HOW THE PEOPLE USE THE ROADS[1]

NATHAN W. DOUGHERTY

THE UNIVERSITY OF TENNESSEE, KNOXVILLE

In 1900, there were practically no motor vehicles on the roads in Tennessee. The travel was almost 100 per cent horse drawn. In 1915, automobile travel had increased until it comprised approximately

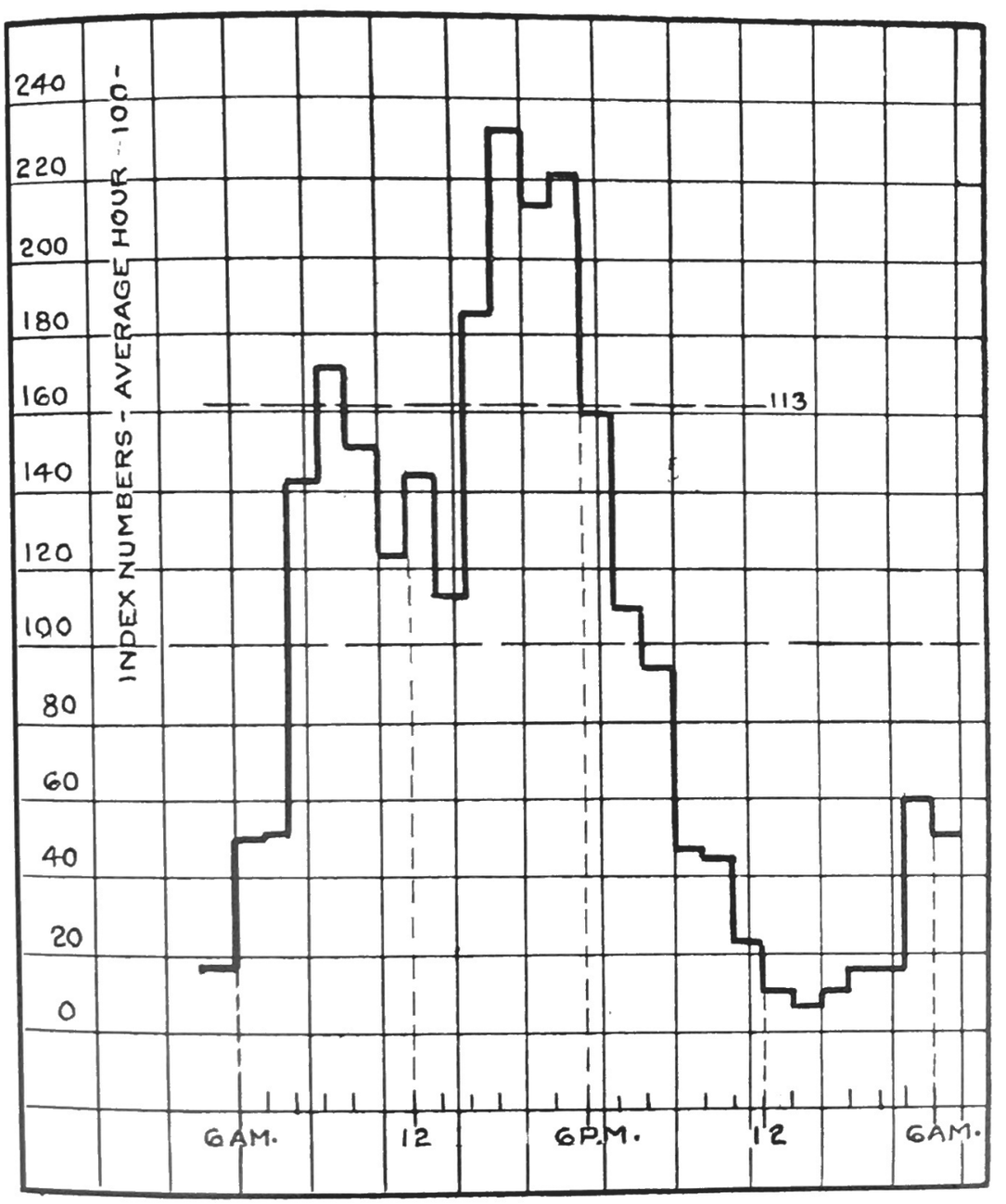

Fig. 1. Hourly Variations in Travel at a Typical Tennessee Highway Station.

50 per cent of the total. There was probably an increase in horse drawn travel from 1900 to 1915. By 1930, horse drawn travel had

[1]Read before the Tennessee Academy of Science at the Knoxville meeting, May 8, 1931.

actually decreased in volume and automobile travel had increased to from 95 to 100 per cent of the total. Some highways have less than 1 per cent horse drawn vehicles. In some of the remote agricultural areas, horse drawn travel may reach 15 to 20 per cent of the total.

Travel and Vehicle Registration

There is a very close relation between motor vehicle registration and travel on the highways. This is particularly true for the local travel. Our studies in Tennessee have indicated a close mathematical relation between motor vehicle registration in a tributary area and the number of vehicles using the highway per day. We have been able to use this relation to predict future use of the roads.

