

Indiana Traffic Speeds 1942-1952

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As part of its routine service to the Indiana State Highway Commission, the Joint Highway Research Project conducts periodic observations of motor vehicle operating speeds at selected rural locations in the state. This paper is the fifth traffic speed paper to be presented before a Purdue Road School audience. The previous papers were presented in 1943 and 1944 by R. E. Frost, entitled "Indiana War Time Traffic Speeds"; in 1945 by W. B. Wilson, entitled, "Effect of Lifting Rationing Restrictions on Traffic Speeds"; and in 1947 by W. S. Quimby, entitled, "Present Trends in Traffic Speeds."

Before discussing Indiana traffic speeds in the 10 year period from 1942 to 1952, two questions should be considered, namely (a) "Why are speed studies conducted?" and (b) "How is speed data obtained?"

REASONS FOR CONDUCTING SPEED STUDIES

Motor vehicle speed studies are conducted for many purposes. Included among these are periodic studies to establish speed trends which are then used as an aid in designing new facilities and modernizing existing ones. For a given location, speed data may be used to aid in determining whether or not prevailing speeds are too fast or too slow for conditions; to aid in the determination of whether some sort of traffic control device is necessary in a given situation and if so what type of traffic control device should be employed and how it should be located; to aid in planning an enforcement program; and to aid in evaluating the need for street or highway illumination.

For example, suppose that numerous complaints have been received by a traffic authority about high speeds on a road that intersects with a heavy traffic artery. Upon investigation it was found that there have been several costly collisions at this intersection in the last few years.

Before the traffic authority can attempt to remedy the situation, it must first determine if excessive speeds are present and if so how

high and how often do they occur. Therefore a speed survey is conducted on the approaches to the intersection. At the same time, the traffic control devices, if any, currently being utilized are observed and the physical condition of the intersecting streets and the intersection is noted.

After thorough study it may be found that excessive speeds are not the major problem but for the purposes of illustration let us assume that unreasonably high speeds are found to occur frequently. Then utilization of a traffic control device may be warranted.

If signs are used, the proper location of direction or warning signs must be based on the stopping distances of vehicles at the observed speeds. If signals are used, they may have to be integrated with other signals in the neighborhood and again warning signs might have to be properly placed. Here again speed data is necessary.

Speed limits may have to be established or existing ones may have to be changed or it might be necessary to revise the enforcement program. Many authorities believe that 85 percent of the vehicle operators generally do what is safe. Thus at any given location the 85th speed percentile, or in other words, the speed which is not exceeded by 85 percent of the motorists at the location is often used in determining the safe operating speed and new speed limits for that street or highway.

METHODS OF OBTAINING SPEED DATA

To answer the second question of how speed data is obtained, many techniques and devices have been developed to obtain information on motor vehicle speeds. The simplest and most economical of these utilizes a system of mirrors whereby an observer with a stop watch can time a vehicle traveling a given distance between the two mirrors.

Other methods include the constant speed motor automatic timer, which is basically an electric stop watch, and the electronic meter type. Both of these apparatus require the use of pneumatic rubber tubes with air switches or electric contact strips as detectors to start and stop the measuring operation.

The electronic meter apparatus employs a constant source of electric power. Activation of the first switch allows the electric current to flow into a condenser. When the vehicle activates the second switch the flow of current stops. Thus, the longer it has taken the vehicle to travel between the two tubes, the more electrical current will be stored in the condenser. If the tubes are always placed the

same distance apart, the electric meter dial can be calibrated directly in miles per hour.

