

## STUDY OF CARTAGE COSTS IN THE CITY OF WASHINGTON.

DEPARTMENT OF COMMERCE,  
BUREAU OF THE CENSUS,  
*Washington, April 21, 1917.*

SIR: I submit herewith the results of the recent inquiry in regard to city cartage in Washington, D. C., made in compliance with your instructions, under the direction of Mr. Eugene F. Hartley, expert chief of division, of this office.

One of the most potent factors in the development and growth of a community or a nation, and in the bearing it has upon the daily life of the individual, is that of transportation. The problem of commodity transportation and distribution is one which, like most other problems of civilization, tends to increase in complexity with the social and industrial evolution of a commonwealth. The pioneer of a century ago produced nearly everything required to supply his simple needs—food, clothing, building materials, and fuel. In many cases he did his own blacksmithing, and sometimes even the shoe-making for his family as well. But as settlements sprang up near him, as villages grew into towns and towns into cities, he and his descendants came more and more to specialize on a few products, of which their output was much greater than their consumption, while of many commodities required to meet their increasing needs they produced none. Thus the matter of transportation and distribution has become of greater and greater importance, until at the present time all industrial activities are so closely linked up with it that the suspension of traffic for a single day would result in serious inconvenience to many, while its cessation for any considerable time would be tantamount to a national disaster.

A comparison of the proportions which the population residing in towns and cities of 8,000 and over represented of the total for the United States in 1810 and in 1910 shows strikingly the extent to which concentration in urban communities has taken place during the period of a century. In the earlier year only 4.9 per cent of the country's inhabitants lived in places of this size, whereas in the later year the corresponding percentage had increased to 38.8, nearly two-fifths of the total. Still more impressive is the change that has taken place during the period of only 30 years, approximately a generation. Between 1880 and 1910 the proportion which the urban

population of the United States—that is, the population in places of 2,500 or more—represented of the total increased from 29.5 per cent to 46.3 per cent. (The corresponding percentages for years prior to 1880 have not been calculated by the Census Bureau.) The urban population is everywhere growing at the expense of the rural. The demand for all classes of commodities, covering a far greater range than the demand of a century ago—for the luxuries of yesterday are the necessities of to-day—is continually increasing, and with it the problem of collecting them from producers, transporting them to centers of population, and distributing them to individual consumers.

In the study of municipal marketing alone much time and thought have been expended during recent years by commissions appointed by various cities for the purpose of devising methods of eliminating the inefficiency and waste which prevail to so great an extent in the distribution of foodstuffs from retailer to consumer, and which, in view of the rapid growth in urban population, constitute a factor of increasing importance in its relation to the transportation problem as a whole. It has been pointed out by these commissions that much remains to be done—in fact, in many cities very little has yet been accomplished—in providing adequate facilities for the distribution of food supplies and in bringing producer and consumer into closer touch. The following table, from statistics compiled by the Division of Statistics of Cities of the Census Bureau, throws some light on the lack of consideration given to markets by cities of over 30,000 inhabitants:

| YEAR.     | Total number of cities of 30,000 population and over. | NUMBER OF CITIES IN WHICH EXPENDITURES FOR MARKETS AND PUBLIC SCALES WERE— |                      |                     |
|-----------|---|--|----------------------|---------------------|
|           |   | Less than \$1,000.   | \$1,000 to \$10,000. | More than \$10,000. |
| 1906..... | 158   | 104  | 42                   | 12                  |
| 1910..... | 184   | 123  | 47                   | 14                  |
| 1915..... | 204   | 131  | 59                   | 14                  |

Thus it will be seen that in 1906 only about one-third of the cities of 30,000 population and over expended as much as \$1,000 on markets and public scales, and that in 1910 and 1915 the proportion had not materially changed.

Much careful thought has been given to the encouragement of farmers' markets as distinguished from those maintained by professional retailers and commission men. In reference to this one phase of distribution alone, it has been pointed out that more facilities are provided for the distribution of produce shipped into the cities than for that brought in locally. In other words, the expan-

sion of facilities for handling local produce has not kept pace with that of facilities for handling commodities brought in by freight.

