

In resurfacing over brick or concrete the surface is thoroughly washed and swept clean, then brought to profile with black base, after which the cleansed surface is uniformly painted with asphaltic cement by means of an ordinary white-wash spray.

If desired, the rock asphalt may be feather edged 5 to 6 feet from the gutter and also at the car tracks, if any exist.

One inch thickness has proven suitable for this surfacing.

Sheet asphalt has been and is now being used quite extensively as a resurfacing over old pavements of all types.

This material is laid in resurface work similar to constructing it on a prepared foundation.

Sheet asphalt cannot be successfully feather edged. It requires a shoulder.

Bituminous macadam has been used successfully over old gravel and macadam pavements and is doing a large service on the state roads.

The same methods of construction are followed in resurfacing as in new construction.

There are other types of resurfacing materials which have given service in many cities of the country. I have only mentioned those we have used in Richmond.

## GREATER SAFETY AT RAILROAD HIGHWAY CROSSINGS

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In discussing safety regulations at railroad highway crossings we must do so from a broad standpoint, having in mind not only the problems with which we are confronted today but we must also take into consideration the conditions we may reasonably expect to exist in the future. This subject is a vital one and is of tremendous importance in any plan we may adopt in our efforts to reduce accidents at railroad highway crossings.

During the seven-year period from 1917 to 1923, inclusive, as a result of crossing accidents in the United States there was a yearly average of 1,882 deaths and 5,100 injuries, and during 1924 there were 2,149 persons killed and 6,525 injured in this manner, an average of 24 casualties per day, as

compared with 9 per day 12 years ago, an increase of 167 per cent, which is not in harmony with the increase in the population of our country during the same period, amounting to only 15 per cent.

We must not overlook the fact that casualties resulting from crossing accidents are not confined to the user of the highway, for in 1922 there were 27 derailments of trains due to accidents of this character, causing death and injury to 138 railroad employees and passengers, in addition to a tremendous loss of property.

### **The Physical Situation**

On December 31, 1924, we had in the United States 242,807 crossings at grade. In seeking a remedy we must do so upon the theory that the future holds no panacea insofar as the physical situation is concerned, for it has already become an acknowledged fact that a solution of this problem, through crossing elimination, is unthinkable by reason of the prohibitive expense, conservatively estimated at 20 billion dollars, and the time required to perform such a stupendous task. Twenty billion dollars is greater than the preliminary estimated value of all railroad property as made by the Interstate Commerce Commission. It is almost equal to the combined resources of the national banks of our country. Certainly, no further argument should be necessary to show the utter inability of the railroads and the municipalities to shoulder such a financial burden.

A progressive plan of crossing elimination should be carried on, and so far as the New York Central Lines are concerned this policy is being pursued, this feature being taken into consideration in the preparation of the annual budget.

A gradual process of crossing elimination has been and still is being carried on by the railroads, but they have been seriously handicapped by the addition of many more new crossings. For example, in 1923 (which is the latest year for which statistics are available) the railroads of the country eliminated 972 crossings at a cost of about 100 million dollars, but during the same period 3,065 new crossings were constructed under conditions over which the railroads had no control. Even should crossing elimination be conducted on a more general scale we could not hope for a solution of the problem by this means for many generations to come. We must, therefore, accept the situation and meet the conditions as they exist.

### The Motor Vehicle

We have in the United States, in round numbers, twenty million motor vehicles. The motor vehicle is specifically concerned since it will be involved in 90 per cent of our crossing accidents this year. The number of automobiles will continue to increase, for it is estimated that in seven years there will be not only one car for every six persons as exist today, but the ratio will be increased to one car for every four persons; in fact, by that time we will have 33 million motor vehicles, a number sufficient to supply one vehicle to each individual that is old enough to reach the steering wheel.

The automobile today is an absolute necessity in the conduct of the business of this country and progress will demand not only its continued use but a greater extension of its services. It is by reason of this situation that it becomes imperative that we, in our attempt to provide a remedy, not only endeavor to take care of our present day needs but of the future as well, and this will include a regulation of the use of the motor vehicle so that it will serve the purposes for which it was intended.