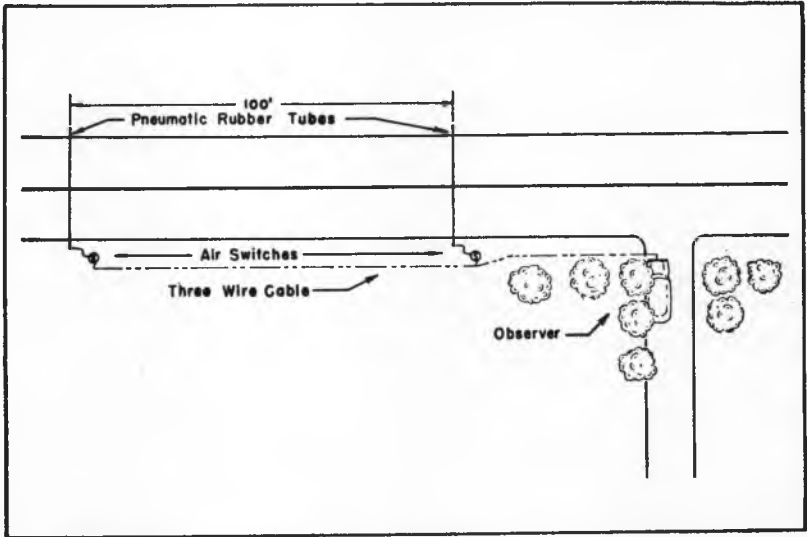


Figure 1. TYPICAL SPEED OBSERVATION STATION

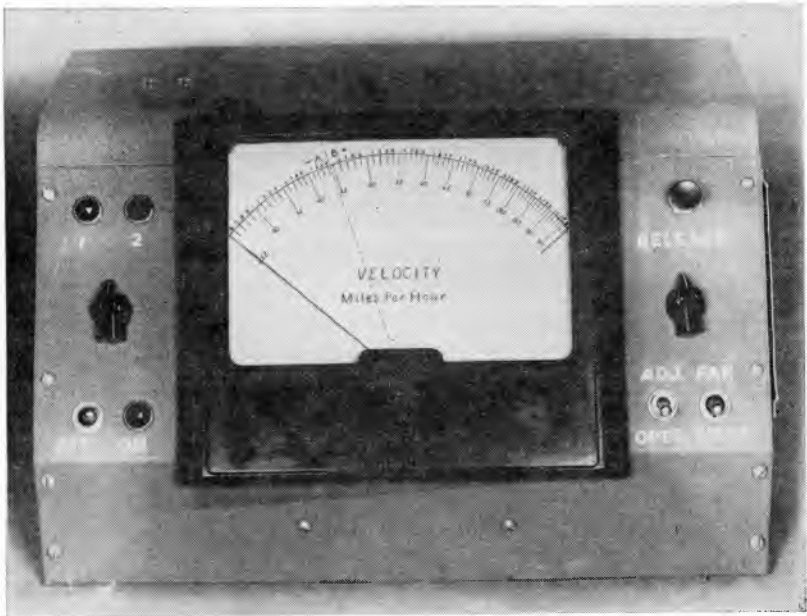


Fig. 2. Front of Joint Highway Research Project speed observation apparatus.

The photoelectric meter operates on the same principle except that photoelectric cells and transverse light beams are used instead of pneumatic tubes or electric contact strips for detector actuation.

The radar meter is the most recent development for obtaining traffic speeds. It is a portable unit and operates on the principle that a radio wave reflected from a moving vehicle will be changed from the transmitted wave proportionally to the speed of the vehicle.

Three speed measuring apparatus have been developed in the Joint Highway Research Project laboratories. The one currently used is of the electronic meter type with the pneumatic tubes stretched 100 feet apart across the traffic lanes (see Figure 1). The average motorist is unaffected by the tubes or the observers who always

