

## ORIGIN AND DESTINATION SURVEYS IN WEST VIRGINIA BY POST CARD QUESTIONNAIRES

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The first survey in West Virginia to determine origins and destinations of traffic by the post-card method as it was originated by Ohio was made in 1948 at Fairmont, a city with a population of about 30,000. The results of this survey were so satisfactory that three more surveys have since been made by the same method: in Bluefield, a city of about 22,000 in 1949; in Parkersburg, including an area with a population of about 40,000 in 1949; and in the Charleston-South Charleston area, with a population of about 100,000 in 1950. All of these surveys have proven eminently successful, in our opinion, in obtaining the information they were designed to obtain.

The limitations of this type of survey should be well pondered by anyone giving consideration before they commit themselves to it. It should be recognized that while the cost will probably be less than any other kind of survey as comprehensive, the data obtained will be in considerably less detail than the house-to-house interview type of survey, or the combination of the inner-parking area-outer cordon type of survey. Even the double cordon interview type of survey provides some kinds of information not possible to obtain by the post-card method.

But to obtain a reasonably comprehensive picture of origins and destinations of vehicular traffic, including all trips, without the necessity of obtaining details of parking habits, public transit traffic, the number of persons traveling, the purpose of trips, or hourly patterns of traffic, the post-card survey has a maximum of usefulness at a minimum of cost.

Aside from these differences in obtained information, as compared with other types of O & D surveys, the only significant difference is in the method of determining internal trips. The data on external trips, or trips made through or across a cordon line or other direct interview stations, are obtained by the usual method of roadside interviews, as in other surveys.

Assuming that the kind and extent of information obtainable by the post-card survey is sufficient for the purposes, the principal limitations and conditions to be considered about the method may be posed by the question: How accurate are the results?

The response to this question may, for the present, be another question: How accurate are the results of any O & D survey?

To what extent, for instance, can any compilations of origins and destinations of traffic, being based upon the sums of verbal or written reports of individual trips by individual persons during a 24-hr. period, be considered to be representative of the annual average daily transfers of traffic in any given area? We have heard of tests for probable accuracy having been made during the course of various O & D surveys by

statistical methods; but if there has ever been a repeat O & D survey which has verified the results of the original, it has not come to my knowledge.

The end purpose of any origin and destination study is, I believe, the determination of the major traffic patterns within such a reasonable approximation of the actual average day-to-day movements that any further increase in accuracy would not result in any significant changes in the location or design of a remedial facility. Screen-line checks showing an apparent verification within 90 percent of the counts have been secured by post-card questionnaires, and have been the rule rather than the exception. Such results logically focus attention toward the question as to whether other types of surveys costing considerably more than the post-card survey are justified unless the additional accuracy, if obtained, might be reflected in designs other than those predicated upon the data obtained by the post-card survey.

The method of sampling by post card is, of course, subject to some question, from the point of view of the classical statistician, but it is this writer's belief that this question should be examined somewhat more extensively before the method is discarded as lacking accuracy comparable to other surveys. In the post-card surveys made by the Ohio method, returns averaging 60 percent or more of the questionnaires have been readily obtained. The question of degree of representation of such a sample should be examined by actual comparison with some other method of survey which relies upon a sample of 10 to 15 percent.

Some study should be made to determine the critical area to be included in a zone and the relationship between the zone area and the population, or number of vehicles therein, found to be necessary to obtain the most accurate representation of the transfers of traffic.

There are other questions to be studied. For instance, in West Virginia it has been our experience that obtaining sufficient samples of travel by trucks is very difficult. We have made special efforts to overcome this deficiency by using direct-interview methods for vehicles owned by fleet owners but in this we have only been partially successful, and such methods still may be unrepresentative because there is yet a large number of independently owned trucks not sufficiently sampled.

Another problem is presented by the travel of vehicles, both passenger cars and trucks, which may be garaged within the area of this survey but with addresses of registration outside the area. Many of these are fleet-owned vehicles and in some sections they may represent a substantial part of the total travel.

One of the principal difficulties found in West Virginia's experience is that presented by probably unreliable registration lists. This is no fault of the Registration Bureau, which is unable to check the accuracy of addresses and has no legal authority to demand exact street addresses rather than post office boxes or general delivery addresses. As a consequence, in some of our surveys we have had a great many cards found to be undeliverable or returned as wrongly addressed for the vehicle represented.