A different phase of the problem is set forth in a study of the distribution of food supplies, made in 1912 by Hon. Cyrus C. Miller, then president of the Borough of Bronx, in which this example is cited: "Fish are brought in every day from New England to the freight terminal on the Harlem River, and because of the lack of marketing facilities must be loaded on a barge and taken down to the fish market to be sold there and be carted back uptown."

A comprehensive study of the entire field of transportation and distribution would cover such matters as rail and water routes, public highways, the location of manufacturing establishments with reference to the markets which they serve, etc. The results of such a study would be of great value in many ways, but no facilities are available for making it at this time. A highly important phase of the general subject, however, and one upon which practically no light of a statistical character has hitherto been thrown, is that of what may be termed "city cartage," that is, the local distribution, from retailer to consumer, of merchandise of all classes; and it is to this phase that the present investigation relates.

For several reasons it was deemed best to limit the inquiry to Washington, D. C. Chief among these is the fact that Washington is not an industrial community and therefore does a minimum of wholesale business, and, proportionally to the total, a maximum of retail business. In fact, no other city of its size in the United States would provide so suitable a field for an initial investigation of this nature.

It may be mentioned here that in the collection of these statistics considerable difficulty was encountered by reason of the reluctance shown by certain dealers in regard to supplying any data pertaining to their business. In the cases of some there was a feeling that figures given by them might in some manner become known to unauthorized persons, or that increased taxation might be based upon them. Others, and especially the smaller dealers, who as a rule had never before been called upon to furnish any data of this character to governmental agencies, were wholly unused to the idea of doing so, were even resentful that such a request should be made of them, and refused point-blank to comply with it. It is obvious, therefore, that before any general and complete investigation along this line could be made in any city or in any group of cities, it would be necessary to conduct a campaign of education or to secure the enactment of legislation to compel the giving of the information sought.

The data obtained by this inquiry—which, as already stated, related to Washington, D. C., only—pertain to the total delivery costs of the establishments canvassed, and include in some cases the cost of

wholesale as well as that of retail delivery. In the main, however, the figures given represent the cost of retail delivery.

The following table summarizes the results of the inquiry:

COST OF DELIVERY—ALL ESTABLISHMENTS CANVASSED: 1916.