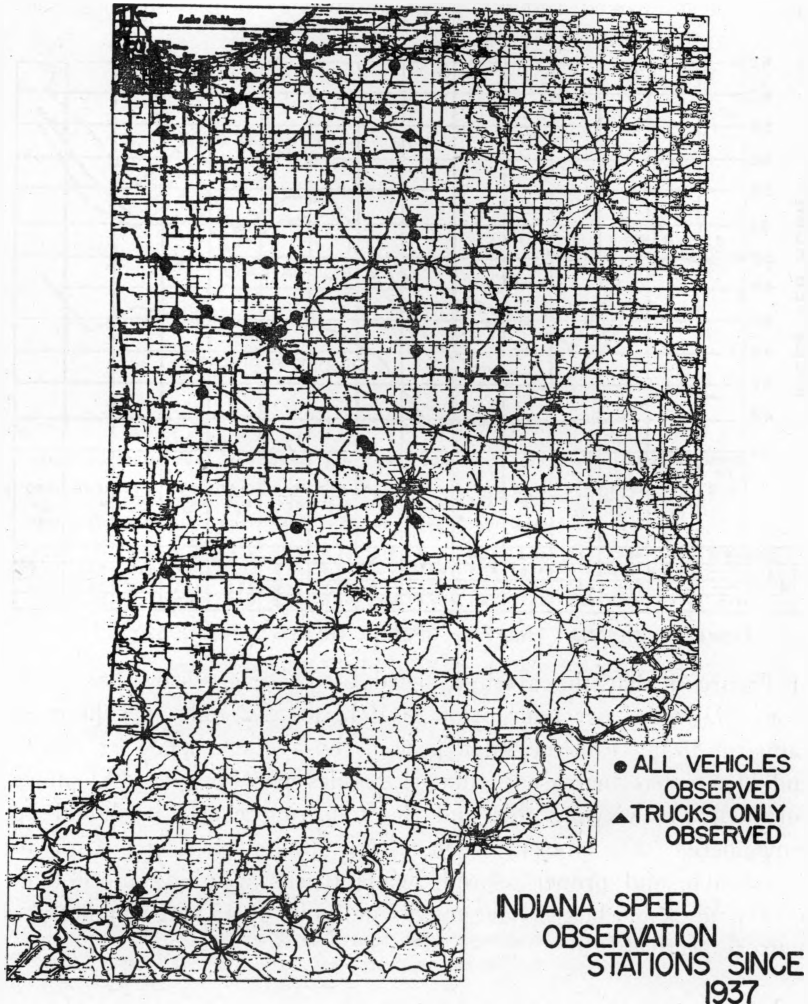


Fig. 3.

attempt to be located as inconspicuously as possible. As shown in Figure 2, speeds are read directly on the meter.

Sufficient data have been accumulated to present an indication of how Indiana speeds have changed in the ten year period from 1942 to 1952. These speeds have been obtained at various locations in the state (see Figure 3). Because of travel limitations, a majority of the speeds have been obtained in the northwestern part of the state. This has been especially true in recent years.

TEN YEAR TREND IN INDIANA SPEEDS

In the 10 year period since 1942, there has been a marked increase in the average speed of passenger cars and trucks and busses on improved Indiana rural highways. It may be observed

