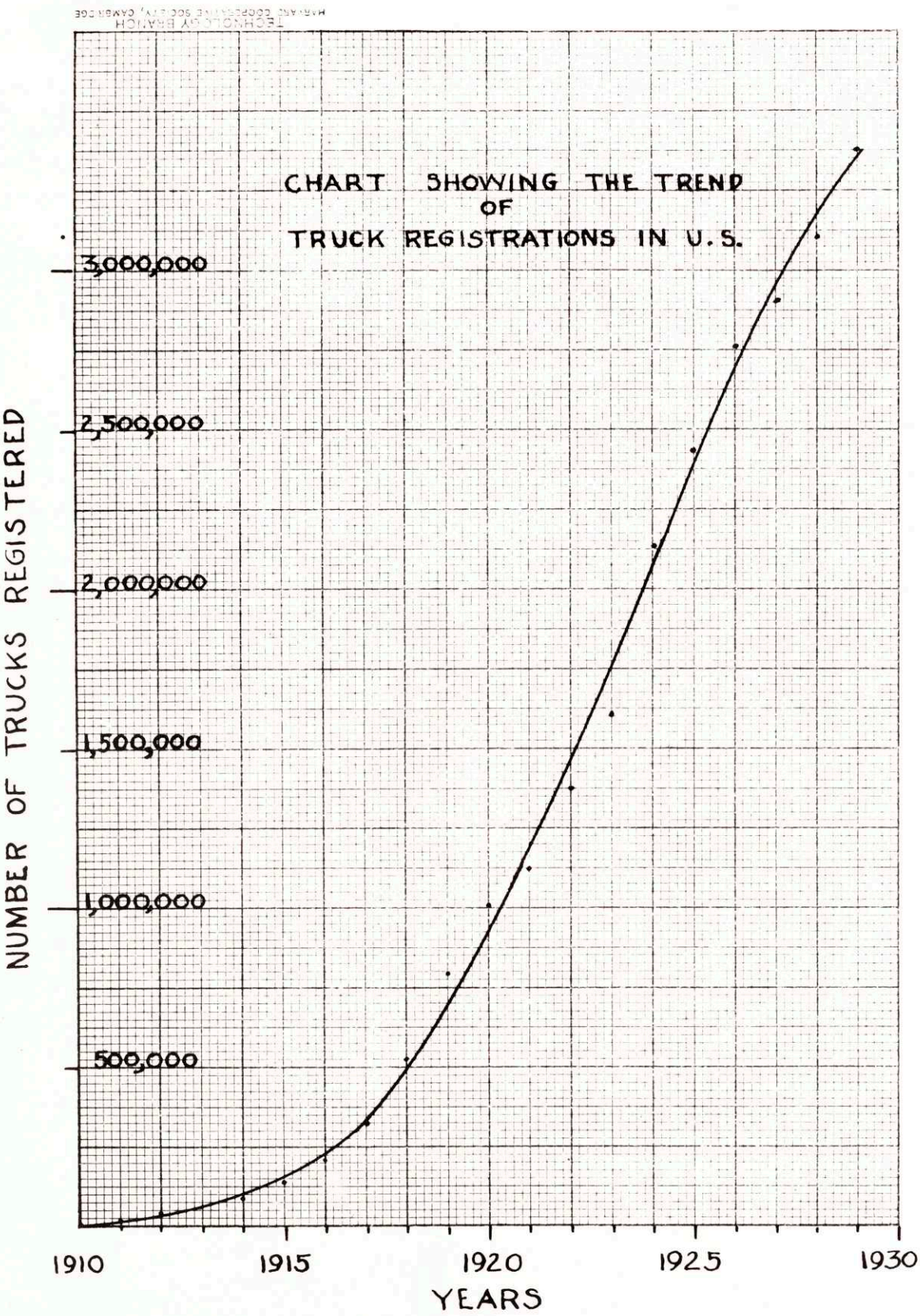


CHART SHOWING THE TREND
OF
TRUCK REGISTRATIONS IN U.S.
NUMBER OF TRUCKS REGISTERED
3,000,000
2,500,000
2,000,000
1,500,000
1,000,000
500,000
1910
1915
1920
1925
1930
YEARS

Fig.6.

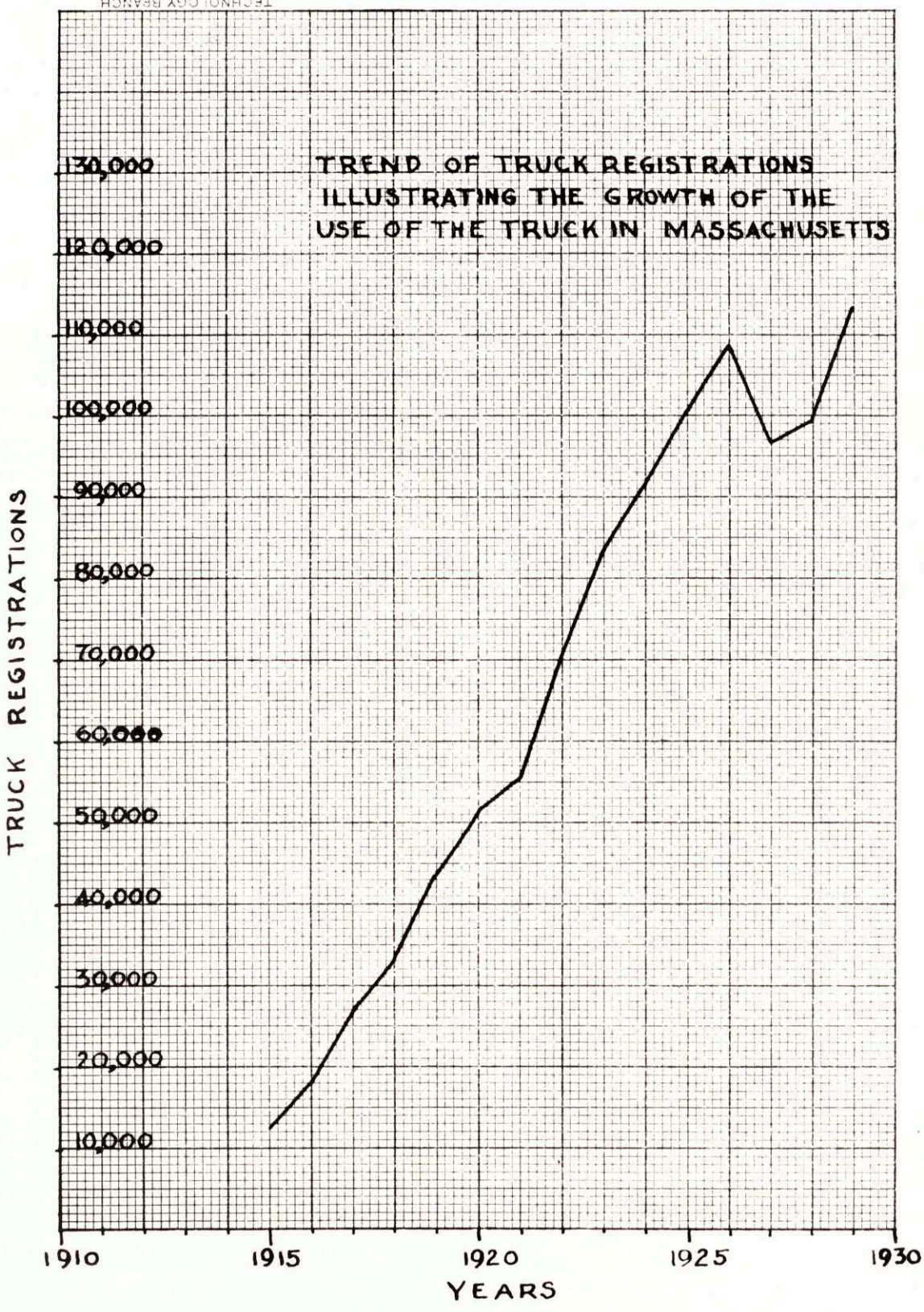


Fig. 7.

COMMON CARRIERS

Common carriers are those which operate over definite routes under definite time schedules and for definite rates, and will handle any business offered regardless of its source. There are no pure common carrier motor transportation companies fulfilling the qualifications of this definition operating to or from Boston and handling freight.

It is true, the Boston and Maine Transportation Company, the New England Transportation Company, and a very few express companies do operate motor trucks in such a service. They are not, however, pure motor transportation companies. The first two mentioned are subsidiaries, respectively, of the Boston and Maine Railroad and the New Haven Railroad, and as such under the present regulations, find it impossible to engage in store door delivery. Express companies, that is, those doing true express business, do not handle freight, but handle only express matter. There are very few of these companies operating, although there are very many bearing the name.

CONTRACT CARRIERS

By far the greater part of the trucks operated to and from Boston by

Transportation companies are contract carriers. These, while they may operate over definite routes, are not limited to specific time schedules, their rates are not fixed and their service is offered to the public with full powers of discrimination.

The proportions of trucks operated by shippers, common carriers, and contract carriers is available only for Massachusetts. The following percentages were presented as testimony by the Massachusetts Motor Truck Club before the Interstate Commission in Dec. 1930. (I.C.C. No. 23,400).

Private Haulers		72.8 percent
Contract Haulers		15.4 percent
Contractors		4.6 percent
Motor Express	Interstate	5.1 percent
	Interstate	2.1 percent
	Total	100.0

There is every reason to believe that Boston figures would compare very closely with these.

In Metropolitan Boston there are listed a total of 976 companies operating motor trucks. These may be roughly classified into five groups: (1) Transportation companies (2) forwarding companies

(3) truckers (4) express companies and (5) movers.

Transportation companies are generally equipped to handle heavy work and to operate over long distances.

Forwarding companies do not employ trucks alone for transportations but this type of company transports via rail, water or truck, and generally covers about a 10 to 25 mile radius by trucks with regular daily pick up and delivery service.

Truckers are more than likely to be found better equipped for short haul and cartage with no regular service or schedules.

Movers make a specialty of house to house or office to office moving of furniture.

NUMBER AND CLASSIFICATION OF COMPANIES OFFERING TRUCK SERVICE IN BOSTON*

Express Companies	285
Movers	253
Truckers	221
Transportation Companies	183
Forwarders	34
Total	976

* New England Telephone Company Classification.

While the above classification is true according to the type of business which these companies purport to render as indicated by their business names, there are distinctly but two classifications: forwarders, and transportation companies (including truckers, movers and express companies). This classification is justified because the latter four types compete keenly for all of this business. In the ordinary motor equipment necessary for handling freight there is very little difference in that adapted to cartage, short haul or long haul work. As a result of this we have transportation companies doing city work, express companies carrying heavy loads from Boston to Worcester, and all sorts of combinations. Companies which hold themselves out as movers, in the majority of cases find themselves operating with no return load. Their equipment is equally adapted for freight moving in this traffic. Forwarders adhere to one type of business more strictly. However, even these companies engage to a limited extent in long hauls and heavy loads.

During 1930 in Boston proper there were

12,968 commercial motor vehicles registered. If Suffolk County is considered, which more nearly approaches Metropolitan Boston, 23,980 commercial vehicles were registered. These figures represent about 80% of the commercial vehicles registered in Metropolitan Boston. Trucks are 97% of the total commercial registration. Buses and trailers comprise the rest.

Only one traffic check was made in the history of the City of Boston in which an attempt was made to determine the amount and character of travel and freight movement in and out of the city. This was made in June 1927. It was very thorough, covering a period from 7:00 A.M. to 12 midnight and consisting of a count of all movement over all entrances and exits to and from the city. The results of the Cordon Count of trucks is contained in Appendix G, and shows about 50,000 trucks entering and leaving the city each day. Not all of this of course is truck movement to and from the city in the sense which we wish to consider. However, estimates of trucking managers lie in the neighborhood

of 1000 trucks operating in and out of Boston daily in freight service from outside points. This coupled with the very modest estimate that each Boston company despatches at least one truck daily adds 1000 more or makes a total of 2000 motor vehicles operating in freight service daily between Boston and outside points. 2000 vehicles, since each must be represented once on exit and once upon arrival, indicate that 8% of Boston's truck traffic with outside points is carried on by contract trucking. The other 92% is either cartage, or is carried on by merchant truck owners.

NATURE OF TRUCKING COMPANIES IN BOSTON

The size of the companies varies from the largest, operating between 50 and 75 trucks, to the smallest operating but one. In order to determine the number operating but one truck, information was sought from insurance companies, and the Registry of Motor Vehicles. The difficulties encountered in this search may be judged from a few facts relating to registration and insurance of trucks. In registering, no record of the use which is to be made of trucks is required.

A statement of this is required in some states, but in Massachusetts it is not. This leaves only the name of the company, or person registering, as an indication of whether or not the truck is to be used by a transportation company. The work of determining the number of trucks operated by transportation companies therefore involves a careful checkup of all registrations in Boston against the names of known concerns. Insurance companies are in possession of the information but there is no central bureau from which their data may be obtained. Also some of the insurance companies are reluctant to part with such information. However, a survey of available data for 1930 shows that of 397 companies, operating a total of 2512 trucks in Metropolitan Boston, 294 or 74% own and operate but one truck. This indicates the nature of the majority of trucking concerns and supports the statements of traffic managers that the business is carried on to a large extent by irresponsible operators, having little conception of modern business methods. As further evidence of the prevalence of the one-truck owner the following statement is made relative to the

State of Massachusetts: of a total number of 50,000 truck owners in the State, only 11,230 own two or more trucks and but 1,750 own five or more. About 38,000 owners of but one truck operate almost one-half of the number registered in this state.

THE ONE-TRUCK OPERATOR

The one-truck operator has often been compared to the tramp steamer. Its place in truck transportation is analogous to that held by the tramp on the water. It serves no definite territory, nor patronage. Its rates for haulage are the common results of bargaining. As one shipper states, "Transporting by truck today is a case of very careful shopping."

This type of company has been fostered by the comparative ease of entering the trucking business in Massachusetts. There are no regulatory bodies governing motor trucking, either State or Federal, in Boston. The equipment necessary is not hard to obtain. A very small outlay of capital is sufficient to purchase a new light, or a second-hand heavy-duty, truck. Office and warehouse may be omitted where

business is on a small scale. Labor wages are absorbed in the owner's profit. Repairs are made by the owner in his spare time, and depreciation and interest on the investment are cast aside. In obtaining a sufficient amount of traffic to continue in business the small company is aided by shippers whose main preference in selecting an agency of transportation is based upon rates. In addition to the ease in entering business the hope of a high return on a small capital investment has increased the numbers engaged in trucking operations. Several cases have been cited in Boston of men and women, far removed from the field of transportation, who have been induced to invest their life's savings in "fly-by-night" trucking enterprises. A fallacy of the high return argument is evident from the number of trucks repossessed yearly and the number of business failures of trucking companies.

LARGER CONCERNS

The larger concerns are very few. In Massachusetts those companies owning ten or more trucks number approximately 200. Most of these companies are equipped to handle anything,

at any time, anywhere. Their rates are based as close as possible to cost records where these are kept, and reasonable schedules are offered to the public. Yet, when the number of their small competitors is taken into account there is little wonder no real definite rates may be made up and adhered to strictly.

Trucking offices and warehouses are to be found located practically anywhere in Metropolitan Boston. The greatest number, however, in any locality is to be found in the marketing and waterfront sections of the city, along Atlantic Avenue and Commercial Street from the South Station to the North Stations. Practically all companies owning three or more trucks operate some sort of a terminal. In the case of the very large companies operating from 25 to 75 trucks the terminal is very similar to a railroad freight house, built along the same lines and operated in the same manner. The terminals of the smaller companies are located in store space and have no loading facilities. The offices of many of the smaller companies are also located close to the waterfront.

The locations of trucking companies close to steamship terminals would apparently indicate that a large proportion of the business is carried on with water lines. This is not true. The greater proportion of the hauling is done for manufacturing establishments. The reason for waterfront proximity is an attempt to separate terminal activities from the most congested commercial districts. Boston's waterfront in this respect is superior to that of New York. It is closer to the heart of the commercial center and the density of traffic is less even in the busy times of the day.

MOTOR SERVICE AND ROUTES

Motor transportation companies offer their service to all points at any time. Most companies, however, in addition, specialize on certain routes of which the most competitive are between Boston and Providence, and Boston and Worcester. Between Boston and the cities of Manchester, Nashua and Concord, Portland, Fitchburg, Springfield, Fall River and New Bedford, there is also very much competition. Also within a twenty-five mile radius of Boston, which includes the cities of Lawrence,

Lowell, Haverill, Salem and Lynn, practically every company operating twenty-five trucks or more runs a daily pick up and delivery service. This can hardly be called a route, however, since this service is performed only upon request or solicitation.

Routes of over 100 miles are not traveled to a very great extent, only two companies of those interviewed having a regular service to New York. While many advertise long haul movement, it will be found that these are engaging only in furniture moving which is conducted on a job basis and is not comparable to ordinary freight transportation. However, additional revenue is obtained by these companies when it is possible to obtain return loads which they can afford to haul at very low rates. The general opinion of managers is to the effect that over fifty miles, trucks cannot compete with rail service.

While the routes mentioned above are maintained by the larger companies, only one or two trucks daily are despatched in this service. All of

the service of the smaller companies and by far the greater portion of the larger is performed by contract with shippers. Many of the Boston manufacturers contract with one or several trucking companies to do their hauling whenever needed. Evidence that this is the case may be seen at the shipping platforms of most large manufacturers where everyday trucks bearing the names of various transportation companies call for freight. This condition, whereby one trucker cannot obtain all the freight of their patronage, prevents the establishment of very many routes.

A comparison of the relative amounts of trucking over through routes from Boston has been taken from the flow map of commercial traffic constructed by the Massachusetts Department of Public Works for August 1930. (A reproduction of this map in reduced size is contained in Appendix G). The basis for this comparison depends upon through traffic being represented by the narrowest portion of the line between any two points.

Between Boston and	Commercial Vehicles in August 1930 daily
(Routes over 25 Miles)	
Worcester	700
Providence	600
Fall River	500
Springfield	300
Newburyport	300
(Routes under 25 Miles)	
Lowell (3 routes 300-400-500)	1000
Quincy	1000
Lynn	1000
Lawrence	700
Natick	700
Brockton	400

Of those companies interviewed the greater number engaging in hauls of 50 miles or over operated over the Worcester and Providence routes.

Between Boston and	No. of Companies Operating Daily Service
Worcester	4
Providence	4
Springfield	3
Manchester	3
Concord	3
Portland	2
Fitchburg	1
New York	2

Three of the companies interviewed operated no regular service.

SCHEDULES

Regular daily schedules are advertised as being offered to the public by trucking companies, but in reality there are very few definite time schedules over any routes. In but one case was such a schedule found: between Boston and Providence one Boston concern operates a tractor and trailer unit leaving at 6:30 P.M., arriving at Providence at 8:30 P.M., leaving Providence at 9:30 P.M., and arriving at Boston at 11:30 P.M.

The leaving time of a truck for any point depends upon the loading time. Regardless of the time of day or night whenever a truck is loaded it is despatched, and it is held up until a load is obtained, except in the case where it is definitely known that no more freight will be picked up. Schedules, so-called, are therefore no more than a service which is performed daily.

TRUCK SPEEDS

The average truck speed in road haul is about fifteen miles per hour. Data on this subject in the form of permanent records are not kept by very many companies but a recording instrument is used by one concern operating between Boston and

Fitchburg, by which a graphical time record is kept for each truck and driver on every trip. For the trip, which is almost exactly fifty miles, the minimum time recorded is two hours. The maximum recorded is four hours and fifteen minutes. Therefore the average time from Boston to Fitchburg is very close to three hours. The time recorded includes idling as well as actual moving time from departure to arrival. Thus the records of this one company, which is the only one known to make use of the recording machine in Boston contract trucking, show the average speed as 16.6 miles per hour. The trucks making these records operate during the day time when the highway traffic is heavy. It is to be expected that night runs would make better time.

Truck time between Boston and other cities as stated by shippers on the questionnaire illustrate the wide variation in speed which is due to the use of both light, fast equipment and heavy slow equipment. The size of the load and the nature of the route also affects the speed.

Between Boston and	Truck Time Hours
Lynn	½ to 3
Worcester	3 to 8
Providence	2 to 5
New York	10 to 16
Montreal	20

STORE DOOR DELIVERY

The Store Door Delivery service which trucks include as a part of haulage is one of the most important advantages which motor transportation possesses over other agencies. The same equipment which is used in road haul is readily adaptable to pick up and delivery. Where heavy truck loads are to be moved they may be loaded at the shipper's platform, and with no necessity of handling at central stations, moved without delay directly to the consigneee. The wide variation in the capacities of trucks* makes this operation also possible with comparatively light loads, since road haul is not confined to the use of heavy trucks.

The important feature of "Store Door" service, in addition to the accommodation, is the fact that it is performed at the same rates as the

* See Appendix G, Capacities of Trucks Registered.

regular road haul from terminal to terminal. Examination of the Questionnaire to Manufacturers shows that the predominating factor in the selection of an agency of transportation is the rates. Furthermore, handling is included in the service offered.

These statements regarding the scope of rates are given merely as general illustrations of the service offered. It must be understood that in contract trucking special arrangements for loading and unloading may be made for each job. These are examples only of customary practice.

Briefly stated, the service of motor transportation eliminates all cartage, whether for full truck loads or merchandise shipments. The latter, though generally passed through a truck terminal, have cartage charges absorbed in the quoted rate.

COMMODITIES CARRIED

The commodities carried by truck to and from Boston are very hard to ascertain. The transportation companies keep no records which would indicate this item. Statements made by managers are to the effect that every thing is carried, but the relative quantities of each are unknown. It is known however that a great deal of wool is carried

but the relative quantities of each are unknown. It is known however that a great deal of wool is carried from Boston to outside points such as Lawrence and Lowell where it is scoured and cleaned, and worked.

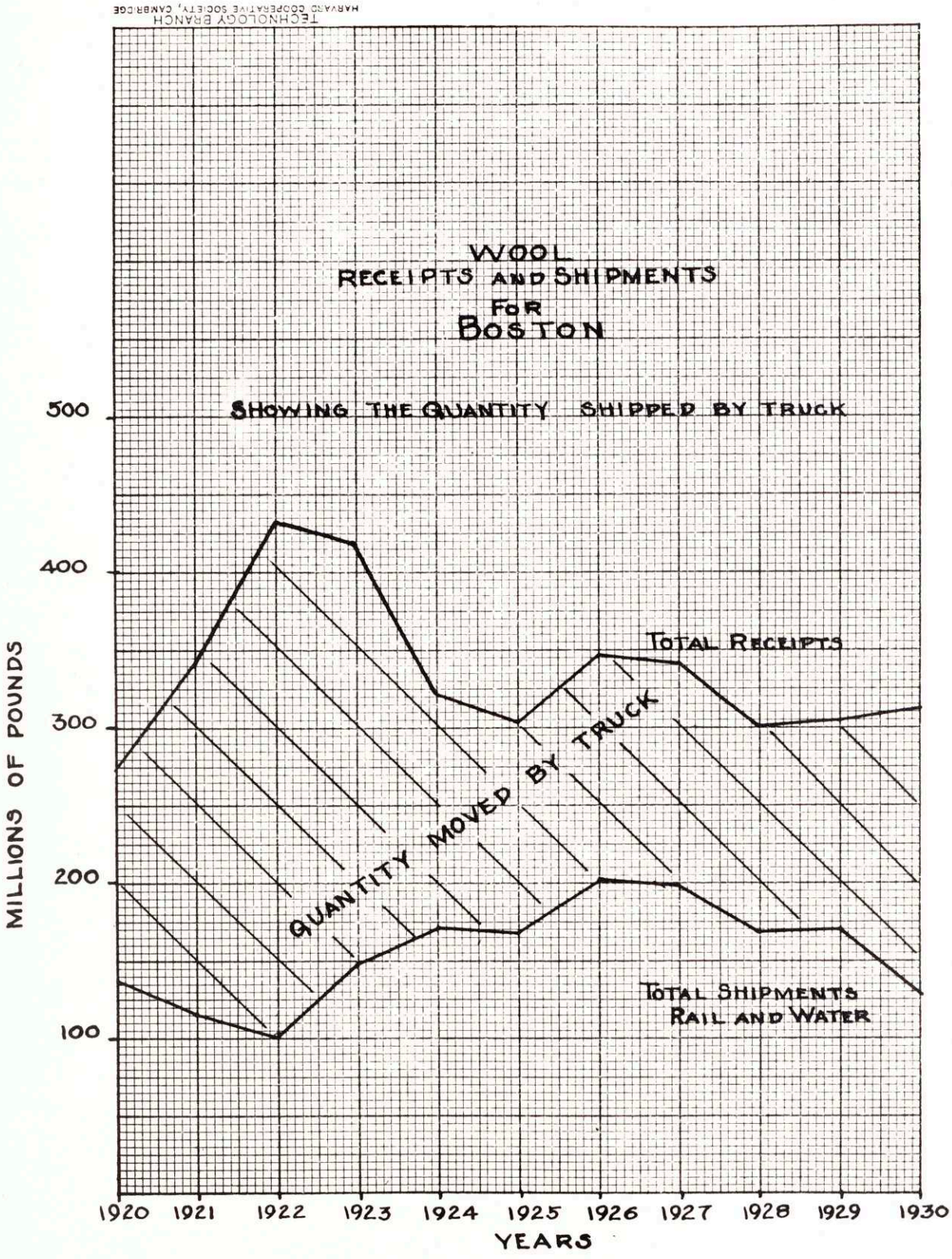


Fig. 8.

From statistics of the National Association of Wool Manufacturers data on receipts and shipments of wool at Boston were obtained. The records available are from the rail and water carriers only. Fig. 8 has been plotted to show the relative differences between the reported receipts and shipments. The quantity of wool not accounted for must have been either consumed in manufactures or shipped from Boston by truck. That manufactured in Boston is negligible since of 800 or 900 establishments in the United States, of which the majority are in New England, but four are located in Boston. Although there is a large amount of warehousing in Boston this factor is cancelled over a period of years, such as plotted, since what arrives must eventually leave. The area between the curves is therefore equal to the quantity of wool moved by truck and as indicated amounts to about 50% of the wool arriving in Boston.

Studies made by the Bureau of Public Roads in other States may be used as an indication of the nature of the commodities carried over the Massachusetts highways.

From a traffic check of 3,906 commodity loads transported over the principal highways of the State of New Hampshire the following table was constructed.

