The Effect Upon Indiana Speeds of the Lifting of Gas Rationing

W. B. Wilson
Graduate Assistant, Joint Highway Research Project
Purdue University

This paper concludes the co-operative investigation of "Wartime Traffic Speeds in Indiana." The chief purpose of the paper is to show the speed trends during 1944 and early 1945, and immediately after the end of the war in August, 1945. At the 1943 and 1944 Road Schools, papers were presented by Mr. R. E. Frost, Research Engineer, Joint Highway Research Project, showing the trends of wartime traffic speeds in Indiana during 1942 and 1943. This paper, then, will finish a complete cycle of traffic speeds from peace time through a period of gas and tire rationing and war, back to peace time with no restrictions.

The data for these studies have been collected on U. S. 52, generally in the vicinity of Lafayette; but check data collected in many sections through the state have agreed so closely with those collected here at Lafayette that it can be assumed that this is a true picture of what is happening over the entire state.

For the benefit of those who have not seen Mr. Frost's report on traffic speeds before the war and during 1942 and 1943, it will be reviewed briefly.

The speed limit in Indiana before the war was restricted to "a reasonable speed." No speed limit, voluntary or enforced, was in existence before March 18, 1942. A study of the average speeds of automobiles and trucks before this time showed that 2,719 automobiles averaged 49.56 m.p.h. and 1,109 trucks averaged 41.20 m.p.h.

After March 18, 1942, came the various periods of voluntary speed limits and enforced speed limits. From March 18, 1942, until July 25, 1942, a voluntary speed limit of 45 miles per hour was asked by the President in order to conserve rubber and gasoline. During this period 6,288 cars averaged 49.92 m.p.h. and 1,501 trucks averaged 41.58 m.p.h. As can be seen, this is a slight increase over the pre-war speeds, showing that the voluntary speed limit did not have the desired effect.

From July 25, 1942, until September 30, 1942, a 40 m.p.h. speed limit was imposed. During this period 2,538 cars averaged 46.74 m.p.h. and 811 trucks averaged 40.26 m.p.h. It is well to show here the differ-
ence in speed between Indiana cars and foreign cars. Of the total number of cars clocked 1,653 were Indiana cars, which averaged 45.62, and 885 were foreign cars, which averaged 48.82. This speed limit had the effect of lowering the average automobile speed approximately 3 m.p.h. and truck speeds 1 m.p.h. from pre-war speeds.

On October 1, 1942, the O.C.D. established a nation-wide 35 m.p.h. enforced speed limit, and this continued throughout the war. Gasoline was not rationed in Indiana until November 30, 1942; so the period from October 1, 1942, until November 30, 1942, is considered as a separate period influencing traffic speeds. During this period cars averaged 42.32 m.p.h. and trucks averaged 39.78, a reduction of 4.42 for automobiles and 0.48 m.p.h. for trucks from the 40 m.p.h. speed limit period. The foreign cars, while included in the above-given car average, still maintained a higher average than the Indiana vehicles. Their average was 44.88 m.p.h., while local or Indiana cars averaged 41.38 m.p.h.

With the advent of gas rationing on December 1, 1942, a new speed-influencing period was begun. Attached to this report are several graphs showing the speeds during the different gas-allotment periods, but for simplicity these have been combined into one period covering the time from December 1, 1942, to January 10, 1944. The speeds of 4,964 automobiles, 2,100 trucks, 3,954 Indiana cars, and 1,010 foreign cars were recorded during this time with the following results:

All cars averaged ............................................42.60 m.p.h.
Trucks averaged ...............................................39.71 m.p.h.
Indiana cars averaged ....................................41.80 m.p.h.
Foreign cars averaged ......................................46.59 m.p.h.

This concludes the report as given by Mr. Frost. As a means of comparing the speeds during the first two years of the war, it will be well to consult Table I and the figures in his paper (pages 94-111, Proceedings of the Thirtieth Annual Road School, 1944).