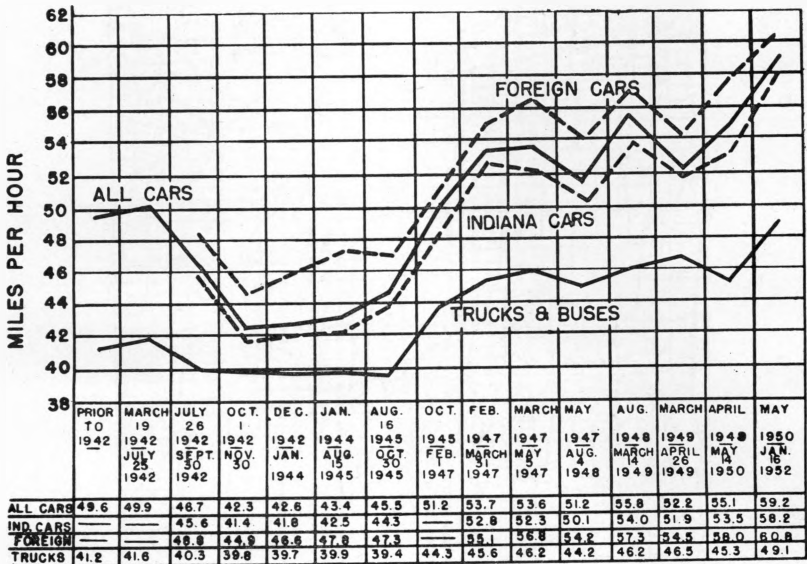


Figure 4 INDIANA TRAFFIC SPEED TRENDS 1942-1952

in Figure 4 that the average speed of passenger cars has risen from 49.6 miles per hour prior to 1942 to 59.2 miles per hour in January, 1952. For the same period, the average speed of trucks and busses has increased from 41.2 miles per hour to 49.1 miles per hour. In viewing this and the following charts it should be remembered that present Indiana law limits passenger cars to "reasonable and proper" speeds while trucks weighing more than 5,000 pounds and busses have maximum limits of 45 and 50 miles per hour respectively.

The effect of World War II gas rationing and nationwide speed zoning may be observed for the war years of 1942 to 1945. The graphs also clearly illustrate the fact that foreign (Non-Indiana) cars travel at average speeds of two to five miles per hour faster than Indiana cars.

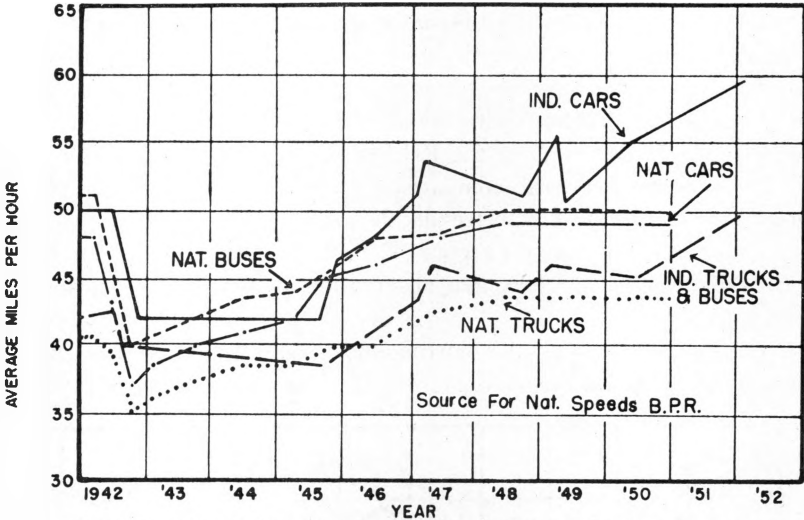


Figure 5 COMPARISON OF NATIONAL & INDIANA TRAFFIC SPEED TRENDS 1942-1952

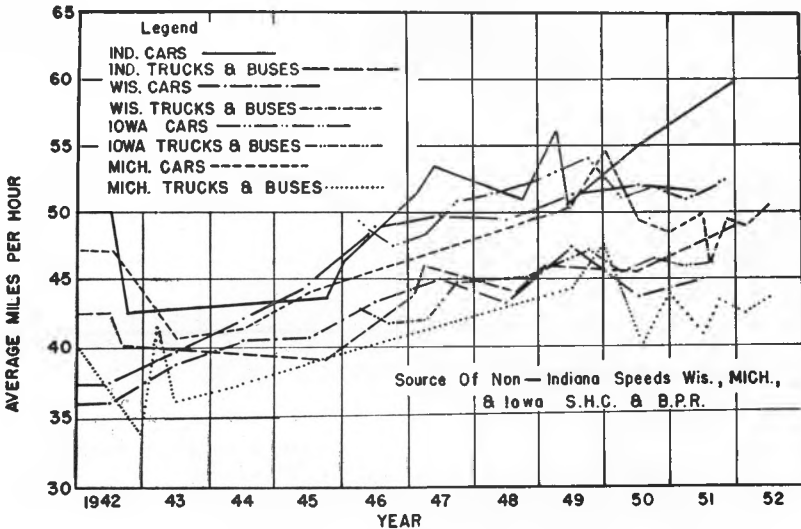


Figure 6 COMPARISON OF INDIANA SPEED TRENDS WITH THOSE OF NEARBY STATES

Indiana average speeds have generally been slightly faster than the national average as computed by the Bureau of Public Roads. This is indicated in Figure 5 and might possibly be explained by the fact that the national average includes the speeds in mountainous states which are lower than average.