Commodity Class	Loaded Trucks percent	Commodity Tonnage percent
Products of Manufactures	58.6	52.1
Products of Forests	12.7	15.4
Products of Agriculture	9.3	9.0
Products of Animals	7.6	5.6
Products of Mines	4.6	11.6
Miscellaneous	7.2	6.3
Total	100.0	100.0

PENNSYLVANIA HIGHWAY STUDY
(Based on 216,000 Net Tons of Commodities)

Commodity Class	Net Cargo Tonnage percent
Products of Manufacture	60.3
Products of Mines	13.1*
Products of Animals	10.9
Products of Agriculture	9.0
Products of Forests	6.7*
Total	100.0

* Short haul movements occurring only in certain areas. Bureau Public Roads 1928.

OHIO HIGHWAY STUDY

Commodity Class	Net Tons Percent
Products of Manufacture	55.9
Products of Animals	14.3
Products of Agriculture	10.5
Products of Mines	8.5
Products of Forests	3.3
Miscellaneous	7.5
Total	100.0

Bureau Public Roads 1927

The questionnaire to the manufacturers also is of use in determining the character of the commodities shipped by truck. The following list contains types of commodities which are shipped by truck in proportions greater than 30% of total shipments.

Groceries	100%
Brewery Products	83½
Dresses and Aprons	75
Tin Cans and Paper Cups	75
Refined Sugar	74
Corrugated Boxes	70
Elevators and Machinery	68
Restaurant Supplies	50
Wholesale Cake	45
Sheepskin Tannery Supplies and Products	35
Sheet Metal	35
Confectionary	35
Incandescent Lamps	33
Jewelry Cases	30

This tabulation shows that the majority of the products of manufactures shipped by truck are light weight articles for the most part, which must be packed in boxes or cartons. This type of commodity takes a high freight rate, a fact which is a predominating influence in the substitution of the truck for other forms of transportation. There are two other advantages which coupled with rates make trucking superior for these commodities within the economical limits of haul. They are, the superiority of the truck in emergency cases, and the superiority of the truck in speed for haul within 250 miles. Wool, the first commodity considered, is according to the truckers handling it, very often ordered for immediate delivery. This situation has been brought about by the increasing tendency towards hand-to-mouth buying and the smaller inventory. Several cases were cited in the course of interviews where wool has been shipped to points in Maine by truck at very high rates during the past three months because plant labor was lying idle awaiting the shipments. Poor business conditions increase the numbers of such emergency cases.

Fresh vegetables and fruits are perishable.

As such they are burdened with high freight rates. In addition they require fast service and special care and handling. This makes the commodities undesirable for rail transportation from both the shippers' and the railroads' point of view. Trucks carry these commodities at lower rates and give better service than rail carriers. Because they deliver directly to the consignee at his store door or warehouse and haul over short distances on faster time schedules there is no need for icing-in-transit. Nor is there need for regrigerator cars since terminal delays are avoided. Fruits and vegetables therefore have a very wide use for the truck. Furthermore the emergency feature also affects these commodities.

LOSS AND DAMAGE

It is to be expected that with no packing requirements the loss and damage suffered by goods in transit is very large. This is not found to be true. The answers to question 4 of the questionnaire contained in the appendix emphasize this condition very forcibly. Seventy-two or ninety-seven replies state that of the three methods of transportation truck results in the least damage. Also

only nine of one hundred and one replies state that the truck results in the greatest amount of damage. No records of claims for loss and damage were kept by any of the companies interviewed, but they definitely state that loss and damage claims are the exception rather than the rule.

The absence of loss in motor truck transportation is due to two factors. The higher caliber of the operating force or driver personnel and the psychological effect of the small truck load as compared to a train load or steamship cargo upon the type of individual responsible for theft and pilferage. The larger companies are able to obtain the choice of drivers since they generally pay the highest wages. At the present time there is an oversupply of drivers because of depressed business condition. Yet even in normal times there is an abundance of operators, for the industry is young and has attracted very many young men to the field.

DISCRIMINATION OF COMMODITIES

Boston trucking concerns are contract carriers and as such are under no obligation to carry any and all commodities. This, however, is the case: within the

limits of the capacities of the equipment which each company owns, everything is accepted which is classed as freight. Discrimination exists to a certain extent in that certain commodities are undesirable, such as furniture or bottled goods, but this is not important enough to result in a refusal to carry. In this respect the truck is by far the broadest of the agencies of transportation. On the other hand, these statements are not to be taken as indicating that any size shipment will be accepted to any point for rates comparable to rail or steamship rates. It is true that any size shipment will be accepted to any point provided that a price is agreed upon, (the question of truck rates is taken up later), but it is easily understood that the transporting by truck of a small shipment to distant points off regular routes cannot be undertaken other than at prohibitive prices. In such cases the service is given, by the large companies at least, of referring the shipper to the proper agency or acting as a forwarding company and assuming the responsibility for the carriage. Truck loads

are never refused and are hauled at special rates and in fast time to any points.

MOTOR TRUCK RATES

It is in the matter of rates that trucking is unorganized. There is nothing approaching standardization in the entire field. Rates are the root of all the existing competition, not only among the trucking companies themselves but with other forms of transportation. In the course of the investigation no information on this subject would be released from the trucking companies except upon condition that such information should be considered confidential. It is for this reason that names of the trucking concerns interviewed are omitted from this report. Competition is exceedingly keen at the present time and consequently rates are based to a great extent upon price quotations of competitors. On several occasions actual cases were met with where either lists or notations of the quoted rates of several trucking companies were kept on hand by managers for ready comparison with their own.

Most rates are quoted over the telephone. The method of making the price for any given

transportation involves these factors, as gathered from telephone conversations concerning rates: The determination of the distance, the weight, bulk, crating if any to be done, difficulties in loading and unloading, methods to be used in loading and unloading, the parties to be responsible for the loading and unloading. The value of the goods and the possibilities of damage are also taken into consideration. Then these factors are weighed against the known costs of the haul and a price quoted. Such a procedure requires the greatest amount of experience in order that, consistent with competition, the rates made shall be profitable. That many of the smaller and younger companies should fail is therefore not so much cause for wonder.

RATE CONDITIONS

Theories of rate making are almost unheard of by those who make truck rates. There are one or two companies in Boston who have attempted to work up published forms of rates similar to railroad tariffs. These trucking tariffs however were not successful. The shippers claimed

that the structure was too complicated to be of any benefit, although compared to rail tariffs they are of the simplest character. Those managers who have made studies along these lines are of the opinion that the industry is not yet ready for published rates, but that the time is not far off when they will be necessary. Each rate with the exception of those contracts covering a definite time period is made according to the circumstances which surround the particular case.

The railroad classification of commodities has been ignored. The very broad statement is made by many truckers that they consider all commodities the same in rate making. Yet, the quoted rates for different commodities show a wide variation. The only conclusion to be drawn from this is that while the official classification of the railroads is not used as a basis there is a certain amount of classification of commodities. Each trucker makes his own classification based on his own experience. Thus, from one company operating over a 100 mile route and apparently making no classification, three

different rates are given; on sugar in packages which is heavy and compact, 30¢; on vegetables, packing house products, textiles, paper, chemicals and leather, which are more bulky, and some of which involve an element of risk, 35¢; and on lumber and machinery which are difficult to handle, 50¢. A very good example of classification of commodities is found in wool. Wool, in the grease, is hauled at a rate of 35¢ per hundred within a radius of 50 to 100 miles of Boston, while scoured wool is hauled for 30¢ per hundred. The tabulation of truck rates on various commodities between Boston and other cities is contained in Appendix H, and shows the wide variation due both to competition and the unorganized condition of the companies. That all commodities are not carried for the same rate is evident from these quoted prices.

In making contracts with manufacturers there is however an absolute disregard for classification in some cases. Under the terms of these contracts, it is specified that all goods shall be moved at the same rate either between certain points or upon a mileage basis. This is practically the only case

where no distinction is made. The extent of such contract work is very difficult to ascertain, since neither transportation companies nor manufacturers wish to disclose the details of such intimate business relationships.

TYPES OF RATE BASES

The present methods of making trucking rates are almost as numerous as the number of companies. The foremost is, perhaps, the blanket rate which is made with shippers covering everything that is to be trucked. Following this there are many other bases upon which rates are made. Where a trip is to be made which will utilize a truck for a day the rate is made to cover the cost plus a profit. The costs of five-ton trucks per day in this case varies from 20 to 30 dollars. A trip of 100 miles is generally considered the equivalent of a truck-day. Another basis which is used in computing rates is an hourly charge plus mileage charges. This formula for five-ton trucks as used by a large Boston concern is $1.49 per hour plus 25¢ per mile. One company in Boston charges rates within the limits of 14¢ to 35¢ per hundred weight, varying

with the type of goods hauled, with a 45 mile radius. One cent per mile per hundred weight is a common rule used by many companies within a radius of 25 miles of Boston. Another basis for rates is the package, carton, crate, box or basket. Shoes are often shipped at these rates, and often complications arise. In one instance where shoes were delivered once a week in New Bedford from Boston the size of the carton was increased to carry almost double the number of shoes. The trucking company in this case had difficulty in changing the rate to meet the changed condition. Fruits and vegetables are often carried on a basket basis. Very long trips are on a rental basis similar to the daily charge of 20 to 30 dollars per truck-day. Long trips are also on a space basis, that is rates are charged per cubic foot or per cubic yard.

For trips to New York, Philadelphia, and Baltimore the charges are made either on a trip or a space basis. Any additional freight however, which may be obtained for these trips is then taken for rates on a weight basis. No companies were found

to be operating anything approaching regular service beyond New York and the rates shown in the Appendix for Philadelphia and Baltimore are those which have been charged on special trips to these points. Other rates which are shown in the tabulation are Less-Truck-Load rates, truck loads are hauled for rates ranging from 10 to 40 percent lower. The term, merchandise, as used in trucking is very much different from that used on the railroad. There it is used to designate all Less-Carload business. In trucking, the term is used to designate only heavy, compact Less-Truckload business. Nothing under 15 pounds per cubic foot is classed as heavy compact freight and the further stipulation is made that the shape of the article must be approved before merchandise rates may be applied. The definition of merchandise in truck transportation covers a wide range of commodities.

One other method ofrate making employed by a number of trucking companies deserves consideration. The actual freight rate as quoted by the

railroads between points is taken by many truckers as their transportation rate. The additional service of store door delivery and speed is then relied upon to draw business from the railroads. The slogan of these companies is, "Freight transportation at freight rates and express service."

The rates contained in Appendix H as stated above are for less-truck-load shipments. These are all subject to a minimum charge which varies as much as the rates themselves. The minimum charges apparently have no relation to the distance over which the goods are to be transported. They vary from 35¢ to 50¢. Only one pickup and one delivery are included in these rates. If more than one is made, a separate pick up or delivery charge is levied. In the case where two shipments, each taking the minimum charge but together totalling the required hundred weight, are picked up at different points, each is treated as a separate shipment and is subject to the minimum charge.

COMPETITION

While the railroads consider the truck as a serious element in the competitive field, the feeling is not mutual. Only a certain element of

fear of the gigantic power of the rail lines is entertained by trucking companies in Boston, and the prevailing thought is that the railroads through financial influence and legislative action may either gain control of truck transportation or restrict road haul.

TERMINALS

Truck terminals for the assembling of loads are maintained by all the larger trucking companies in Boston, and also on their important routes, such as, Providence, Worcester, Springfield and Fitchburg. The operation of these terminals is very similar to that of a railroad freight house. Freight is delivered by the trucks, engaged during the day in pick up work, unloaded onto the terminal floor and either loaded into trailers preparatory to shipment, or separated into truck loads awaiting the arrival of equipment. Arrangements are also made at these terminals with other companies to haul freight to farther points which is very similar to railroad inter-change, whereby cars or freight are transferred from one line to another at junction points. The operation

of these termini in the manner outlined leads to the conclusion that elimination of handling is not as wide spread nor as important as is ordinarily held. Handling of less-truck-load freight under this system entails just as much time and labor as freight house handling, and the interchange of freight with chain truck lines similarly involves the same difficulties encountered in railroad work. The quantity of terminal and interchange work appears to be increasing as truck transportation develops. It is inevitable that this should come about as regular routes are established and something in the manner of schedules is set up.

COST OF OPERATION

The limits of the economical haul of the motor truck in the general transportation scheme is at the present time unknown. Each manager of each company has his own ideas upon which he establishes his service. Thus, managers of the companies designated in the Appendix G stated the following mileages: A, 50 miles; C, 25 miles; G, 25 miles; and one company, not represented in this list, maintains 10 miles as the limiting profitable haul for truck consistent with rail rates.

When the sparseness of cost accounting systems is considered it is not difficult to understand the wide variation in these estimates. Setting limits to such a thing as the economical haul of the truck is no small problem considering the differences in speed, flexibility and service, but when no cost studies are available the problem is impossible of solution. Of the companies represented in Appendix G only one had a complete cost accounting system. Several had taken steps to establish the accounting and were able to give figures on costs per truck mile on certain types. This indicates a trend in truck transportation towards more efficient operation, but the greater number of companies and some of these operating to to 25 trucks, have no cost accounting system at all. Only two concerns were interviewed which kept adequate cost accounting systems. One of these is an express company and is therefore not included in the Appendix. The results of actual cost studies of this company are however contained in Appendix G, and show clearly the difference in the cost of operation of different sizes of trucks. The other

company having a complete cost system operates only within a 10 mile radius of Boston. Hence the costs can not be applied to road haul. A study of truck and trailer operation between Boston and Portland, Maine, by the only company interviewed operating on a long haul and keeping and adequate system of costs records has shown that with the load doubled, and fuel the only variable cost this did not increase in the same proportion, but far less. Truck and trailer operation has proved very profitable to this company and should wherever loads are available to utilize the equipment to capacity. Of the other companies from which information was sought, some estimated their costs, but others would not even attempt this. The estimates vary quite widely but are for the most part higher than those which are calculated from actual studies.

Data upon trucking costs is very hard to obtain from the companies mainly because of the lack of study and cost accounting. When such conditions prevail among the larger and more organized companies, the condition of the smaller ones must

be much worse. Without studies analyzing the costs of the factors which comprise transportation it is impossible to make a logical rate. The common book-keeping systems employed simply inform the operator that he is or is not making money, but as an aid to determining the causes it is almost worthless. Cost accounting is a necessary part of motor transportation. Until it is more widely adopted and utilized to show the subdivision of unit costs rate will continue to be chaotic.

TONNAGE CARRIED BY TRUCKS BETWEEN BOSTON AND OUTSIDE POINTS

In order to obtain the total tonnage carried between Boston and outside points by truck, publications, periodicals and other sources of information were investigated with no results. Chambers of Commerce and other civic organizations have never studied the problem and no governmental body requires reports of this nature. At the outset of this investigation it was thought that the companies operating trucks would have some data on the subject. This was not found to be the case as

very few companies keep their own tonnage records. Ton-mileage records are unknown in the trucking business.

A few records were obtained which illustrate the tonnages carried. Company B, as designated in Appendix G, had records for the tonnage originated in Boston for the first three months of 1931.

Jan. 1931	1,453,000 lbs.	725 tons
Feb. "	1,287,000 "	643 "
March "	1,841,100 "	920 "

Company A was able to give a record of the tonnage handled for one industry outside of Boston for which it did trucking exclusively.

	Outbound	Inbound
Jan. 1931	549,000 lbs.	167,000 lbs.
Feb. "	552,000 "	85,000 "
March "	558,000 "	81,000 "

These quantities indicate that substantial tonnages are handled by truck on contract work.

However to obtain a composite picture of the tonnage moved by all trucks (contract and private) it is necessary to resort to one estimate.

TONNAGE ESTIMATE

From the tonnage estimate in Appendix G the average load per trip, per truck, operating between Boston and other points was found to be 0.954 tons, or 1,908 pounds. This compares favorably with the studies made by the U.S. Bureau of Public Roads in Ohio, where the average net load of cargo per truck was found to be 2520 lbs. Only loaded trucks were used in obtaining this figure. The study made by the Bureau in Pennsylvania shows the average gross-loaded-weight of all trucks checked in the survey to be 7,600 lbs., a figure which is surprisingly close to that of this estimate. We are of the opinion, therefore, that the final figure of 1,912,000 tons moved in and out of Boston per year by truck is very close to the true tonnage.

REGULATION

There is no regulation of the motor truck in the State of Massachusetts. There have been however attempts recently to have such legislation passed and it is not unknown that

there is a high feeling on the part of the railroads, steamship companies and some of the larger trucking companies that some regulation should be established over the motor truck. That such regulation is constitutional, according to the principles of the government, is now well established, but no regulation has yet been established over interstate commerce. Steps have been taken by the Interstate Commerce Commission however in the way of investigation. In 1928 a very thorough investigation was made which was the broadest of any that had been made up to that time covering motor bus and truck operations. Hearings were held in thirteen of the largest cities in the United States, and over 5,000 pages of testimony were collected from over 400 witnesses who represented every possible angle of transportation. The results and findings of the commission however were not very positive. Legislation was suggested in a moderate way but it was stated that it was the opinion of the commission that the truck had not yet reached the stage where regulation was necessary. The commission also

hinted that the Interstate Commerce Commission was already overburdened and did not look favorably towards undertaking the regulation of motor vehicles. In 1930 and 1931 also the Commission undertook a similar investigation, the results of which are not yet published.

Attempts at federal legislation have not been lacking. Several bills have been introduced in Congress, the most important of which is the Cummings-Parker Bill, in 1928. By its provisions interstate regulation was to be controlled by joint State Commissions composed of the members of the regulatory commissions of the several states over which the traffic took place. The Interstate Commerce Commission was to act as the appellate tribunal in cases of dispute. Both common carriers and contract carriers were to be subject to the requirements of the bill to obtain a Certificate of Public Convenience and Necessity. However, only common carriers were to be subject to the requirements of service and rate regulation. This bill was not passed because its ineffectiveness was

apparent. Without rate and service regulation any form of legislation is without teeth, and coupled with the difficulties of distinguishing between common and contract carriers it is a well founded fact that neither State nor Federal government may compel a private carrier to become a contract carrier unwillingly. Since 1928 there have been no important attempts at legislation regarding the Federal control of the motor truck.

State regulation has shown a tendency to increase in the past five years. In 1925, twenty-five states required that property motor carriers carry liability insurance and fifteen states required cargo insurance to be carried. By 1929 there were thirty states which had some regulation of the motor truck when employed as a common carrier. This consisted primarily of the following items: the requirement that a certificate of public convenience and necessity be obtained; that liability insurance or an indemnity bond be taken out; that vehicles be operated with care; that rates be filed and adhered to; that routes,

schedules and quality of service be subjected to supervision. In 1930 thirty-seven states had some provision for regulating carriers of property.

Regulation of property carriers in Massachusetts has never been effectually brought about. In 1930, there was introduced a bill in the state legislature providing that a Certificate of Public Convenience and Necessity should be required of all carriers operating motor vehicles, but this never reached the House. The source of agitation has been largely from the railroad and steamship companies, which has been one of the opposing arguments presented. Shippers and the public generally have been satisfied with trucking in the past, and the trucking companies themselves have violently opposed regulation. This feeling however is not evident at the present time. Of those shippers and truckers interviewed very many were vitally interested in the question of truck regulation and favorably inclined towards it. Among truckers this is prevalent primarily among the

larger companies. The competition of the past few years has become of such a nature that many feel that rate regulation is the only remedy which will raise their revenues to the point where a reasonable return on the investment may be realized. There is still present however the feeling that if regulation is enacted a monopoly on transportation will be obtained by the railroads.

APPENDICES

APPENDIX A

QUESTIONNAIRE

TO
MANUFACTURERS

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
DEPARTMENT OF CIVIL AND SANITARY ENGINEERING

CAMBRIDGE A, MASS.

January 15, 1931.

Gentlemen:

We would greatly appreciate your cooperation in filling out and returning the enclosed questionnaire.

This information is to be used in connection with a study of transportation in the eastern section of New England which is being made by graduate students at the Massachusetts Institute of Technology. The ultimate purpose is to determine the present status of railroad service as of itself and as compared with other means of transportation from the standpoint of the shippers and receivers of freight.

A prompt reply will assist in carrying out this investigation.

Yours very truly,

J. B. Babcock
Professor of Railway
Engineering

Enc.

Form C

Name of Company _____

Address _____

Nature of Business _____

---

1. Indicate approximate percentages of shipments which you send or receive by Rail ____, Truck ____, Water ____.

2. In case some of your shipments go by Truck or Water which could move by Rail, state reason for your preference.

_____

3. How does service offered by railroads compare with that offered by trucking or steamship companies?

_____

4. Which method of transportation results in largest amount of damage in transit? Rail____, Truck____, Water____. Which results in the smallest damage? Rail____, Truck_____, Water____.

5. Which method results in greatest delay*in transit? Rail_____, Truck____, Water____. Which results in the least delay? Rail_____, Truck_____, Water_____.
*Note: Delay means time longer than the usual time in transit.

6. Are the railroad employees cooperating with you in a satisfactory manner?_____

7. What suggestions have you to offer regarding:

(a) Railroad equipment for your service

_____

(b) Location of public team tracks

_____

(c) Width and condition of driveways in the freight yards or approaches _____

(d) Condition of public streets leading to railroad facilities

_____

(e) Type and condition of freight house platform

_____

(f) Rough handling of freight in freight house

_____

(g) Delays in railroad shipments _____

(h) Action by railroad on freight claims _____

(i) Other remarks _____

_____

_____

_____

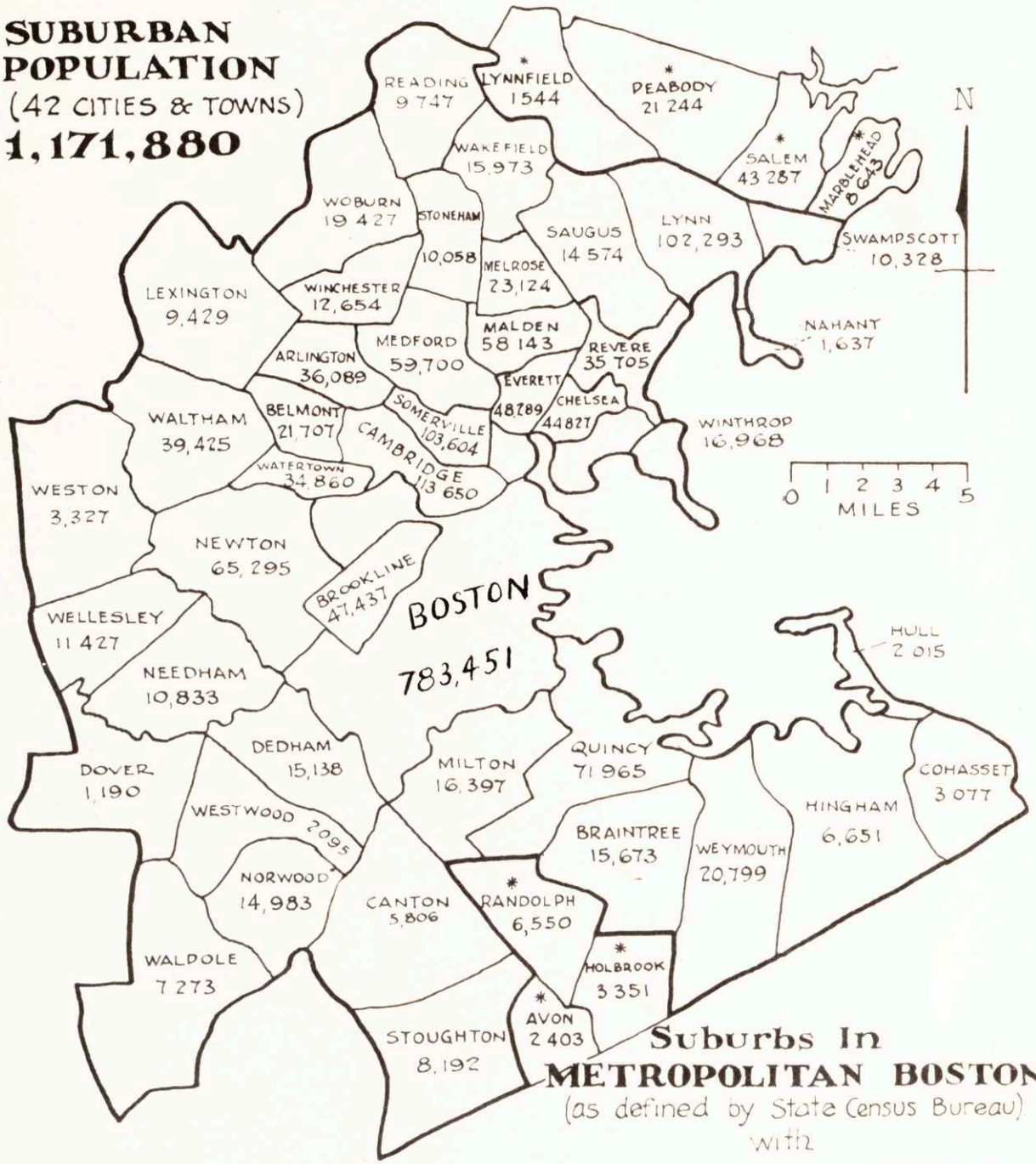
-OVER-

If you ship to or receive from any of the following points, indicate the average time in transit for these movements:

Shipping Point or Destination		Rail Days	Rail Hours	Truck Days	Truck Hours	Water Days	Water Hours
Boston	CL						
	LCL						
Quincy	CL						
	LCL						
Providence	CL						
	LCL						
Lawrence	CL						
	LCL						
Lynn	CL						
	LCL						
Worcester	CL						
	LCL						
Portland	CL						
	LCL						
Montreal	CL						
	LCL						
New York	CL						
	LCL						
Chicago	Cl						
	LCL						
St. Louis	CL						
	LCL						
Baltimore	CL						
	LCL						
- - - - - -	CL						
	LCL						
- - - - - -	CL						
	LCL						

BOSTON EVENING TRANSCRIPT, THURSDAY, JUNE 12, 1930

Boston Suburban Population Approximated



Chamber and Federal Preliminary Figures of Forty-Two Nearby Cities and Towns
* Denotes Cities and Towns not included in Total Figure 1,171,880

Fig. 9.

QUESTIONNAIRE TO INDUSTRIES

This questionnaire was sent to 600 industries in New England located in cities and towns served by the Boston and Maine Railroad. In formulating the questions, the object in view was to obtain information on the extent of shipping by rail, water and truck, to determine the reasons for preference, and to locate the centers of service failures in railroad performance. A total of 170 questionnaires were returned answered, which represents 28% of the number mailed. This percentage, while apparently very low, shows a remarkable interest in transportation questions on the part of shippers: An interest which has steadily been increasing within the past quarter of a century and bringing the business world to the realization that transportation costs constitute 15 to 25% of the finished product delivered to the consumer. In 1915, the Terminal Commission created by the State Legislature to investigate and report on terminal facilities at Boston issued and distributed a questionnaire of a somewhat similar nature. The replies to this amounted to but 15% of the total mailed and the opinion of the commission at that time was that great interest was indicated.