| CLASS OF ESTABLISHMENTS OR COMMODITIES.                           | Number of establishments reporting. | Gross sales.       | COST OF DELIVERY. |                          |
|---|-------------------------------------|--------------------|-------------------|--------------------------|
|   |                                     |                    | Amount.           | Per cent of gross sales. |
| Aggregate.....  | 128                                 | \$32,826,402       | \$2,047,781       | 6.2                      |
| Merchandise, not otherwise specified.....                         | 20                                  | 13,086,095         | 244,803           | 1.8                      |
| Department stores, hatters and furriers, and shoe dealers.....    | 7                                   | 11,272,841         | 174,311           | 1.5                      |
| Establishment reporting maximum percentage for delivery cost..... | 1                                   | 4,083,000          | 71,123            | 1.7                      |
| Establishment reporting minimum percentage for delivery cost..... | 1                                   | 501,000            | 3,307             | 0.7                      |
| Furniture and carpets.....  | 8                                   | 1,384,183          | 39,443            | 2.8                      |
| Establishment reporting maximum percentage for delivery cost..... | 1                                   | 216,099            | 9,441             | 4.4                      |
| Establishment reporting minimum percentage for delivery cost..... | 1                                   | 35,040             | 754               | 2.2                      |
| Hardware.....   | 5                                   | 1,029,071          | 31,049            | 3.0                      |
| Establishment reporting maximum percentage for delivery cost..... | 1                                   | 145,982            | 6,270             | 4.3                      |
| Establishment reporting minimum percentage for delivery cost..... | 1                                   | 390,645            | 9,071             | 2.3                      |
| Food products.....  | 69                                  | 12,620,353         | 930,291           | 7.4                      |
| Meat products (wholesale only).....                               | 8                                   | 5,611,431          | 61,001            | 1.1                      |
| Establishment reporting maximum percentage for delivery cost..... | 1                                   | 707,194            | 13,131            | 1.9                      |
| Establishment reporting minimum percentage for delivery cost..... | 2                                   | 350,122<br>967,599 | 2,752<br>8,039    | 0.8                      |
| Bakery products.....  | 14                                  | 2,242,153          | 444,560           | 19.8                     |
| Establishment reporting maximum percentage for delivery cost..... | 1                                   | 450,000            | 117,407           | 26.1                     |
| Establishment reporting minimum percentage for delivery cost..... | 1                                   | 21,840             | 2,066             | 9.5                      |
| Dairy products.....   | 4                                   | 1,549,920          | 187,109           | 12.1                     |
| Establishment reporting maximum percentage for delivery cost..... | 1                                   | 150,000            | 19,500            | 13.0                     |
| Establishment reporting minimum percentage for delivery cost..... | 1                                   | 442,642            | 50,132            | 11.3                     |
| Groceries and meats.....  | 39                                  | 2,307,856          | 101,399           | 4.4                      |
| Establishment reporting maximum percentage for delivery cost..... | 1                                   | 18,500             | 1,517             | 8.2                      |
| Establishment reporting minimum percentage for delivery cost..... | 1                                   | 48,000             | 960               | 2.0                      |
| Ice cream.....  | 4                                   | 908,993            | 135,322           | 14.9                     |
| Establishment reporting maximum percentage for delivery cost..... | 1                                   | 126,041            | 50,416            | 40.0                     |
| Establishment reporting minimum percentage for delivery cost..... | 1                                   | 749,902            | 80,935            | 10.8                     |
| Seasonal commodities.....   | 8                                   | 2,299,791          | 459,640           | 20.0                     |
| Coal and wood.....  | 7                                   | 1,940,211          | 295,840           | 15.2                     |
| Establishment reporting maximum percentage for delivery cost..... | 1                                   | 860,000            | 166,000           | 19.3                     |
| Establishment reporting minimum percentage for delivery cost..... | 1                                   | 209,118            | 16,871            | 8.1                      |
| Ice.....  | 1                                   | 359,580            | 163,800           | 45.6                     |

## COST OF DELIVERY—ALL ESTABLISHMENTS CANVASSED: 1916—Continued.

| CLASS OF ESTABLISHMENTS OR COMMODITIES.                           | Number of establishments reporting. | Gross sales. | COST OF DELIVERY. |                          |
|---|-------------------------------------|--------------|-------------------|--------------------------|
|   |                                     |              | Amount.           | Per cent of gross sales. |
| Building materials.....   | 12                                  | \$1,561,369  | \$159,769         | 10.2                     |
| Brick.....  | 4                                   | 410,572      | 81,849            | 19.9                     |
| Establishment reporting maximum percentage for delivery cost..... | 1                                   | 251,519      | 67,821            | 27.0                     |
| Establishment reporting minimum percentage for delivery cost..... | 1                                   | 100,425      | 5,537             | 5.5                      |
| Lumber and planing-mill products.....                             | 8                                   | 1,150,797    | 77,920            | 6.8                      |
| Establishment reporting maximum percentage for delivery cost..... | 1                                   | 279,442      | 34,253            | 12.3                     |
| Establishment reporting minimum percentage for delivery cost..... | 1                                   | 239,441      | 8,482             | 3.5                      |
| Brewers and bottlers.....   | 8                                   | 1,413,366    | 152,800           | 10.8                     |
| Breweries.....  | 4                                   | 1,206,057    | 110,920           | 9.2                      |
| Establishment reporting maximum percentage for delivery cost..... | 1                                   | 130,816      | 18,567            | 14.2                     |
| Establishment reporting minimum percentage for delivery cost..... | 1                                   | 218,088      | 16,276            | 7.5                      |
| Bottlers of soft drinks.....                                      | 4                                   | 207,469      | 41,880            | 20.2                     |
| Establishment reporting maximum percentage for delivery cost..... | 1                                   | 23,652       | 5,853             | 24.7                     |
| Establishment reporting minimum percentage for delivery cost..... | 1                                   | 77,937       | 12,331            | 15.8                     |
| Laundries.....  | 6                                   | 477,237      | 72,800            | 15.3                     |
| Establishment reporting maximum percentage for delivery cost..... | 1                                   | 82,803       | 16,771            | 20.3                     |
| Establishment reporting minimum percentage for delivery cost..... | 1                                   | 73,584       | 7,600             | 10.3                     |
| Miscellaneous <sup>1</sup> .....                                  | 5                                   | 768,191      | 27,678            | 3.6                      |
| Establishment reporting maximum percentage for delivery cost..... | 1                                   | 19,000       | 3,800             | 20.0                     |
| Establishment reporting minimum percentage for delivery cost..... | 1                                   | 406,194      | 7,078             | 1.7                      |