Neighboring states were asked for information about their speed trends in order to obtain a further basis of comparison. Through the courtesy of their respective state highway authorities, available motor vehicle speed averages in Wisconsin, Iowa, and Michigan are compared with those of Indiana in Figure 6. Because much of the data for the 1942-1952 period is not available for all these states a 10 year comparison cannot be made but the close proximity of the post war trends should be noted.

The next five charts (Figures 7, 8, 9, 10, and 11) illustrate the trends in traffic speeds at five observation points in the Lafayette vicinity.

Figure 7 indicates the northbound speed trends of passenger cars and trucks and busses on U. S. 52, a major highway with dual

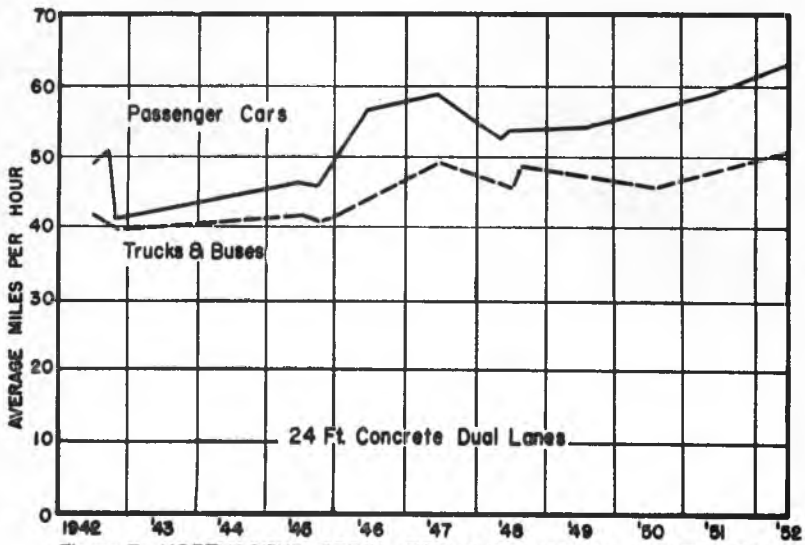


Figure 7 NORTHBOUND SPEED TREND ON U. S. 52 SOUTH OF LAFAYETTE, INDIANA

lanes 24 feet wide. The speeds were obtained south of Lafayette on level, straight stretches of highway.

The curves in Figure 7 should be compared with Figure 8, wherein the speed trends on U. S. 52 a few miles north of Lafayette are indicated. It should be noted how the change in 1949 from an 18