The poor business conditions prevailing at this time are reflected in the number of replies from manufacturing establishments failed or in poor circumstances. Six replies were returned by the Postal Authorities as out of

business and eleven were returned by companies stating that their plants either had been liquidated or were in the process of liquidation.

The names of industries and the addresses were obtained from the Directory of New England Manufacturers published by the Boston Chamber of Commerce and in which only those employing 100 or more workers are included. This indicated the relative size of the industries answering the questionnaire and the accuracy of their judgment.

Cities and Towns from which answers were received

Boston	50	Gloucester	1	Pepperell	1
Cambridge	25	Beverly	2	N. Billerica	1
Somerville	2	Amesbury	2	Haverhill	5
Waltham	2	Newburyport	2	Lawrence	8
Watertown	1	Portsmouth	1	Lowell	10
Newton	1	Portland	7	Nashua	2
Wakefield	1	Augusta	1	Manchester	4
Everett	3	Clinton	1	Derry	1
Chelsea	3	Gleasondale	1	Dover	2
Lynn	5	Worcester	7	Farmington	2
Peabody	5	Chelmsford	2	Rochester	4
Salem	3	Littleton	1	New York City	1

The greater portion of the replies, 43%, were received from Boston and Cambridge. 13½% were received from

the cities of Haverhill, Lawrence and Lowell, 11% from Everett, Chelsea, Lynn, Peabody and Salem, 8% from Portland and Worcester; and the remaining 24½% from the 24 other cities and towns. Of all the returned questionnaires 60% were from Metropolitan Boston.

ANSWERS TO QUESTIONNAIRE

Question 1. Indicate approximate percentages of shipments which you send or receive by rail, water and truck.

In answer to this question a total of 154 answers were received. The average percentages for the territory covered follow:

RAIL	TRUCK	WATER
57.8	27.4	14.8

These figures show the relative importance of the different agencies of transportation. Rail is by far the most important carrying more than twice as much as either of the others. Steamship movement of goods which one would ordinarily consider as the next in line is not indicated so by those answering, who are those choosing the agency for the transport of their products.

Figure 1 has been constructed from the data obtained from question 1 to show the relation between the number of shippers and the percentage of their shipments which are despatched or received via each method. Each line on this chart must be considered separately as there is no simple relation between them. However, each curve considered separately shows the number of shippers, in a group of 154, who might be expected to ship a given percentage of their total shipments by the agency of transportation which it represents. The chart shows that

the greater number ship the majority of their products and receive the majority of their raw materilas by rail. The converse is true of both water and truck, that is, those employing either of these methods to the exclusion of rail are very few, water transportation being used by the minimum number. When it is considered that the center of population is located in Indiana this is a reasonable trend, for this also must be the center of converging transportation routes. It cannot be reached by water, the distance is too long for an economical haul by truck and hence the railroads have practically a monopoly on business handled from Boston to this point, where the greatest number of shipments would be expected to go from any manufacturing district.

Similar to the average figures for the entire territory, averages have been obtained for Boston, those cities and towns on or very near the Coast, and those located inland.

BOSTON-PROPER

RAIL	TRUCK	WATER
63.2	22.7	14.1

CITIES AND TOWNS ON OR NEAR THE COAST

Cambridge	Everett	Gloucester
Somerville	Chelsea	Beverly
Waltham	Lynn	Newburyport
Newton	Peabody	Portsmouth
Wakefield	Salem	Portland

RAIL	TRUCK	WATER
59.4	21.4	19.2

INLAND CITIES AND TOWNS

Clinton	E. Pepperell	Lowell	Farmington
Gleasondale	N. Billerica	Nashua	Rochester
Worcester	Amesbury	Manchester	
N. Chelmsford	Haverhill	Derry	
Littleton	Lawrence	Dover	

RAIL	TRUCK	WATER
53.0	38.7	8.3

TABLE AI

TABLE SHOWING THE USE MADE OF THE THREE AGENCIES OF TRANSPORTATION BY SHIPPERS

TOTAL NO. OF SHIPPERS FURNISHING DATA. 154

TERRITORY REPRESENTED: THAT COVERED BY QUESTIONNAIRE

PERCENTAGE OF SHIPMENTS	NO. SHIPPERS USING RAIL	NO. SHIPPERS USING TRUCK	NO. SHIPPERS USING WATER
0 to 10	4	29	32
10 to 20	10	32	32
20 to 30	15	21	25
30 to 40	9	9	8
40 to 50	11	11	7
50 to 60	23	12	7
60 to 70	16	5	4
70 to 80	25	10	0
80 to 90	18	1	0
90 to 100	22	8	1

Question 2. In case some of your shipments go by truck or water which could move by rail, state reason for your preference.

Considering the fact that many shippers gave more than one reason, there were 214 answers to this question. The tabulation of these reasons is presented below.

RATE PREFERENCE

Number stating preference because of rates 86

Subdivided into:

Preference (without stating which agency)	38
Definite water preference	31
Definite truck preference	17

TIME PREFERENCE

Number stating preference because of time, 60

Subdivided into:

Preference (without stating which agency)	23
Definite water preference	12
Definite truck preference	25

STORE DOOR DELIVERY

Number stating preference for truck transportation because of store door delivery 36

In addition to these major classifications of preference for truck or water transportation over rail, the following group of varying reasons were submitted shown in the order of their magnitude.

Determined by customer's order	11
Better all-around service	6
Truck packing requirements less stringent	3
Less handling in truck transportation	2
Water more reliable	1
Trucks more reliable	1
Arrival notice eliminated	1
Trucks guarantee delivery at a specific time	1
No red tape involved with truck transportation	1
Truck movements result in the least damage	1
Trucks are the most flexible unit of transportation	1
Water preferred because of dock location	1
Empty containers returned free by truck transportation companies	1

The results of Question 2 for Boston Proper also show the same reasons for preference. A total number of 71 answers were given from this city.

RATE PREFERENCE

Number stating preference because of rates 32

Subdivided into:

Preference (without stating which agency)	14
Definite water preference	10
Definite truck preference	8

TIME PREFERENCE

Number stating preference because of time	18
Subdivided into:	
Preference (without stating which agency)	6
Definite water preference	4
Definite truck preference	8

STORE DOOR DELIVERY

Number stating preference because of store door delivery	12

The other scattered reasons for Boston preference are contained in the tabulation for the entire territory covered by the questionnaire.

Question 3. How does service offered by railroads compare with that offered by trucking or steamship companies?

Very few answers were returned to this question. Those which were submitted did not vary sufficiently from Question 2 to be considered.

Question 4. Which method of transportation results in the largest amount of damage in transit? Rail - truck - water- Which results in the smallest damage? Rail - truck - water

To the question asking for the largest amount of damage 101 replies were received. Of these 74 or 73.5% stated that rail transportation resulted in the largest amount of damage, 18 or 17.6% stated that water produced the most, while but 9 or 8.9% chose the truck.

In answer to the question asking for the smallest amount of damage the results above are verified. To this question 97 replies were received. 72 or 74% stated that truck transportation resulted in the least damage. 13 or 13.5% stated that water resulted in the least, and 12 or 12.5% that rail resulted in the least.

Question 5. Which method results in the greatest delay in transit?

RAIL	TRUCK	WATER
85	4	36

Which results in the smallest damage?

RAIL	TRUCK	WATER
13	101	7

This question, as number 4, reflects adversely upon rail and water transportation in favor of the truck. In reply to the query concerning the greatest delay 125 returns were received. Of these 85 or 68% designated rail as the agency most frequently delayed, 36 or 28.8% designated the water carriers, while but 4 or 3.2% named the truck. To the query concerning the least delay the same order is shown. 121 replies were made. Of these 101 or 83.5% named the truck as being responsible for the least number of delays. 13 or 10.7%, however, favored the rail line in this respect over the water carrier which was named by only 7 or 5.8% of the total number answering this question.

Question 6. Are the railroad employees cooperating with you in a satisfactory manner?

A total of 159 answers were received to this question indicating an almost unanimous expression of opinion in a definite affirmative. 155 answers were "yes", the greater part of these expressing a most satisfactory relation between the public and the railroad personnel. Only 2 replies definitely stated no, and 3 more could be construed as indicating a slight friction between these particular shippers and employees of the operating department.

The stations from which negative replies were received are Boston, 1; Newton, 1; Cambridge, 1; North Chelmsford, 1; and Haverhill, 1.

Newton is served by the Boston and Albany Railroad, Cambridge by the Boston and Albany and the Boston and Maine Railroads, and Boston by these two roads along with the New Haven Railroad. North Chelmsford and Haverhill are served by the Boston and Maine Railroad exclusively.

Question 7. What suggestions have you to offer regarding:

(Note: Replies not expressing any opinion have been considered as approving present conditions)

(A) Railroad Equipment for your Service.

No suggestions or complaints were received.

(B) Location of Public Team Tracks

No suggestions or complaints received

(C) Width and Condition of Driveways in Freight Yards or Approaches.

Regarding the width and condition of driveways, 19 complaints were received. Of these only 4 referred definitely to Boston and Maine Stations, 2 from Haverhill and 2 from Amesbury. The other 15 complaints were from Boston, Worcester and Lowell which are served by more than one line.

Driveways are in need of paving at the points mentioned.

(D) Condition of Public Streets Leading to Railroad Facilities.

The poor condition of public streets leading to railroad facilities brought replies from 13 shippers. Of these only 6 are definitely located on the Boston and Maine Railroads, 3 from Boston, 2 from Haverhill, and 1 from Portland.

In Boston the chief cause for dissatisfaction is the congested condition of the streets which is not within the direct control of any railroad management. In Haverhill and Portland paving is apparently badly needed.

(E) Type and Condition of Freight House Platform

11 complaints were received in answer to this question. Only 3 were from territory covered by the Boston and Maine Railroad. At Salem the freight house platform is in need of a covering for protection of teamsters and goods in inclement weather. At Chelsea the freight house is apparently either too small or the doors are not large enough, for the complaint has been made that delays in loading and unloading are experienced. At Boston the one and only complaint is not justifiable for it is claimed that delays result from the necessity of the teamsters performing railroad labor, loading and unloading from and into the house.

In the New Haven and Boston and Albany freight houses at Boston the platforms are too low, the

houses generally in poor condition and slow and rough handling at these particular points are declared to be the initial causes for much congestion and delay.

(F) Rough Handling of Freight in Freight House

10 complaints were made against rough handling in freight houses. 8 of these applied to the Boston and Maine Railroad while only 2 applied to the New Haven and Boston and Albany Railroads.

The points from which complaints were received are Boston, Watertown, Wakefield, Waltham, Lowell, and Rochester.

(G) Delays in Railroad Shipments

20 complaints were received concerning train delays. 15 of these were from shippers definitely using the Boston and Maine Railroads, and emphasized the point that schedules were not maintained as strictly as advertised. These complaints were received from the following cities: Boston 3, Beverly 3, Portland 4, Haverhill, Lowell, Lynn, Salem and Peabody.

(H) Action by Railroads on Freight Claims

Stating that action on claims was too slow and should be accelerated 21 complaints were received. 15 of these were from Boston and Maine territory but were from no definite localities or groups of shippers.

(I) Other Remarks:

This heading brought forth very many suggestions and complaints. Some of these and the number reporting are listed below:

1. "The car tracing system is inadequate and should be improved." 4

2. "The arrival notice is antiquated and should give place to the telephone". 3

3. Regarding Container Car Service

(a) "An insulated container of a 1 ton capacity is needed as standard railway equipment by the shipping public".

(b) "Sectionalized box cars should be established, each section to be used only for similar types of merchandise. This plan is a scheme to hasten delivery by decreasing loading and unloading time".

(c) "More consolidated L.C.L. service should be established as a means to decreasing both transit time and rates".

4. Regarding Car Service

(a) "Improvements can and should be made on house car service to New York and other important commercial centers".

(b) "During the winter months of the year warm car service is scarcely sufficient to handle the demand."

(c) "A special fast refrigerator service should be established for the fish business from Boston. This is necessary because of the nature of the commodities, fresh fish being one of the perishables."

(d) "A special fast freight service should be established on certain commodities. Just as each commodity takes different rates so does each vary in the time required and allowed between plant and market."

OTHER REMARKS

One suggestion was made that overnight local service be established.

One shipper advises the removal of all freight houses and public team tracks to a location 5 miles beyond the congested city centers.

One shipper suggests the establishment and maintenance by the railroads of a Public Tariff Library, accessible to shippers for rate reference and prices. This scheme it is claimed would result in a time saving for both business and railroads.

While the results for question 7 presented above picture the railroads darkly,

it must be known that this is but one side considered. A large number of the replies commended the railroads for their splendid work, service and equipment. In addition to these it can safely be assumed that where no statement was made regarding the particular question, approval has been implied. In this light for each one the headings above an average of 135 approvals were returned. This represents 80% satisfied with Railroad performance.

Some of the remarks were distinctly complimentary. At Worcester the Boston and Albany service has been rated at 100%. One company states that railroads have recovered freight which they had been shipping by trucks since the war. Another states that in comparison with rail and water transportation trucks are in a condition of chaos. These are a few indications of the results of efficient railroad operation which has been appreciated by shippers.

RAIL, TRUCK AND WATER TRANSPORTATION TIME BETWEEN IMPORTANT CITIES

DAYS

BETWEEN	BOSTON			QUINCY			PROVIDENCE			LAWRENCE			LYNN			WORCESTER			PORTLAND			MONTREAL			NEW YORK			CHICAGO			ST. LOUIS			BALTIMORE		
AND	RAIL	TRUCK	WATER	RAIL	TRUCK	WATER	RAIL	TRUCK	WATER	RAIL	TRUCK	WATER	RAIL	TRUCK	WATER	RAIL	TRUCK	WATER	RAIL	TRUCK	WATER	RAIL	TRUCK	WATER	RAIL	TRUCK	WATER	RAIL	TRUCK	WATER	RAIL	TRUCK	WATER	RAIL	TRUCK	WATER
BOSTON				1.57	1.00		1.21	1.00		1.38	1.00		1.29	1.00		1.45	1.00					3.00	1.50		2.00	1.00	1.11	4.44		7.00*	5.19		*	3.61		2.86
CAMBRIDGE	1.00	1.00		1.00	1.00		1.12	1.00		1.25	1.00		1.25	1.00		1.25	1.00		1.75	1.00	1.57	3.00	4.00		2.00	1.00	1.45	4.95		9.50	5.16	5.00		3.30		3.00
SOMERVILLE																									2.00											
WALTHAM	1.00																																			
WATERTOWN																				1.00						1.00										
NEWTON																												9.00								
EVERETT		1.00		3.00	1.00		2.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00		2.50	1.00		5.00			2.00			5.00			6.00			4.50		
CHELSEA				1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.50	1.00		2.00		1.00				2.50		1.00	7.50		6.00	7.00		5.00	4.00		3.30
LYNN					1.00			1.00			1.00			–		2.50	1.00		1.50	1.00	2.00				3.50		1.67	5.00			7.00					4.00
PEABODY	1.16	1.00					2.50	2.00		1.00			1.00	1.00		1.00			1.75						2.50		1.50	4.50						4.00		2.00
SALEM	1.00	1.00		3.00	2.00		3.00	2.00		2.00	2.00		2.00	1.00		3.00	2.00		4.00	2.00		5.00			2.25		2.00	4.00		9.00	5.00		12.00	4.00		5.00
GLOUCESTER		1.00					2.00			1.25	1.00			1.00		2.00	1.00		3.00						3.00			5.00						7.00		
BEVERLY		1.00					2.50	1.00								2.50			2.00	1.00	1.00				2.00		1.00	6.00		8.00	6.50					3.00
AMESBURY	1.00	1.00					1.00	1.00																												
NEWBURYPORT		1.00									1.00			1.00												1.00		3.00								
PORTSMOUTH	1.50	1.00																																		
PORTLAND	3.16	1.00					3.25			1.00			1.50			1.33						2.25					2.00	4.00								4.00
AUGUSTA	1.00																																			
CLINTON	1.00	1.00					2.00	1.00		1.00	1.00					1.00	1.00								3.00	1.00	1.00									
GLEASONDALE	3.00	1.00																							1.00		1.00									
WORCESTER				1.00	1.00		1.25	1.00		1.00	1.00		1.00	1.00					1.00	1.00		2.83	1.25		1.40	1.00	3.00	5.75	3.00		6.87	5.00		3.83	1.50	4.00
CHELMSFORD		1.00						1.00			1.00						1.00											5.00			7.00					
LITTLETON																																				
PEPPERELL	1.00	1.00			1.00		1.75	1.00						1.00		1.00	1.00								2.50											
N. BILLERICA		1.00																									1.00									
HAVERHILL	1.00	1.00																							1.00											
LAWRENCE				2.33	1.00		2.25	1.00					1.50	1.00		1.70	1.00		1.00	1.00		2.50			2.33	1.33	1.43	3.75		6.00	5.33		7.00	4.00		3.66
LOWELL	1.50	1.00					1.83	1.00		1.00	1.00			1.00		1.50	1.00		1.50			3.00			3.56	1.25	1.17	6.33			7.33			6.00		
NASHUA	1.00	1.00			1.00		1.00	1.00		1.00	1.00					1.00	1.00		1.00						2.00			4.50			5.50			4.50		
MANCHESTER	1.25	1.00		1.00			1.00				1.00			1.00			1.00		1.00						2.33	1.00	2.00	5.00		9.00	5.75		9.00	5.50		5.00
DERBY	1.00	1.00		1.00	1.00		2.00	2.00		1.00	1.00		1.00	1.00		1.00	1.00		1.50	1.50		2.00			2.00	1.50	2.50	4.00			4.00			3.50		4.00
DOVER	1.00	1.00			1.00					1.00	1.00			1.00		2.00			1.25	1.00					3.00			5.00			5.50			5.00		3.00
FARMINGTON	1.00	1.00																																		
ROCHESTER	1.25	1.00					2.00			1.00	1.00		1.50	1.00		1.33	1.00		1.63	1.00		3.50			3.16	2.00	3.00	6.50			7.00			4.75		3.00

LESS THAN 24 HOURS CONSIDERED AS 1 DAY

* RAIL AND WATER

APPENDIX B

FREIGHT TRAIN SCHEDULES TO AND FROM BOSTON

APPENDIX B

TABLE OF CONTENTS

EXPLANATION

Schedules of through and local freight trains in and out of Boston.

These schedules were drawn from:

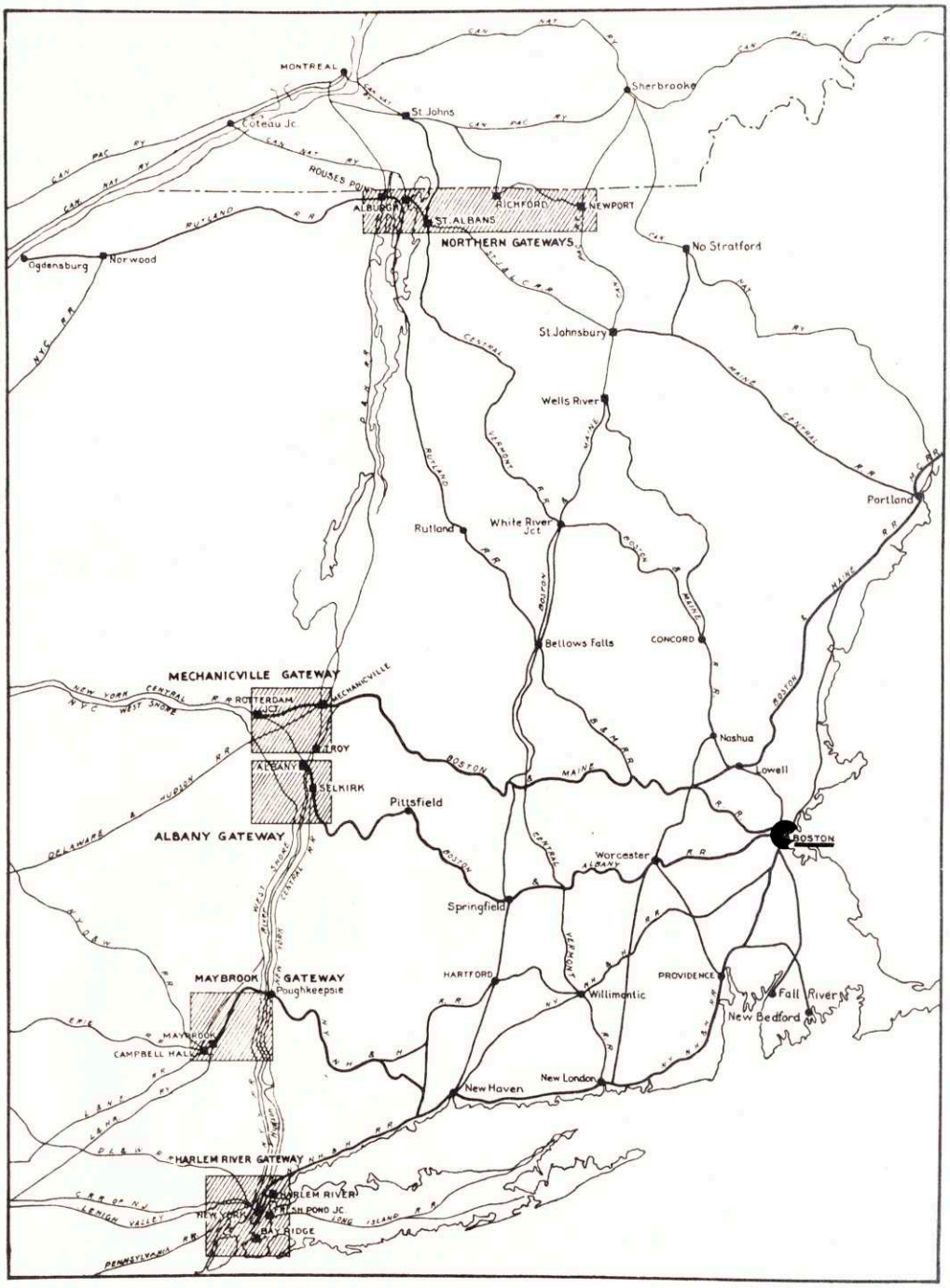
Boston and Maine, "Freight Train Symbol Book No. 17," revised to Nov. 6, 1930.

Boston and Albany, "Freight Train Book No. 4, "effective, April 27, 1930.

New Haven, "Service, Arranged Freight Trains", effective Oct. 6, 1930.

These schedules are all subject to change without notice, and they have all been changed to meet the variations in business conditions. They can, therefore no longer be held to be strictly accurate, but they serve as a good indication of the type of service offered under fairly normal conditions.

In addition to the trains shown in the schedules, there are practically always on the average of one or two through extras daily, the number depending on the volume of business to be handled. It is the policy of the railroads to maintain the schedules as advertised as much as possible, and therefore the schedules are arranged for the minimum business, with extras to take care of increases rather than having schedules arranged for maximum business with the necessity of cancelling advertised



Railroad Lines to and from Boston

Fig. 10.

TABLE - B I

BOSTON AND MAINE RAILROAD

THROUGH FREIGHT TRAINS -- SOUTH AND EAST
Effective Nov. 6, 1930

Worcester	7:30pm											
Rotterdam		11:30am									3:00am	
Mechanicville		1:20pm			6:30pm				5:45am	6:30am		
North Adams					8:45pm							
Springfield							7:10pm					
Holyoke							7:45pm					
East Deerfield		6:50pm			10:45pm		10:10pm	10:15am	10:45am			
Fitchburg		11:00pm						1:15pm	1:45pm			
Ayer	9:30pm						3:15am					
Plymouth			4:10pm									
Lakeport			5:10pm									
Wells River											11:50am	
White River Junction										11:50am	3:00pm	
Concord			8:00pm							3:40pm	7:00pm	
Manchester			9:30pm									
Nashua			10:30pm							5:50pm		
Lowell			1:00am							7:30pm	10:00pm	
Rigby				7:30pm		11:00pm						
Dover				10:00pm								
Lawrence				2:00am								
Bellows Falls							6:30pm					
Keene							8:00pm					
Winchendon							10:30pm					
East Fitchburg							12:15am					
Boston	12:30am	1:30am	2:30am	3:00am	3:30am	3:30am	4:15am	4:45am	3:20pm	4:30pm	9:00pm	11:00pm

TABLE - B II

BOSTON AND MAINE RAILROAD

THROUGH FREIGHT TRAINS -- NORTH AND WEST
Effective Nov. 6, 1930

	B-M 1	B-U 3	B-U 1	B-P 1	B-M 3	B-R 1	B-P 5 exc.Sun.	B-S 1 exc.Sat.	B-X 1 exc.Sun.	B-O 1 exc.Sat.	B-W 1 exc.Sun.	B-T 1
Boston	3:30am	3:45am	6:35pm	6:45pm	6:50pm	7:30pm	7:35pm	8:15pm	8:30pm	9:05pm	10:50pm	11:45pm
Ayer	. . .	. . .	. . .	. . .	. . .	. . .	. . .	9:40pm	. . .	. . .	12:45am	. . .
East Fitchburg	. . .	. . .	. . .	. . .	9:30pm	9:35pm	. . .	. . .	. . .	. . .	. . .	12:10am
Fitchburg	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	11:30pm	. . .	. . .	. . .
Wachusett	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	12:15am	. . .	. . .	1:00am
Gardner	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	3:10am
Athol	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	4:00am
Orange	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	5:00am
Millers Falls	. . .	. . .	. . .	. . .	. . .	12:01am	. . .	. . .	. . .	. . .	. . .	5:55am
East Deerfield	9:45am	. . .	. . .	. . .	11:45pm	1:00am	. . .	1:15am	. . .	. . .	. . .	10:00am
North Adams	. . .	. . .	. . .	. . .	1:30am	3:15am	. . .	. . .	. . .	. . .	. . .	12:15pm
Johnsonville	. . .	. . .	. . .	. . .	3:45am	. . .	. . .	. . .	. . .	. . .	. . .	2:15pm
Mechanicville	4:00pm	. . .	. . .	. . .	4:35am	. . .	. . .	. . .	. . .	. . .	. . .	. . .
Lowell	. . .	5:30am	7:40pm	. . .	. . .	. . .	. . .	. . .	. . .	10:40pm	. . .	. . .
Nashua	. . .	. . .	8:20pm	. . .	. . .	. . .	. . .	. . .	. . .	11:45pm	. . .	. . .
Manchester	. . .	. . .	9:20pm	. . .	. . .	. . .	. . .	. . .	. . .	1:30am	. . .	. . .
Concord	. . .	9:20am	10:40pm	. . .	. . .	. . .	. . .	. . .	. . .	3:20am	. . .	. . .
White River Junction	. . .	5:45pm	4:30am	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
Wells River	. . .	7:30pm	#6:00am	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
Lawrence	. . .	. . .	. . .	. . .	. . .	. . .	9:30pm	. . .	. . .	. . .	. . .	. . .
Dover	. . .	. . .	. . .	. . .	. . .	. . .	1:00am	. . .	. . .	. . .	. . .	. . .
Rigby	. . .	. . .	. . .	11:30pm	. . .	. . .	4:30am	. . .	. . .	. . .	. . .	. . .
Rotterdam	. . .	. . .	. . .	. . .	. . .	7:45am	. . .	. . .	. . .	. . .	. . .	. . .
Northampton	. . .	. . .	. . .	. . .	. . .	. . .	. . .	2:45am	. . .	. . .	. . .	. . .
Holyoke	. . .	. . .	. . .	. . .	. . .	. . .	. . .	3:35am	. . .	. . .	. . .	. . .
Chicopee	. . .	. . .	. . .	. . .	. . .	. . .	. . .	4:00am	. . .	. . .	. . .	. . .
Springfield	. . .	. . .	. . .	. . .	. . .	. . .	. . .	4:15am	. . .	. . .	. . .	. . .
Winchendon	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	1:50am	. . .	. . .	. . .
Keene	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	3:30am	. . .	. . .	. . .
Bellows Falls	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	6:30am	. . .	. . .	. . .
Lakeport	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	4:45am	. . .	. . .
Plymouth	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	6:15am	. . .	. . .
Worcester	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	4:00am	. . .
Troy	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	3:00pm
Troy, N. Y. C. yard	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	3:20pm

except Monday

service when business is light.