### Analysis of Accidents

In making this analysis we find 70 per cent of our crossing accidents occur in daylight, 63 per cent at crossings where there is no obstruction to view and a large majority at crossings with which the driver is familiar—in the community where he resides—which clearly indicates that he is so familiar with the situation he feels he is immune to danger and drives heedlessly on the tracks without using any care whatsoever; or he sees the train approaching and increases his speed in an effort to beat it over the crossing. It is, also, of interest to know that one out of every 5 crossing accidents results from the automobile running into the side of the train. Some drivers failing to beat the train over the crossing attempt to “butt” it off the track.

A large percentage of drivers are wholly incompetent, due to either mental or physical defects. Mental, due to inability to read or understand the English language; physical, due to impaired vision or hearing, immature age and enfeebled condition, due to old age. A large number of these accidents can be charged to intoxicated drivers. It is certainly indicative of something lacking in our laws when men of the type described as mentally and physically defective are permitted to drive automobiles. But, it is obviously grossly neglectful to permit them to be operated by drunken drivers.

A judge in one of our large cities some months ago remarked from the bench that an automobile in the hands of an intoxicated driver is far more dangerous than a loaded revolver in the hands of a maniac on a crowded street.

Contrast the comparative qualifications of the driver of an automobile and the driver of a locomotive. The former, as a rule, needs no qualification other than his ability to possess a car. He is not only unfamiliar with its operation but is lacking in a knowledge of our laws governing its use on the highways. In many instances his responsibilities are such that he is weakened in his regard for the rights of others. Whereas, the locomotive engineer has earned his right to a seat in the cab of his engine by virtue of many years of training. He is not only familiar with its mechanism and operation but also with the rules governing its movement over the road. His responsibilities are a part of his makeup. He sits in his cab not only with these qualifications but with a steady hand, a clear head, a brain that is nowise affected by anything he may have drunk and with a keenness which is so alert that he is, in fact, a part of the locomotive being operated under his guidance.

While 25 per cent of the drivers do not use the care requisite to safety, yet, only about 5 per cent are grossly neglectful, using no care whatsoever. Thus, we find that only a small percentage of the drivers are careless, yet, if this were not true it would only be a few years until our country would be depopulated, for during last year, as a result of automobile accidents in our streets and highways, including those occurring at railroad crossings, there were 19,000 persons killed and 450,000 injured, an increase of 700 per cent in 12 years. The percentage of careless drivers is small, yet it represents a large army of 1,000,000 reckless demons flitting about the country having no regard for their own safety or the safety of their fellow men.

The reckless motorist is regarded as the greatest menace we have today in the safe operation of passenger trains, for he is, indeed, a potential train wrecker.

While crossing accidents during the past 12 years have increased 167 per cent and automobile accidents of all kinds have increased 700 per cent it is interesting to know that during the same period passenger fatalities on the American railroads have decreased 59 per cent. While the railroads have in certain instances reduced the speed of some of the best passenger trains as a greater assurance of safety, the speed of the automobile has increased. The act of foolhardiness has been changed from "Blowing out the Gas" to "Stepping on the Gas."

In showing the relative comparison of safety in travel by automobile and by train your attention is called to the fact that during 1924, which is the latest year for which we have available statistics, there were 19,000 persons killed by motor vehicles, of which number 6,650 were passengers in the machine. There were, also, 450,000 persons injured, of which number 157,500 were passengers in the machine. During the same year there were 41 passengers killed and 2,260 injured in the United States as the result of passenger train accidents. In other words, confining ourselves to casualties to persons riding in the motor vehicle and to casualties to passengers resulting from train accidents, we find the motor vehicle deaths outnumber those to passengers on trains 160 to 1 and the injuries 70 to 1.

As regards public safety, the public is responding to our appeals for co-operation. We are receiving the support of national, state, county and municipal officials. We are receiving aid from those organizations having to do with the manufacture and sale of automobiles. Many civic bodies are contributing nobly to this work and the churches and schools are lending most effective support. But this co-operation needs developing. If our contact with automobile drivers was as close as it is with our employees and the response toward co-operation was proportionate we would reduce crossing accidents 50 per cent within a year, and eventually would bring them down to an infinitesimal number.