There is one feature particularly necessary for the success of this survey in whatever community it is tried: it must have the popularity of public support. To secure this, more than for any other type of survey, it is necessary to publicize its execution by all available methods, following the theme that it is by, and for the eventual benefit of, the people to whom the questionnaires are addressed; that the degree of their

response will influence the accuracy of results. Each community presents its own peculiar problems and required methods in enlisting this support.

The necessity for this publicity feature will usually automatically solve one of the greatest problems so vexing to planners: the issue of getting the results of their survey accepted by the people of the community.

Many engineers have told me of having made traffic surveys and issuing factual reports only to have them laid up on the shelf, unaccepted as conclusive by the public, and hence of no benefit because the masses of citizens knew so little about them and therefore mistrusted the findings.

It has been our experience with the post-card surveys in West Virginia that, because of the publicity attendant upon their execution by which the citizens were persuaded to an interest sufficient to cause them to participate by voluntarily responding to the questionnaires, this interest usually led to general acceptance of the resulting data as factual and conclusive.

Our post-card survey at Charleston was a repeat. The first survey had been made in 1944 by the single-cordon interview method by which, although it omitted a considerable element of traffic, the data revealed for the traffic was technically accurate. But probably because it had been made without a campaign of publicity and participation by the local citizens, except those who were forced to stop and submit to interviews at roadside stations, its report was never fully accepted by the various organizations and public bodies to whom it should have been useful.

The repeat survey by the post-card method was made with the full participation of these organizations operating through a special central committee. The fact that an average of 60 percent of the post cards was returned indicates that the motor vehicle owners generally gave their support voluntarily, and as a result it is probable that the data and conclusions will be generally accepted. Such also was the case of the other surveys -- at Fairmont, Bluefield, and Parkersburg.

Other problems of lesser importance have arisen in connection with the surveys, of which lack of space and time allotted here prohibits full discussion. Nevertheless we in West Virginia think that the so-called controlled post-card method, as it was developed by Ohio, and as we applied it, is a reasonably good method and furnished more than its money's-worth in information.

Some data on costs of this type of survey as they were tabulated for the Charleston project are presented. The total cost of the survey was \$23,340.98, divided by items as follows:

1. Internal survey by post cards:	
Printing (25,000 cards) -	\$ 395.16
Postage (outgoing and returns) -	785.41
Preliminary work:	
(Searching addresses and addressing cards) <u>1</u>	3702.34
Zoning cards -	531.88
Field and office, zoning city and making maps -	473.33

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1 Owners of 2,378 fleet-owned trucks were solicited by personal call, by which trips of 1,971 trucks were returned. The cost of this included in the item of "searching addresses and addressing cards."

Table continued:

Analysis:		
Zoning trips -		\$ 334.85
I.B.M. -		129.00
Office work -		<u>278.34</u>
SUBTOTAL		6630.31
2. External Survey:		
Field (interviewers, supervisors and checkers) -		5202.49
Analysis:		
Zoning trips -		920.00
I.B.M. -		129.00
Office work -		<u>1700.17</u>
SUBTOTAL		7951.66
3. Density Counts:		
Field - checkers and counters -		3369.34
Office tabulations -		<u>954.50</u>
SUBTOTAL		4323.84
4. Preparation of report (Mapping, printing, etc.) -		2775.50
5. Overhead Expenses (General supervision, etc.) -		<u>1659.67</u>
GRAND TOTAL -		23340.98

There were 21,478 post cards mailed out, from which 11,745 usable returns were obtained.

Of the post cards returned the number of trips reported by each was as follows, in percentages of the total.

<u>Trips</u>	<u>Passenger Cars</u> Percent	<u>Trucks</u> Percent	<u>Total</u> Percent
0	15.5	20.7	15.8
1	0.6	0.8	0.7
2	17.1	16.0	17.0
3	5.7	5.1	5.7
4	17.2	13.8	16.9
5	7.8	6.5	7.7
6	10.9	7.6	10.6
7	6.0	4.0	5.8
8	6.1	6.4	6.1
9	4.5	4.5	4.5
10	5.2	6.2	5.3
Over 10	3.5	8.5	3.9

The analysis of the survey developed a total of 153,280 trips. These were composed of the following types:

<u>Type of Trip</u>	<u>Passenger Cars</u>	<u>Trucks</u>	<u>Total</u>
Through External	5,635	2,007	7,642
Other External	50,538	12,899	63,437
Internal	<u>65,565</u>	<u>16,636</u>	<u>82,201</u>
Total	121,738	31,542	153,280