The foreign traffic is a law unto itself. No doubt, there is a relation between the number of vehicles crossing Tennessee and the number of vehicles registered in each state, but there seems to be no particular relation between the number of vehicles coming from Florida and the number coming from Wisconsin. Local traffic depends upon the condition of the roads and the number of vehicles available while tourist traffic depends upon topography, climatic conditions and places of interest.

The ownership of motor vehicles may be predicted with reasonable accuracy. In 1926, we made estimates of the motor vehicle registration in 1930 and missed the number about 5 per cent. As long as present conditions prevail, the registration for the succeeding years can be predicted with reasonable accuracy. Knowing the motor vehicle ownership, we are able to predict the use of the roads. If we double the registration in Tennessee, we will practically double the use of the public thoroughfares.

Variation in Travel

People are all creatures of habit and their habits are very similar. Early in the morning, there is a peak of travel in and near the cities as people go to their places of business. There is a fifteen minute period in each city which carries a peak traffic flow where the capacity of practically all of the main thoroughfares is reached. In some of the cities, for example in Washington, there has been an effort to relieve the congestion by staggering the opening times of several government offices.

On the open road, there are similar peaks. Where the road leads from farm to market, there are a number of vehicles on the highways approaching the market center to be ready for early customers. The peak, however, usually comes sometime after the daylight hours have begun. Usually, there is a peak of travel in the late afternoon and since there is such a peak, it is the most dangerous time to travel. Accident reports show that between 5:00 in the afternoon and 8:00 in the evening we have the greatest number of accidents. Drivers are usually tired and there is a change from daylight to darkness changing

Fig. 2. A Beautiful Cement-Concrete Pavement between Waverly and Trotter's Landing Bridge, Humphrey County (U. S. Highway No. 70). Published through the courtesy of the Tennessee State Highway Department.

the visibility. As a consequence, there are more accidents and, therefore, more fatal injuries, at that time. The maximum hour during the day is usually about 75 per cent above the average hour.

Improvement of the highways makes them safer and more convenient for night travel. In Tennessee and elsewhere, night travel has grown greatly during the last ten years. At the present time from

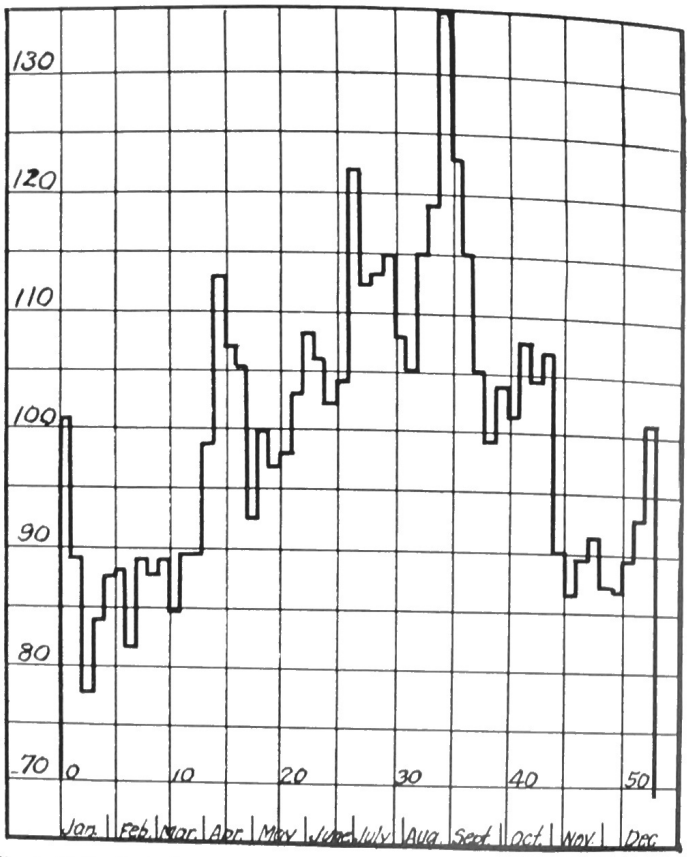

Fig. 3. Daily Variations in Travel at a Typical Tennessee Highway Station.

6:00 p. m. to 6:00 a. m. there is about 40 per cent of the travel that occurs from 6:00 a. m. to 6:00 p. m.

Not only is there variation in traffic during the hours of the day but there is a change in flow during the days of the week. In Tennessee, Sunday is the peak day. Fortunately, the travel on Sunday is of a different make-up from the general week-day travel. On the

Fig. 4. An Excellent Asphalt-Surfaced Road on a Cement-Concrete Base, between Nashville and Lewisburg, Davidson County (State Route No. 11). Published through the courtesy of the Tennessee State Highway Department.

