

Street Traffic Committee, National Automobile Chamber of Commerce, on behalf of Mr. Alvan McCauley of this committee.

5. A Method of Measuring the Relative Efficiency of Traffic Flow Through Street Intersections, by Dr. A. N. Johnson, Dean of Engineering College, University of Maryland.
6. The Railroad Grade Crossing Hazard on Rural Highways, by W. G. Eliot, 3d, of the United States Bureau of Public Roads.

## HIGHWAY ACCIDENT STATISTICS

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Of the approximately 90,000 accidental fatalities in the United States last year, motor vehicles were involved in about 23,000 or more than one-fourth of the total. This figure includes cases of collision between a motor vehicle and a railroad train or street car as well as with another motor vehicle, wagon, bicycle or pedestrian, and other types of motor vehicle accidents. This national total has been increasing about 5 per cent annually, whereas the fatalities from other kinds of accidents have been decreasing.

Motor vehicle accidents were, at first, largely a city problem. A few years ago the automobile accident death rate per 100,000 persons, as reported by the United States Census Bureau, was about twice as high in the cities as in the rural districts. Since then, the rural death rate has been increasing more rapidly than the city death rate. This naturally results from the rapid construction of highways and the increasing traffic thereon.

In cities, pedestrians form about 66 per cent of the victims of fatal motor vehicle accidents. In rural districts this percentage is about 50. Most of the other victims are drivers or passengers in the motor vehicle. Of the national total of fatalities, railroad grade crossing accidents contribute about 9 per cent, but this percentage is considerably lower in cities and higher on country highways.

These few figures are sufficient to show the severity of the automobile accident problem—if any such proof be needed—and to show also the vital need for accurate information on how accidents happen as the basis for any preventive campaign. The circumstances and causes of traffic accidents are different in the city and in the

country, in different cities and in different states, according to the topography, density of population, character of highways, laws, systems of law enforcement, and other factors. The percentages mentioned, which are based on the incomplete information available, may be quite inaccurate as applied to some particular city or state.

It is possible to count on one hand states having a satisfactory accident reporting system. All of these shining examples are states having an efficient motor vehicle department. Outside of these few states, we must look for information to the city police departments, and most of these have in the past given little attention to accident statistics. The seriousness of this situation was recognized by the National Conference on Street and Highway Safety which strongly urged a general improvement in state and city accident reporting and listed the essentials of a satisfactory report system.

To assist in meeting this condition of affairs, the Statistics Committee of the National Safety Council three years ago prepared what is now known as the Standard Accident Reporting System, for motor vehicle accidents primarily, and for use by city and state departments. As the committee which prepared this system was composed of city and state officials together with insurance statisticians, the system was based on practical experience, and, with a few minor changes, has been generally accepted as practicable and effective. In less than three years' time the use of this uniform system has been extended until it now includes two states—New York and North Carolina—fifty-nine cities outside of those states including Chicago, Philadelphia, Detroit, and other large as well as small communities. A few of these have made some alterations in the system to suit their local conditions but this does not interfere with the two major objectives of the system. First, to provide the local authorities with information which they can use in their preventive work, and second, to furnish from these various jurisdictions, monthly and annual reports which can be combined and tabulated by the National Safety Council to present a picture of the national situation and the trend from year to year.

The Standard System includes two principal units, the form for reporting the individual accident, and the form for making monthly and yearly tabulations.

The individual accident report form is placed on both sides of a 4 x 6 inch card. In addition to the usual entries of the names and description of the individuals and the vehicles involved, this form

contains sections on such subjects as what the driver was doing, condition of vehicle, what the pedestrian was doing, condition of road, weather, and light. Under each of these headings there is a list of possible items in which the appropriate item is marked with a check mark by the reporting officer, or, sometimes, by someone in the headquarters office after reviewing the various original reports. The items included are those which experience has shown to be the most important. The aim has been to develop information of as great value as possible, without making the form unreasonably complicated or burdensome.

In the monthly tabulation sheet, as printed by the National Safety Council and furnished to the various jurisdictions, the most important information is tabulated. Some jurisdictions, including those of New York State, North Carolina, Chicago, Detroit, and others, having an up-to-date statistical system, employ a more elaborate monthly report form on which additional information is included—all, however, being obtained from the same primary report.

In all of these larger bureaus the transition from the individual report cards to the monthly or yearly tabulation is made by means of a punch card system which minimizes manual labor and makes it possible to tabulate a great number of individual cases in any number of ways.

In jurisdictions too small to use a punch card system, the data on the individual reports are first transferred to a large tally sheet (which also is furnished by the National Safety Council) and the totals are copied from this on the monthly report.

The local police department or state bureau uses its monthly and yearly tabulations in a variety of ways. Copies are furnished to the city traffic engineer, the local safety council, automobile clubs, and other interested organizations, and they also form the basis of newspaper publicity and other educational work.

The filing of the original report cards by street locations is strongly recommended. When this is done, it is possible at any time to take from the files all report cards for a certain street or a certain intersection and make an intensive study of them to determine the need for engineering or other improvements at that particular point.

A complete description of this system and the use of it is contained in the 40-page pamphlet "Public Accident Reporting" recently issued by the National Safety Council, a copy of which will be furnished without charge to any interested person. Some of the

valuable data yielded by the use of this system are found in the Council's annual statistical report "Accident Facts 1927" which is likewise available on request.