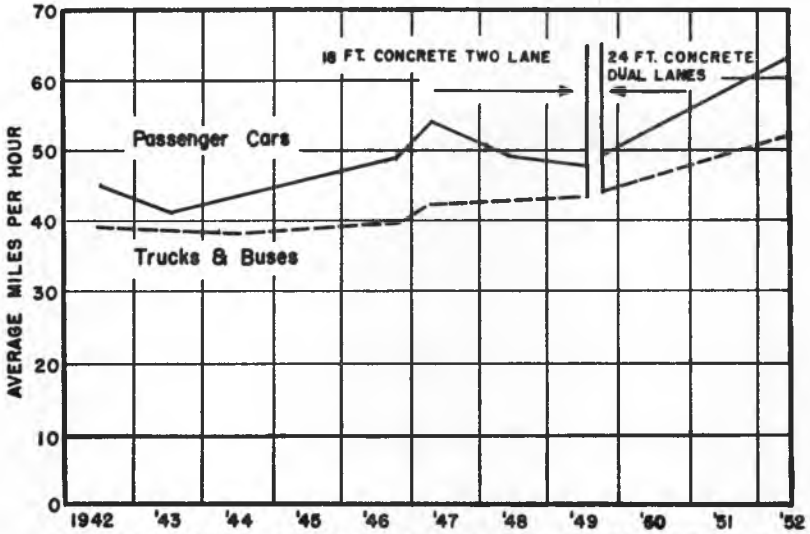


Figure 8 NORTHBOUND SPEED TREND ON U.S. 52 ONE MILE WEST OF KLONDIKE, INDIANA

foot concrete two lane pavement to a 24 foot dual lane pavement has affected an increase in speeds. In comparing this location with the 1952 northbound speeds on U. S. 52 south of Lafayette it was found that the average northbound passenger car speed south of Lafayette was 62.9 miles per hour while the average north bound

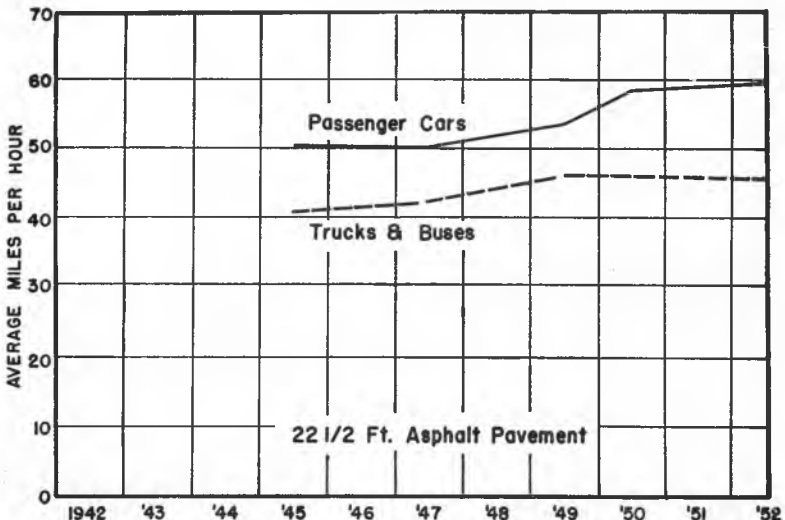
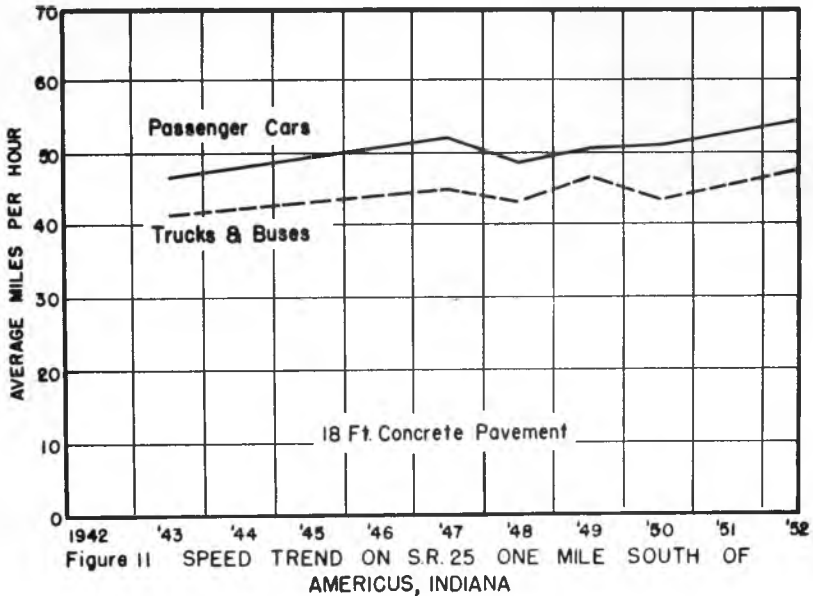
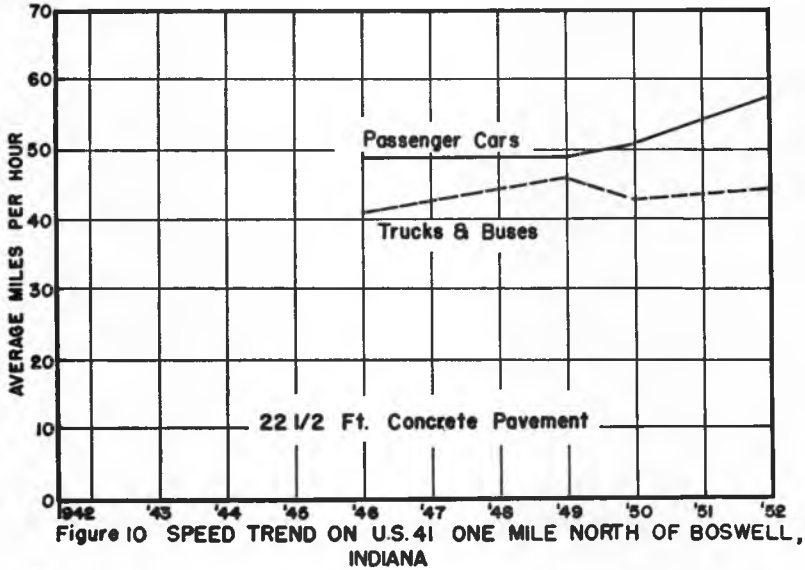


