

DISCUSSION  
ON  
TRAFFIC CENSUS

MR BURTON MARSH, *American Automobile Association*. It might be interesting to point out results of a limited analysis of this same matter made in Philadelphia in 1932. Eight hour traffic counts (7-11 A M and 2 30-6 30 P M) had been made for some 2,000 intersections. Also at several key stations, some 16 hour and some 24 hour counts had been made. It was realized that the man power required for keeping such a record up to date, year after year, was quite out of the question. Therefore, our Traffic Statistician analyzed the records for different one and two hour periods and for different types of districts. He found that there were differences throughout the hours of the day dependent upon the type of district. After many attempts to work out satisfactory factors, the study was stopped without a successful outcome. However, this analysis could *not* be considered as *definite* proof that satisfactory short-time count factors cannot be developed for a city like Philadelphia, for some of the counts were perhaps not accurately made. Many of the counts were made by unemployment relief workers, and while there was quite close supervision, it was probably not adequate at some intersections. I am confident that the analyses were sound, as they were made by a very competent statistician.

This illustration *does* indicate one of two conclusions (a) There are too many variables in a city like Philadelphia to develop satisfactory short-time count factors, or (b) The original field counts were not accurately made. (For example, the men may not have shifted their tallying at exactly the end of the specified half-hour periods, there may have been dishonest tallying, or certain observers may not have been able to "keep up" with the vehicular flow, and may have "estimated" certain heavy flows.) If this is true, it emphasizes the necessity of strictly accurate tallying as the basis for determining short-time count factors.

DETERMINATION OF TIME SAVED BY VEHICLES USING  
THE NEW JERSEY HIGH LEVEL VIADUCT

BY LAWRENCE S TUTTLE

*Assistant Highway Economist, U S Bureau of Public Roads*

[In Abstract\*]

This paper presents an estimate of the vehicle time saved annually by the recently completed viaduct between Newark and Jersey City, under present traffic conditions. Field studies were made before and

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after the opening of the viaduct by the Division of Highway Transport, Bureau of Public Roads, in cooperation with the New Jersey State Highway Commission

The viaduct completes the express highway from Elizabeth to the Holland Tunnel, which is one of the most heavily traveled routes in the United States. Traffic congestion on the old ground level route often reached serious proportions due to frequent opening of draw bridges and traffic at numerous intersections. Traffic counts indicated

DAILY TRAFFIC BEFORE OPENING OF VIADUCT (OLD ROUTE)—AT HACKENSACK RIVER BRIDGE

	Passenger cars	Light trucks	Heavy trucks	Total
Week days	28,970	3,780	4,650	37,400
Saturdays	35,710	2,385	2,705	40,800
Sundays and holidays	47,070	1,377	853	49,300

DAILY TRAFFIC AFTER OPENING OF VIADUCT (OLD ROUTE)

	Passenger cars	Light trucks	Heavy trucks	Total
At Hackensack River Bridge				
Week days	11,290	1,976	3,334	16,660
Saturdays	13,830	1,176	1,994	17,000
Sundays and holidays	9,940	352	308	10,600

Traffic diverted to the viaduct

Week days	17,680	1,804	1,316	20,800
Saturdays	21,880	1,209	711	23,800
Sundays and holidays	37,130	1,025	545	38,700

SUMMARY OF VEHICLE-MINUTES SAVED PER YEAR

	Minimum estimate	Maximum estimate
Passenger cars	47,407,000	57,445,000
Light trucks	3,521,000	4,833,000
Heavy trucks	3,744,000	3,827,000
Total	54,672,000	66,105,000

a total yearly traffic during 1932 at the Hackensack River bridge of 14,600,000 vehicles, with an average week-day traffic of 37,000 vehicles and average Sunday traffic of 50,000 vehicles

The trip time for vehicles on both the old and new routes was obtained by listing the vehicle license numbers at both ends of the route together with the time of passage to the nearest minute. Vehicles were classified as passenger cars, light and heavy trucks, light trucks being  $2\frac{1}{2}$  tons or less capacity

The viaduct cost \$19,300,000 Capitalizing this amount at six per cent would require the annual savings to be \$1,158,000 This would place a value of 1 75 to 2 12 cents on each vehicle-minute saved It is emphasized, however, that these estimates do not include all savings which may be credited to the viaduct There is a saving in travel distance and also an additional volume of traffic which previously avoided the old route on account of the congestion Traffic is expected to increase to a greater amount than the old route could have served

In discussion, Mr F LAVIS, *Consulting Engineer, New York* said

I think the value of these economic studies and their effect on the design cannot be too strongly emphasized and it seems advisable to further stress the fact that such studies have two distinct phases

First, the phase which governs the design of the *route*, that is, studies of the effect of the route, its length, freedom from delays, rise and fall, curvature, etc , on the operation of the vehicles which use it

Second, the phase which governs the design of the *structure* which carries the route

These two studies, while in a certain sense entirely separate and distinct, are in many other ways interdependent and must necessarily be considered together

