WHAT WE ARE TRYING TO DO ABOUT TRAFFIC SAFETY

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More has been said and done about safety during this past year than ever before in the history of our country. Just about one year ago the National Safety Council announced its Five-Year Campaign to reduce fatalities in motor vehicle accidents 35 per cent by the end of 1940. The country was divided into eight districts, and field representatives were schooled at our Chicago offices and then sent out to their assigned territories. Their job was to co-operate with each of the states and municipalities desiring aid. Hundreds of cities in nearly all the states had expressed a determination to stop motor vehicle accidents, but many of them had been at a loss as to how to go about the job. Each of these field representatives was qualified for this work by long years of experience in state, national, and industrial safety activity.

Complete statistics are not yet available for 1936. We have every reason to expect that there has been a one or two per cent increase in fatalities. If you consider this increase in terms of fatalities alone, you may be led to assume that the Five-Year Campaign is a failure. On the other hand, when we realize that gasoline consumption—in other words, road mileage—has gone up some ten per cent, the results don't look so bad. In the face of this increased exposure, there is about an eight per cent decrease in the death rate in terms of gasoline consumption or car mileage. Do not misinterpret my statement—it is not my intention to intimate that we are satisfied, but certainly it is a much better record than we have experienced in recent years.

Sixteen states have actually reduced their fatalities, with 14 of them showing reductions of more than 7 per cent. Unfortunately, Indiana is not listed in this group. In fact, motor vehicle deaths in your state rose over 12 per cent when compared with 1935. This is one of the largest increases in the country—whether measured on a basis of population *or* of gasoline consumption.

I think we can say that in most cases these reductions have resulted because emphasis was properly placed on those items where it was most needed. In some instances a vigorous safety campaign did not bring comparable results. Evidently some of the campaigns will yet show reductions in accidents. We cannot always expect immediate results.

The safety engineer has come to learn that it takes a well-balanced program to effect permanent reductions in accident experience. I know of many cities where accidents have been

reduced by concentrated drives and attendant publicity, only to revert to former conditions as soon as the enthusiasm waned. Enthusiasm alone will not do the job! True, public interest must be aroused, but unless it is strengthened by some constructive features—something the individual can see—the public soon loses interest. The traffic engineer in providing a sound program always keeps foremost in his mind the three E's—Engineering, Education, and Enforcement.

Engineering must strive to provide adequate streets and highways, properly safeguarded and equipped with signs, signals, and regulations to handle the vehicular and pedestrian traffic demand successfully. We must provide sufficient aids and restrictions, but no more than are necessary to help traffic move safely and smoothly. Safety when properly administered furthers, rather than impedes, progress.

Enforcement, to be effective, requires an enforceable ordinance and enforceable regulations. Rules that cannot be enforced encourage disobedience of all regulations. Enforcement must be strict and violations treated with impartial firmness if traffic regulations are to be accepted by citizens with an attitude of respect and willing compliance.

Education focuses the attention of a community on the accident situation. It enlists the support of the public in the safety movement, develops a safety consciousness in the individual, and brings about popular disapproval of traffic violations.

During the year 1935, some 37,000 motor vehicle deaths in this country interrupted travel on our highways. In addition, 1,200,000 personal injuries did their part further to disrupt it. Four million to five million accidents involving only property damage contributed to unsuccessful conveyance of persons or goods. At least 7,000,000 trips were partially or completely frustrated. It is estimated that automobile accidents represented in 1935 an economic loss of some $1,600,000,000. Considerable comment was made at the time of appropriation of the now famous "Four-billion-Eight" Bill; yet here is a figure one-third as large, representing an absolute yearly loss which receives only casual consideration by the public.

Probably our greatest obstacle lies in getting the wholehearted co-operation of the public—and a determination on their part to really do something about it. Too many drivers still believe that accidents "just happen" and that we have to put up with them. It has been proved hundreds of times that accidents don't "just happen"—they are caused!

Of the three problems we have confronting us—the vehicle, the driver, and the highway—the driver still remains our biggest hurdle.

THE DRIVER

The driver's license law is probably the best method we have of controlling the driver. The chief defect in the Indiana

Drivers' License Law is that it requires no examination. A license law without an examination is very little better than none at all—purely a revenue-producing measure. In Indiana you do not take advantage of the revocation and suspension clause. In the examination and in revocation and suspension lie the teeth of the measure. Contrary to usual belief, the examination need not be long or unnecessarily technical. At the present time we feel that it should take about 20 minutes for the average driver. The examination itself is exceedingly simple; yet at the outset some 25 to 30 per cent of the applicants are refused a license. In view of the simplicity of the examination, this speaks all the more for the need of the law. Ultimately only three to five per cent of the drivers are refused licenses, and thus actually the measure does not constitute any unreasonable hardship on the motoring public as a whole.