<sup>1</sup> This group comprises 2 establishments dealing in plumbing and heating supplies; 1 establishment dealing in paints, oil, and glass; and 2 florists' establishments. These have been combined in order to avoid disclosing the amount of business done by individual establishments.

Of the 5,000 or more retailers shown by the classified business directory of Washington, 120 carefully selected dealers, representing 17 lines of retail business (some of whom did a wholesale business also), together with 8 wholesalers of meat products, were canvassed. For the entire number of establishments, the average delivery cost was equal to 6.2 per cent of the total gross sales.

Among the several classes of commodities sold at retail, the corresponding percentages ranged from 45 for ice to 1.5 for department-store merchandise. The lowest percentage shown for any class of commodities covered by the table was 1.1 for wholesale meat products.

The classes of commodities showing the highest five average percentages for delivery costs are: Ice, 45 per cent; bottled soft drinks, 20.2 per cent; brick, 19.9 per cent; bakery products, 19.8 per cent;

and laundered goods, 15.3 per cent. The classes for which the lowest three averages (exclusive of that for wholesale meat products) appear are: Department-store merchandise, 1.5 per cent; furniture and carpets, 2.8 per cent; and hardware, 3 per cent.

Among the individual establishments, the proportions which delivery cost represented of total gross sales ranged from six-tenths of 1 per cent in the case of a shoe dealer to 45 per cent in the case of the ice dealer.

The subject of milk delivery deserves special mention. Of the price paid for this commodity by the consumer, it is probably true that about 40 per cent represents profit and the cost of handling and distribution. Of this 40 per cent, the average cost of distribution or delivery would be from one-fourth to three-tenths, that is, from 10 to 12 per cent of the selling price. That a part of this cost is chargeable to the demand of the consumer for special service is the opinion of a prominent milk dealer, who states that, in addition to his three regular deliveries, he is forced to maintain three or more special deliveries, under penalty of losing his patrons.

Again, in certain sections milk must be delivered at the rear of some houses and at the front of others on the same street, thus necessitating long detours on the part of the driver or the operation of two wagons, one for front and one for rear delivery.

The effect of these factors on the cost of milk delivery is in some cases important. There is, nevertheless, a considerable waste in the delivery of this article of food, due to the large amount of duplication and interweaving of routes; and the opportunity for the introduction of economies through the combination and orderly arrangement of routes is probably greater than is afforded in connection with the delivery of any other important foodstuff. For this reason the establishment of central milk-supply stations has lately been under consideration in a number of municipalities.