An inspection of Table B IX seems to show an abnormally small number of locals in and out of Boston on the New Haven. One reason for this is that the road switchers operating, such as are shown in the Boston and Maine and Boston and Albany schedules, are not shown in the New Haven schedule. In addition, much of the work at the towns very near Boston on the New Haven is done by locals coming from other towns, whereas on the other two roads such work is done by locals and switchers coming from Boston.

TABLE B III

BOSTON AND ALBANY RAILROAD

THROUGH FREIGHT TRAINS -- EAST
Effective April 27, 1930

	B.A.6	D.B.2	R.B.2 exc.Sun.	P.B.1	X.B.2	B.A.4	B.A.2
East Buffalo	10:30pm	. . .	. . .	. . .	2:00am	. . .	. . .
Depew	11:00pm	. . .	. . .	. . .	. . .	. . .	. . .
Dewitt	5:30am	3:30am	. . .	from	. . .	from	from
Minoa	5:45am	. . .	. . .	Phila.	. . .	Syracuse	Chicago
Selkirk	12:30pm	12:15pm	. . .	5:00pm	5:00pm	8:15am	9:00am
Rensselaer	. . .	. . .	5:30pm	. . .	. . .	. . .	. . .
Pittsfield	. . .	. . .	. . .	. . .	. . .	11:15am	12:01pm
North Adams Junction	. . .	. . .	8:00pm	. . .	. . .	. . .	. . .
West Springfield	8:00pm	8:15pm	11:45pm	12:30am	12:15am	4:30pm	5:00pm
Worcester	10:45pm	11:15pm	2:45am	. . .	. . .	7:50pm	8:10pm
Framingham	11:45pm	12:15pm	. . .	. . .	. . .	8:50pm	9.10pm
Beacon Park)	. . .	. . .	4:00am	5:45am	6:30am	9:45pm	10:15pm
Boston)	1:00am	1:15am	. . .	. . .	. . .	. . .	. . .

TABLE B IV

BOSTON AND ALBANY RAILROAD

THROUGH FREIGHT TRAINS -- WEST
Effective April 27, 1930

	N.H.3 exc.Mon.	B.D.1 exc.Mon	B.N.1	B.R.1 exc.Sun.	L.S.3 exc.Sun.	B.S.13
Beacon Park	2:00am	6:15am	11:15am	6:00am	8:45pm	10:15pm
Framingham	3:00am	. . .	12:06pm	. . .	9:40pm	. . .
Worcester	. . .	. . .	1:30pm	7:55pm	. . .	12:01am
Palmer	7:15am	. . .	3:15pm	. . .	. . .	2:15am
Springfield	. . .	. . .	. . .	. . .	. . .	2:45am
West Springfield	8:00am	2:00pm	5:00pm	11:00pm	1:30am	3:00am
North Adams Junction	. . .	. . .	8:10pm	2:00am	. . .	. . .
Chatham	. . .	. . .	10:00pm	. . .	. . .	. . .
Selkirk	. . .	10:00pm	. . .	. . .	7:30am	. . .
Dewitt	. . .	6:00am	. . .	. . .	9:00pm to Gibson	. . .
New York, 72nd St.	. . .	. . .	5:30am	. . .		. . .
New York, 33d St.	. . .	. . .	6:30am	. . .	. . .	. . .
Rensselaer	. . .	. . .	. . .	4:15am	. . .	. . .

TABLE - B V

NEW YORK, NEW HAVEN AND HARTFORD RAILROAD

THROUGH FREIGHT TRAINS -- NORTH AND EAST
Effective Oct. 6, 1950

	O-B 4	P-B 8 exc.Sun.	P-B 6 exc.Sun.	O-B 6	C-B 6	H-B 4 exc.Sun.	N-B 4	Hyannis-Boston exc.Sat.	L-B 8	F-B 8 exc.Sun.	Woods Hole-Boston exc.Sun.	H-B 6	O-B 8
Maybrook	11:00am	. . .	. . .	9:30am	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	9:00am
Harlem River	. . .	. . .	. . .	. . .	. . .	7:30pm	. . .	. . .	. . .	. . .	. . .	. . .	. . .
New Haven	7:30pm	. . .	. . .	. . .	. . .	10:40pm	. . .	. . .	. . .	. . .	. . .	. . .	4:00pm
Greenville	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	11:55pm	. . .
Bay Ridge	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	3:00am	. . .
Oak Point	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	4:30am	. . .
Cedar Hill	. . .	. . .	. . .	. . .	. . .	. . .	8:45pm	. . .	. . .	. . .	. . .	10:00am	. . .
Providence	11:55pm	10:00pm	9:15pm	. . .	. . .	2:15am	2:30am	. . .	. . .	. . .	. . .	. . .	8:45pm
Mansfield	. . .	11:45pm	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
Walpole	. . .	12:45am	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
Waterbury	. . .	. . .	. . .	5:00pm	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
New Britain	. . .	. . .	. . .	7:00pm	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
Hartford	. . .	. . .	. . .	9:30pm	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
Willimantic	. . .	. . .	. . .	11:45pm	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
Putnam	. . .	. . .	. . .	1:00am	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
Readville	. . .	2:00am	. . .	3:00am	. . .	. . .	4:15am	. . .	. . .	. . .	. . .	. . .	. . .
Taunton	. . .	. . .	11:00pm	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
Fall River	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	7:35am	. . .	. . .	. . .
Woods Hole	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	8:00am	. . .	. . .
Hyannis	. . .	. . .	. . .	. . .	. . .	. . .	. . .	10:45pm	. . .	. . .	. . .	. . .	. . .
Yarmouth	. . .	. . .	. . .	. . .	. . .	. . .	. . .	11:45pm	. . .	. . .	. . .	. . .	. . .
Buzzard's Bay	. . .	. . .	. . .	. . .	. . .	. . .	. . .	3:15am	. . .	. . .	10:00am	. . .	. . .
Tremont	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	11:30am	. . .	. . .
Middleboro	. . .	. . .	11:45pm	. . .	. . .	. . .	. . .	. . .	. . .	8:25am	1:00pm	. . .	. . .
Brockton	. . .	. . .	1:15am	. . .	. . .	. . .	. . .	5:00am	. . .	9:10am	3:30pm	. . .	. . .
South Braintree	. . .	. . .	2:45am	. . .	. . .	. . .	. . .	5:40am	. . .	. . .	4:10pm	. . .	. . .
Framingham	. . .	. . .	. . .	. . .	1:15am	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
Lowell	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	4:00am	. . .	. . .	. . .	. . .
West Concord	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	4:40am	. . .	. . .	. . .	. . .
Forest Hills	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	6:30am	. . .	. . .	. . .	. . .
Bird St.)	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	7:00am	. . .	. . .	. . .	. . .
Boston)	2:15am	2:30am	3:15am	3:30am	3:30am	4:00am	4:45am	6:20am	. . .	9:55am	4:40pm	6:45pm	11:00pm

TABLE - B VI

NEW YORK,NEW HAVEN AND HARTFORD RAILROAD

THROUGH FREIGHT TRAINS -- SOUTH AND WEST
Effective Oct. 6, 1930

	Boston - Woods Hole exc.Sun.	B-H 5	B-L 1 exc.Sun.	B-F 1 exc.Sun.	B-H 1 exc.Sun.	B-O 1	B-O 5	B-H 3	B-C 5	Boston - Hyannis exc.Sat.	B-O 7	B-P 5 exc.Sun.	B-P 1 exc.Sun.
Boston	6:30am	7:00am	11:00am	3:30pm	5:45pm	6:45pm	7:00pm	7:30pm	7:35pm	8:45pm	9:00pm	10:15pm	11:30pm
South Braintree	7:30am	. . .	. . .	4:00pm	. . .	. . .	. . .	. . .	. . .	9:30pm	. . .	11:15pm	. . .
Brockton	8:30am	. . .	. . .	4:30pm	. . .	. . .	. . .	. . .	. . .	11:15pm	. . .	12:15am	. . .
Middleboro	9:30am	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	12:05am	. . .	. . .	. . .
Tremont	11:00am	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
Buzzard's Bay	12:30pm	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	2:00am	. . .	. . .	. . .
Woods Hole	2:30pm	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
Readville	. . .	. . .	. . .	. . .	. . .	8:30pm	8:00pm	. . .	. . .	. . .	. . .	. . .	12:35am
Taunton	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	3:15am	. . .
Mansfield	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	2:30am
Attleboro	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	3:45am
Providence	. . .	. . .	. . .	. . .	7:35pm	9:30pm	. . .	. . .	. . .	. . .	12:15am	3:00am	5:00am
New London	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	4:30am	. . .	. . .
Cedar Hill	. . .	4:30pm	. . .	. . .	. . .	2:00am	. . .	5:00am	. . .	. . .	10:15am	. . .	. . .
Fresh Pond	. . .	9:00pm	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
Bay Ridge	. . .	9:30pm	. . .	. . .	. . .	. . .	. . .	7:30am	. . .	. . .	. . .	. . .	. . .
Greenville	. . .	11:30pm	. . .	. . .	. . .	. . .	. . .	9:30am	. . .	. . .	. . .	. . .	. . .
Framingham	. . .	. . .	2:00pm	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
South Sudbury	. . .	. . .	2:30pm	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
West Concord	. . .	. . .	4:15pm	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
Lowell	. . .	. . .	5:00pm	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
Fall River	. . .	. . .	. . .	5:50pm	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
New Haven	. . .	. . .	. . .	. . .	11:30pm	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
Harlem River	. . .	. . .	. . .	. . .	1:30am	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
Maybrook	. . .	. . .	. . .	. . .	. . .	8:00am	. . .	. . .	. . .	. . .	. . .	. . .	. . .
Putnam	. . .	. . .	. . .	. . .	. . .	. . .	10:30pm	. . .	. . .	. . .	. . .	. . .	. . .
Willimantic	. . .	. . .	. . .	. . .	. . .	. . .	1:15am	. . .	. . .	. . .	. . .	. . .	. . .
Hartford	. . .	. . .	. . .	. . .	. . .	. . .	3:30am	. . .	. . .	. . .	. . .	. . .	. . .
Yarmouth	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	5:00am	. . .	. . .	. . .
Hyannis	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	6:30am	. . .	. . .	. . .

TABLE B VII

BOSTON AND MAINE RAILROAD

LOCAL FREIGHT TRAINS FROM BOSTON
Effective November 6, 1930

Daily except Sundays

12:01am	to Nashua and return.
12:30am	to Rockport.
5:45am	to Waltham and return
6:25am	to South Acton and return
6:35am	to Chelsea and return
6:45am	to Wilmington, Stoneham and return.
6:50am	to Union Market, Watertown and return.
7:00am	to Lynn, Salem and return.
7:00am	to Woburn and return.
7:10am	to Medford, Edgeworth and return.
7:15am	to Union Square, West Cambridge and return.
7:40am	to Lowell Junction and return.
8:10am	to Lynn and return via Saugus Branch.
8:15am	to Oakdale and return.
8:30am	Billerica Shops to Boston via Lexington Branch
9:05am	to Chelsea and return.
10:05am	to Lexington, (Saturdays 8:05am).
6:30pm	Salem-Boston-Salem-Marblehead-Danvers-Salem.
6:45pm	Rockport to Boston.
7:00pm	Haverhill to Boston and return.
9:00pm	Portsmouth to Boston and return.

TABLE B VIII

BOSTON AND ALBANY RAILROAD

LOCAL FREIGHT TRAINS FROM BOSTON
Effective April 27, 1930

Daily except Sundays

5:40am	to Wellesley, Natick, Saxonville Branch and Milford Branch.
5:15am	to Newton, West Newton, Newton Highlands Branch and Newton Lower Falls Branch.
6:00am	to East Boston.
6:45am	to East Cambridge, B. & M.
7:00am	East Boston to Chelsea
8:00am	East Boston to B. & M. and Beacon Park.
8:30am	Chelsea to East Boston.
8:45am	to Everett.
9:00am	Boston and B. & M. to East Boston.
10:00am	East Boston to Chelsea.
11:00am	Chelsea to East Boston.
11:00am	East Boston and Chelsea to Beacon Park.
11:00am	Everett to Beacon Park.
12:01pm	to Everett.
12:01pm	East Cambridge and L. & F. Junction to Beacon Park.
2:30pm	Everett to Beacon Park.

TABLE B IX

NEW YORK, NEW HAVEN AND HARTFORD RAILROAD

LOCAL FREIGHT TRAINS FROM BOSTON
Effective October 6, 1930

Daily except Sundays

6:00am	to Milton, Atlantic and Wollaston.
8:30am	to Winslows, via Dorchester.
7:40pm	Atlantic to Avon.

TABLE B X

BOSTON AND MAINE RAILROAD
THROUGH MERCHANDISE CARS FROM BOSTON

Boston "A" House, East Cambridge, Massachusetts
Inter-Line Cars

Destination	Route	Days Forwarded	Basis for service
Albany, New York	D & H	Daily	Next AM
Akron, Ohio	D & H-Erie	Daily	3rd AM
Barre, Vt.	M & WRR.	Daily	2nd AM
Bennington-Way, Vt.	Rut. R.R.	T.T.S.	Next PM
Bethlehem, Pa.	D & H-CNJ	Daily	3rd AM
Binghamton, New York	D & H	Daily	2nd AM
Binghamton, New York	D & H-DL&W	Daily	2nd AM
Boltonville-Mont.,Vt	M & WRR.	Daily	Next PM
Buffalo City, N.Y.	D & H-DL&W	Daily	2nd AM
Buffalo, Lake	Erie (Summer only)	Daily	2nd AM
Buffalo (L St.), N.Y.	N.Y.C.	Daily	2nd AM
Burlington, Vt.	C. Vt.	Daily	2nd AM
Burlington, Vt.	Rut.	Daily	2nd AM
Cedar Hill, Conn.	NYNH & H	Daily	2nd AM
Center Rutland-Way,Vt.	Rut.	Daily	2nd AM
Chester-Way, Vt.	Rut.	M. W. F.	Next AM
Chicago, Ill.	D&H-DLW-NYCSTL	Daily	3rd PM
Chicago, Ill.	D&H-DLW-Wab.	Daily	3rd PM
Chicago Ill.	D&H-Erie	Daily	3rd PM
Chicago, Ill.	Can.Pac.-Wab.	Daily	4th PM
Chicago, (Gibson)Ill.	N.Y.C.	Daily	3rd PM
Cleveland, Ohio	N.Y.C.	Daily	2nd PM
Cleveland, Ohio	D&H-DLW-NYCSTL	Daily	2nd PM
Detroit, Mich.	D&H-DLW-PM	Daily	3rd AM
Detroit, Mich.	NYC-MC	Daily	3rd AM
E. Buffalo, N.Y.	D&H-DLW	Daily	2nd AM
E. Ryegate Way, Vt.	Can. Pac.	Daily	Next PM
Endicott, N.Y.	D&H-Erie	Daily	2nd AM
Harrisburg, Pa.	D&H-Penn.	Daily	4th AM
Hornell, New York	D&H-Erie	Daily	2nd AM
Johnson City, N.Y.	D&H-Erie	Daily	2nd AM
Manchester, N.Y.	D&H-L.V.	Daily	2nd AM
Marion, Ohio	D&H-Erie	Daily	3rd AM
Mechanicville,N.Y.	D&H	Daily	Next AM
Newport, Vt.	Can.Pac.	Daily	Next PM
Northumberland,Pa.	D&H-Penn.	Daily	3rd AM
Pittsburgh,Pa.	D&H-Penn.	Daily	4th AM
Pittsburgh,Duquesne St. Pa.	D & H-Penn.	Daily	4th AM
Providence Tfr.R.I.	NYNH & H	Daily	2nd AM

TABLE B X

(continued)

Destination	Route	Days Forwarded	Basis for Service
Proviso Transfer,Ill.	CP-CNW	Daily	4th PM
Rochester, New York	New York City	Daily	2nd AM
Rotterdam Junct. N.Y.	NYC	Daily	Next AM
Rutland, Vermont	Rut.	Daily	Next PM
St.Albans,Vt.	C.Vt.	Daily	Next PM
St.Albans,Vt.	NDL	Daily	Next PM
St. Johnsbury,Vt.	Can.Pac.	Daily	Next AM
St. J.and LC Ry. Way	Can.Pac.	Daily	2nd AM
St. Louis,Mo.	D andH-DLW-Wab.	Daily	4th AM
Scranton,Pa.	D and H	Daily	2nd AM
Suncook Valley,R.R.	B and M	Daily	Next AM
Syracuse, N.Y.	D and H-DL and W	Daily	2nd AM
Troy, N.Y.	NYC	Daily	2nd AM
Utica,N.Y.	NYC	Daily	2nd AM
Warwick,N.Y.	NYNH and H-L-HB and O	Daily	3rd AM
Waverly Transfer, N.J.	NYNH and H-Pa.	Daily	2nd AM
Woodstock Ry, Vt.	B and M	Daily	Next AM
Youngstown, Ohio	D and H-Erie	Daily	3rd AM
Boston, Mass. - Rutherford Ave. Station Inter-Line Cars			
⊙ Anson-Kineo,Me.	MeCt.	Daily	Next AM
Auburn, Maine	MeCt.	Daily	Next AM
Augusta, Me.	MeCt.	Daily	Next AM
Bangor, Me.	MeCt.	Daily	Next AM
Bangor-Vanceboro,Me.	MeCt.	Daily	2nd AM
Bath, Me.	MeCt.	Daily	Next AM
Brunswick,Me.	MeCt.	Daily	Next AM
Cumberland Ctr.-Winslow Maine	MeCt.	Daily	Next AM
Dover and Foxcroft,Me. (inc.Greenville Br. B and Ar).	MeCt.	Daily	2nd AM
Fairfield-Skowhegan,Me.	MeCt.	Daily	Next AM
† Franklin-Eastport,Me.	MeCt.	Daily	2nd AM
Gardiner, Me.	MeCt.	Daily	Next AM
Holden-Ellsworth-Mt. Desert Ferry, Me.	MeCt.	Daily	2nd AM
Leeds Jct.-Farmington, Me.(inc.S.R.andR.L.R.R.)	MeCt.	Daily	Next PM

TABLE BX
(Continued)

Destination			
Lewiston Upper, Me.	MeCt.	Daily	Next AM
So.Windham,N.H.-Beecher Falls, Vt.	MeCt.	Daily	Next PM
Northern Me.Jct.Tfr.Me.	McCt-Band Ar.	Daily	Next AM
Newport-Dexter,Me.	MeCt.	Daily	Next AM
Oakland-Madison,Me.	MeCt.	Daily	Next PM
Pejepscot Mills-Lewiston Lower	MeCt.	Daily	Next AM
Pittsfield-Harmony,Me.	MeCt.	Daily	Next AM
Rockland,Me.	MeCt.	Daily	Next AM
*Rumford Jct.-Oquossuc, Me.	MeCt.	Daily	Next AM
Sabattus-Wilton,Me.	MeCt.	Daily	Next AM
ΔSt. Croix Jct.-Princeton-Calais,Me.	MeCt.	Daily	2nd PM
Unity-Belfast,Me.	MeCt.	Daily	Next PM
Vanceboro,Me.	MeCt.-Can.Pac.	T.T.S.	2nd AM
Walnut Hill-No.Belgrade Me.	MeCt.	Daily	Next PM
Waterville,Me.	MeCt.	Daily	Next AM
Wiscasset-Thomaston,Me.	MeCt.	Daily	Next AM
Yarmouth,Me. to Island Pond, Vermont	Can.Nat.	Daily	Next PM

† Eastport, 3rd A.M.
⊙ Points beyond Bingham, 2nd A.M.
Lancaster to Beecher Falls, 2nd A.M. * Points for beyond Rumford, 3rd A.M.
Δ Princeton, 3rd AM.

APPENDIX C

COMPARISON

OF

CARLOAD AND LESS CARLOAD FREIGHT

APPENDIX C

TABLE OF CONTENTS

EXPLANATION

Figures 4 and 5 were constructed from the data in Table CI. This table constitutes a summary of the "Report of Cars Loaded and Unloaded the Previous 24 Hours", Form CT137, of the Boston and Maine Railroad. The stations listed represent about half of the stations on the Portland and Terminal Divisions of the Boston and Maine, including the upper quarter of the list when arranged in order of the number of cars handled, the rest being chosen at random from the other three quarters. This list of stations was originally compiled from information drawn from the Boston and Maine "Industrial Reports". The figures represent the average number of cars loaded and unloaded per month for the last quarter of 1930.

Not all the stations in the table are shown in Figs. 4 and 5 because of the crowding that would result. Approximately all those, however, having more than 100 cars in any one column in Table CI are indicated. In order to obtain the average number of tons shipped or received per month by each class of freight, the number of C. L. cars should be multiplied by 26.5, and the number of L. C. L. cars by 4.3. The source of these figures is given below.

As can be seen from Figure 11, the average volume of business for the last quarter of 1930 is very

nearly equal to the average volume for the whole year. The fact that these two averages lie so close together makes it possible to save a great deal of time by taking averages for this quarter instead of for the whole year, since the results obtained may be taken as fairly representative of the year.

In Figure 11 the weekly figures were drawn from the Boston and Maine Operating Statistics, Report Form OS1. The monthly averages represent the average Gross Ton Miles per week for each month. These are obtained from the figure of the Total Gross Ton Miles as reported on Form OS21, divided by the number of days in the month multiplied by 7. The average for the year is taken from the sum of the monthly totals multiplied by $\frac{7}{365}$. The average for the last quarter is the sum of the last three monthly totals times $\frac{7}{92}$.

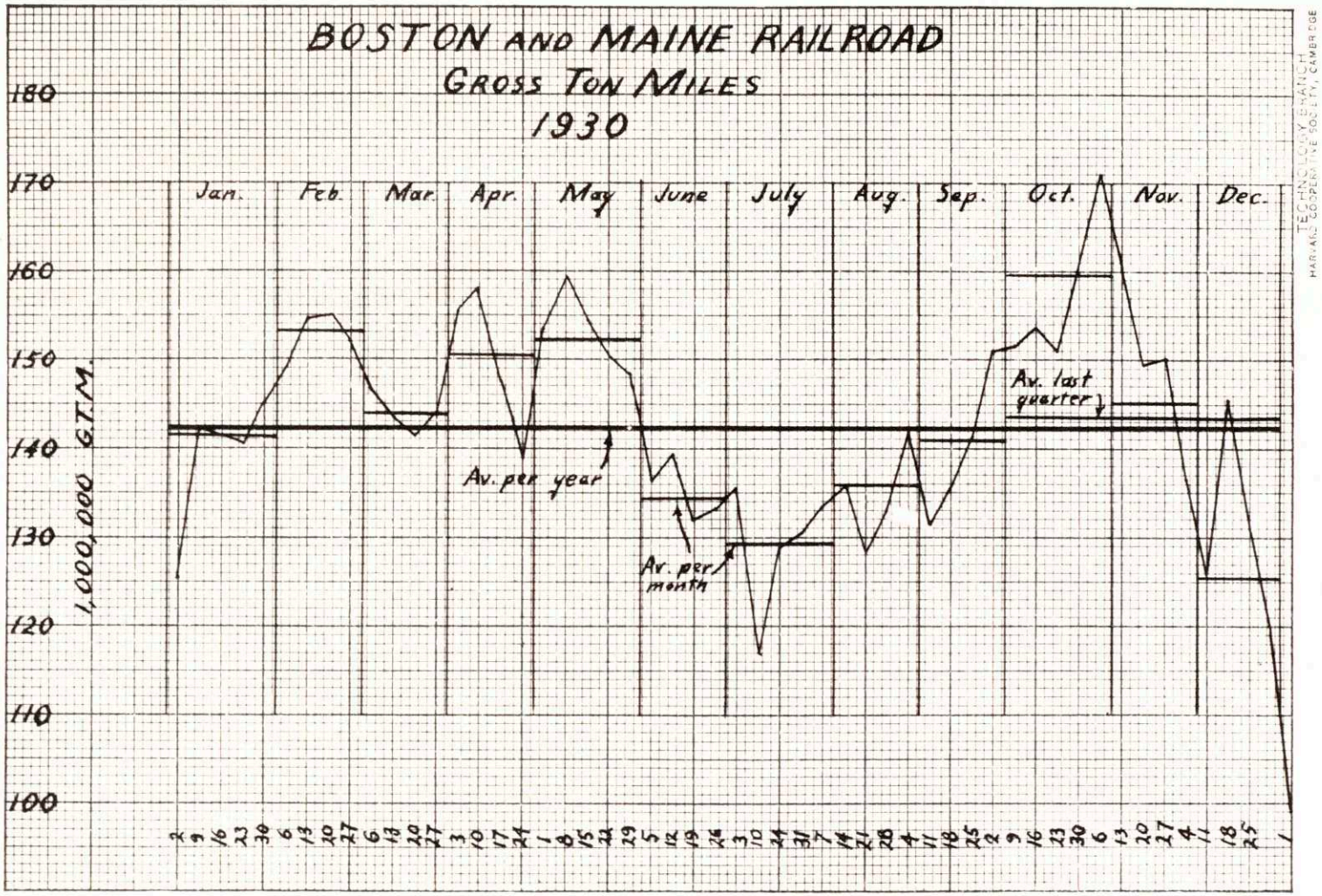


Fig. 11.