The most important reason for licensing the operators of motor vehicles is to improve the quality of driving on the highway; that is, to help motorists avoid and get out of dangerous situations. If the license is issued without examination, the possibility of having it taken away will keep some people from misbehaving. This does not, however, prevent the physically incompetent from getting into trouble. The driver must be impressed with the fact that the operation of a motor vehicle is a privilege rather than a right.

It is no more than right that those persons wishing to use our highways should know the rules of the road and safe driving practices. They must be able to interpret the sign wording, must be old enough to drive alone, and must have no physical deficiencies preventing them from operating a car safely. A good examination is conducted on a scored basis. Specific routes are designated for the road-test which gives the examiner an opportunity to study the driver under fire.

I recently saw an analysis of liability insurance rates which I think is interesting. The average in 1931 in 47 states, excluding Massachusetts and the District of Columbia, for a car of average type in the highest rated territory in each state, was $30.66. In 1936 this average rate was listed at $34.74, an increase of $4.08. This increased rate was undoubtedly due to a rapid rise in fatalities and personal injuries, and a leniency on the part of the courts. The average in the 19 states with license laws which included a state examination in 1931 was $26.52. In 1936 this rose to $27.10, or an increase of only 58c—only 14 per cent of the $4.08 average increase for the country.

Six states have no licensing whatsoever. Six other states require chauffeurs' permits only. Thus one-fourth of the states in this country have little concern as to who drives within their boundaries. Ten others have a license law but have made no provision for examinations. Five additional

states very seldom give examinations. There are more than one-half—27 in fact—which do not know if their drivers are qualified to operate a vehicle or not. Four states make no restriction as to age limit, and the others vary the restriction from 14 to 18 years.

The drivers' license law is one medium for reducing accidents. The states having standard license laws in 1935 had 7 per cent fewer motor vehicle deaths than the states with substandard or no licensing laws. Since 1926 these states have effected a 21 per cent reduction in the motor vehicle death rate, while increases from 4 to 33 per cent are noted in the states in the other group. We must not entirely attribute this record to the drivers' license law, however, since in all probability those states which have pioneered in adopting the license law are also up to date in other accident prevention work.

I assume that many of you have heard a great deal in the past few months concerning the Traffic Safety Institute held in your state. I refer to the institutes for high school teachers which taught the proper procedure for teaching motor-vehicle safety. To W. A. Knapp of the Purdue Public Safety Institute goes the credit for conceiving this plan. Mr. Knapp secured the approval of Mr. Floyd I. McMurray, State Superintendent of Public Instruction, and then through the assistance of Messrs. J. S. Baker and D. S. Berry of the National Safety Council, organized and presented this short short-course in teacher guidance. Twelve meetings were arranged at strategic points about the state, and it is estimated that they were attended by some 500 Indiana school teachers.

To my knowledge Indiana is the first state in the nation to undertake the task of properly instructing its teachers in this all-important subject. Practical demonstrations were given and the teachers were furnished with bibliographies of available text-material. The essential and the non-essential publications were listed. At the conclusion of each institute a number of safety films were shown to illustrate the value of visual education. Certificates of attendance were given to all persons attending the institutes, and certified lists were accordingly transmitted to the county superintendents and the State Department of Public Instruction.

THE TRAFFIC ENGINEER

Probably there has been more progress in traffic engineering in the past year or two than in any of the other safety fields. Hardly a month goes by without our receiving a request for assistance in establishing such a set-up. We do not say that every municipality must have a traffic engineer, but rather that at least there must be an allocation of responsibility to some member of the city engineering de-

partment. Certainly the traffic engineer has established his importance in state highway work. Traffic planning is a growing and continuous problem. Lacking opportunity for experience, officials under pressure to prevent accidents and avoid congestion, have tried out various kinds of restrictions, regulations, control devices, and safeguards. Some have been successes and others failures. No person has a corner on methods of traffic safety. All have capitalized on the experience of others. We are now at that point in the development of traffic engineering where we must do all we can to point out the most effective and successful methods of control which have proved to be practical and to prevent accidents and congestion.