Figure 9 SPEED TREND ON U.S. 52, SIX MILES WEST OF OTTERBEIN, INDIANA

passenger car speed north of Lafayette was 63.2 miles per hour. Similarly the average 1952 northbound truck speed south of Lafayette was 51.3 miles per hour while the northbound trucks north of Lafayette averaged 51.0 miles per hour.

Figures 9 and 10 illustrate the speed trends on two major routes of 22½ foot pavements which carry heavy volumes of



traffic. A leveling-off effect may be observed on the U. S. 52 location while the U. S. 41 speeds are rising.

Increased average speeds are also evident on S. R. 25 south of Americus (see Figure 11). This route might be called one of the secondary state routes.

Each year in the month of August the State Highway Planning Survey conducts a special truck weight study at 20 loadometer stations throughout the state. For the last eight years the Joint Highway Research Project has observed truck speeds at some of the loadometer stations. The yearly average speeds and weights of trucks and semi-trailer combinations observed in these special studies are illustrated in Figure 12.

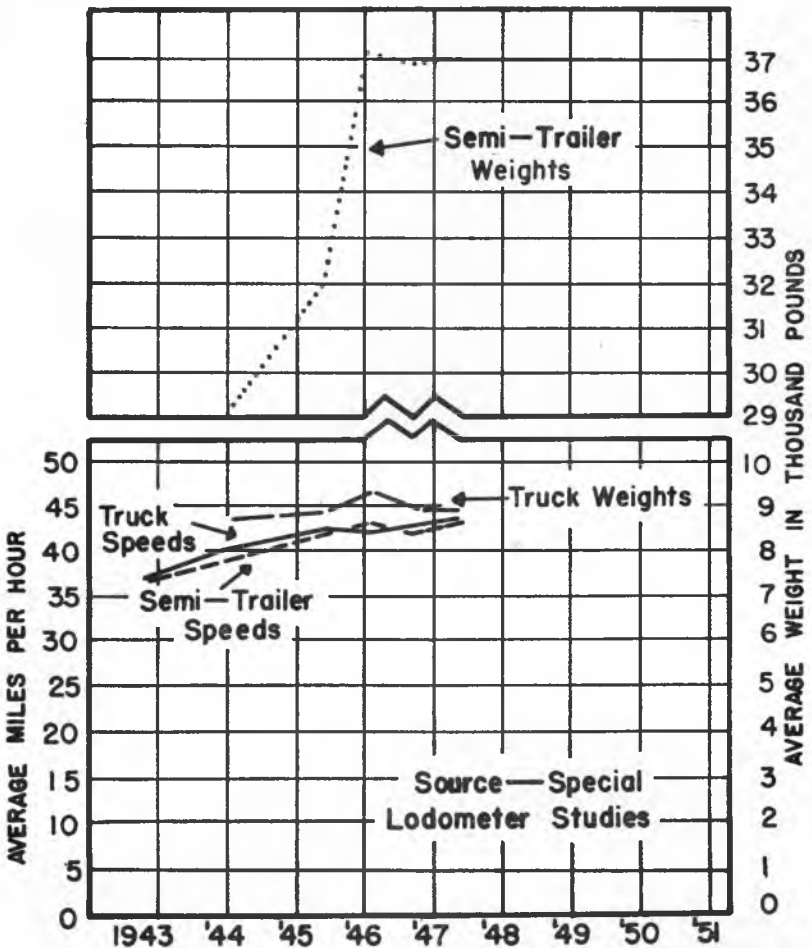


Figure 12 INDIANA TRUCK SPEED & WEIGHT TRENDS

CHANGE IN PERCENTILE SPEEDS

Also of importance to highway authorities are the frequencies of very high and very low speeds. To obtain a measure of these frequencies, average values of the 85th and 15th percentile speeds were computed for the speed data obtained in observations at seven stations in early 1949 and at five stations in early 1952. It was found that the average 85th percentile for passenger car speeds increased 6.7 miles per hour from 61.3 miles per hour in 1949 to 68.0 miles per hour in 1952. In the same period, the average 85th percentile speed for trucks increased only 2.3 miles per hour from 52.6 miles per hour to 54.9 miles per hour.

The 15th percentile speed for passenger cars increased 5.7 miles per hour from 44.0 miles per hour in 1949, to 49.7 miles per hour in 1952. At the same time the 15th percentile speed of trucks increased only 1.6 miles per hour from 39.4 miles per hour to 41.0 miles per hour.

If these increases continue at the same rates on a statewide basis, a greater number of accidents may result because of an increasing range between fast and slow moving vehicles.

SUMMARY OF RESULTS AND CONCLUSIONS