Fig. 5. A Stretch of Cement-Concrete Pavement near Lavergne, in Davidson County (U. S. Route No. 70). Published through the courtesy of the Tennessee State Highway Department.

main thoroughfares, 97 per cent of the Sunday travel is from passenger automobiles. Since most of the vehicles have similar speeds and the drivers have similar desires, the capacity of the highway is greatly increased. Where there is mixed travel, such as horse drawn vehicles, heavy trucks, light trucks, flivvers, and real automobiles, there is conflict in use and therefore a decrease in capacity. In Tennessee, the Sunday travel is usually 50 per cent higher than the average for the week.

As might be expected, there is a great difference in travel for the months of the year. February is the low month and August is the high month. The maximum week in Tennessee is usually about the third or fourth week in August. At that time of the year, people are on vacations, the weather is warm and those who are at home are seeking pleasure and recreation by daily rides on the highways. In Tennessee, August is about 35 per cent higher than the average month for the year. February is usually 50 to 60 per cent of the average for the year.

Origin

On most of the public thoroughfares, the traffic is essentially local. Highways in Tennessee show about 85 per cent of the travel from the county in which the road is located or the adjacent counties. The remaining 15 per cent is from the remainder of the state and from anywhere else in North America. Near the larger cities, the local traffic has an even greater significance.

A number of years ago, A. M. Wellington, in discussing the origin of freight for railways, pointed out that the ability of a station location to attract freight varies as the square of the distance from the origin of the freight. In Tennessee we have made a number of counts of foreign cars noting their origin. For the shorter distances, there seems to be a relation between distance and the number of vehicles. Our curves indicated approximately the same relation that Mr. Wellington found for freight haulage. Up to 800 miles, the number of vehicles varies approximately as the square of the distance. This statement, of course, must be modified by topographical barriers. There is a stream of traffic having its origin in New England, New York and the Atlantic Seaboard, running down through Tennessee and west through Texas, Oklahoma and California. We find a large number of motor vehicles in Tennessee from the states in this area. There is another stream of travel from the middle west south, crossing Tennessee in a north and south direction. Kentucky, Ohio, Indiana and Illinois lead this procession. When we cross the Mississippi River into Iowa, Minnesota, Kansas and the Dakotas, we find practically no travel from this source in Tennessee. The Mississippi River intervenes and the Ohio offers a barrier. Florida and Wisconsin are about the same distance from Tennessee yet the number of vehicles from Florida is probably 100 times the number of vehicles from Wisconsin. Apparently, the people in Wisconsin are slow to hear of the virtues of travel across Tennessee.

Fig. 6. A Portion of the Indian Gap Road in the Picturesque Great Smoky Mountains. Published through the courtesy of the Tennessee State Highway Department.

Fig. 7. A Beautiful Curve for the Motorist. Note the center line, the guard rail, and the visibility. Published through the courtesy of the Tennessee State Highway Department.

Distribution on the Roads

There is probably no average driver in the United States but the habits of the composite driver can be well defined. If, for example, a group of automobiles stop at a railway grade crossing and start again, it will take a number of miles to get them out of platoon formation. If the road is carrying 30 per cent of its capacity, the platoons may continue almost indefinitely. This is especially true if the speed of the leading vehicle is between 30 and 35 miles per hour. The others fall in line and continue at this speed.

All drivers have the same fear of the curbs and shoulders. Highway engineers have constructed the modern pavements so that there is no inconvenience in traveling on any part of the road surface. Still, there is an overwhelming preponderance of travel toward the middle of the road. We have observed on the four-lane road the cautious drivers hugging the center line as if there were sudden death in the outside lane. This habit, however, may be overcome by traffic officers on the road to give traffic instructions.

We are living in a motor age where thousands of automobiles, driven by persons having similar habits and similar tastes, travel the roads. They travel in groups. They take similar hours of the day and the same days of the week, filling the roads to capacity at one time and leaving them practically empty at another. As business and commercial travel increases, there will be a tendency to level up the variations that exist at the present time.

TENNESSEANS AT THE A. A. A. S.

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An Outline of Irish and Sweet Potato Certification Procedure in Tennessee, before the American Association of Economic Entomologists.

Several Vanderbilt men presented papers at this time. From the School of Medicine, Karl Mason read a paper on *Can Ferrous Iodide Replace Vitamin A in the Diet,* and E. T. Ellison on *The Oestrous Cycle in Vitamin A-Deficiency,* before the American Society of Zoologists. William W. Frye and Henry E. Meleney—also from the School of Medicine—read a paper before the American Society of Parasitologists, on *A Survey of Flies, Pigs, Fowls, Rats, and Mice in a Rural Community for the Intestinal Protozoa of Man,* and H. W. Brown, before this same organization, *Clinical Experiences with Hexylresorcinol against Ascaris, Hookworm, Trichuris, Enterobius and Taenia.* Other departments of Vanderbilt were also well represented. George R. Mayfield had a paper on the program of the Wilson Ornithological Club on *Present Status of the Nesting Warblers of Tennessee;* Lyle H. Lanier of the Department of Psychology, had a paper on *An Experiment in Cutaneous Denervation,* before the

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