The following table gives statistics as to delivery costs for certain groups of establishments dealing in groceries and meats, the grouping being based on amount of business done:

COST OF DELIVERY—GROCERIES AND MEATS: 1916.

| GROSS SALES PER ESTABLISHMENT. | Number of establishments reporting. | Gross sales. | COST OF DELIVERY. |                          |
|--------------------------------|-------------------------------------|--------------|-------------------|--------------------------|
|                                |                                     |              | Amount.           | Per cent of gross sales. |
| Total.....                     | 39                                  | \$2,307,856  | \$101,399         | 4.4                      |
| Under \$20,000.....            | 7                                   | 112,500      | 6,413             | 5.7                      |
| \$20,000 to \$30,000.....      | 4                                   | 93,903       | 4,370             | 4.7                      |
| \$30,000 to \$40,000.....      | 10                                  | 332,056      | 15,302            | 4.6                      |
| \$40,000 to \$50,000.....      | 8                                   | 343,115      | 15,336            | 4.5                      |
| \$50,000 to \$100,000.....     | 5                                   | 392,762      | 16,241            | 4.1                      |
| \$100,000 and over.....        | 5                                   | 1,032,920    | 43,737            | 4.2                      |

It will be noted that for the group of establishments having gross sales amounting to less than \$20,000 the cost of delivery was proportionally somewhat higher than for the rest, and that, in general, the cost of delivery tends to decrease, relatively to the amount of business done, as the size of the establishment increases.

The following table presents, for bakeries, statistics similar to those given in the preceding table for establishments dealing in groceries and meats:

COST OF DELIVERY—BAKERIES: 1916.

| GROSS SALES PER ESTABLISHMENT. | Number of establishments reporting. | Gross sales. | COST OF DELIVERY. |                          |
|--------------------------------|-------------------------------------|--------------|-------------------|--------------------------|
|                                |                                     |              | Amount.           | Per cent of gross sales. |
| Total.....                     | 14                                  | \$2,242,153  | \$444,500         | 19.8                     |
| Under \$20,000.....            | 3                                   | 40,827       | 6,164             | 15.1                     |
| \$20,000 to \$42,000.....      | 3                                   | 82,640       | 12,054            | 14.6                     |
| \$42,000 to \$60,000.....      | 3                                   | 144,240      | 24,864            | 17.2                     |
| \$190,000 to \$230,000.....    | 3                                   | 626,228      | 131,374           | 21.0                     |
| \$450,000 and over.....        | 2                                   | 1,348,218    | 270,104           | 20.0                     |

These figures indicate a tendency opposite to that shown in the case of grocers and meat dealers; that is, the cost of delivery is greater, relatively to the amount of business done, for the large establishments than for the small ones. The comparatively low cost shown for the smaller establishments is due in part to the fact that the proportion of the total output which is sold over the counter is greater for these establishments than for the larger ones. In fact some of the larger establishments sell no goods whatever over the counter.

ESTIMATE OF TOTAL CARTAGE COSTS FOR THE CITY OF WASHINGTON.

Hitherto in the consideration of cartage as a factor in the cost of commodities to the consumer, the discussion has related solely to that element which has been termed "distributing cartage." A number of other elements, one of which is probably as important as distributing cartage, must be taken into account in arriving at the cartage costs borne by a community. For want of better nomenclature these elements may be designated as follows: "Receiving or inward cartage," "shipping cartage," "general cartage," "freight," and "Government cartage."

1. *Receiving or inward cartage.*—This form of cartage comprises the haulage or drayage from the freight or other terminal to the mercantile establishment. Although in the case of a number of establishments from which inquiry was made it was found that

separate accounts for this form of cartage were not available, sufficient information has been obtained upon which to base an estimate that this element would be equal to about 5 per cent of the distributing cost for the city of Washington.

2. *Shipping costs.*—This covers charges on outbound express, freight, and parcel-post shipments made by retail and wholesale establishments. In the case of Washington this element is small as compared with distributing cartage, probably amounting to less than 2 per cent of the latter.

3. *General cartage.*—This element includes the transportation and delivery of goods by express companies; delivery by local express, transfer, and storage companies; and heavy hauling and drayage done by general contractors and others.