To briefly summarize the trend of Indiana motor vehicle speeds, it can be stated, on the basis of speed observations made by the Joint Highway Research Project, that:

1. For the ten year period from 1942 to 1952, average operating speeds on selected rural improved highways increased approximately one mile per hour each year for passenger cars.

(a) Average passenger car speeds have increased from 49.6 miles per hour prior to 1942 to 59.2 miles per hour in early 1952.

(b) Average truck and bus speeds have increased from 41.2 miles per hour prior to 1942 to 49.1 miles per hour in early 1952.

2. On the basis of observations in 1949 and 1952, there is an increasing range between the high and low speeds occurring on improved rural highways. The 85th and 15th percentile speeds of passenger cars have increased at a faster rate than the 85th and 15th percentile speeds of trucks and busses.

- (a) The average 85th percentile speed of passenger cars has increased from 61.3 miles per hour in early 1949 to 68.0 miles per hour in early 1952.
- (b) The average 15th percentile speed of passenger cars has increased from 44.0 miles per hour in early 1949 to 49.7 miles per hour in early 1952.
- (c) The average 85th percentile speed for trucks and busses increased from 52.6 miles per hour in early 1949 to 54.9 miles per hour in early 1952.
- (d) The average 15th percentile speed of trucks and busses increased from 39.4 miles per hour in early 1949 to 41.0 miles per hour in early 1952.

There are numerous factors which will determine to what extent motor vehicle operating speeds will increase in the future. Such factors as traffic volumes and densities, changes in vehicle designs and operating characteristics, and the design and maintenance procedures utilized on our highway system will have a very important effect on vehicular operating speeds in the future. The type of enforcement program and the extent to which it is carried out will also determine the passenger car, truck, and bus speeds of tomorrow.

At the same time, the changes in vehicular operating speeds must be considered in the design of new highway facilities and in the maintenance, modernization, and relocation of existing pavements. Wide ranges between very high and very slow speeds must also be avoided if we are to get out of the "traffic muddle" as we got out of the mud of a generation ago.