It will be noted from this table that, during the first two years of the war, the speeds of all cars were reduced from 49.56 m.p.h. to 42.60 m.p.h., a reduction of 6.96 m.p.h. and that truck speeds were reduced from 41.58 m.p.h. to 39.71, a decrease of 1.87 m.p.h. While automobile traffic speeds showed a slight increase during 1943 over the previous period, the trucks, although not decreasing their speed as much as the cars, showed a slight decrease during every period.

The period from January 10, 1944, to August 15, 1945, is the next period into which the survey is divided. During this period gas rationing stayed rather stable; more of the traffic was of an essential nature,
cars and tires were wearing out, and a fewer number of people were traveling. During this period 4,134 automobiles were checked (3,563 Indiana and 571 foreign) and 1,433 trucks were clocked. The maximum speed clocked was an Indiana car, which was traveling 79.2 m.p.h.; the fastest foreign car was traveling 72.5 m.p.h.

The average speeds during this period were as follows:

- All cars averaged ............................................43.40 m.p.h.
- All trucks averaged ..........................................39.91 m.p.h.
- Indiana cars averaged ......................................42.53 m.p.h.
- Foreign cars averaged ......................................47.80 m.p.h.

Comparison of these speeds with those of 1943, or the previous period, shows that all cars increased their speeds from 42.60 m.p.h. to 43.40 m.p.h., and that trucks increased theirs slightly from 39.71 m.p.h. to 39.91 m.p.h. Indiana cars increased their speed from 41.80 m.p.h. to 42.53 m.p.h. and foreign cars from 46.59 m.p.h. to 47.80 m.p.h.

It is, of course, impossible to evaluate entirely the reason for this slight increase in all types of traffic, but possibly it can be explained by the fact that most of the automobiles still in use were of the "essential" variety and these drivers could either obtain new cars or replacements for tires as well as extra gasoline allotments. This, of course, does not mean that only this type of automobile was traveling, but enough of this type was on the road, and at an increased speed, to raise the average of the slower vehicles above the previous average.

On August 15, 1945, gasoline rationing was lifted and a study was begun to find the effect of this on the traffic speeds. Generally speaking, the public as a whole had become accustomed to slower driving speeds and was fully aware that its automobiles were wearing out and could not stand the dangers of high-speed traveling. In the survey that started on August 15, 1945, and continued through October, 1945, an increase in volume of traffic was noted. People who had stored their cars, or who had not driven because of lack of gasoline or for purely patriotic reasons, wanted to take a drive again and did. No figures are given on this increase, but it was noted simply that, during a day's survey, more vehicles were clocked than at the same location before the war's end. During this period 1,710 cars and 286 trucks were clocked. Of the 1,710 cars, 1,028 were Indiana and 682 were from out of state. Their speeds were as follows:

- All cars averaged ..............................................45.50 m.p.h.
- All trucks averaged ..........................................39.43 m.p.h.
- Indiana cars averaged ......................................44.30 m.p.h.
- Foreign cars averaged ......................................47.28 m.p.h.
Maximum speeds recorded were 69.0 m.p.h. for Indiana cars and 71.0 m.p.h. for foreign cars.

The averages for this period show an increase of 2.10 m.p.h. for all cars but a decrease of 0.48 m.p.h. for trucks. Indiana cars increased their speed 1.77 m.p.h., but foreign cars decreased their speeds 0.52 m.p.h. These latest averages still leave automobile speeds 4 m.p.h. below pre-war speeds and truck speeds 1.77 m.p.h. below.

In a study of this nature, into which the human element enters to a large degree, it is impossible to make predictions for the future; but it is the belief of the writer that with tires once more available and new cars on the market, speeds will rise to at least a pre-war level and, in some cases, will exceed it.

**Additional Activities in the Traffic Field**

The war being over and an increase in the flow of traffic expected, the Joint Highway Research Project has undertaken further activities in traffic research. Studies in lateral placement on highways, of effects of concrete widening, of acceleration and deceleration at intersections, of driver reaction to signs, and of other phases of traffic are planned.

The photo-velaxometer developed in the Joint Highway Research Project Laboratory is well adapted to all these studies. More than one characteristic may be observed at a single spot on the highway, as is the case with the intersection study of U. S. 52 and U. S. Business 52 from Lafayette. Here the speeds of cars traveling through the intersection were recorded as well as the acceleration of cars turning right into the through highway.