4. *Freight.*—This embraces all charges by railroads and steamboat lines on inbound freight. Next to the cartage costs of retail distribution, these charges probably add the greatest amount to the prices of retailed commodities. The aggregate rail-freight charges paid by the city of Washington during the calendar year 1916 amounted to approximately \$6,340,000, of which sum 86 per cent, or approximately \$5,450,000, represented inbound freight. The report of the Census Bureau on transportation by water for the year 1906, the latest for which figures are available, shows receipts of approximately 600,000 net tons of inward water freight at the port of Washington. Assuming an increase of 20 per cent during the 10 years from 1906 to 1916 (the population of Washington increased by a little less than 19 per cent during the decade 1900–1910), the inbound water freight in 1916 would amount to approximately 720,000 tons, which, on a basis of an estimated average rate of \$2.50 per ton,<sup>1</sup> would represent approximately \$1,800,000. The combined inbound rail and water freight charges would thus amount to about \$7,250,000.

5. *Government cartage.*—The sum total of cartage costs for Washington would not be complete unless the drayage done by Government-owned vehicles—which, of course, is in great measure peculiar to this city alone—were taken into consideration. In the 10 executive departments and about the same number of independent offices and commissions, there are in use 110 motor trucks and horse-drawn vehicles, constantly in service and manned by a considerably greater number of employees.

An estimate covering the foregoing items not only possesses much general interest but tends to bring home to the mind of the average member of the community some realization of the extent to which transportation charges enter into the cost of the commodities he purchases. Although the scope of the investigation was not broad

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<sup>1</sup> From records on file in the United States Engineer's Office.

enough to permit the collection of sufficient data on which to base an authoritative statement, nevertheless the information that has been compiled indicates in a general way the importance of the freight, express, and cartage elements in the cost of living.

*Estimated total freight, express, and cartage cost—Washington, D. C.: 1916.*

|   |             |            |
|---|-------------|------------|
| Distributing cartage—retail and wholesale establishments.....         | \$6,150,000 |            |
| Receiving cartage—retail and wholesale establishments.....            | 300,000     |            |
| General cartage:  |             |            |
| Express and baggage.....  | \$800,000   |            |
| Cartage contractors.....  | 750,000     |            |
|   |             | 1,550,000  |
| Shipping cartage (outbound), retail and wholesale establishments..... | 100,000     |            |
| Government cartage.....   | 200,000     |            |
|   |             | 8,300,000  |
| Total cartage.....  |             |            |
| Inbound freight:  |             |            |
| Rail.....   | \$5,450,000 |            |
| Water.....  | 1,800,000   |            |
|   |             | 7,250,000  |
|   |             | 15,550,000 |
| Total freight, express, and cartage charges for city of Washington..  |             | 15,550,000 |

Although, as already explained, data were secured for only 128 of the 5,000 or more wholesale and retail establishments in Washington, these concerns represent a far greater proportion of the total business done than of the total number of establishments. On the basis of the estimated purchasing power of the community, it is believed that the total gross sales of these 128 establishments represent approximately one-third of the aggregate amount of wholesale and retail business done in the city of Washington. This ratio, therefore, has been employed in estimating the total distributing-cartage cost.

In arriving at this estimate no attempt has been made to include cartage costs incident to the delivery of food supplies and other commodities brought into the market by farmers and truckmen from the surrounding country. This factor is not small, but for manifest reasons it was impossible to secure any data pertaining to it.

At the time the last census was taken, in 1910, the population of the city of Washington numbered about 331,000, comprising over 71,000 families (according to the census classification, which approximately, although not precisely, represents the natural family); and the increase which is estimated to have taken place since that year brings the total population and the total number of families up to approximately 364,000 and 79,000, respectively, in 1916. The estimated total transportation and cartage costs applying to commodities for public consumption in Washington, as shown in the

above table, would be \$15,250,000 (deducting the sum of the two items, "Shipping cartage (outbound)" and "Government cartage" from the total). This represents approximately \$40 for each individual, or \$190 for each family.

Respectfully submitted.

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To Hon. WILLIAM C. REDFIELD,  
*Secretary of Commerce.*

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