TABLE C I

BOSTON AND MAINE RAILROAD

AVERAGE NUMBER OF CARS RECEIVED AND SHIPPED PER MONTH
LAST QUARTER,1930

Station	C. L. Received	C. L. Shipped	L. C. L. Received	L. C. L. Shipped
Alton	12	6	7	--
Alton Bay	1-	34	3	1
Amesbury	99	70	54	64
Arlington	33	1	10	1-
Ayer	111	29	60	70
Ballardvale	4	--	12	8
Bar Mills	18	7	--	6
Barrington	9	1	1	--
Beverly	197	610	1-	16
Biddeford and Saco	430	118	129	152
Boston	10 674	8 631	3 056	5 489
Bradbury	3	27	--	1-
Burleyville	4	23	2	1-
Cambridge	549	45	60	2
Chelsea	352	642	39	12
Clinton	89	52	67	61
Concord (F),Mass.	27	--	1	--
Cumberland Mills	65	148	--	--
Danvers	60	1	3	1
Danversport	59	--	2	--
Deering Junction	97	145	--	1
Derry	169	9	39	24
Dover, N.H.	266	94	172	100
Everett	110	22	16	--
Farmington	24	1	15	42
Glenwood	126	10	3	--
Gloucester	226	89	84	127
Graniteville	18	6	--	--
Groton	20	6	1	--

TABLE C I (cont'd)

Station	C. L. Received	C. L. Shipped	L. C. L. Received	L. C. L. Shipped
Hamilton and Wenham	19	5	3	1
Hampstead	7	2	--	--
Hampton Falls	3	1	1-	--
Haverhill, Mass.	910	125	57	1
Hollis	6	5	--	--
Intervale	1	5	--	--
Ipswich	51	1	--	8
Lakeport	74	19	112	105
Lancaster, Mass.	8	9	1	5
Lawrence	1 807	331	2 519	2 899
Littleton,Mass.	39	36	2	1
Lowell	1 134	303	148	172
Lynn	830	367	192	259
Malden	126	7	12	1
Manchester, Mass.	13	1-	2	1-
Manchester, N. H.	1 493	280	360	577
Maplewood	75	22	6	7
Maynard and Gleasondale	86	13	44	9
Melrose, Mass.	91	2	1	1-
Merrimack, New Hampshire	29	42	--	--
Milton, N. H.	46	54	--	1
Mountainview	17	28	3	4
Nashua	825	883	1 504	1 880
Newburyport	114	11	47	19
North Berwick	39	50	2	11
North Billerica	39	2	4	--
North Chelmsford	76	22	1	13
North Conway	18	4	31	--
North Somerville	192	95	--	7
North Woburn	23	--	3	--
Oak Grove	207	181	1	4
Peabody	405	121	52	87
Pepperell (P)	140	80	2	33
Plaistow	12	1-	--	--
Portland	982	572	1 133	936
Portsmouth	383	396	137	81

TABLE C I (cont'd)

Station	C. L. Received	C. L. Shipped	L. C. L. Received	L. C. L. Shipped
Raymond	17	6	2	1-
Reeds Ferry	1	--	--	--
Rochester	129	174	308	118
Rockport	32	9	50	17
Rowley	1	--	1	--
Salem, Mass.	837	824	517	141
Salisbury	5	--	1	--
Scarboro Beach	3	12	4	--
Somersworth	98	6	108	88
South Sudbury	12	--	--	2
South Wilmington	83	169	--	23
Springvale	59	13	78	66
Still River	6	--	--	--
Union	16	20	--	--
Wakefield, Mass.	163	32	1	1-
Waltham	441	44	26	--
Ward Hill	2	--	1-	--
Watertown	352	102	13	24
West Acton	19	--	1-	--
West Chelmsford	9	113	1	--
West Concord	48	47	31	48
West Kennebunk	2	2	--	3
Winchester, Mass.	72	29	--	1-
Woburn	138	5	5	1
Worcester	858	506	580	978

Note: "1-" indicates less than ½ car per month.

CALCULATION OF COSTS OF CARLOAD AND LESS-CARLOAD-HANDLING

In order to determine the average load per car of C. L. freight, refer to the Commodity Report of the Boston and Maine for 1930:

	Cars (1000)	Tons (1000)
Originated on line:	105	2 825
	95	1 953
Terminating on line:	105	2 825
	383	10 621
Totals	688	18 224

$\frac{18\ 224}{688}$ = 26.5 tons per car, C.L.

The average load per car of L.C.L. freight is given in the Boston and Maine Operating Statistics Report, Form OS2, weekly. The average for the last 13 weeks of 1930 is:

4.3 tons per car, L.C.L.

The average tons per loaded car (all cars, C.L. and L.C.L.), given per month on Report Form OS21, is, for the last 3 months of 1930:

20.5 tons per loaded car.

Having given the percentage that L.C.L. tonnage is of the total (Report of the New England Railroad Committee, 1931):

New England Roads:	7%
Other Eastern District Roads:	2%

The percentage that L.C.L. cars are of the total is:

New England Roads, $7 \times \frac{20.5}{4.3} = 33.4\%$

Other Eastern District Roads, $2 \times \frac{20.5}{4.3} = 9.5\%$

From Boston and Maine Report Form OS1 (weekly) we have, for the last 13 weeks of 1930, an average cost for fuel, train wages and locomotive repair costs of:

87.2¢ per 1000 gross ton miles.

Assuming an average tare weight per freight car of 20 tons (figure commonly used in wheel reports) we have:

Gross weight per C.L. car	46.5 tons
Gross Weight per L.C.L. car	24.3 tons

Therefore the cost of road haul for each class of freight is:

$87 \times \frac{46.5}{26.5} = 153¢$ per 1000 net ton miles, C.L.

$87 \times \frac{24.3}{4.3} = 491¢$ per 1000 net ton miles, L.C.L.

According to the 1930 Annual Report of the Boston and Maine, the average haul per net ton was 133 miles. The average hauling cost incurred was, therefore:

$\frac{153 \times 133}{1000}$ = 20.4 ¢ per net ton, C.L.

$\frac{491 \times 133}{1000}$ = 65.2 ¢ per net ton, L.C.L.

From report form OS2, the average cost for yard handling (last 13 weeks of 1930) was 72.5¢ per car. This may safely be assumed to be the same for light and heavy cars. Thus the yard handling costs were:

$\frac{72.5}{26.5}$ = 2.7¢ per net ton, C.L.

$\frac{72.5}{4.3}$ = 16.9¢ per net ton, L.C.L.

In addition to this, L.C.L. freight has charged to it the freight station costs, which, for the same period averaged:

61.4¢ per ton, L.C.L.

This makes the total terminal costs for handling:

16.9
61.4
78.3¢ per net ton, L.C.L.

Now adding up all the costs, we have:

	C.L.	L.C.L.
Road haul:	20.4	65.2
Terminal costs:	2.7	78.3
	23.1¢ per ton, C.L.	143.5¢ per ton L.C.L.

$$\frac{143.5}{32.1} = \underline{\underline{6.2}}$$

Referring again to the Commodity Report for 1930, dividing the total revenue by the total tonnage, for each class we then have:

$$\frac{\$\ 38\ 372\ 000}{18\ 397\ 000 \text{ tons}} = \$\ \underline{\underline{2.03}} \text{ per ton, C.L.}$$

$$\frac{\$\ 7\ 495\ 000}{1\ 287\ 000 \text{ tons}} = \$\ \underline{\underline{5.82}} \text{ per ton, L.C.L.}$$

$$\frac{5.82}{2.03} = \underline{\underline{2.9}}$$

APPENDIX D

STUDY OF COMMODITIES

APPENDIX D

THE COMMODITIES ON WHICH COMPETITION EXISTS

When it comes to discussing the elements of competition it is no longer possible to talk about freight traffic as a whole, but each commodity has to be considered separately. The difference in rates, the difference in requirements as to handling and packing, and as to speed, loading, etc. makes each commodity a problem in itself which cannot be compared with the problems of other commodities. Hence we have a list of some seventy commodities, as classified by the American Railway Association, for the purpose of reporting freight movement to that body and to the Interstate Commerce Commission. (See Table D I).

Since it is not possible to make a complete study of every item on this list, the principal commodities originated on the Boston and Maine Railroad have been chosen. The tonnages originated as shown on the annual summary of the quarterly commodity reports to the A.R.A. are a fairly good indication of the commodities producing

the majority of the traffic. In studying these questions with a view to making economies it is natural that the greatest economies can be made where the largest amount of traffic is. All commodities originating 1000 carloads or more on the B & M. during the years 1926 or 1927 were chosen. These were as follows:

Item No.	Commodity
9	Cotton
12	Fresh fruits (except citrus)
14	Fresh vegetables (excludes potatoes)
18	Cattle and calves
22	Packing house products (except fresh meats)
26	Wool
27	Hides and leather
29	Anthracite coal
31	Coke
35	Clay, gravel, sand and stone
40	Logs, posts, poles and cordwood
42	Pulp wood

43	Lumber, timber, shooks, staves and headings
45	Refined petroleum and its products
47	Sugar, syrup, glucose and molasses
51	Bar and sheet iron, structural iron and iron pipe
53	Castings, machinery and boilers
55	Brick and artificial stone
58	Agricultural implements and vehicles, other than automobiles
59	Automobiles and auto trucks
61	Furniture (new)
63	Ice
64	Fertilizers (all kinds)
65	Paper, printed matter and books
66	Chemicals and explosives
67	Textiles
68	Canned goods (all canned food products)
70	All L.C.L. freight

Although only 40% of the total number of items, these originate over 70% of the tonnage.

TABLE D I

ABSTRACT FROM "COMPARATIVE REPORT OF FREIGHT TRAFFIC MOVEMENT - TWELVE MONTHS ENDED DECEMBER 31, 1926 AND 1927

(Company's Material Excluded)

BOSTON AND MAINE RAILROAD

Item No.	Commodity	Revenue Freight Originating on Road Including Import Freight Traffic. No. of Carloads 1926	1927
	Products of Agriculture		
1	Wheat	--	--
2	Corn	--	1
3	Oats	--	--
4	Other grain	38	29
5	Flour and meal	232	212
6	Other mill products	94	278
7	Hay, straw and alfalfa	560	522
8	Tobacco	422	303
9	Cotton	704	1599
10	Cotton seed and products, except oil	5	13
11	Citrus fruits	--	--
12	Other fresh fruits	1955	2240
13	Potatoes	168	200
14	Other fresh vegetables	3643	3050
15	Dried fruits and vegetables	47	52
16	Other products of agriculture	597	511
	Total	8465	9010
	Animals and Products		
17	Horses and mules	254	244
18	Cattle and calves	1500	1360
19	Sheep and goats	38	20
20	Hogs	26	37
21	Fresh meats	65	86
22	Other packing house products	1483	1376
23	Poultry	8	8
24	Eggs	26	36
25	Butter and cheese	65	47
26	Wool	240	4774
27	Hides and leather	1503	1537
28	Other animal products	2598	2471
	Total	7806	11996

		No. of Carloads 1926	1927
	Products of Mines		
29	Anthractie coal	1293	429
30	Bituminous coal	--	--
31	Coke	6839	5920
32	Iron ore	141	6
33	Other ores and concentrates	135	34
34	Base bullion and matte	--	--
35	Clay, gravel, sand and stone	16697	15645
36	Petroleum (crude)	--	--
37	Asphaltum	182	39
38	Salt	56	103
39	Other products of mines	1756	1967
	Total	27099	24143
	Products of Forests		
40	Logs, posts, poles and cordwood	5088	4745
41	Ties	329	218
42	Pulp wood	7611	4255
43	Lumber, timber, shooks, staves and headings	20161	19927
44	Other products of forests	4085	4035
	Total	37274	33180
	Manufactures and Miscellaneous		
45	Refined petroleum and its products	9454	8325
46	Vegetable oil	98	62
47	Syrup, sugar, glucose and molasses	3905	3745
48	Boats and vessel supplies	32	34
49	Iron, pig and bloom	804	946
50	Rails and fastanings	74	30
51	Bar and sheet iron, structural iron and iron pipe	1909	1860
52	Other metals, pig, bar and sheet	71	83
53	Castings, machinery and boilers	7023	6288
54	Cement	123	110

		No. of Carloads 1926	1927
	Manufactures and Miscellaneous		
55	Brick and artificial stone	7845	6860
56	Lime and plaster	38	407
57	Sewer pipe and drain tile	711	646
58	Agricultural implements and vehicles, other than automobiles	1149	726
59	Automobiles and auto-trucks	7182	7281
69	Household goods and second hand furniture	115	124
61	Furniture (new)	3216	2630
62	Beverages	417	356
63	Ice	16747	19154
64	Fertilizers (all kinds)	4076	6210
65	Paper, printed matter and books	14176	11843
66	Chemicals and explosives	5872	4506
67	Testiles	6774	5167
68	Canned goods (all canned food products)	675	1133
69	Other manufactures and miscellaneous	10954	84678
	Total	183440	173204
	Grand total carload traffic	264084	251533
		Number of tons	
70	All L.C.L. freight	1033499	983291

TRENDS OF TONNAGE

The purpose of Tables DII and DIII is to indicate the trend of traffic in the various commodities shown. In studying the competition in freight transportation, the fact whether the tonnage on the railroads shows a steady increase or a steady decrease over a period of years, may be taken as a fair indication of how the railroads are meeting such competition as arises, and also in which direction its efforts should be made in order that the most important traffic may be held on the rails. In following the trend of a given commodity, of course, the trend of production or consumption of that commodity should be taken into account also, provided sufficient reliable information regarding these factors can be obtained.

Unfortunately information regarding any industry as a whole in New England is very difficult to obtain. As a matter of fact there is no source where definite data may be obtained concerning any given commodity for the period 1920 to 1930. Information which has been used in discussing the trends of the various commodities was obtained from

interviews with traffic managers and shippers of large concerns in every one of theindustries represented by the commodities listed. Many of the shippers requested that their identity be withheld, so that it has been decided not to use the names of any private concerns. The concerns interviewed in each case were fairly representative of the industry as a whole, so that information obtained was correct and such as could be adequately applied to the cases in question.

Table D II shows the number of revenue tons of each of the commodities listed originated on the Boston and Maine Railroad for each year from 1920 to 1930. The figures are rounded off to the nearest ten tons for the sake of simplicity. They are obtained from the cumulative annual report made up from the quarterly "Comparative Report of Freight Traffic Movement," made by the Boston and Maine Railroad.

Table D III is a table of index numbers, made direct from Table D II. The year 1920 was represented by 100 in each case (except in the few items

noted), and for each subsequent year the tonnage figure was divided by the tonnage for 1920 to give the correct index number. The plots in Figs. 12 to 20 inclusive were made directly from the index numbers of Table DIII.

In interviewing the shippers the question sheet (Table D IV) was filled out as completely as possible in each case. The list of traffic managers and shippers to interview was obtained from: (1) the results of the questionnaire (2) the Economics Department of the Massachusetts Institute of Technology (3) the Boston Chamber of Commerce (4) the Associated Industries of Massachusetts and (5) the Traffic Club of New England.

TABLE - D II

REVENUE TONS OF GIVEN COMMODITIES ORIGINATED# ON THE BOSTON AND MAINE RAILROAD FOR THE YEARS 1920 TO 1930

Item No.	Commodity	1920	1921	1922	1923	1924	1925''	1926''	1927	1928	1929	1930
9.	Cotton	--	--	--	"19 280	12 390	14 370	12 580	23 060	33 850	32 850	22 160
12.	Fresh fruits (except citrus)	33 180	27 510	22 820	19 620	30 310	24 550	25 060	28 520	28 900	26 190	41 020
14.	Fresh vegetables	43 630	39 650	25 470	31 520	37 930	38 230	46 670	38 600	27 290	26 270	23 780
18.	Cattle and calves	22 240	16 390	18 080	18 790	18 060	19 690	16 780	15 300	13 360	11 010	9 460
22.	Packing house products	31 320	16 390	22 770	19 850	18 030	15 140	15 100	16 810	15 330	13 560	10 150
26.	Wool	49 480	57 460	42 840	"19 280	2 980	3 650	3 010	42 560	52 690	51 670	36 540
27.	Hides and leather	59 550	29 230	39 570	41 560	32 380	27 500	25 420	24 580	26 660	23 790	14 810
31.	Coke	98 990	52 660	101 870	126 310	92 760	171 300	181 330	166 740	161 000	176 000	178 930
35.	Clay, gravel, sand and stone	681 720	473 460	557 190	618 830	558 760	610 660	585 900	591 650	647 990	633 480	619 720
40.	Logs, posts, poles, etc.	87 450	104 520	88 820	113 510	109 120	92 400	111 100	92 270	116 280	110 790	82 310
42.	Pulp wood	152 690	182 920	141 630	185 340	159 490	230 080	215 170	116 550	92 260	127 710	140 180
43.	Lumber, timber, shooks, etc.	877 000	554 720	658 080	635 670	509 700	452 670	386 060	398 680	458 940	393 030	297 080
45.	Refined petroleum, etc.	--	--	--	""996 750	288 940	328 790	348 830	306 420	312 180	290 620	231 060
47.	Sugar, syrup, glucose, etc.	82 920	70 860	81 200	61 070	57 660	90 880	92 290	86 640	72 780	77 400	70 500
51.	Bar and sheet iron, etc.	85 040	28 200	33 460	44 430	26 600	28 140	35 190	33 720	116 250	131 000	88 790
53.	Castings, machinery, etc.	182 270	116 030	115 630	148 190	108 600	112 280	120 300	100 440	110 070	106 790	83 570
55.	Brick and artificial stone	190 950	112 590	217 290	197 140	163 880	275 900	300 260	283 060	93 650	156 140	100 000
58.	Agricultural implements, etc.	21 150	15 260	33 340	9 490	13 420	7 270	9 900	10 290	1 460	4 820	4 250
61.	Furniture, (new)	25 920	18 170	25 180	29 230	24 520	23 040	27 900	20 870	21 370	22 160	14 870
63.	Ice	495 920	795 040	605 790	585 440	572 960	627 120	481 870	547 650	651 050	346 830	234 310
64.	Fertilizers (all kinds)	170 990	116 520	132 150	122 840	99 500	81 260	85 510	139 880	132 910	140 230	142 080
65.	Paper, printed matter, etc.	330 640	246 530	351 810	361 380	318 190	325 800	346 690	288 970	268 600	282 160	236 210
66.	Chemicals and explosives	156 400	114 370	150 720	148 540	139 160	142 170	153 830	112 920	22 910	25 820	15 560
67.	Textiles	115 780	88 980	82 780	88 460	64 350	70 470	65 490	51 780	35 880	33 810	22 520
68.	Canned goods	--	--	--	--	--	--	12 440	21 060	19 380	22 620	22 170
70.	All L. C. L. freight	1 801 810	1 174 860	1 201 160	1 230 920	1 060 620	1 055 380	1 033 500	983 290	941 610	907 390	726 940

Traffic arriving by boat and forwarded by rail is not "originated" if the bill of lading covers the water and rail movement as one continuous haul.

" Import traffic

"" Oil received from Mexico by tank ships and stored in tanks at Chelsea, Mass.

'' Includes Vermont Valley and Sullivan County Railroad.

TABLE - D III

REVENUE TONS ORIGINATED -- INDEX NUMBERS
1920 - 100

Item No.		1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930
8.	Cotton	--	--	--	100*	64	74	65	120	176	171	115
12.	Fresh fruits (except citrus)	100	84	70	60	92	75	76	87	88	80	125
14.	Fresh vegetables	100	96	58	72	87	88	107	88	68	60	54
18.	Cattle and calves	100	74	81	84	81	88	75	69	60	50	43
22.	Packing house products	100	52	73	63	58	46	48	50	49	43	32
26.	Wool	100	116	86	39	6	7	6	86	107	104	74
27.	Hides and leather	100	49	65	70	54	46	43	41	45	40	25
31.	Coke	100	53	103	128	94	173	183	168	163	178	181
35.	Clay, gravel, sand and stone	100	69	81	90	81	89	85	86	94	92	90
40.	Logs, posts, poles, etc.	100	120	102	130	125	106	128	106	133	128	94
42.	Pulp wood	100	120	93	82	96	151	141	76	60	83	92
43.	Lumber, timber, shooks, etc.	100	63	75	73	58	58	44	46	52	45	30
45.	Refined petroleum, etc.	--	--	--	100*	98	111	118	104	106	98	78
47.	Sugar, syrup, glucose, etc.	100	86	98	74	70	110	111	105	88	92	85
51.	Bar and sheet iron, etc.	100	33	39	52	31	33	41	40	137	155	104
52.	Castings, machinery, etc.	100	64	68	81	60	68	66	55	60	39	46
55.	Brick and artificial stone	100	59	114	105	86	144	158	118	49	82	52
58.	Agricultural implements, etc.	100	72	158	45	64	32	47	49	25	20	20
61.	Furniture, (new)	100	70	97	113	95	82	108	81	82	85	57
63.	Ice	100	160	122	118	115	126	97	117	131	70	47
64.	Fertilizers (all kinds)	100	68	76	72	58	48	50	82	73	82	83
65.	Paper, printed matter, etc.	100	75	106	109	94	98	105	87	81	85	71
66.	Chemicals and explosives	100	73	96	95	89	91	98	72	15	17	10
67.	Textiles	100	77	72	76	56	61	57	45	31	29	19
68.	Canned goods	--	--	--	--	--	--	100#	170	156	182	178
70.	All L. C. L. freight	100	65	67	68	59	58	57	54	52	50	40

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* 1923 = 100

1926 = 100

TABLE D IV

INFORMATION ON COMMODITIES

Source of information:

(1) Inbound, received: commodity:

(2) Quantity:

(3) Approximate size of shipments:

(4) Origin of majority of shipments :

(5) Agency used, and time in transit: Rail: Water:
Truck:

(6) Most important factor: Speed:
Cost:
Reliability:
Convenience:

(7) Outbound, shipped: commodity:

(8) Quantity:

(9) Approximate size of shipments:

(10) Destination of majority of shipments:

(11) Agency used, and time in transit: Rail: Water:
Truck:

(12) Most important factor: speed:
Cost:
Reliability:
Convenience:

(13) What is wrong with railroad service:

(14) What should be done about it:

FACTORS OF COMPETITION

The question now is: which ones of these twenty-eight items would be classed as competitive traffic, and which ones not ? We will, therefore, make a brief investigation of each item. It must be kept in mind in the following discussions, that in each case (except item 70, "All L.C.L. freight") carload traffic only is dealt with.

Cotton: Raw cotton should be considered as definitely competitive. A large percentage of the bales coming to New England arrive in Boston by boat to be shipped out by rail or truck. To nearby towns, by truck from wharf to factory is undoubtedly the fastest, on longer hauls, however, the rail movement is a great deal more economical, especially since usually freight cars are brought right unto the docks, and most cotton mills have their own private sidings. (Fig. 12 shows the fluctuation in tonnage of cotton originated on the Boston and Maine).

Fresh fruits: For this commodity the method of shipment is determined practically entirely by the distance and seasons of the year, with the result that there is no real competition possible for this traffic. On long hauls, fruit needs refrigerator car service, which can be supplied only by the railroad and on short hauls, where a truck can deliver the fruit in such a short time so as to avoid the need of refrigeration, at the same time eliminating a great deal of handling, it stands to reason that this is by far the most economical way. Fig. 13 shows that on the average, since 1920, the tonnage of fresh fruit originated on the Boston and Maine has increased, which is not the case with most of the other commodities.

Fresh vegetables: Vegetables do not require quite as much icing as fruit. As shown also by Fig. 13 the tonnage of vegetables has declined steadily in the last ten years, and according to the Boston Fruit and Produce exchange, the consumption of vegetables in Boston has increased, if anything, during that time. Trucks are now carrying this commodity,

and it is doubtful whether it is possible for the railroads to supply the service rendered by the trucks. At the present time, vegetables picked late in the day can be delivered to the market before it opens the next day, and in addition, the fact that a truck can go from the farm right straight to the market place for unloading makes this much the most convenient and most economical way. In other words, this is a commodity which really belongs to the trucks.

Cattle and calves: Here again is a commodity which cannot be said to be highly competitive. On a long haul, or in large quantities, the railroad is the only agency which can supply the service required. There are perhaps a few cattle being transported by truck at present, but the number is so small that it is of no consequence. The reduced tonnage as shown in Fig. 14 is due to a steady decline in the raising of cattle on New England farms.