By saying the problem is continuous I mean that it is not possible to make a preliminary study and then prescribe remedies which need to be given no further consideration. In any city or state with a population of more than 250,000, traffic engineering is a full-time job. The best way we have found so far to handle traffic engineering is through the study of the accident experience. Just as a doctor examines his patient, so do we probe for the sore spots in traffic, identify the difficulties at these points, and then prescribe the remedy which is most practicable and fitting. I believe that too often we become confused with the seeming complexity of the task. Proper traffic engineering approach is as simple as a drivers' license examination when taken step by step.

First, we must have accident reports. For continuous traffic engineering, all accidents must be reported; that is, we usually require reports of all fatal and personal injury accidents and of property damage of more than $25.00. In the absence of complete statistics we often refer to the police blotter. With fewer reports we naturally require fewer accidents to establish the presence of the sore spot.

Next we plot the accidents on a spot map. We must not unnecessarily complicate the picture by trying to show too much information about those accidents on the spot map. It is best to classify as to motor vehicle vs. motor vehicle, motor vehicle vs. pedestrian, and motor vehicle vs. others. Later, it may be desirable to show a further breakdown to include fatalities, personal injury, and property damage. We also have in many cases attained valuable information through the plotting of the residences of drivers involved in accidents. The spot map provides excellent information for conducting selective educational and enforcement programs. With a minimum of personnel, certainly we can expect the greatest returns from concentrating on those types of accidents which are most serious, and on those locations where the greatest number of accidents occurs.

The accident reports as they come in are numbered serially, spotted on the map, and then filed by location. All reports of

accidents occurring at one intersection are filed in the same pocket.

After the preparation of the spot map, the engineer should list the hazardous locations in order of importance. As these reports of accidents at specific localities increase they are listed on the priority sheet. Collision diagrams are prepared for each of these "worst" accident locations. The collision diagram as usually used is a reasonably accurate but rough drawing showing the confines of the roadway and the dates, approximate times of day, and type of accident. Symbols are used to designate the direction of travel and the vehicles or objects entering into each accident.

It is the exceptional case when the collision diagram does not bring to light some definite pattern. After all, since accidents are caused, the experience should be somewhat similar unless there are a number of causes.

Once the collision diagram has been developed, the engineer must visit the location and make a rough drawing of the physical conditions which may contribute to the accident experience. This drawing is termed the "condition diagram." If the collision diagram is available at the time of the field study, the engineer should review the accidents carefully in an endeavor to ascertain just what physical conditions are likely to be responsible. Road widths are shown and dimensions determined for such items as buildings, trees, bushes, poles, etc. Such special items as walls, embankments, and street grades should be carefully designated.

One of the most important tasks assigned to the traffic engineer is that of preparing a set of uniform standards and general specifications. All installations or plans bearing on traffic safety should be checked against these standards. The traffic engineer should be constantly alert to discover problems not previously encountered in connection with his field work. All complaints or matters referred by other departments should be answered by first checking them against the spot map and other accident information. A follow-up file is useful for calling future attention to matters which should be given consideration. It is often necessary to hold certain problems until more accident experience accumulates. It is decidedly important to check the results of remedies to answer the question, "Were accidents reduced and, if so, what types were reduced or eliminated?"

Following the preparation of the spot map and the collision and condition diagrams, it may be necessary to make special studies; such studies include examination of flow volume, parking, speed, pedestrian movement, and obedience. Publicity must not be ignored, since it is highly important to inform the public why such changes are necessary, how they should be obeyed, and what benefits have resulted.

During the past year we have been working with many

county and state engineers in applying the traffic engineering approach to their specific problems. Admitting that certain changes will have to be made in adapting the present procedure, we are experimenting in a number of counties and states to develop the most practicable procedure.

At this point I want to offer the services of the National Safety Council to any county organization interested in applying the traffic engineering approach to the elimination of accidents. During the past year we have co-operated in a number of such instances in the hope that we can adapt present practices to the rural problem. The usual county engineering force is naturally quite limited, and I think we all can appreciate that we have all been kept busy building roads—little emphasis having been placed on the accident-experience approach.

THE VEHICLE

Compulsory motor vehicle inspection is gaining in favor every day. In the 13 states now having mandatory inspection, only three of them do their inspecting at state-operated stations. The other 10 states use authorized stations. We hear many rumors which indicate that the trend is definitely toward the state-operated stations. You will remember that Michigan used the authorized station plan a few years ago, but has since discontinued it. The authorized station is a step ahead of the voluntary campaign, or safety lanes as they are called, but is far from being satisfactory.