#### THE OPPORTUNITY OF STATE AND COUNTY HIGHWAY DEPARTMENTS

As has already been stated, only a handful of states are pretending to keep any sort of worthwhile accident records. In the remainder, the only state records are those of the health department which cover fatalities only, and those in an inadequate manner.

Every person interested in safety must look with the greatest pleasure on the increasing interest of state highway departments in the proper recording and study of highway accidents. In those few states where the highway department includes the Bureau of Motor Vehicles, it is possible to do a complete and thorough job as will be done in Pennsylvania under the new law effective next January, but even where the highway department does not have the enforcement of a state driver's license law, it still can get, and often does get, some sort of reports on accidents occurring on the state highway system. Now, it is just as easy, in fact, easier, to have these reports made in a proper manner and to give them a periodic analysis in the headquarters office. In places where this is not done, the same suggestion may be made to the county departments.

For most highway engineers the items contained on the forms of the Standard Accident Reporting System will probably suffice. In only one of the sections or schedules is there reason to expect that the needs in reporting highway accidents will be materially different from those in reporting accidents on city streets, and that one is the section relating to location, which appears on the monthly tabulation form. For state highway use, it may be desirable to show the number of accidents occurring on curves, hills, and, possibly, at other special points which are not ordinarily important in cities. If so, a few such items can easily be added to the Standard form without disturbing the rest of it.

In many other matters it would be perfectly possible to make the Standard form twice or three times as long by adding numerous other subjects and items that have been suggested from time to time. It has been the deliberate opinion of the public officials on the committee that most of these other items are inconsequential and that the addition of them would do more harm than good. However, the form is always open to amendment if the need can be shown. On the Statistics

Committee of the National Safety Council the point of view of the Highway Engineer is well represented by Mr. A. B. Fletcher, of the United States Bureau of Public Roads, and Mr. A. H. Hinkle, nominated by the American Association of State High Officials

#### CLASSIFYING ACCIDENTS ACCORDING TO RESPONSIBILITY

We are all interested, and the Highway Research Board, perhaps, more than some others, in getting at the ultimate underlying causes of highway accidents. Some people immediately think of this as a matter of fixing the responsibility for the accident. In developing a system of statistical classification, they start with the main headings: fault of the driver, fault of the pedestrian; perhaps two or three similar groups. These, in turn, are broken down into sub-classification.

The public officials, statisticians and engineers forming the Statistics Committee of the National Safety Council early set their faces against any such system of classification. They felt—and, as I remember, it was unanimous—that while in some cases the responsibility for a particular accident can be easily determined by any impartial person, there are many other accidents due to a combination of causes and open to wide differences of opinion as to the cause or the person responsible. The committee felt that the most we could expect from any statistical system is to set forth the *circumstances of the accident*—what the pedestrian was doing, what the driver or drivers were doing, the condition of the roadway, the weather, and so on. It is sometimes difficult to determine all these facts, but at least it is less difficult to do so than to determine with judicial accuracy the relative responsibility of the parties involved. The committee's position in this matter was endorsed by the Statistics Committee of the National Conference on Street and Highway Safety. According to this view, the gathering of reports and statistics is not the last, but only the first, step in determining the underlying causes of accidents. By studying the monthly and yearly tabulations, the public officials or the student will be struck at once by the high frequency of certain items, such as "cutting in" and "did not have right of way," and the low frequency of other items, such as defective machines. From such statistics the lawmaker and the educator may draw their own inferences as to the remedies needed.

The engineer, for his part, will study these reports not so much in the mass, but rather by specific locations to determine what engineer-

ing remedies may be needed at a particular point. The psychologist, in turn, will use the reports and tabulations as a starting point in making an intensive scientific study of the individual differences of drivers and their effect on accident susceptibility. There is also great need in every metropolitan police department of an accident investigation squad composed of trained men who will immediately visit the scene of every serious accident and collect all possible data not only for the purposes already mentioned, but for purposes of prosecution of those who appear to have been guilty of a violation of the traffic ordinance, or of criminal negligence.

Every one who has looked at the subject of traffic accidents from a scientific standpoint agrees that there is vital need for these further studies—engineering, psychological, and other—of the underlying causes of accidents. The investigators who first make a practical study of this sort leading to concrete conclusions will perform a great public service.

## PRESENT STATUS OF LEGAL REGULATION OF AUTOMOBILE HEADLIGHTS, TAIL LIGHTS AND MOTOR-VEHICLE BRAKES IN THE UNITED STATES

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### HEADLIGHTS

*General Principles Followed.* In recent years the principle has become generally accepted that control of headlight devices should rest with the respective states and not with municipal or local authorities or with the federal government. The general principle which has been followed in nearly all state legislation is that of creating a list of approved devices and making it illegal to sell or use devices not thus approved.

*Basis of Approval of Devices.* Some state official or commission is usually authorized to approve devices on the basis of definite specifications and tests. In most states the official who has jurisdiction is given authority to establish the specifications under which tests shall be made. The specifications which have been generally used, however, are those established by the Illuminating Engineering Society in 1920 and revised in 1922. These specifications have received ap-