Packing house products: This is another commodity requiring refrigerator service in hot weather on long hauls. On short hauls delivery can be made quickly enough so that refrigeration is not

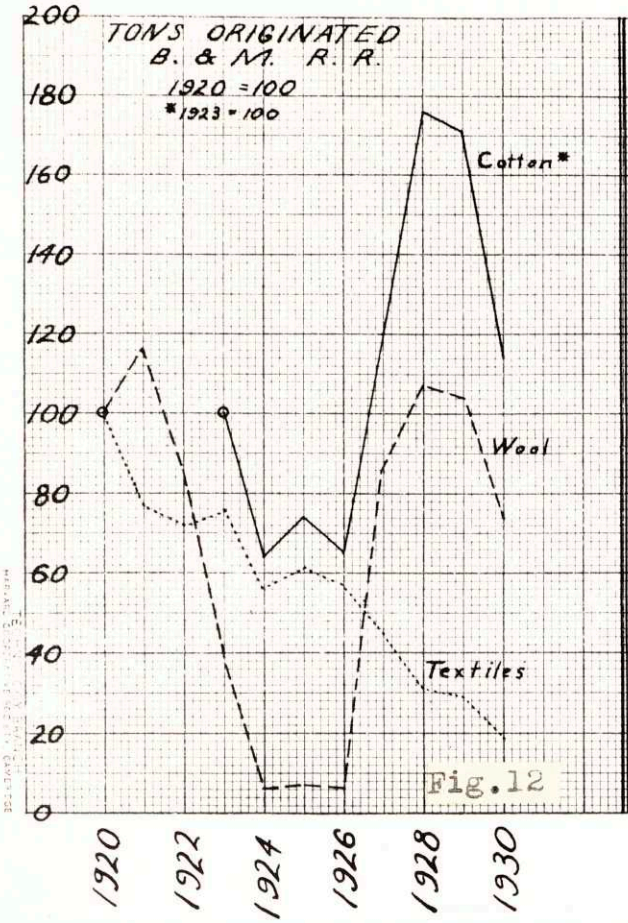

Fig.12

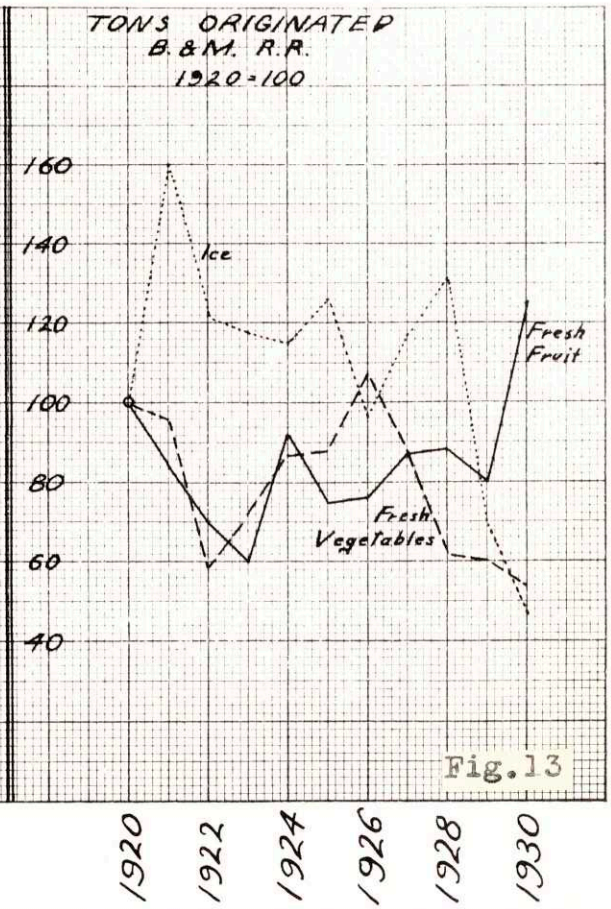

Fig.13

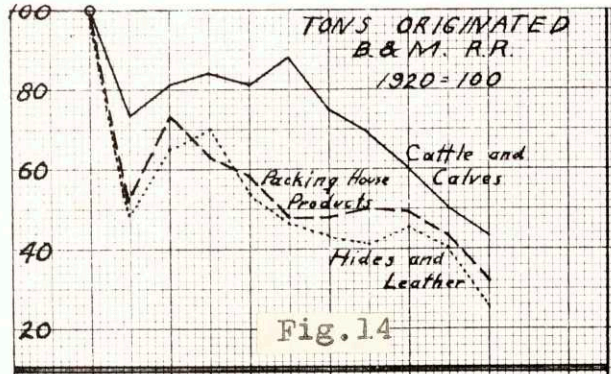

Fig.14

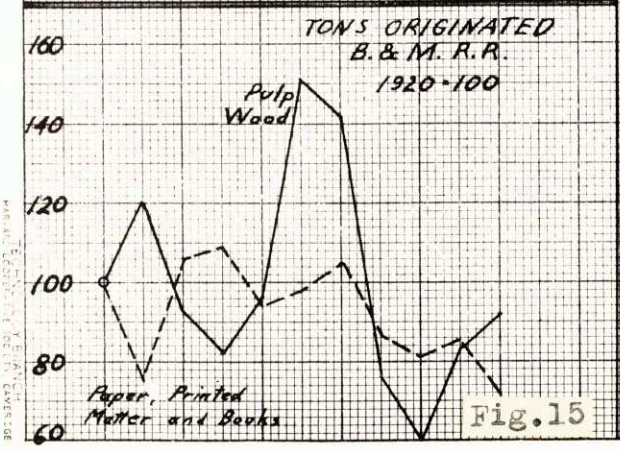

Fig.15

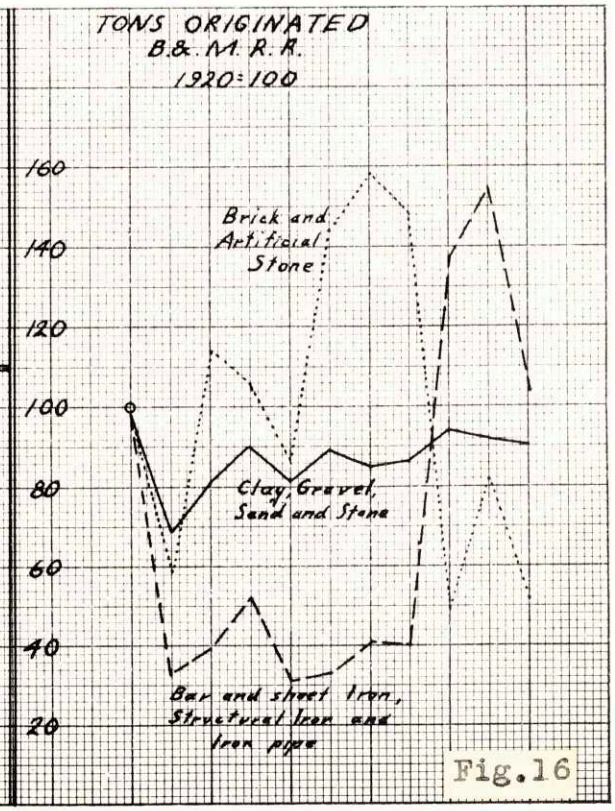

Fig.16

necessary. The majority of the trade of Boston packing houses is in New England. The short haul, therefore, is a large percentage of this traffic. This accounts for the decrease in tonnage shown in Fig. 14.

Wool: Wool, in bales, is highly competitive. At present most of the wool from the southwest comes to Boston by boat. Trucks are usually used for high speed delivery to nearby towns, although the method of shipping depends entirely on rates and speed of service. (See Fig. 12).

Hides and Leather: In the leather industry the competition among manufacturers has forced all the shippers to find the fastest method of shipping freight that there is. On the shortest hauls the truck is without question the only thing. Likewise, the longest hauls can best be handled by the railroads. The competition then lies in each agency trying to push the dividing line between the long and short haul as far away as possible from his end of the field. This applies, of course, to most of the other commodities as well. (See Fig. 14).

Coal: The serious competition for coal traffic lies between the railroads and the coastwise steamers. The speed of movement is of very little importance, the sole consideration being the cost of transportation. To Boston proper, the water route is practically the only economical one. From the Virginia coal fields, the all rail rates, and the water, via Boston and then rail, rates are about equalized at a north and south line approximately in the Connecticut Valley.

Local delivery of coal is now nearly exclusively performed by truck. There are several reasons. First, the time consumed is naturally much less. Secondly, the coal trestle at the consignee's plant is seldom so located that the coal required the minimum of handling from the cars to the furnace. Trucks can deliver coal at the boiler house door, and also in divided lots at different boiler house doors in the same plant, thus saving a great deal in cost of handling at the plant.

Coke: Coke manufactured in Boston, and distributed in nearby towns, is practically all handled by truck. There is hardly any competition

in this field, because even if a concern has a private siding, there are always considerable handling expenses from the car to the furnace, which can be eliminated by trucks delivering the coke at the boiler house door. On account of the bulk and the large quantities usually shipped, the railroads naturally give the best long haul service. Fig. 18 shows the increase in the coke traffic.

Clay, gravel, sand and stone: This item cannot be said to be highly competitive. Sand and gravel, the two most important of these commodities, were among the first to be transported to any extent by truck. On the very short haul, four or five miles, the time required for a rail haul would be so long as to be out of the question. Up to twenty-five miles, beyond which not much sand and gravel is transported anyway, rail haul would only be economical if it so happened that there were a side track at both the borrow pit and the consignee's location. The reason these commodities are not transported any great distances is that the competition among the gravel dealers is so keen that they

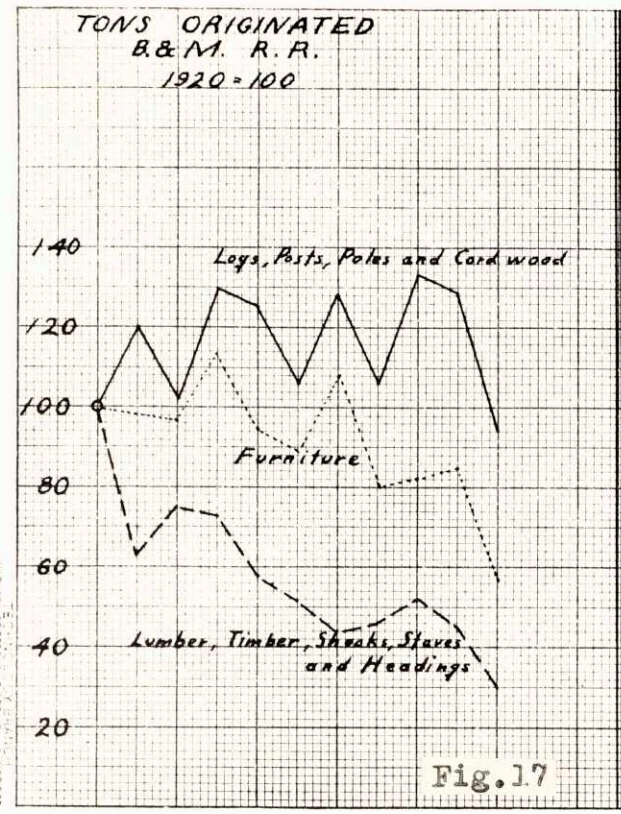

Fig. 17

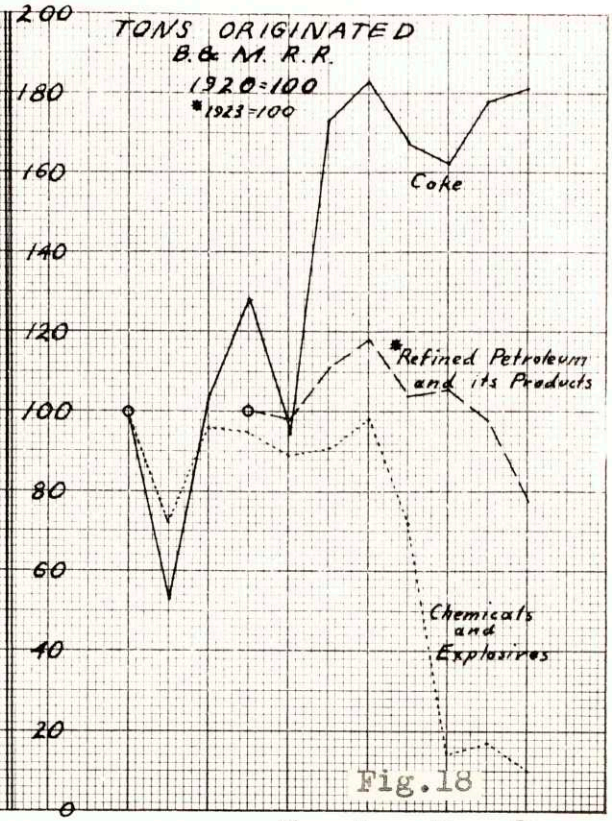

Fig. 18

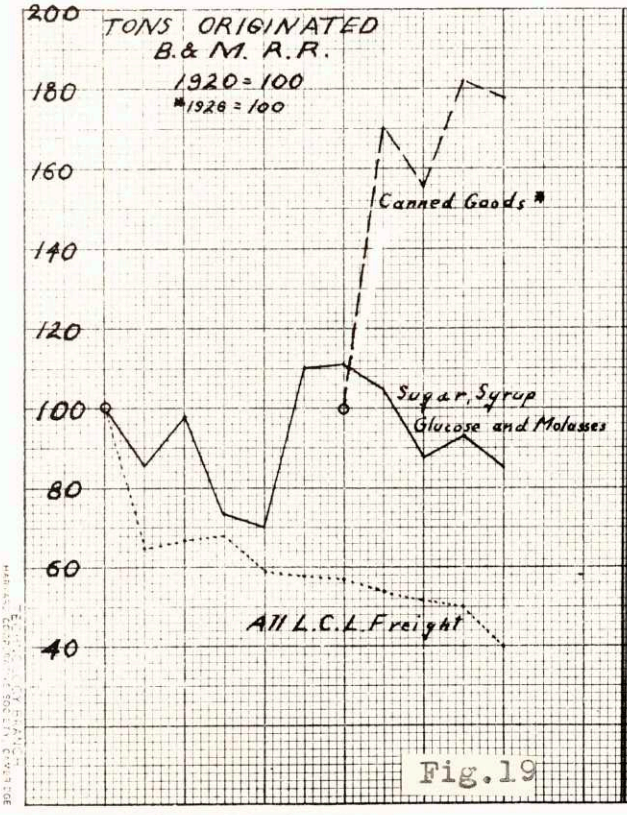

Fig. 19

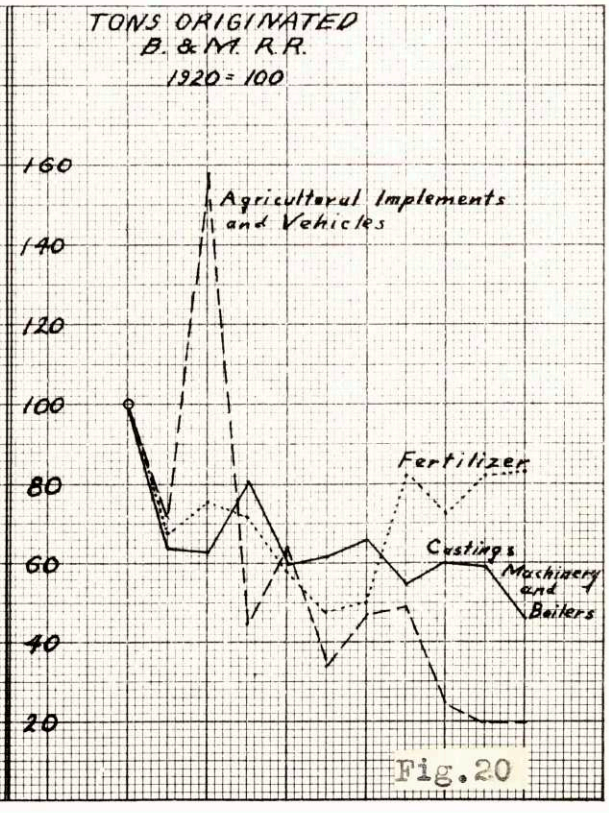

Fig. 20

are forced to find their supply of material near the place of use, the cost of transportation otherwise making the price too high. Fig. 16 shows this traffic on the rails is comparatively steady.

Logs, posts, poles and cord wood: This item is competitive. Logs, posts, and poles, are usually so bulky as to make them difficult to transport by truck, but for short distances, however, the handling costs are so much less, and the time saved so great, that trucks are prescribed. Cordwood is handled very much by truck, especially in the last few years. It is not transported very far, and the extra handling, if done by rail, makes this method uneconomical. (See Fig. 17).

Pulp wood: Pulp wood is not a competitive commodity. It is bought and used in such large quantities and its bulk is such that by rail is by far its cheapest means of transportation. Time is no element in this case. Some pulp wood is transported from Nova Scotia by boat. That is because the wood is picked up out of the water, and water shipment is hence much cheaper. (See Fig. 15).

Lumber, timber, shooks, staves and headings: On long hauls, the lumber business is definitely committed to the rails. The main reason for this is because of the milling-in-transit and treating-in-transit privileges offered by the rail tariffs. On the short haul, and because of the time and handling saved, trucks are used of course. The decline shown in Fig. 17 is due to the fact that practically all the lumber originating on the Boston and Maine is for comparatively short haul, and it is this short haul lumber which the railroads are losing to the trucks.

Refined petroleum and its products: At the present time of competition and over production that exists in the oil business, the speed of transportation makes very little difference. This traffic seeks the agency with the lowest possible rates. The competition between tank car and pipe line is keen and it is not till the rail service becomes definitely too expensive that pipe lines are laid down. Therefore it seems up to the railroads to do all they can so as not to make it necessary to install their competitors. (Fig. 18).

Syrup, sugar, glucose and molasses: Sugar used by the candy makers in Boston is largely refined here, the raw material arriving from the south by boat. That means there is practically no rail haul. Syrup comes in tank cars from the middle west. These commodities move in such large quantities, and their method of handling is such that by rail is the only practical way of shipment. (Fig. 19).

Bar and sheet iron, structural iron and iron pipe: The nature of these products makes the railroad the natural way of shipping them. For other than the short haul, which may practically be classed as local delivery, the weight and difficulty of handling by hand makes rail shipment the most economical. (Fig. 16).

Castings, machinery and boilers: Machinery, the main commodity of this item, is handled by rail wherever the size of the shipment and the length of the haul warrant doing so. On the short hauls, however, trucks are used a great deal in order to save time, and also because a great deal of expense

can be saved through not having to meet such strict crating and packing requirements. Machinery is difficult to crate properly at best, therefore it is a great advantage to have it receive individual treatment and care in handling such as it does from truckmen. (Fig. 20).

Brick and artificial stone: There is no competition here. Practically without exception all brick moves by rail. One of the reasons is that commodity rates exist on brick which make any other form of transportation too expensive. The decline shown in Fig. 16 is due to the decline in building construction in the past few years.

Agricultural implements and vehicles, other than automobiles: As can be seen from Fig. 20, this commodity has declined steadily on the Boston and Maine Railroad. This is to be explained by a general decline in the farming business in New England.

Automobiles and auto-trucks: The automobile shipments are the main sources of competition between the different railroads. Trucking is done to some extent, but the reliability of the railroad service makes the latter the favorite agency at the present

time. The routing of the auto traffic is determined chiefly by the service given at the delivery end.

Furniture: Furniture is exceptionally liable to damage. For that reason strict crating requirements are provided in the tariffs, placing a great deal of expense on the shipper. When handled by truck, furniture does not need to be crated as elaborately, and at the same time the damage sustained is a great deal less than on the rails. The main reason for this is that when transported by truck, the furniture is handled by men directly under the supervision of those in the furniture business, and especially trained to do so. The truck, therefore, has become the favorite agency for this traffic. This is indicated by the decline in furniture tonnage on the Boston and Maine, in Fig. 17.

Ice: The ice traffic is not competitive. For distances greater than about ten miles it has to be transported by rail, because other methods cause too much shrinkage. Hauls less than ten miles or so have been lost to the railroad because of the reduction in freight service, but this is a comparatively small item. The decline in ice traffic shown in

Fig. 13 is entirely due to the fact that artificial ice, manufactured in the city for city use, is replacing natural ice. The consumption of ice in and around Boston has increased steadily for the past ten years. This rather indicates that even if the early morning ice trains did exist at present there would no longer be the ice that needs to be shipped.

Fertilizers: Fertilizer, because of its nature, and the fact that it is mainly a long haul commodity, has not been taken away from the railroads as much as most other commodities in the last ten years. Trucks, however, are of course getting such short haul, and small lot business as there is. (Fig. 20).

Paper, printed matter and books: Paper from the mills, news print, etc., is transported mostly by rail because of the size and weight of the rolls, and the fast freight service that is offered for this commodity. Books are usually not in a great hurry to reach their destination, since there are hardly ever any rush orders of any size

in this business. Hence, sole consideration is given to freight rates. Water routes are used a great deal for long distances, and on short hauls trucks are used because they have been found cheaper in their respective instances. (Fig. 15).

Chemicals and explosives: Chemicals which are raw material for manufacture come to Boston by rail and by water, depending chiefly on the rate. Chemicals manufactured here, are trucked to a great extent where the haul is short and the lots are not large. An important consideration is in the danger of handling certain chemicals, such as acids and explosives, and the precautions that must be taken. For small shipments this consideration increases the cost of rail transportation considerably, which is one reason the trucks are used. (Fig. 18).

Textiles: The transportation of textiles requires speed. This is more true now than it was several years ago. On account of the large amounts of material involved in the business, and the continued change in the nature of the demand, and the change in styles and types of product, inventories

as small as possible are kept on hand. This means that when goods are ordered they must be received with the least possible delay. Rail transportation is used whenever that is the fastest service. Trucks are used very extensively on the short haul, because they are faster, in spite of the fact that they are often more expensive. (Fig. 12).

Canned goods: On account of the fact that this commodity is manufactured practically everywhere in the country, the transportation, which is practically always from manufacturer to consumer, consists chiefly of the short haul. The short haul is the field where the truck offers better service than the railroad, hence this is also a commodity where the railroad will have to use all its resources in order to keep the traffic which can easily be transported by truck. (Fig. 18).

All L.C.L. freight: Any one who is connected with, or even only interested in the transportation business, has for a long time been aware of the fact that merchandise is being taken more and more away from the railroads. It seems hardly to be avoided.

L.C.L. rates being higher than the regular carload rates, and the trucks being able to successfully compete with the latter in many instances, it is logical that trucks will almost universally have the advantage from a rate point of view. This is also the class of traffic where the need for store-door delivery is most keenly felt. There is no doubt that the railroads can do a great deal to keep from losing any more of the L.C.L. business, but just what it is economical to do, and what is not, is a question which requires a great deal of study. (Fig. 19).

Figs. 12 to 20 show the trends of these commodities as originated on the Boston and Maine. Taking into account the above considerations, and studying these curves, the following may be called the important competitive items, classed according to the element in transportation which is most important in each case:

Routing determined chiefly by cost:

Cotton

Hides and leather

Coal

Logs, posts, poles and cord wood

Lumber, timber, shooks, staves and headings

Refined petroleum and its products

Paper, printed matter and books

Chemicals and explosives

Canned goods

All L.C.L. freight

Routing determined chiefly by speed:

Packing house products

Wool

Hides and leather

Logs, posts, poles and cord wood

Lumber, timber, shooks, staves and headings

Castings, machinery and boilers

Textiles

Canned goods

All L.C.L. freight

Routing determined chiefly by reliability:

Machinery

Automobiles and auto-trucks

Furniture

Routing determined chiefly by convenience:

Furniture

All L.C.L. freight

Some of the items, it will be noticed, are placed in two different classes, cost and speed, for instance, being practically of equal importance in these cases. This gives us four classes of freight, which, for convenience will be named as follows, in order of their importance:

Class A. Minimum Cost Freight

Class B. Maximum Speed Freight

Class C. Maximum Reliability Freight

Class D. Maximum Convenience Freight

Referring now to facts shown by returns on the questionnaire described in Appendix A, we find that the above classification in order of importance is borne out by the shippers. The questionnaire was sent to and answered by shippers of all commodities, regardless of their nature, and we find that of all those answering the question, "What is your reason for preference in choosing an agency in transportation?" 40% answered: "Because of rates,": 28% "Because of speed," and 17%,"Because of store door delivery service." The first two of these answers are from shippers of Class A and Class B freight, and

these shippers were divided in their preference for rail, water or truck. A large percentage of the Class A shippers, however gave water transportation as being their choice becuase of the lower rates. It is common knowledge that on the majority of goods, other considerations being taken into account, water transportation as a rule is cheaper than any other, and it is natural that the water route should claim the largest percentage of Class A traffic, where there is a choice of routes as to land or water at all.

As to Class B shipments, a definite majority of the shippers gave the truck as supplying the requirements of speed best. This is a consideration however, which is closely allied with the last of the three answers cited above, namely, "Because of store door delivery service." Store door delivery is one of the elements which would help most in bringing about maximum speed, as well as it is also an item in bringing about minimum cost by the elimination of handling. Since regulations and restrictions are such that it is at present practically impossible for the railroads in B$_o$ston to go into actual store door

delivery service, the shippers requiring this are those requiring and using truck service most. The whole question of store door delivery is a complicated one, and one that has been discussed, studied, and pondered over by railroad managements for many years, and at present there are no indications that there is a solution to be reached in the near future.

Cost and speed are by far the two most important considerations in transportation as can be seen by the fact that they are the factors stressed by most of the shippers questioned on the subject. Reliability is most important only with certain commodities, such as automobiles for instance, and convenience, such as applied to furniture movement, is naturally important only as it is allied with considerations of cost and speed. It has already been mentioned that a great deal of freight traffic has moved away from the rails because of the superior service that trucks are able to offer in many instances. Much of this traffic could be handled by rail if railroads supplied service which they do

not now find it profitable to do. But when the railroads allowed this traffic to get away from them, so to speak, they suffered an injury from which they can never completely recover. The good-will of many of the shippers has been lost, and many shippers also, although they admit that the railroads offer better service than they have ever before, feel that as a matter of loyalty, they owe it to whatever trucking concern they are now doing regular business with to continue to patronize him. In other words, in this present readjustment of the set ways in routing commodities, where every one has been looking for the fastest possible method of shipping, or the cheapest possible method, on account of continually increasing competition, and the continual reduction of inventories, bringing about more and more hand to mouth buying, it has been a question of first come first served for the transportation agencies. The element of speed was a new thing, as far as being important in freight transportation is concerned. The railroads did not meet the demand. The trucks did. And since it is far

easier for a carrier to retain the traffic it has, thanto divert traffic away from its competitors, the process of diverting those commodities which can now again be moved to greatest advantage by rail, since the railroads have begun to supply really fast service, will necessarily be a slow one.

There are also many instances where railroads have not yet done all they can to meet the demands that traffic makes of transportation. Store door delivery is one of these, as mentioned above.

There are also instances where a reduction in rates would possibly bring back enough traffic to make such a reduction worth while. As a matter of fact this possibility exists in each one of the Class A commodities, and it is recommended that these items be given special study by railroad traffic departments for this purpose. The routing of coal from the coal fields, as has been noted, is determined solely by the freight rate. If rail rates could be made more favorable there is no doubt but what this traffic would increase a great deal. As it is at present, all water borne coal is loaded into

freight cars at the mines and has to be handled from the rails into the boats, and in a great many cases from the boats back to the rails when it arrives in New England. With merchandise and other L.C.L. freight, the rate also plays an important part. As has been pointed out, whether or not it is economical to truck goods at all, or how far it is economical to truck goods, is determined, on Class A traffic at least by the difference in rail rates and the rates charged by truckers. As a matter of fact, if we can assign a value to the handling eliminated by a truck haul and also to the store door delivery service as well as to the demand for speed, we may equate this to the rail haul cost plus whatever value can be assigned to reliability and such other advantages as the rail haul may have. This would give a definite conclusion as to which agency should economically be used for a given commodity in a given haul. As can be seen the determining factors vary widely, and the fact that it is practically impossible to generalize is again borne out.

The loading and packing requirements placed on certain kinds of traffic which moves by rail are also often cause for these commodities to move by truck. Machinery and furniture are two outstanding examples of this. Of course, these requirements are at present imposed by regulation, and not only that, but they seem necessary in order to prevent claims for damage and breakage. In other words, it comes down to the fact that goods transported by rail are subject to more and rougher handling than those transported by truck. This item naturally has more bearing on less-than-carload traffic than on carload. It seems possible, however, and even probable, that intensive supervision in freight handling should be able to eliminate claims to such an extent that the money saved thereby would more than compensate for the expense of such supervision. Traffic would possibly increase due to greater good-will created by freedom from damage and a possible elimination of some of the most stringent packing requirements. Intensive supervision of this nature should therefore be given serious consideration

by railroad managements.

