Traffic Accident Records in Appraising Highway Needs

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● HIGHWAY adequacy can be measured by structural condition, the facility of vehicular movement, and accident experience. This paper discusses the use of accident experience as a measure of highway adequacy.

Over past years much has been written about the need for better accident reporting and the engineering use of accident data through maps, files, and other methods. These items are the key to successful use of accident records in appraising highway needs.

In using accident records to appraise highway conditions, the engineer needs two things which he seldom gets: complete or nearly complete reporting of accidents and accurate location descriptions. The two are related because unless the accidents can be located with reasonable accuracy the report is useless to the engineer.

The National Safety Council estimates that, in 1955, there were nearly 300 non-fatal accidents for each fatal accident in the nation. The three states with the highest normal reporting ratios achieve less than 200 to one. Only 30 percent of the states achieve a ratio of 100 or more to one. The actual range in statewide reporting ratios is from 186 to one in New York to 11 to one in Arkansas. On rural state highways, the true ratio probably exceeds 100 non-fatal accidents for each fatal accident. Washington has the highest reporting ratio on rural state highways, 75 to one. Other states are fairly evenly distributed from 60 down to 13 to 1.

Only seven states report more than 350 non-fatal accidents to each fatal accident in cities. The remaining states have city ratios distributed from 300 to one down to three to one.

A current study in Massachusetts, in which the Bureau of Public Roads, the State Department of Public Works and the Registry of Motor Vehicles are attempting to determine the true costs of motor vehicle accidents, bears out the fact that normal accident reporting is far from complete reporting. In 1954, the state reported to the National Safety Council that there were 141 non-fatal accidents reported for each fatal accident. Massachusetts is considered among the better reporting states, but the more detailed study showed that the ratio was actually 416 to one. In rural areas the ratio was 183 to one and in urban areas 510 to one.

The point of this analysis of ratios is not to show variances between states and cities, but to show the failure to achieve complete reporting. In presenting partial results of the Massachusetts study to the Southeastern Association of State Highway Officials in September, Robie Dunman commented, "Even in states with the very best accident-reporting records, unreported accidents run as high as 50 to 60 percent of the total." Even if the estimated 5,400,000 accidents resulting in less than $25 damage were eliminated as inconsequential, the ratio of non-fatal accidents to fatal accidents in 1955 is still nearly 140 to 1 nationwide, and only a few states come close to this figure.

Incomplete reporting makes it impossible to give proper weight to accident experience in identifying highway deficiencies and establishing priorities of improvement. This has tended to depreciate the use of accident records in making highway appraisals. Yet what the records do show is definite and is useful in identifying some hazardous locations; useful, that is, when the engineer can or will use them. It is true that in many cases accident records are not available for engineering use and, yet in other cases the evidence is that engineers attempt too feebly or not at all to use records which are available.

For appraisal purposes, the most useful of the methods in which accident records are kept is the large-scale spot map or strip map. There are many notable examples

of each, and it is not necessary to describe them here. Machine tabulation of accidents by location is helpful if the sections covered are not too long and the termini agree with other data section breaks. The basic requirement is to be able to identify the location where each accident occurred and to accumulate a record over a sufficient period of time so that it has significance.

Accepted accident record procedures include the filing of accident reports or cross-reference cards by route and location so that they are readily available to the engineer in studying spot improvements or palliative treatments which may eliminate or reduce hazardous conditions; for these purposes, actual reports are indispensable.

In studying over-all highway needs, however, actual reports are not needed. In fact, not studying the reports eliminates the tendency to assign responsibilities. Most accidents involve more than one contributing factor or cause and evaluating primary, secondary and tertiary responsibilities is an involved process which cannot properly be done from most accident reports. Thus, it is better to assume that highway conditions have, at least, partial responsibility in all reported accidents and that improvements to those conditions would reduce the number of accidents.

Recent development of refined techniques in investigating and evaluating contributing factors in motor vehicle accidents, principally by J. Stannard Baker of Northwestern University Traffic Institute, shows that highway and traffic conditions share more in the causes of accidents than past routine tabulations of road defects have indicated. As scientific research continues and expands, the relationships between geometrics and moving traffic may be shown to influence almost all accidents.

What is significant accident experience? There are no standard rates of occurrence which can be applied to these procedures. Oregon is now developing expectancy rates which can be used to compare costs to benefits. Another study is contemplated which will attempt to relate accident occurrence to design features somewhat in the manner attempted by the Bureau of Public Roads and the National Safety Council in 1943, 1944, and 1945. Out of these studies and perhaps others, yardsticks may come which will identify the sections of roads having a disproportionate number of accidents.

In the meantime, there are left such devices as comparing actual experience with average vehicle-mile accident rates for different highway systems or assigning values according to the range in vehicle-mile rates from high to low. There are two disadvantages to dealing with vehicle-mile rates in these matters. They only allow comparison with averages or normals without regard for the fact that either may be too high to be tolerated, and they depreciate the value of the cumulative accident experience in determining urgency with which improvements are needed.

In determining urgency or priority of individual improvements, the accident-per-mile rate must also be considered and shows evidence of being the better yardstick. It recognizes directly the economic and social benefits to be obtained from early improvement of road sections which now experience large numbers of accidents regardless of whether or not the actual number of accidents produces a low vehicle-mile rate on high volume roads. Use of vehicle-mile rates on high volume roads may obscure a situation responsible for numerous accidents, and vehicle-mile rates may over emphasize the importance of a few accidents on low volume roads.

However, none of these uses is actually valid because of the general low level of accident reporting. Without some reliability in the basic data, engineers and administrators must always be skeptical of results indicated by accident records. Of course, the remedy is more complete reporting through stepped-up activities by the police and officials responsible for collecting reports. Continued use by engineers, recognizing the inaccuracies, would put new emphasis on the importance of good accident reporting. It does not stretch the imagination much to see the effect on local officials when they realize highway projects are programmed, in part, according to available accident experience.

There are more engineering uses of accident records than have been touched on here. These are the uses of the costs of accidents in studying the economics of highway transportation in general and in establishing economic warrants for individual improvements. Some scientific work is already underway in these areas. The Massachusetts study ratios has broken the cost-barrier, so to speak, and revealed a better direct

cost of passenger car accidents than heretofore available. This study continues and soon will produce the direct cost of truck accidents and the indirect costs of all accidents. When more states follow Massachusetts' lead the actual cost of traffic accidents may be surprising. The importance of the accident history has been stressed in other work. Again the success of that work depends on the completeness of the accident record and its availability to the engineer. But its importance is such that it warrants more than a little effort on the part of the engineer to get it.