If the stations are state operated, the first and only objective is the proper testing of motor vehicles. With the authorized station plan, the emphasis is, of course, placed on operating the business at a profit, with inspection being the secondary issue. In a recent summary I made of authorized stations, I found that the number of such stations in any one state varied from 400 to 8,000. Certainly the inspection of these stations to insure uniformity and honest dealing represents an enormous task.

Knowing the cost, the number of vehicles being inspected, and the number of inspections per year, it is not at all complicated to lay out a plan of inspection which will be self-supporting. I understand that the manufacturers of testing equipment are willing to install their equipment on a time basis to permit amortization of the debt, as inspection fees come in. So far, the best plan seems to be two inspections per year.

Eleven cities now have compulsory inspection. In recent weeks two more cities have passed ordinances establishing inspection, the actual plan to go into operation as soon as the stations can be built.

I may say that there are four important values of inspection: First, it improves the average condition of the vehicle

on the highway. Second, it improves the quality of garage service by requiring the vehicles to pass prescribed standards. Third, it invalidates the plea that "the brakes did not work" or "the vehicle was at fault," since legally the vehicle cannot operate under these conditions. Fourth, it provides an excellent opportunity for informing drivers about their cars and the conditions which are necessary for safe operation.

The Committee of the National Conference on Street and Highway Safety concluded that vehicular defects were contributory factors in at least 15 per cent of all motor vehicle accidents. Actually the several reports which I have seen from states having good motor vehicle inspection and accident reporting, show only some 7 to 10 per cent attributed to defective equipment. We do feel, however, that poorly maintained or partially defective equipment contributed to a large percentage of the accidents.

SPEED

We get on rather controversial ground when we start to discuss speed. The National Safety Council now has a committee studying the subject, "What Are the Elements in the Relation between Vehicular Speeds and Traffic Accidents?" This subject has been rehashed a number of times, but this committee will attempt to get a meeting of minds as to the facts available on the subject and then perhaps summarize this consensus to get a picture of what the best practices should be. Finally, I suppose we shall attempt to make some research to prove or disapprove our recommendations.

There has always been the question of whether we should set a top speed limit. Certainly we can agree that we must limit speeds in urban areas; and that there should be some variations within the urban boundaries. Statistics seem to show that the seriousness of the accident increases with the speed. For instance, we say that only one accident in 61 is fatal at 20 miles per hour, while at 50 or over, 1 accident in 11 is fatal. Very little information is available as to the frequency. By frequency, I mean whether the man that drives at some rate of speed which we would say was above normal has more accidents than those persons driving at lower rates.

"Zoning" seems to be gaining in favor. Several bills in this regard have recently been introduced throughout the country. In the past we have more or less left it up to the operator to determine the speeds which were safe at different locations and under certain conditions. In setting a maximum rate we do not take into account that at certain points the operator must drive considerably more slowly than at others. Under certain adverse conditions, a speed of 35 miles per hour can be far more dangerous than 60 under the best of conditions.

I think that in all fairness we must admit that most of us drive over 60 at one time or another. Under these conditions should we favor the adoption of the state-wide top limit of say 50 miles an hour? Certainly we are contributing to disrespect and deliberate disregard of the law when we do so. I believe we will have taken a step in the right direction when we impress the public with the sincerity behind the regulations which we adopt as laws.

In establishing zones we let the driver know that a study has been made and that under ordinary circumstances—admittedly we all have to drive more slowly during unusual weather conditions—he can operate at reasonable safety within the limits stated on the sign. This tends to make enforcement easier, reduces the possibility of mistakes on the part of the driving public, and all in all is more practicable since we are not depending upon the judgment of the individual driver as to what does, or does not, constitute danger.

Perhaps the next step in zoning will be the construction of highways between certain stated points where we can say that under reasonable circumstances it will be safe to operate throughout the length of the road at certain speeds. We hear more every day regarding the advantages of the divided highway. National statistics are rather scarce. I saw some facts the other day which seemed to indicate the advantages of the divided system. In the city of Chicago one of the streets through the park system had a record of some 500,000 car miles per accident. This highway was divided and had no intersecting streets. Another route which was divided but which did have several intersections, had a record of some 300,000 car miles per accident. One of the conventional streets shows an accident experience of 41,784 car miles per accident. I believe that there should be some attempt made to separate physically all new through highways. This separation need not be more than a few feet. It is important that any landscaping done on this separating area be such that sight distances are maintained and that there are no view obstructions at intersections.