In competing with water transportation it is almost totally a question of rate, and here again it is the Class A commodities which should be given the most careful consideration.

Probably the most outstanding difficulty encountered in the total transportation system of today is the lack of coordination of the different agencies, and also the lack of definite cooperation between shippers and carriers. It is true, attempts have been made to eliminate these sources of difficulty. Examples of this are found in the establishment of such companies as the Boston and Maine Transportation Company, described in Appendix E, and the New England Transportation Company, a subsidiary of the New Haven Railroad. But when the possibilities of coordination are considered, and also what has been done to that effect in European countries, these efforts can only be considered as meagre attempts. Again this brings us to store door delivery.

Then considering cooperation of shippers, it is evident by referring to question 7 in the

questionnaire to manufacturers (Appendix A) that many shippers are very little acquainted with railroad service. For instance, one shipper suggests that the telephone instead of the mail be used for giving arrival notice. He must evidently be unaware of the fact that he can arrange with the railroad to have such notice given to him by phone. Another suggests that special refrigerator car service be given for shipments of fish out of Boston to the west, evidently unaware of the regular service for fresh fish and lobsters given by the "Minute Man" of the Boston and Maine to Chicago.

APPENDIX E

THE BOSTON AND MAINE TRANSPORTATION COMPANY

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TRUCKING OPERATIONS OF THE BOSTON AND MAINE RAILROAD

The Highway Transportation business of the Boston and Maine Railroad is carried on by a subsidiary company, the Boston and Maine Transportation Company. This organization was formed in the summer of 1925, after several years of consideration of the motor truck situation by the officials of the B.& M. R.R. Several reasons were involved in the decision to form a subsidiary company, rather than to have therailroad carry on trucking operations im its own name. Among these reasons may be cited: A feeling that highway transportation would be of rather a specialized nature, and should be kept separate from the rail operations; a desire to be freed from regulations imposed by Federal and State Commissions on railroads; and a lack of knowledge as to whether railroads could legally operate over the highways, coupled with the fact that it was not felt desirable to make a test case at that time.

The Boston and Maine Transportation Company, familiarly known as the "B.M.T." operates both busses

and trucks throughout a large portion of the territory served by the Boston and Maine Railroad. However, this article will be concerned only with the trucking operations.

The trucking operations cover practically all of the eastern portion of the B.& M.'s territory, together with routes operating in the vicinity of Fitchburg, Holyoke, and North Adams in Massachusetts; and White River Junction, Concord, Manchester, Keene, and Lakeport in New Hampshire. The town of White River Junction itself is in Vermont, but the major portion of the route operating from there is in New Hampshire. In the eastern territory, the main centers of operation are Boston, Lawrence, Lowell, Lynn, Newburyport, and Salem in Massachusetts; Rochester and Dover in New Hampshire; and Biddeford , Maine. The equipment in use at each of these points is indicated in Table EI. This list of equipment includes that which is generally used by the contractor at each point, but he is privileged to furnish any type he pleases, provided it will satisfactorily handle the traffic.

TABLE EI

Equipment Available at Various Points

Point	Equipment	Capacity	Contractor
Boston,Mass.	43 Semi-trailers	8 ton	
	35 closed,8 open		Big Three,
	14 tractors		Inc.
	20 trucks	2-7 ton	
	14 dump trucks	7 ton	Consolidated Trucking Co.
Biddeford,Me.	2 trucks	5 ton	Big Three,Inc.
Concord,N.H.	2 trucks	5 ton	Big Three,Inc.
Dover, N.H.	2 trucks	5 ton	Big Three,Inc.
Fitchburg, Mass.	2 trucks	6 & 3½ ton	Smith & Co.'s. Express
Holyoke,Mass.	4 trucks	7 ton	Sheldon Transfer
Springfield, Mass.	1 truck	1½ ton	Co.& Storage Co.
	(Teams also available)		
Keene, N.H.	2 trucks	5 & 2 ton	Big Three, Inc.
Lakeport,N.H.	1 truck	5 ton	Big Three,Inc.
Lawrence,Mass.	5 trucks	7 ton	
	2 trucks	5 ton	N.F. Smith
	3 trucks in Boston service	7 ton	
Lowell,Mass.	2 trucks	7 ton	
	1 truck	1½ ton	N.F. Smith
	2 trucks in Boston service	7 ton	
Lynn, Mass.	1 truck	5 ton	Stone's Express
Manchester, N.H.	1 truck	3 ton	W.M. Auclair
North Adams, Mass.	1 truck	7 ton	Mullen Bros.
Newburyport, Mass.	1 truck	1½ ton	Stone's Express
Rochester,N.H.	1 truck	5 ton	Big Three, Inc.
Salem,Mass. Beverley,Mass.	2 trucks	5 & 2 ton	Big Three, Inc.
White River Junct.Vt.	2 trucks	2 ton	E.W. Pierce W.T. Murphy

The above equipment is that generally used by the B.M.T., but the contractors are privileged to furnish any trucks that will handle the business.

As is implied in the last paragraph, the B.M.T. does not own or operate its own trucks at any point. The management feels it advisable rather to contract for its equipment with existing local truckmen at each point. This arrangement tends to increase good-will locally, as well as to relieve the B.M.T. of the responsibility of caring for the trucks and employing drivers. In addition, at some of the points the business is not sufficient to keep even one truck busy all of the time, and the arrangement in effect permits the contractor to handle any regular local trucking business on the side when time permits. Furthermore, it removes one competitor from the field, and at the same time does nothing that will increase the already serious congestion on the highways.

These contractors agree to handle all the traffic that the B.M.T. may have at the point in question. At some of the points, the contracts are on a "Full Time" basis. At these points, the equipment used by the B.M.T. is at their disposal at all times, and cannot be diverted to other business except by special permission. At the remaining points the contract is "part time," and the equipment may be put to any use by the

owner when not required for B.M.T. business.

At all points except Boston, the contracts are for thirty day periods. Payment to the contractor is on a basis of a tonnage rate, a mileage rate, or a combination of time and mileage. The actual rates vary with different points. At many of the smaller points, there are no formal contracts; merely agreements made through correspondence. The situation at Boston is entirely different. There the B.M.T. has contracts with two separate companies. The first of these, the Consolidated Trucking Company, is on the above thirty day basis. This company is used for the transportation of coal, in seven ton dump trucks, and also for miscellaneous dump truck work required by the various railroad departments. The other company, "Big Three Incorporated," handles all of the general trucking on a five year contract, made in 1928. Under this contract the B.M.T. agrees to buy all of the equipment used in its service if the contract is cancelled prior to its expiration in 1933. Such cancellation may

be made on sixty days' notice. If, on the other hand, the contractor cancels the contract prior to expiration, the B.M.T. reserves the right to buy the equipment if it so desires. The price to be paid in either case is to be determined in accordance with a method outlined in the contract. This same company also conducts the business of the B.M.T. at Salem, Dover, Rochester, Biddeford, Lakeport, Concord, and Keene.

The service that the B.M.T. performs for the Boston and Maine Railroad falls into three general classes, namely: transfer, concentration, and ferry car. Each of these will be taken up separately. In addition to the above, the B.M.T. does a considerable amount of general trucking on its own account, entirely independent from that which it does for the railroad.

The transfer service is performed at four points, Boston, Lowell, Fitchburg, and Springfield. At Lowell, the service is between the B & M. and the New Haven freight houses, L.C.L. freight being handled in both directions at this point. At Springfield, a small volume of freight is transferred

to the New Haven and to the Boston and Albany houses from the B & M. at Fitchburg, a B.M.T. truck makes a round trip in the morning from the B.& M. freight house to that of the New Haven Road.

At Boston, the transfer work is of a much more general nature. L.C.L. freight comes in to Boston at two inbound freight houses, known as "B" and "C" located at East Cambridge. A considerable volume of this business is en route on a rail-and-water movement, and must be transferred to piers along Atlantic Avenue, at the Hoosac Wharves or at Mystic Wharves. All of this transfer is performed by truck. The steamship companies with which this service is in effect are:

Eastern Steamship Co.	to New York and Maine	Atlantic Ave.
Clyde Line	to Southern Atlantic U.S.Ports	Atlantic Ave.
United Fruit Co.	to South and Central American Ports and Caribbean Ports	Atlantic Ave.
Ocean Steamship Co.	to Southern Atlantic U.S. Ports	Hoosac Wharf
American Hawaiian S.S. Co.	to Pacific Ports	Mystic Wharf
Luckenbach Line	to Pacific Coast	Mystic Wharf
Dollar Line	to All Ports	Mystic Wharf

Movement from the B.& M. to these lines is not scheduled. As fast as trailers or trucks are loaded for these destinations, they are despatched, and empties are set for further loading. Trailers are used for most of this business, but trucks are used to some extent. Prior to the organization of the B.M.T., this transfer business was handled by independent truckers, so that this service does nothing to increase the highway congestion along the waterfront, even if it does not reduce it, though in all probability it does reduce it to some extent. The present amount of this congestion may be judged from the fact that early morning trips can be made from the freight house to an Atlantic Avenue Pier in about twenty minutes, while those later in the day take from thirty minutes to an hour.

In addition to this pier service, the B.M.T. handles L.C.L. transfer between the Boston and Maine houses and the New Haven's # 6 House, located near Summer Street Extension, South Boston, This service, like the pier service, is not a scheduled

one, but trips are made as often as necessary to move the business.

The ferry car service is performed throughout the territory served by the B.M.T. The Boston and Maine's switching tariff states in effect that, at any shipper's request, ferry car service may be performed by highway vehicle, subject to tariff regulations. The result of this is that a large part of the service is performed by the B.M.T. However, the shipper in question must be located on a Boston and Maine siding. In other words, he must be so located that regular ferry car service with rail equipment could be performed before he can have motor truck ferry car service. This service is performed in strict accordance with the I.C.C.-B.& M. Switching Tariff regulations, and charges to the shipper are assessed exactly as if a railroad car had been used. Certain companies have arranged for calls at their plant on a definite schedule, but in most cases, the service is subject to request by the shipper or receiver.

The remaining class of service, concentration, is the largest of the three, considering the

operation of the company as a whole. It is practically the only service performed at most of the outlying points (except for such ferry car work as is done), and constitutes a good percentage of the work donein Boston. From Boston, trips are made, on schedule, to practically all of the suburban stations, taking L.C.L. freight from the inbound houses out to the suburban points, and on the return trip, bringing in the freight that is outbound from these points and leaving it at the Boston outbound houses, "17" House on Front Street, Charlestown, for Maine Central Points, and "A" House, East Cambridge, for other points). Only one trip per day is made to most of these points, though more will be made if there is too much freight to handle in one trip. Certain of these points, such as Waltham and Chelsea, regularly receive two calls a day, morning and afternoon. Trucks are used for most of this suburban work, though semi-trailers are used for a few of the routes.

As stated above, practically all of the work at the outlying points is of the nature of concentration work. In most cases this takes the

form of substitution of highway vehicles for peddle cars in the local freights. The truck routes in general follow the rail route as closely as the layout of the highways will permit, though in many cases cross country routes are followed between stations. The reason for this following of the rail route is that the railroad freight stations exclusively are used for the handling of the shipments, the billing in general being done by the local agent of the railroad. Accordingly, it is necessary for trucks to call at all railroad stations along their route.

The method of operation on this concentration or peddle work is such that the shipment moves under its railroad waybill, and, so far as the shipper knows, might be moving by rail. The shipper brings his shipment to the freight station in the regular manner, and makes out the regular bill of lading and shipping order. A standard B.& M. waybill is made out by the agent just as if the shipment were going to move out of his station by rail. He also enters the waybill on a B.M.T. form,

in triplicate, and delivers the shipment to the truck driver, who signs the B.M.T. form keeping the two carbon copies. The agent keeps the original of this form as his record, and delivers the waybill to the driver. The latter brings the shipment to the concentration point, delivers it with the waybill and the B.M.T. abstract to the B.& M. agent, who signs and returns one copy of the B.M.T. form to the driver. From then on, the shipment is handled in the regular manner, as if it had come in to a transfer station in a way car. The reverse move, i.e. from the concentration point to the small stations, is handled in substantially the same manner. The same forms are used, and in the same way.

The despatching of trucks is handled from the various centers of operation. At Boston, the only point where there is a regular despatcher in the employ of the B.M.T., the despatching is handled from an office near "A" House. Movements from "A" "B" or "C" Houses are directed in person. Normally the driver makes his round trip as directed, either

in transfer service or suburban concentration service. But if he finds that he will not have a full load returning to "A" house he phones the despatcher, who may direct him to make other calls on his way in.

At Holyoke, Lawrence, and Lowell, the despatching is handled by the contractor. At these points, the contractor has a good many trucks that are not in B.M.T. service, and by having the despatching in his hands he can save a great deal of cross movement, using trucks interchangeably for his own business and for B.M.T. business. For example, he may have a load of his own going to a point and a B.M.T. load coming in from a point near the first. He may save a good many empty miles by using the same truck for both moves. This would be more difficult to accomplish if the B.M.T. despatching was in B.M.T. hands.

At Dover, Biddeford, and Rochester, the despatching is handled by a B.M.T. "Inspector," who devotes a large part of his time to work other than despatching, or in his absence, by the freight house checker, who is a B.& M. employee. At these

points, however, the truck movements are largely on schedule, requiring little supervision other than a decision as to which truck will make a given trip. At Concord, N.H. and Lakeport, the despatching is handled by the B.& M. freight agent in addition to his regular duties.

At all these points, the drivers are instructed to call the despatcher whenever unusual conditions arise with which they are unable to cope. Thus if a driver gets more tonnage than he can handle, he calls the despatcher, who may instruct him to take as much of the load as he can handle, and continue the trip, if he is at an intermediate point of a scheduled trip, while the despatcher sends out another truck on a special trip to pick up the excess load. The man acting as despatcher keeps in touch with all concerned in movements, such as the agents, the shipping clerks at industries with sidetrack facilities for whom ferry car service may be performed, and the drivers, as much as possible. Through his efforts, it is possible to save a great deal of cross movement, and empty mileage, in a manner similar to that outlined above.

All trucks in use for B.M.T. business are considered as rented to the company while on its business, and accordingly are subject to the orders of the B.M.T. at any time. In a similar manner, the drivers, while actually employed by the contractors, take their orders from B.M.T. despatchers as though employed by that company. At points where the railroad has freight house employees, the loading and unloading of the trucks is done by them. At all other points, the truck driver does this work. In places where the work is heavy, helpers are maintained for this purpose. In other cases, two men ride the truck, as driver and helper.

The organization of the B.M.T. is headed by a Board of Directors, composed of several of the Vice-presidents of the Boston and Maine Railroad. Under this Board is a President of the B.M.T. Next in line come two managers of the B.M.T., one in charge of the bus service, and one in charge of truck service. These two men are also directly responsible to the Vice-president and General Manager of the B.& M.R.R. The Manager of Trucking has reporting to him a General Freight Agent, two

Traveling Freight Agents, an Assistant to the Manager of Trucking who has direct charge of the Boston Clerical Force and also of the trucking work which the B.M.T. performs on its own account; and the field men, consisting of a Supervisor of Trucking at Boston, and the inspectors at Lawrence, Holyoke and Biddeford. The truck drivers and helpers, and any clerks and foremen at outlying points come under the inspectors, while the Boston force of drivers and foremen are in the charge of the Supervisor of Trucking, as is the despatcher at Boston.

The B.M.T. Trucking Department derives about 75% of its revenue from the Railroad, the remainder coming from its independent operations as a trucking company. The payment by the railroad to the B.M.T. is made on a cost-plus basis with the exception of the Boston transfer work, which is paid for on a flat basis of eight cents a hundred pounds. The B.M.T. accounting is done in the Boston and Maine general offices, by a special bureau of the B & M. Accounting Department. This force is paid for by

the B.M.T. The following condensed statement (from that for July, 1930) will serve to indicate the approximate amounts of money involved:

Revenues			$62,171
Expenses			
Superintendence	$1,387		
Station & Frt.Ho. Employees	3,679		
Miscellaneous Transportation Expense	20		
Total Transp. Expense		$ 5,086	
Traffic, Superintendence and Solicitation		894	
Salaries & Exp. of Gen. Officers	522		
Salaries & Exp. of Gen. Off. Clerks	1,124		
Injuries & Damages	47		
Rent of Equipment	53,999		
Total Gen. and Misc. Expenses		55,692	
Total Operating Expenses			61,672
Net Operating Revenue			499
Income from Interest on Bank Deposits			39
Net Income			538

The above statement applies only to the trucking operations. The accounting for the bus service is kept separately.

The schedules of the trucks are arranged in the form of loose leaf booklets for the use of drivers, other employees of the B.M.T., and such

employees of the Boston and Maine Railroad as are concerned. They are subject to change without notice, and in general are more or less elastic, though they are adhered to as closely as possible. Certain service has been discontinued during the past year because it was found that the traffic could be handled as efficiently and more economically by rail, or because the volume of traffic did not warrant the faster and sometimes more expensive truck service. As one of the main objects of the B.M.T. is to enable the B.& M. R.R. to dispense with unprofitable rail service, or to save money on expensive rail service, naturally the rails are used where it is found to be cheaper than using the highway.

The schedules are in general arranged to provide a definite closing time for each station. This time is advertised as the latest at which freight can be received in order that it may go forward the same day. The truck reaches the station as soon after this advertised closing time as is possible. Delays appear to be due to exceptionally

large volumes of freight loaded or unloaded at a station rather than to bad weather, though rain does have a serious effect, as it both slows up the running and reduces the capacity of the open trucks. Tarpaulins must be used in stormy weather limiting the height of the load.

APPENDIX F

STEAMSHIP DATA

APPENDIX F

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TABLE F I

COMPANIES OPERATING STEAMSHIPS IN COASTWISE SERVICE FROM BOSTON

American Hawaiian Steamship Company

Boston Molasses Company

Boston Sand and Gravel Company

C.H. Sprague & Son Company

Clyde Steamship Company

Cities Service Refining Company

Colonial Beacon Oil Company

Eastern Steamship Company *

Gypsum Packet Company, Ltd.

Luckenbach Steamship Company

Merchants and Miners Transportation Company*

Metropolitan Coal Company

Moormack Gulf Lines (Moore and McCormack)

Maine Coast and Canada Steamship Company*

Munson-McCormick Lines

New England Fuel and Transportation Company

Norton Lilly Company

Ocean Steamship Company

Pan-American Petroleum and Transport Company

Standard Oil Company

* Operate between the points considered in this report.

TABLE F II

COASTWISE TRAFFIC 1929*

CLASSIFICATIONS TONNAGES SHIPPED AND RECEIVED
BY WATER AT BOSTON
(TONS OF 2000 lbs.)

ANIMAL AND ANIMALS PRODUCTS

RECEIPTS		SHIPMENTS	
Fish	127,861		
Hides & Skins	11,635		
Miscellaneous	20,464	Miscellaneous	12,898
Total	166,435	Total	35,179

VEGETABLE FOOD PRODUCTS

Fruit and Vegetables	35,329	Potatoes	16,623
Flour & Grain	10,189		
Miscellaneous	16,588		
Total	76,575	Total	29,229

OTHER VEGETABLE PRODUCTS

Naval Stores	33,530		
Total	42,052	Total	12,623

TEXTILES

Wool	35,526	Clothing and Dry Goods	25,989
Cotton	22,359		
Clothing and Dry Goods	56,242	Miscellaneous	13,025
Total	131,055	Total	55,189

WOOD AND PAPER

Lumber & Logs	379,302	Lumber & Logs	10,457
Wood Pulp	24,726	Paper	25,558
Total	422,671	Total	40,566

* 1930 Figures not available until June 1931.

TABLE F II (Continued)

NON METALLIC MINERALS

Coal	6,905,464	Coal	41,940
Sand and Gravel	551,939	Coke	23,550
Stone	36,540		
Sulphur	35,720		
Crude Oil	2,437,948		
Fuel Oil	557,413	Fuel Oil	365,327
Gasoline	107,752	Gasoline	91,365
Refined Petroleum Product	641,528	Refined Petroleum Product	371,676
Water Gas Tar	12,285	Water Gas Tar	11,316
Total	11,301,764	Total	913,953

ORES, METALS AND MANUFACTURES OF

		Pig Iron	85,864
		Iron & Steel Articles	11,841
Total	8,453	Total	106,540

MACHINERY

Total	4,207	Total	3,682

CHEMICALS

Phosphate rock	60,584	Fertilizer	40,900
Coal Tar	28,814	Soap & Soap Powder	21,283
Miscellaneous	24,810		
Total	131,194		

UNCLASSIFIED

Canned Goods	82,642		
General Cargo	368,765	General Cargo	433,101
Total	458,302	Total	436,770
Grand Total	12,742,708	Grand Total	1,712,057

APPENDIX G

MOTOR TRUCK DATA

APPENDIX G

TABLE OF CONTENTS

TABLE G I

TRUCK REGISTRATIONS IN THE UNITED STATES

YEAR	NO. REGISTRATIONS
1905	600
1910	10,000
1911	20,000
1912	41,400
1913	63,800
1914	85,600
1915	136,000
1916	215,000
1917	326,000
1918	525,000
1919	794,372
1920	1,006,082
1921	1,118,520
1922	1,375,725
1923	1,612,569
1924	2,134,724
1925	2,441,709
1926	2,764,222
1927	2,914,019
1928	3,113,999
1929	3,379,854

TABLE G II

1930

COMMERCIAL REGISTRATIONS IN MASSACHUSETTS
(Cities and towns in which more than 100 trucks are registered)

Illustrating the Concentration Points of Trucking Activities in the State

COUNTY REGISTRATIONS

Barnstable	2076
Berkshire	3756
Bristol	10052
Dukes	308
Essex	12986
Franklin	1839
Hampden	9750
Hampshire	2276
Middlesex	22873
Nantucket	252
Norfolk	6600
Plymouth	6284
Suffolk	23980
Worcester	12066
Total	114918

BARNSTABLE COUNTY

Chatam	101
Falmouth	350
Total	2076

BERKSHIRE COUNTY

Adams	281
Adams (N.)	551
Gt.Barrington	224
Pittsfield	1475

ESSEX COUNTY

Beverly	553
Danvers	297
Gloucester	743
Haverhill	1175
Ipswich	235
Lawrence	2027
Lynn	2653
Manchester	112
Marblehead	227
Metheun	483
Newburyport	325
Peabody	655

TABLE G II (Con'd)

BERKSHIRE COUNTY	
Williamstown	178
Total	3756

BRISTOL COUNTY	
Acushnet	100
Attleboro	553
Attleboro N.	321
Dartmouth	341
Dighton	200
Easton	201
Fairhaven	219
Fall River	2562
Mansfield	165
New Bed.	2774
Reboboth	193
Seekonk	212
Swansea	171
Somerset	122
Taunton	1241
Westport	249
Total	10052

DUKES COUNTY	
Oak Bluffs	100
Vineyard Haven	108
Total	308

ESSEX COUNTY	
Amesbury	225
Andover	367
Andover N.	203
Rockport	113
Salem	1198
Saugus	283
Swampscott	169
Total	12986

FRANKLIN COUNTY	
Deerfield	115
Greenfield	539
Orange	150
Shelburne Falls	123
Turners Falls	121
Total	1839

HAMDEN COUNTY	
Agawam	178
Chicopee	600
Holyoke	1325
Indian Orchard	152
Longmeadow	176
Ludlow	191
Palmer	112
Springfield	5375
Westfield	525
Wilbraham	114
Williamansett	130
Total	9570

MIDDLESEX COUNTY	
Acton	147
Arlington	573
Bedford	105

TABLE G II (Con'd)

MIDDLESEX COUNTY

Belmont	295
Billerica	172
Cambridge	3198
Chelmsford	215
Concord	295
Dracut	125
Everett	1147
Framingham	669
Hudson	131
Lexington	327
Littleton	101
Lowell	2165
Malden	1376
Marlboro	363
Maynard	191
Medford	816
Melrose	450
Natick	351
Newton	1323
Pepperell	111
Reading	275
Somerville	2713
Stonham	243
Sudbury	119
Wakefield	371
Waltham	1087
Watertown	853
Weston	126
Wilmington	113
Winchester	347
Woburn	631
Total	22826

NANTUCKET COUNTY

Nantucket	237
Total	252

NORFOLK COUNTY

Cohasset	145
Dedham	275
Foxboro	116
Franklin	206
Medway	105
Milton	279
Needham	325
Norwood	283
Quincy	1258
Wollaston	106
Randolph	170
Sharon	104
Walpole	218
Wellesley	267
Weymouth	532
Total	6600

PLYMOUTH COUNTY

Abington	208
Bridgewater	226
Brockton	1957
Carver	110
Duxbury	122
E.Bridgewater	145
Hanover	721
Hingham	261
Hull	131
Kingston	120
Marshfield	118
Middleboro	391
Plymouth	594
Rockland	212
Scituate	226
Wareham	255
Whitman	248
Total	6284

TABLE G II (con'd)

NORFOLK COUNTY

Bellingham	116
Braintree	381
Brookline	679
Canton	170

SUFFOLK COUNTY

Allston	298
Boston(prop.)	12968
E.Boston	541
S. Boston	976
Brighton	538
Charlestown	1123
Dorchester	2316
Chelsea	1061
Hyde Park	241
Jamaica Plain	487
Mattapan	217
Revere	536
Roslindale	392
Roxbury	1866
West Roxbury	207
Winthrop	213
Total	23980

WORCESTER COUNTY

Athol	283
Auburn	150
Boylston	125
Brookfield	225
Clinton	205
Dudley	102
Fitchburg	1121
Gardner	368
Grafton	104
Leominster	425
Milford	402
Millbury	119
Northboro	104
Oxford	100
Shrewsbury	190
Southbridge	301
Spencer	122
Uxbridge	164
Webster	220
Westboro	116
Winchendon	110
Worcester	4805
Total	12066

TABLE G III

MASSACHUSETTS REGISTRATIONS

Passenger Cars, Trucks, Motorcycles

1915 - 1929

YEAR	PASSENGER CARS	TRUCKS	MOTORCYCLES
1915	90,580	12,053	.....
1916	118,615	18,194	.....
1917	147,310	26,964	.....
1918	160,486	33,011	.....
1919	203,364	43,819	13,698
1920	354,245	51,386	15,143
1921	307,471	55,561	12,058
1922	378,839	70,999	11,675
1923	482,645	83,505	11,733
1924	580,489	91,826	10,778
1925	663,858	100,490	10,333
1926	717,539	108,685	9,215
1927	722,955	96,748	7,245
1928	784,448	99,142	6,656
1929	903,648	113,268	6,168

TABLE G IV

MASSACHUSETTS

TOTAL REGISTRATIONS BY MONTHS 1930

MONTH	1930
December	78,075
January	529,021
February	32,456
March	68,827
April	109,743
May	72,461
June	47,936
July	42,580
August	34,569
September	27,622
October	24,572
November	15,957
Total	1,013,819

TABLE G V

MASSACHUSETTS

REGISTRATIONS BY MONTHS: FISCAL YEAR

1929

MONTH	PASSENGER	TRUCKS	BUSES	TRAILERS	MOTORCYCLES
DECEMBER	7,792	702	18	36	34
JANUARY	418,807	72,451	1,469	306	613
FEBRUARY	30,028	2,941	43	32	240
MARCH	65,425	5,358	16	29	812
APRIL	101,534	6,842	75	37	1,172
MAY	71,299	5,477	71	37	992
JUNE	52,105	4,332	94	18	726
JULY	47,028	3,672	66	13	616
AUGUST	38,380	3,081	81	14	471
SEPTEMBER	26,394	2,732	13	7	208
OCTOBER	26,809	3,529	16	16	190
NOVEMBER	18,047	2,151	26	9	94
TOTAL	903,648	113,268	1,988	556	6,168

TABLE G VI

MASSACHUSETTS

REGISTRATIONS BY MONTHS: FISCAL YEAR

1930

MONTH	PASSENGER	TRUCKS	BUSES	TRAILERS	MOTORCYCLES
DECEMBER	7,145	904	1	1	24
JANUARY	449,013	76,608	2,551	426	423
FEBRUARY	29,426	2,818	40	18	154
MARCH	63,044	5,044	40	52	647
APRIL	102,010	6,534	111	37	1,051
MAY	66,419	5,169	148	51	674
JUNE	43,533	3,672	168	31	532
JULY	38,878	3,188	107	21	381
AUGUST	30,968	3,092	94	21	399
SEPTEMBER	24,670	2,745	35	13	159
OCTOBER	21,089	3,181	95	24	183
NOVEMBER	13,949	1,963	24	6	15
TOTAL	890,144	114,918	3,414	701	4,642

Total Commercial Registrations 119,033

Percent Trucks and Trailers $\frac{115,619}{119,033} = 97$

TABLE G VII

CORDON COUNT OF TRUCKS ENTERING AND LEAVING BOSTON
June 28, 1927 7:00 A.M. to 12 Midnight

Gateway	Inbound	Outbound	Total
Charlestown Brdg	2591	3354	5945
Warren Ave. Brdg	1904	1437	3341
Craigie Brdg	2657	2694	5351
Longfellow Brdg	1666	1660	3326
Embankment Rd.	22	20	42
Revere St.	4	8	12
Pinkney St.	3	2	5
Mt.Vernon St.	81	112	193
Chestnut St.	172	119	291
Beacon St.	1007	1169	2176
Total Amt. estimated competing with B.& M.	10,107 (41%)	10,575 (41%)	20,682 (41%)
Boylston St.	863	765	1628
Park Sq.	1534	1733	3267
Carver St.	----	85	85
Eliot St.	296	497	793
Stuart St.	746	639	1385
Warrenton St.	----	98	98
Tremont St.	756	974	1730
Washington St.	642	135	777
Whitmore St.	----	39	39
Harrison Ave.	683	1198	1881
Tyler St.	1001	----	1001
Hudson St.	359	----	359
Albany St.	----	1470	1470
Dorchester Ave.Brdg.	2047	2152	4199 3337
Summer St.Brdg	1705	1632	3028
Congress St.Brdg	1615	1459	3028
Northern Ave.Brdg	1509	1519	305
South Ferry	148	157	874
North Ferry	415	459	
Total	24,426	25,586	50,012

TABLE G VIII

TOTAL RECEIPTS AND SHIPMENTS OF WOOL AT BOSTON
(1000 lbs.)