The second of these two phases has been ably treated in a paper<sup>1</sup> by Mr S. S. Johannesson recently presented to the American Society of Civil Engineers The first was set forth in my own paper<sup>2</sup> presented to the same Society some three years ago

It is the first of these two phases to which Mr Tuttle calls attention in his reference to the economic problems which controlled the design of the route He has, however, confined his present studies to only one section of the project, that from mile 1 4 to mile 4 7, out of a total route length of about 13 miles and, further, these studies have been confined only to the economic value of time savings and do not take into account, except by passing reference, the not inconsiderable economic gain due to the savings in distance and other factors

Even on this particular section of 3 3 miles the saving in distance is some 4,000 ft which, from the character of traffic using this highway, indicates (see my paper above referred to) a justifiable expenditure of some \$25,000,000 to \$30,000,000 or considerably more than its actual total cost

Mr Tuttle is careful to point out that there are these other factors but I think there is some danger that his conclusion, "that in order to justify the construction of the Viaduct a vehicle minute must be

<sup>1</sup> Lincoln Highway, Jersey City to Elizabeth, N J Proc ASCE Nov 1933, p 1389

<sup>2</sup> Highways as Elements in Transportation F Lavis, Transactions ASCE Vol 95 (1931), p 1020

valued at 2 12 cents or 1 75 cents" may be lifted from its context, quoted elsewhere, and be thus misunderstood. It may, I fear, convey the inference that this structure or this project had not sufficient economic justification in as much as these values are too high.

I think that further attention might well be called to the fact, which is also parenthetically mentioned by Mr Tuttle, that economic justification of any route of this kind should be based on reasonable anticipations of traffic, or traffic capacity, and not necessarily on the traffic which may actually use it during the first few years after it is placed in service.

It would seem also that certain highway engineers have not yet entirely realized the fact that it is the capitalized value of the annual savings which determines the justifiable expenditure.

It is important also to bear in mind other characteristics of this whole 13 mile route which are not apparent on the Viaduct section. I refer particularly to the relief of congestion in the streets of the business, manufacturing and residential sections of Jersey City, Newark and Elizabeth.

In addition to the savings in costs of operation of vehicles actually using this route because of savings in time, distance, etc., which alone would have justified its cost, there is the vast relief and savings to the vehicles, merchants, manufacturers, industrialists and residents of these cities by taking this large volume of traffic off the streets which they require for use in their businesses and daily avocations.

It is almost impossible to estimate the money value of savings of this nature but my own opinion is that this also, by itself, would have justified the construction of this \$40,000,000 project.

Unthinking people have protested against the expenditure of this large sum of money by the State of New Jersey to help, as it has been stated, a lot of cars not registered in that State. The cities of Jersey City, Newark and Elizabeth are, however, large taxpayers and furnish a not inconsiderable part of the State revenue both on the basis of assessed values of real property and in contributions of motor vehicle and gasoline taxes, and they were entitled to this relief from the almost intolerable burden imposed on their streets by this through traffic. The construction of this route is a lasting and very substantial benefit to them as well as to the actual users of the new route.

MR S JOHANNESSON, *New Jersey Highway Commission*, said

There is no doubt that the results obtained give a true picture of the traffic conditions at the time the study was made, but owing to the effects of the present business depression, it is not believed that the results will represent the condition that will exist when we return to normal times.

The records of the bridge openings made during the period that the

traffic studies recorded in the paper were made, indicate that their number is only about 50 per cent of that which might have been expected in accordance with the trend shown for several previous years, and the records of the traffic volume on the highway indicate that this also was materially less than that which might have been expected in normal times

In order to get a proper picture of the economics connected with vehicle operation over the new high level viaduct as compared with travel over the old highway, it is necessary to make use of figures which will apply in normal times. When business conditions do improve, it is probable that the river traffic will be materially increased, resulting in an increase in the number of times that the highway traffic has to be stopped. This has an important bearing, because when the highway traffic is heavy, the total time lost is not proportional to the time the bridges are closed to vehicle traffic, but more nearly to the square thereof

It is possible to show that even at the present times, the amount saved in cost of vehicle operation by the vehicles passing over the new viaduct represents an interest on the capital invested of more than six per cent, but the actual savings will far exceed this amount when normal conditions return

The fact is that the new viaduct was built to relieve the traffic congestion that had developed on the old Lincoln Highway, a congestion that was becoming so serious that much transportation was diverted from this highway on account of the delays suffered. The construction of the new viaduct is a means of saving the increase in transportation cost on this account and this saving should properly be credited to its account

MR BURTON W MARSH, *Traffic Engineer, American Automobile Association, Washington, D C*, said

It seems to me that it would be of great interest to know three things about the 50 foot roadway on the viaduct. 1 How much use is being made of the middle lane? As I understand it, there are five 10 foot lanes. 2 How many accidents have resulted thereby? As I understand it, this is a high speed viaduct. 3 Is it considered by those present and other highway officials that a five lane width, meaning necessarily a third lane to be used only for passing or in one direction only, is a desirable arrangement for high speed arteries of that type