I recently heard of a development, now in the research stage, which I think will interest you. This development consists of a curved steel surface attached to the outer edge of the pavement and having a cross-section which increases the superelevation rapidly beyond the pavement edge. It is intended that this device shall replace the conventional type of guard rail. The two engineers who are experimenting with it claim that tests seem to indicate that it is difficult to run a car over this raised portion at a speed of more than 60 miles an hour. I was surprised to learn that the device was less than 3 feet in height and that the cost would not be much greater than ordinary guard rail of the steel-plate type.

I think the time will come when commercial vehicles will

be manufactured with stated performance specifications and licensed to carry a maximum stated load. In the past we have been concerned more with the break-down of the pavement as caused by heavily laden trucks, rather than with visualizing what results that load may cause regarding stopping distance and minimum speed up and down grade. Certainly one of the greatest complaints against the large trucks on the highway is the reduced speed at which they must travel. If trucks are to follow closely behind passenger cars, they must be able to stop in similar distances. Until the time comes when such restrictions will be established as to loading, I believe that we should build extra lanes on the highway at particularly hazardous points.

I understand that you have a bill up before your Legislature to increase the State Police force. Certainly the present number of officers is not sufficient to carry on the tasks required of that organization in your large state. Generally I think we can say that we have three groups of people on the highway: First, that reasonably large group which will follow good safety practice. Second, that group—and I believe it to be small—which has to be goaded into obeying. Last, but by all means the largest, that group of people, in between the other two, who are easily swayed in either direction; that is, if enforcement is good they naturally follow the crowd; if bad, they constitute an enormous hazard.

Few statistics are available as to the results which can be expected from increasing the state policing body. However, in Iowa during the month of August, 1934, there were some 58 fatalities more than for the same period during the previous year. At that time the policing force was increased, and during the five months until the end of the year accidents were reduced to such an extent that the 12 months' record was 60 fatalities below the 1933 experience; that is, a total of 118 fatalities were averted during the five months' period—and this in the face of a large national increase in motor vehicle fatalities.

HIGHWAY LIGHTING

We all have recently seen a great deal of publicity favoring highway lighting. Some advocates of this form of accident prevention believe that we should start out with a plan to illuminate completely our entire highway system. I think that most of you will agree that, from a monetary standpoint at least, we cannot expect to take this step immediately. Why not apply some of the selfsame reasoning to this problem that we do in prescribing corrective treatment at other hazardous locations?

The object of lighting must be to reveal hazardous conditions that otherwise would be obscured. When we have demonstrated that lighting will definitely eliminate or materially re-

duce certain types of accidents, I think we are not going to have much difficulty in selling the idea to the public. So far, too many of our installations have been made on straight stretches of highway where accidents seldom happen anyway. By carefully selecting particularly hazardous points where we have every reason to believe that lighting will reveal the hazards, we should ultimately accumulate an abundance of statistics as to what type of lighting is needed, what types of accidents can be prevented, and what general locations adapt themselves to this kind of treatment. I have in mind a location in the State of Oklahoma where night accidents were many times more predominant than day accidents. After careful study, all highway signs were reflectorized and properly relocated. The accident experience immediately took an enormous drop. Certainly we would not want to bear the cost of lighting this stretch of road when we were able to accomplish the same results through a much more inexpensive type of treatment. What we need to answer the lighting question is more "before" and "after" experience.

In closing, I want to stress the fact that Engineering, Education, and Enforcement are essential features in a safety program of traffic administration. In providing a balanced program we must see that sufficient time and thought are given to proper planning, through frequent reference to the accident experience, and that none of the major features are made less effective by subordination to the others. Concentrated drives may reduce accidents temporarily, but it takes the continuous program to bring permanent results, which after all are what we are looking for.

WHAT ARE WE DOING TO INCREASE SAFETY?

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Mr. Hayden has very ably presented this subject from the viewpoint of a traffic engineer. I am not a traffic or safety engineer, and therefore cannot discuss the subject from that viewpoint. The Indiana State Highway Commission has no traffic engineer acting under the usual conception of such a position. We hope to have one soon that will be a full-fledged traffic engineer. Therefore, speaking as a Highway Engineer, I shall attempt to describe the many things we as a state highway department are doing to promote and increase safety. Time will not permit my going into very much detail in these various activities. In making this inventory of the various things being done in the interest of safety, I was somewhat surprised at their number and magnitude. Because of the lack of sufficient information, some of the things we are