YEAR	RECEIPTS REPORTED	SHIPMENTS REPORTED	SHIPMENTS UNACCOUNTED FOR or by truck
1919	479,017	149,606	329,411
1920	274,063	136,040	138,023
1921	343,072	115,197	227,875
1922	433,808	102,458	331,350
1923	416,103	148,880	267,223
1924	322,024	170,993	151,031
1925	305,619	168,403	137,216
1926	346,931	201,182	145,749
1927	341,549	199,725	141,824
1928	300,923	168,520	132,403
1929	305,398	170,740	134,658
1930	312,758	130,751	182,007

TABLE G IX

WOOL SHIPMENTS REPORTED BY RAIL AND WATER AT BOSTON
(1000 lbs.)

YEAR	B&A RR	NH RR	B&M RR	WATER
1919	46,667	80,313	19,076	3,590
1920	55,026	63,022	13,243	5,749
1921	50,091	51,533	11,883	1,690
1922	32,697	31,859	35,590	5,308
1923	27,753	46,485	56,828	17 ,814
1924	28,076	65,577	56,904	20 ,436
1925	28,054	62,213	76,286	1,850
1926	26,580	64,349	100,521	9,732
1927	30,560	62,018	84,412	22,735
1928	33,518	54,245	64,744	16,013
1929	32,224	63,476	58,557	16,483
1930	20,066	80,796	14,637	15,252

TABLE G X

DATA RELATIVE TO TRUCKING COMPANIES INTERVIEWED

COMPANY	NO.TRUCKS	DAILY SCHEDULES From and to Boston
A	60	Providence, service within 25 mile radius
B	60	Worcester, Springfield, New York, service within a 25 mile radius.
C	55	25 mile radius service
D	50	Service within a 50 mile radius
E	45	Lawrence, Lowell, Worcester, New York, Newark, Manchester, Concord, Nashua; also 25 mile radius service.
F	40	Worcester, Springfield and intermediate points. Also 25 mile radius service.
G	32	No regular schedules
H	26	Manchester, Nashua and Concord.
I	25	Providence
J	16	No regular schedules
K	14	Providence
L	10	Fitchburg
M	8	No regular schedules
N	7	Providence
O	5	Worcester, Springfield
P	4	Portland
Q	3	Concord, Manchester

TABLE G X (Cont'd)

COMPANY	AVERAGE LONG HAUL (Miles)	LONGEST HAUL (ever undertaken) (Miles)	CAPACITY TRUCK FOR LOAD HAUL (Tons)
A	50	250	7
B	150	1000	5,7
C	25	100	3
D	50	900	5
E	50	350	--
F	42	1000	3,5,6½,10
G	76	350	5
H	50	75	2½,5
I	44	350	5
J	10	250	4,5,7
K	50	250	5,8
L	50	150	6,8½,10
M	50	70	8
N	50	50	8
O	50	150	8
P	100	100	3,4,5,6
Q	75	75	5

TABLE G X (Cont'd)

COMPANY	LARGEST SINGLE COMMODITY	DISCRIMINATED COMMODITIES	TONNAGE RECORDS	TERMINALS (Maintained on Routes)
A	---	furniture	yes(x)	yes
B	---	very light, bulky goods	yes	yes
C	Wool	---	no(x)	---
D	Rush Shipments	---	no	yes
E	---	---	---	yes
F	---	Bottled goods light cartons	no(x)	yes
G	Rush Shipments	---	no(x)	no
H	Wool	Furniture	no	yes
I	---	---	no	yes
J	---	---	no(x)	no
K	---	---	no(x)	yes
L	Rush Shipments	---	no(x)	yes
M	Wool	---	no(x)	no
N	---	---	yes	yes
O	Fruits and vegetables	---	yes	yes
P	Rush Shipments	---	no	no
Q	Rush Shipments	---	no	yes

Note: x means incomplete or very poor, if any.

TABLE G X (Cont'd)

COMPANY	COST PER TRUCK MILE	OPINIONS ON MOTOR REGULATION	
		Rate	Social
A	15¢ to 100¢	yes(x)	yes
B	---	no	no
C	---	no	no
D	21¢ E		
E	---	yes	no
F	35¢ E	yes(x)	no
G	---	no(x)	yes
H	---	yes	no
I	---	no	yes
J	5 ton 35¢ E 2½ ton 28¢ E	yes	yes
K	27¢ E	yes	yes
L	22¢ E	yes	no
M	15¢ E	yes	yes
N	19¢ E	yes	yes
O	28¢	no	yes
P	---	no	no
Q	---	no	no

Note: E, estimated, no cost studies available

x position not definite

TABLE G XI

1930

YEARLY TONNAGE AND EXPENSES OF A BOSTON COMPANY OPERATING SEVEN TRUCKS ON A FIFTY MILE ROUTE

TONNAGE

January	801.9 tons
February	754.7
March	880.0
May	785.0
June	731.5
July	753.1
August	641.7
September	804.3
October	868.9
November	649.5
December	609.9
Total	9151.8

Expenses 1930	$ 64,069	$ 7.00 / ton	35¢ / cwt.
Income	58,478	6.39 / ton	32¢ / cwt.
Loss	5,591	.61 / ton	3¢ / cwt.

YEARLY COMPARISON

YEAR	INCOME	EXPENSES	PROFIT OR LOSS	TONNAGE
1928	$68,885	$64,687	$ 4197	10,129
1929	66,119	68,366	2247 (L)	9,678
1930	58,478	64,069	5591 (L)	9,152

TABLE G XII

COSTS PER TRUCK MILE AS CALCULATED BY A BOSTON COMPANY OPERATING EXTENSIVELY OVER NORTHERN NEW ENGLAND

(Total expenses included)

MANUFACTURER	CAPACITY (tons)	COST PER MILE	MILEAGE OF STUDY
G M C	2	13.0 ¢	4591
International	2½	12.4 ¢	5124
International	2½	14.3 ¢	3835
Mack	2½	15.3 ¢	3945
Mack	2½	21.0 ¢	2575
Mack	2½	13.0 ¢	3814
Auto Car	2½	17.0 ¢	3445
Pierce Arrow	5	20.3 ¢	3000
Pierce Arrow	5	21.0 ¢	2610

TONNAGE ESTIMATE

The details of the estimate of the tonnage carried by motor truck between Boston and points beyond a 25 mile radius involved the following steps and data ;

(1) The Map of the Average Daily Flow of Commercial Vehicles over the Massachusetts Highways: on this map a circle of 25 mile radius was drawn about Boston Proper, and at the entrances and exits of the area enclosed, the numbers of vehicles were scaled. These numbers were considered as traveling to and from Boston, which is justified, since on the map, the narrowest portions of these route streams are at the outer edge of the area and the narrowest portion is the best representation of through traffic between any two points. Where the line crossed highways at intersections or within the limits of city congestion the numbers were scaled a sufficient distance outside to eliminate exaggerations. Thus the average daily commercial flow of vehicles to and from Boston for the month of August 1930 was obtained.

(2) The classification of commercial vehicles for the year 1930: from Table G VI trucks and trailers were found to be 97% of the total commercial registrations.

(3) The relation of the traffic of other months of the year to that of August. The gasoline consumption figures for 1930 by months were used as indices of the ratios of monthly traffic to that of August. The ratios and their application to the August Daily Flow figures are shown in Table G XIV.

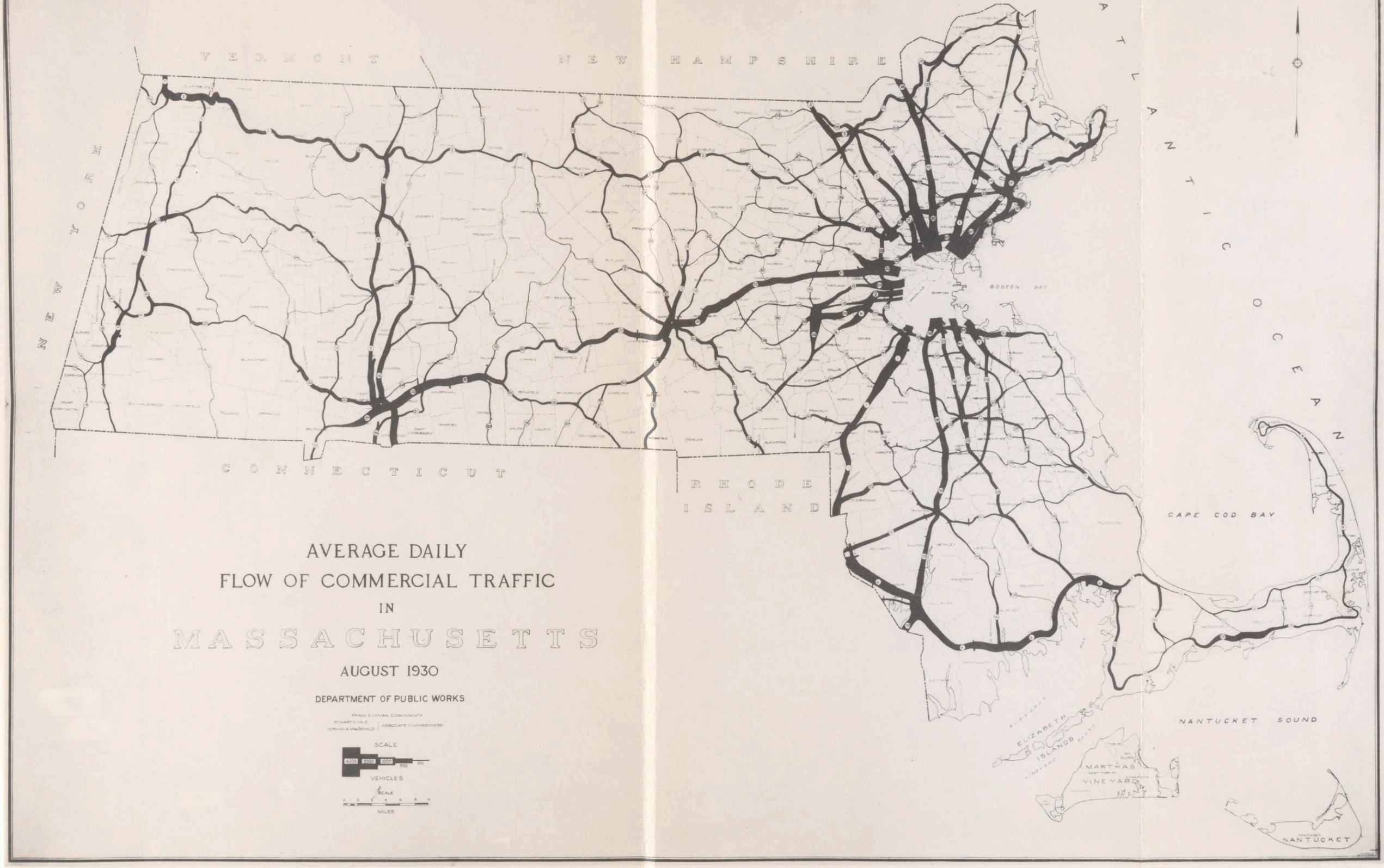
(4) A classification of truck registrations by capacities: tables G XV and G XVI were drawn from the records of the Cashier's office at the Massachusetts Registry of Motor Vehicles which is the only source of this material. There it is kept according to the fee paid, which is $1.50 per 1000 pounds of gross-loaded-weight with a minimum fee of $6.00. The data is also kept only in monthly records so that it was necessary to separate and change the form of the original data to correspond with the tabulations contained in the tables mentioned above. From these classifications and the corresponding

Reissue Registration classification the total gross-loaded-weight of all trucks, collectively, in Massachusetts was calculated, and from this, by dividing by the total number off truck registrations (excluding reissues) the average gross-loaded-weight of all trucks in the State was obtained.

(5) A relation between the average load per trip and the truck capacity; in order to obtain this a percentage figure was sought from the companies interviewed of the average load carried per truck per trip in terms of the registered capacity. The results of the investigation on this particular question were so unreasonable they were considered of no value, and an estimate of 50 % was made by the writers considering light bulky loads and empty return trips.

(6) A relation between the capacity and the gross-loaded-weight: observations of trucks used about Boston show that in every case the registered capacity is about equal to the tare weight. Therefore, 50% of the gross-loaded-weight has been adopted as the average capacity of the trucks registered in Massachusetts.

Fig. 21



AVERAGE DAILY FLOW OF COMMERCIAL TRAFFIC IN MASSACHUSETTS

AUGUST 1930

DEPARTMENT OF PUBLIC WORKS

FRANK E. LYMAN, COMMISSIONER
RICHARD K. HALE, HERMAN A. MACDONALD } ASSOCIATE COMMISSIONERS

SCALE

4000 2000 1000 500 100

VEHICLES

SCALE

0 1 2 3 4 5 6

MILES

TABLE G XIII

DAILY NUMBER OF COMMERCIAL VEHICLES ON ROUTES LEADING TO BOSTON

From Flow Map of Commercial Traffic Drawn up by the Mass. Dep't. of Public Works

Daily Flow, August 1930

ROUTE	NUMBER OF COMMERCIAL VEHICLES
127	600
22	300
1A	300
1	350
97	100
114	300
28	800
3B	350
3	400
4	400
2	200
111	100
62 plus 117	250
20	800
115	100
135	100
126	350
137	200
1	800
138	700
28	400
102	300
58	200
3	100
3A	100
Total	8600

These figures scaled from map at points 25 miles from Boston Proper.

TABLE G XIV

Since August is the peak period in highway transportation it is necessary to correct the average daily flow figures of August to more accurately represent the flow during the other months of the year. The ratios of monthly gasoline consumption to the August gasoline consumption were chosen for these corrections.

Month	Gasoline Consumption gal.	Ratio	Average daily traffic flow
Jan.1930	30,315,011	.544	4680
Feb.	29,883,808	.536	4610
Mar.	36,233,818	.650	5600
April	45,243,707	.810	6970
May	47,926,116	.860	7400
June	51,431,524	.923	7940
July	55,102,976	.980	8430
August	55,721,926	1.000	8600
Sept.	50,389,630	.904	7760
Oct.	48,021,835	.864	7420
Nov.	43,411,062	.779	6700
Dec.	41,648,128	.747	6440

The number of truck-days per year as stated by operating companies is 300. On this basis there are 25 truck-days per month.

Month	Commercial traffic per month No. Commercial Vehicles to and from Boston
Jan.	117,000
Feb.	115,250
March	140,000
April	174,250
May	185,000
June	198,500
July	210,750
August	215,000
Sept.	194,000
Oct.	185,500
Nov.	167,500
Dec.	161,000
Total	2,063,750

Trucks 97% of all Commercial Vehicles
No Trucks per Year 2,001,837

TABLE G XV

1930

TOTAL COMMERCIAL REGISTRATIONS

By Gross-loaded-weights and the Products of Registrations and Gross-loaded-weights

Gross Loaded Weights	No. of Registrations	G.L.W. x No. Reg. (1000 lbs)
4000 and under (Ave. 2000)	36,547	73,094
5000	13,630	68,150
6000	10,645	63,870
7000	7,828	54,796
8000	5,621	44,968
9000	2,956	26,604
10000	2,253	22,530
11000	1,527	16,797
12000	1,750	21,000
13000	1,442	18,746
14000	1,386	19,404
15000	1,097	16,455
16000	1,238	19,808
17000	941	15,997
18000	1,037	18,666
19000	826	15,694
20000	1,073	21,460
21000	591	12,411
22000	688	15,136
23000	434	9,982
24000	547	13,128
25000	411	10,275
26000	462	11,960
27000	359	9,693
28000	3224	90,272
Over (Ave.35000)	279	9,765
Total	98, 790	720 ,661

TABLE G XVI

COMMERCIAL REISSUE REGISTRATIONS
1930

By Total Gross-loaded-weights and the Products of GLW and Number of Registrations

G.L.W.	No. Commercial Reissue Reg.	G.L.W. X No. Reg. (1000 #)
4000# and under (Ave. 2000)	15,464	30,928
5000	323	1,615
6000	159	954
7000	113	791
8000	70	560
9000	58	522
10000	41	410
11000	48	528
12000	21	252
13000	38	494
14000	10	140
15000	25	375
16000	11	176
17000	9	153
18000	5	90
19000	11	209
20000	--	--
21000	9	189
22000	5	110
23000	4	92
24000	4	96
25000	11	275
26000	9	234
27000	4	108
28000	7	196
Over (Ave. 35,000)	5	175
	16,364	39,672

TABLE G XVII

CALCULATIONS OF MOTOR TRUCK TONNAGE ESTIMATE

Total gross-loaded-weight of all registered vehicles	720,661,000 lbs.
Increase due to reissues	39,672,000 lbs.
Total G.L.W.	760,333,000
Number of truck registrations	98,790
Average gross-loaded-weight per truck	7,640 lbs.
Average capacity (1/2 average G.L.W.)	3,820 lbs.
Average capacity (1/2 average G.L.W.)	1.909 tons.
Average load per trip (1/2 average capacity)	0.954 ts.
Number of truck trips per year	2,001,837
Total tonnage carried to and from Boston	1,912,000 tons

APPENDIX H

TRANSPORTATION RATES

APPENDIX H

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TABLE H I

TRUCK RATES

(Cents per 100 pounds. Quoted by the companies interviewed)

BETWEEN BOSTON AND LYNN
(12 miles)

Wool (in bags)	15¢	
Merchandise	12½¢	20¢

BETWEEN BOSTON AND LOWELL
(27 miles)

Cotton piece goods	20¢			
Wool (in bags)	15¢	25¢		
Chemicals	27½¢			
Merchandise	14¢	25¢	30¢	35¢

BETWEEN BOSTON AND LAWRENCE
(28 miles)

Cotton piece goods	25¢			
Wool (in bags)	25¢			
Chemicals	27½¢			
Machinery	25¢			
Merchandise	14¢	25¢	30¢	35¢

BETWEEN BOSTON AND NEWBURYPORT
(38 miles)

Wool (in bags)	25¢			
Merchandise	14¢	30¢	35¢	40¢

(Note: Merchandise is any heavy compact freight, weighing more than 15 lbs. per cubic foot)

TABLE H I (cont'd)

BETWEEN BOSTON AND PROVIDENCE
(44 miles)

Cotton piece goods	80¢		
Wool (in bags)	25¢		
Furniture	50¢		
Paper	20¢	25¢	50¢
Chemicals	18½¢	25¢	
Hides, leather, shoes	20¢	25¢	50¢
Brick, stone	10¢		
Machinery	50¢	100¢	
Merchandise	25¢	40¢	50¢

BETWEEN BOSTON AND WORCESTER
(45 miles)

Fresh vegetables	30¢		
Packing house products	25¢		
Sugar (packages or bags)	15¢		
Cotton piece goods	30¢		
Wool (in bags)	25¢	30¢	
Paper	25¢		
Chemicals	25¢	30¢	
Hides, leather	25¢		
Scrap leather	55¢		
Machinery	25¢	50¢	
Merchandise	20¢	25¢	40¢

TABLE H I (cont'd)

BETWEEN BOSTON AND FITCHBURG
(49 miles)

Wool (in bags)	25¢			
Paper	22¢			
Merchandise	20¢	28¢	30¢	

BETWEEN BOSTON AND MANCHESTER
(58 miles)

Fresh vegetables	50¢			
Butter	10¢			
Sugar	35¢			
Wool (in bags)	30¢	35¢		
Merchandise	37½¢	40¢	45¢	50¢

BETWEEN BOSTON AND SPRINGFIELD
(100 miles)

Fresh vegetables	35¢	40¢		
Packing house products	35¢			
Sugar	30¢			
Cotton piece goods	30¢	35¢	50¢	60¢
Wool (in bags)	30¢	35¢		
Lumber	50¢	60¢		
Paper	35¢	50¢		
Chemicals	35¢	50¢	60¢	
Hides, leather	35¢	50¢		
Machinery	35¢	50¢	100¢	
Merchandise	30¢	60¢		

BETWEEN BOSTON AND PORTLAND
(100 miles)

Fresh vegetables	40¢	
Packing house products	40¢	
Sugar	40¢	
Cotton piece goods	35¢	
Wool (in bags)	30¢	35¢
Paper	30¢	
Machinery	50¢	
Merchandise	40¢	60¢

BETWEEN BOSTON AND HARTFORD
(150 miles)

Fresh vegetables	50¢
Packing house products	40¢
Machinery	40¢
Merchandise	40¢

BETWEEN BOSTON AND NEW YORK
(250 miles)

Fresh vegetables	100¢		
Packing house products	100¢		
Sugar	85¢		
Cotton piece goods	100¢		
Lumber	143¢		
Paper	100¢		
Chemicals, leather	100¢		
Machinery	145¢		
Merchandise	65¢	100¢	115¢

TABLE H II

COMPARISON OF RAILROAD, STEAMSHIP, AND TRUCK RATES

BOSTON TO NEW YORK
(cents)

Class	1	2	3	4	5	6
Railroad class rates	66½	60	50	38	27½	22
Steamship " "	66½	60	50	38	27½	22
Representative motor truck rate			100			

BOSTON TO PHILADELPHIA
(cents)

Class	1	2	3	4	5	6
Railroad class rates	66½	60	50	38	32	28
Steamship " "	61½	56	47	35	30	27
Representative motor truck rate			150 to 200			

TABLE H II (Cont'd)

COMPARISON OF RAILROAD STEAMSHIP AND TRUCK RATES

BOSTON TO BALTIMORE
(cents)

Class	1	2	3	4	5	6
Railroad class rates	78	68½	58½	42½	36½	30½
Steamship " "	73	64½	55½	39½	34½	29

Representative motor truck rate 200 to 300

BOSTON TO PORTLAND
(cents)

Class	1	2	3	4	5	6
Railroad class rates	60	51	40	30	21	17
Steamship " "	60	51	40	30	21	17

(Steamship, anything higher than 5th class takes a blanket rate of 30¢ per hundred)

Representative truck rate 40

APPENDIX I

SOURCES OF INFORMATION AND DATA USED IN THIS THESIS

LIST OF SOURCES OF INFORMATION

Boston and Maine Railroad

Boston and Albany Railroad

New Haven Railroad

Boston and Maine Transportation Company

Eight Steamship Companies Operating in Coastwise Service

Twenty Boston Trucking Companies Interviewed Personally*

Thirty-five Boston Shippers Interviewed Personally*

170 New England Manufacturers Interviewed by Questionnaire*

National Association of Wool Manufacturers

National Association of Cotton Manufacturers

Associated Industries of Massachusetts

New England Traffic Club

New England Telephone Company

Motor Truck Club of Massachusetts

Massachusetts Registry of Motor Vehicles

Massachusetts State Highway Department

Office of the War Department at Boston

Port Authority Boston

Publications:

Report of the New England Railroad Committee 1931

Traffic Surveys of the U.S. Bureau of Public Roads

Others of Minor Importance

* Names were requested to be omitted.