The study of lateral placement of vehicles, that is to say, their distance from the edge of the pavement, can be a valuable aid in determining width of bridges, deceleration or acceleration lanes, and the effect of two-way traffic interference. A start in this direction has been undertaken with two days of study, mainly to determine the limitations and find the most efficient means of obtaining accurate results. One day was spent in finding the lateral placement of vehicles on an ordinary 18-foot concrete pavement, while the other was taken at a spot where 2' 3" widening had been placed on both sides. The study, even in an experimental sense, was a success in that comparable results were obtained for these types of pavement.

The results of the study on the 18-foot pavement showed that all single-tired vehicles traveled within 3' x 6" of the pavement edge, with 97.2% of these traveling 1' 6" to 3' 0" from the edge. This means that on an 18-foot pavement the left wheels of the vehicle are very close
to the center line. On the 18-foot concrete pavement widened 2' 3" on each side all the single-tired vehicles traveled within 4' 6" of the pavement edge. In this particular study, none of the cars used the 2' 3" widening; but the widening did have the effect of bringing the traffic closer to the edge of the original pavement. This traveling 4' 6" from the edge on the widened lane means that they were 2' 3" from the edge of the original pavement as compared to 3' 6" on the unwidened pavement. This means that the clearance between vehicles at the centerline is increased about 2' 6". Dual-tired trucks traveled closer to the edge than the cars, and 39% of them utilized the widening.

The feasibility of using deceleration or sleeper lanes and acceleration lanes at intersections of important highways is a problem that is open to much discussion. At the intersection of U. S. 52 and U. S. Business 52 in West Lafayette, a study was made of the use of the sleeper lane erected here for use of drivers making righthand turns, and a speed pattern was plotted of their acceleration after turning on to U. S. 52.

In a one-day survey it was ascertained that, of the total cars using this intersection, 65% made righthand turns from U. S. Business 52 on to U. S. 52. Of the cars making a righthand turn, 84.5% used the sleeper lane. A speed trap 700 feet long was erected to determine the acceleration of these automobiles and also to get the speeds of the through cars on U. S. 52. The average speed in the first interval of the trap was 19.64 m.p.h., and this increased through succeeding intervals until it reached 32.16 m.p.h. in the last interval, which was 600 feet from the point at which the vehicle was at a complete stop. The average speed of through cars at this point on U. S. 52 was 45.0 m.p.h. for that day, thus showing that the vehicles had not attained their cruising speed at that distance. There is no acceleration lane here, and the automobile that makes a right turn here enters a through traffic lane; so it would be interesting to compare these data with those taken on an existing acceleration lane. However, no such data are available at present, but it is planned to make this study in the near future.

A study of the effect of a narrow bridge upon the speed of vehicles was made at the truss bridge one mile east of Templeton on U. S. 52. This bridge, being 4 feet narrower than the adjoining pavement, presented an excellent opportunity for a study of this nature. The east approach was selected for this study. Since on this side the bridge is approached on a long downhill grade, higher speeds than normal were obtained. The speed trap was set up with the first interval 650 feet from the bridge and the last interval 50 feet from the bridge. It was decided to class the vehicles into two categories—those with no inter-
ference from approaching vehicles and those which were interfered with by vehicles approaching from the opposite direction.

The speed pattern for both types was a fluctuating one, with the cars interfered with averaging about 2 m.p.h. less than those not interfered with.

To give you an idea of the fluctuating speeds, the averages of the through cars in the seven intervals of the trap were 54.67, 49.16, 51.92, 50.33, 53.00, 46.68, and 49.84, while the averages for the cars interfered with were 52.23, 47.15, 49.46, 48.18, 49.20, 44.67, and 47.46.

These speed patterns give an indication of the reaction of a driver as he approaches an obstruction such as a narrow bridge. It will be noted that the reactions of drivers of both types of vehicles were the same, but that the speed of those interfered with was lower.

Intensive studies by the Joint Highway Research Project on these different phases of traffic are planned in the near future, and it is hoped that they will aid engineers in designing safe, economical, and efficient highways in the future.