

THE RAILROAD GRADE-CROSSING HAZARD ON RURAL HIGHWAYS

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In a recent discussion of certain phases of the highway accident problem, the following statement was made:

"It is safe to say that the average citizen not familiar with the facts would rate fatalities at railroad grade crossings as one of the most important hazards of the highway. As a matter of fact, however, such accidents represent about 4 per cent of the fatalities and a far smaller percentage of injuries."

The paper which follows reports an attempt to refine the current statistics pertaining to grade-crossing accidents, and to determine more accurately than has hitherto been done the actual importance of such accidents in relation to other street and highway accidents. Its conclusion seems hardly to warrant such a brief dismissal of the subject as that quoted above.

The generally recognized source of grade-crossing accident statistics, and the only authoritative source for nation-wide figures, is the Bureau of Statistics of the Interstate Commerce Commission. According to its tables, there were in the calendar year 1926 a total of 5890 grade-crossing accidents on the steam railroads of the United States, in which 2491 persons were killed and 6991 persons injured. These statistics are derived directly from accident reports which railroads are required by law to render monthly to the Interstate Commerce Commission.

Unfortunately, we have no comparably accurate statistics for other types of street and highway accidents. According to the latest estimate of the National Safety Council, there were some 25,000 persons killed during 1926 in all street and highway accidents, and perhaps 700,000 persons injured. The estimate of fatalities is based principally upon the mortality tables of the United States Bureau of the Census, and is probably not far from correct. The estimate of the number injured is more frankly a guess, based upon the ratios of non-fatal to fatal injuries in limited areas where such figures are available. On the basis of these estimates, grade-crossing accidents appear to be responsible for 10 per cent of the fatalities, but for only about 1 per cent of the total number of personal casualties. The disproportionate ratio of fatalities to injuries and the high mortality per accident at grade crossings are conspicuous.

In the belief, however, that these simple totals did not tell the whole story, the United States Bureau of Public Roads recently undertook a more detailed analysis of the original reports of individual grade-crossing accidents in the files of the Interstate Commerce Commission for 1926. The results have been interesting and enlightening, and it is expected that they will be published in detail at another time. In this present paper only a single phase of the analysis will be considered. It was the opinion of those responsible for the study that the proportion of grade-crossing accidents in the country at large would not apply to rural highways in which the Bureau is principally interested. It was assumed, first, that, due to better protection or elimination of grade crossing in cities and larger villages, the majority of all crossing accidents occur in rural areas, and, second, that the majority of all street and highway accidents occur in urban areas. If these two assumptions are correct, then it would appear that the rural grade crossing in relation to other rural highway hazards is a good deal more serious than our usual crude statistics have indicated. In other words, if we analyzed urban and rural accidents separately—and there are good reasons for doing so—we should find grade-crossing accidents taking a much more prominent place among rural accidents.

The relative frequency of crossing accidents in urban and rural areas was arrived at through the study of the Interstate Commerce Commission records above referred to. By noting the "nearest station" to the scene of the accident as reported by the railroad, together with the "distance and direction from station named," and with the occasional assistance of other data given, it was possible to divide the accidents into two groups, those occurring in incorporated places having a population (Census of 1920) of 2500 persons or more ("urban"), and all others ("rural"). This classification is in accord with the United States Census definition of urban and rural population, and in approximate accord with the provisions of the Federal Aid Highway Act, which provides that Federal Aid shall not be extended to highways within incorporated places of 2500 persons or over, except on "that portion of any such highway or street along which, within a distance of one mile, the houses average more than 200 feet apart." It was not always possible, of course, to know whether a given accident occurred outside or within the corporate limits of the place named. An individual judgment had to be made, with the expectation that errors would tend to neutralize each other. It seems almost certain, however, that the predominance of error lies in the direction of increasing the "urban" total.

The result of this "urban" and "rural" classification was something of a surprise, for the total number of accidents proved to be almost exactly equally divided, there being 2907 "urban" accidents and 2897 "rural" accidents. On the other hand, a large majority of the fatalities resulted from "rural" accidents. Out of 2465 fatalities tabulated,¹ 1570 were "rural," or approximately 64 per cent. The lower mortality per accident in cities may be attributed, among other things, to the slower speed of trains and highway vehicles, and to the larger proportion of pedestrian accidents.

The second assumption, namely, that the majority of all street and highway accidents occur in urban localities, appears to be fairly well substantiated by what fragmentary statistics are available. The mortality statistics of the United States Census Bureau for the Registration Area in 1925 (the latest compiled) show nearly 61 per cent of all deaths from automobile accidents (including collisions with street cars and railroad trains) occurring in cities of 10,000 population or over.² The report of the Massachusetts Motor-Vehicle Department on 669 fatal accidents during the fiscal year 1926 shows 394, or nearly 60 per cent, occurring in "business districts" or "thickly-settled residential districts." For the two months of June and July of this year the state of New York reports 314 motor-vehicle deaths for localities of more than 2500 population, and 130, or less than 30 per cent, in the rural regions. Figures from other sources show similar proportions of urban and rural deaths. It is, therefore, estimated that only 40 per cent of all traffic fatalities occur in "rural" areas under present conditions.

If 64 per cent of the grade-crossing fatalities occur in "rural" areas, whereas only 40 per cent of all traffic-accident fatalities occur in the same regions, it is a matter of simple arithmetic to demonstrate that grade-crossing accidents are responsible for 16 per cent of all fatalities resulting from accidents on "rural" highways.

This figure of 16 per cent is subject to various qualifications and cannot be regarded as final. Allowance must be made for certain defects in the statistics upon which it is based.

1 As stated above, it seems probable that the proportion of grade-crossing accidents attributed to "rural" localities is too small.

¹In this independent tabulation, no attempt was made to secure agreement with the figures published by the Interstate Commerce Commission.

²It should be noted that the statistics quoted in this paragraph are those for motor vehicle accidents only, and do not include all forms of traffic accidents.

2. The Census statistics of automobile fatalities, quoted above, attribute 61 per cent to cities of over 10,000, whereas grade-crossing accidents are here separated on the basis of a minimum "urban" population of 2500 persons.

3. On the other hand, the mortality statistics of the Bureau of the Census report each fatality as of the city in which death occurs, without regard to the site of the accident which caused the death. Over 13 per cent of the automobile fatalities reported from 61 of the larger cities during the 52 weeks ending November 5, 1927, were the result of accidents which took place outside of the city limits. Unfortunately, the Bureau of the Census neither receives nor publishes similarly refined statistics for the smaller places

4. The grade-crossing accident statistics here quoted are those for the steam railroads of the country. During 1926 there were also 237 persons killed at crossings by the electric railroads which report to the Interstate Commerce Commission. While the proportion of "rural" accidents is probably lower on the electric roads than on the steam roads, a considerable number of these fatalities should properly be included in the "rural" grade-crossing total

5. Finally, it should be observed that the number of fatalities at grade crossings, as reported by the Interstate Commerce Commission, includes only those in which death occurs immediately or within 24 hours after the accident. A special tabulation made by the Commission for the purposes of this study shows that during 1926 there were 205 "subsequent fatalities" resulting from grade-crossing accidents. The number of deaths at grade crossings should, therefore, be put at 8 per cent higher than the usually accepted figures upon which the foregoing argument has been based

To just what extent these considerations offset each other we cannot say. But even a conservative interpretation of the evidence appears to warrant the tentative conclusion that at least 16 per cent of all rural highway fatalities—not to be confused with the number of accidents or the number of non-fatal injuries—are to be attributed to the rural grade crossing