It seems that tragedies of an appalling nature are necessary to awaken the conscience of America. The accident frequency in this country has reached such gigantic proportions as to demand national recognition and, due to this fact, the Hon. Herbert Hoover, Secretary of Commerce, called a National Safety Conference, at Washington, last December. This conference devoted two days to a careful study, discussion and analysis of the accident problem. Every agency having to do with the causation and prevention of accidents participated in the program. President Coolidge in addressing this conference said: "If the death and disaster that fall upon the innocent people during the year and throughout the country as a whole were concentrated into one calamity we would shudder at such a tremendous catastrophe," and in speaking further he said: "The yearly toll of accidents has reached an appalling total, the evil is so widespread as to be of national concern."

### **The Remedy**

What is the remedy? This is a joint responsibility between the railroads and the public. The railroads have a duty

to perform. We must not lessen our efforts toward increased efficiency in the maintenance and protection of highway crossings and in the manner of train operation as it applies to accidents of this character. Our every act in the discharge of our duties in this regard must carry a sincerity of purpose of such positive character as will convince the public of our real devotion to a most worthy cause.

The remedy lies largely in a constructive campaign of education. We must find some means to curb the reckless motorist and at the same time make driving safer for the great majority of motorists who are careful.

As an aid to this plan I would suggest the public can render effective service by carrying out the following suggestions:

1st. The prevention of the building of unnecessary highways across railroad tracks.

2d. The elimination of crossings through the re-routing of highways wherever possible.

3d. The elimination of obstructions to view on the highway within 500 feet of the crossing.

4th. Require every owner, driver and insurance carrier of every automobile involved in an accident causing personal injury to report full details thereof to designated state officials.

5th. The enactment of stringent laws requiring a proper standard of qualifications, making it impossible for motor cars to be operated by those who are unable to meet the required mental and physical tests.

My belief in the justice of our cause, coupled with my deep-seated faith in the fairness of the American people, gives me hope for the future. I believe the signs of the times point to a rule of law laying down a standard of competency to be met before licenses to drive motor vehicles will be issued. When this is done we will weed out a large army of present-day drivers who, by reason of defective vision, cannot see the train, much less the crossing; who, by reason of impaired hearing, cannot hear the roar of a cannon, much less the locomotive whistle; who, by reason of mental defects, cannot understand the operation of the car, much less the rules governing its use on the highway. We will weed out the old and decrepit who have retired from every form of activity excepting the God-given right to drive the family car; and, lastly but not least, we will remove from the steering wheel those whose right to operate a car is in fact a travesty on justice—the drunken driver whose acts are materially augmenting our casualty record at this time.

Through a greater spirit of co-operation there were 119 fewer crossing fatalities in the United States in 1924 than in

1923. It is our hope that all organizations and agencies, civic, political and otherwise, that are in any manner concerned in the conservation of life and limb and whose aid is so essential in the success of this movement will unite in a common enterprise and that as a result our co-operation will become more extensive, so that it will assume a force of such magnitude and power as will serve to wipe out this needless slaughter of human life.

## SURVEYS AND PLANS FOR COUNTY ROADS

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By W. W. Southard,  
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There has been a great improvement during the last ten years in the method of making road surveys and in the care taken in the preparation of plans for road improvements. Formerly it was almost universal custom for surveyors to run levels down the center of the proposed road and merely plat a profile showing the difference in elevation at one hundred foot stations. A new grade line was shown which gave the cuts and fills in the center of the road but there was no way to determine the amount of earth to be excavated at the sides. Consequently the surveyor's estimate was a guess, and similarly the contract in making his bid could only approximate the amount of earth to be moved.

The entrance of the State Highway Commission into the field of road construction has given the surveyors of the state an example to follow in the method of making surveys and the preparation of plans. The Bureau of Public Roads of the U. S. Department of Agriculture has laid down very exact and definite requirements which must be met by all states on Federal Aid Roads. In turn the Indiana Highway Commission has made rulings covering the plans to be submitted to them by the counties when asking state approval of plans and specifications. This, together with the desire of most surveyors to prepare plans as nearly approaching the perfection of those of the State Highway Commission as practical, has resulted in the improvement mentioned above.

I will try to outline briefly the methods to be followed in surveys of the different types of roads in this state.

In the central and northern part of the state most of the roads follow section or half-section lines. In the southern part