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Improved Driver Communications

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INTRODUCTION

The cost of traffic accidents today approximately equals the cost of providing the highway system. This simple economic fact can be arrived at by looking at annual expenditures—$21 billion for roads[1] against $16.6 billion for accidents[2]—or at vehicle operating costs—1.7 cents per vehicle-mile[1] for insurance against 1.4 cents per vehicle-mile for all the taxes which build the roads, as well as provide other services.

Ignoring all of the humanitarian aspects, this economic reality should, by itself, be enough to convince us that traffic safety is a major concern—even a threat to the continued acceptance of highway transportation. The present level of accident cost is simply too high to continue to tolerate.

IMPROVING THE DRIVER AS A DECISION MAKER

Each of us, I and my distinguished copanelists, will talk to seemingly different approaches to achieving greater traffic safety. But let me submit that we may all be talking about the same approach—improving the reliability of the driver as a decision maker.

As highway engineers we can do three things about traffic accidents. First, we can reduce the number of decisions a driver need make and therefore the number he may make wrong. We can do this by putting in grade separations to eliminate cross traffic or medians so that the driver can forget about on-coming or turning traffic; or secondly, we can provide the driver with better information on which to base a decision—longer sight distance is one of many examples; or finally, we can reduce the consequence of a wrong decision by making lanes wider, ditches shallower, and bridge piers harder to find or softer to hit.

PROGRESS HAS BEEN MADE

In the past 20 years, we have made remarkable strides in all categories—but particularly the first and third. There are highways—

[1] Federal Highway Administration.
[2] Insurance Information Institute.

the Massachusetts Turnpike is one example—with fatal accident rates one-fourth the national average; yet these roads are being driven by "average" drivers in "average" cars—about the same ones that are involved in four times as many fatal mistakes on other highways.[3]

Now, we are not going to grade-separate all the intersections in the United States, nor are we going to remove all the trees and fixed objects along 3½ million miles of streets and roads. I sincerely hope that much more of this will be done as we modernize our road system, simply because it does work and it does pay economic dividends.

GREAT POTENTIAL EXISTS FOR IMPROVING DRIVER INFORMATION SYSTEMS

However, let me turn to the second alternative—improving driver information — and quote a recent federal highway administrator, Lowell Bridwell, who said, "Highway communication is the biggest single untapped source of greater service and safety that we can utilize for highway transportation improvement."[4]

Bridwell was talking about some new tools which are, or certainly can be available, but let me start with the tools at hand now—the standard signs, signals and markings that we all know and love and continue to ignore.

It has always seemed strange to me that we as engineers would spend $100,000 a mile (or $10 million for that matter) to build a road and then not spend the extra one or two percent to tell the motorist where it goes or that there is a curve ahead or that passing isn't safe. From a service standpoint, it doesn't make much sense.

Or another truism we all learned in public speaking—don't mumble! We have been mumbling to the motorist for years with signs that were too small, too confused, poorly maintained and all too frequently poorly planned and located.

As one indication of the state of our highway signing, some years ago my organization conducted an interview at a state fair of those who had come over 200 miles by car.[5] In over half of the cases,

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[3] International Bridge, Turnpike and Tunnel Association Accident and Fatality Report 1969-1970.

[4] Summary Report: National Conference on Highway Communications, Automative Safety Foundation, 1968.

[5] Some Principles of Freeway Directional Signing, Schoppert et al, Highway Research Board Bulletin 244.

the driver had thought he was lost at least once on the trip. One-third of the time he was right—he was lost!

Another example—the Los Angeles freeway system is equipped with 2,240 telephones—one every quarter mile in each direction. Their purpose is to aid stranded motorists and they accommodate about 85,000 calls per year. Twenty-five percent of these calls are for information—the poor motorist is lost![6] In a similar situation on the Eisenhower Expressway in Chicago, 31 percent of calls are for information.[6]

These lost motorist statistics are not, perhaps, directly related to safety, although a confused driver can get himself and others into trouble.

They illustrate, however, that a system relying solely on fixed message signs to give the driver all the information he needs, has definite limitations not only in guidance but in safety and efficiency as well. And this is what Bridwell was talking about—our next major advance in highway service will be to improve the information on which drivers base decisions.

MAJOR CATAGORIES OF INFORMATION NEEDS OF THE DRIVER

What are these information needs? Here are at least some of the major categories:

1. Routing information—destination, major junctions, best alternates,
2. Roadway conditions—ice or sharp curve,
3. Traffic conditions—congestion, accident,
4. Guidance information—where is the proper travel path,
5. Vehicle closure data—is it safe to pass, is the car ahead stopping,
6. Right-of-way assignment—at intersections, ramps and railroad crossings and with emergency vehicles,
7. Traffic regulations—standard and emergency,
8. Servce information—again, both standard and emergency.

These categories of information have several things in common. First, they are almost all variable. With the exception perhaps of the roadway features, such as curves, most of this information changes constantly—trains occupy a grade crossing only a few minutes of the

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[6] National Cooperative Highway Research Program, Project 20-5, unpublished.

day, the existence of an approaching car over a hill crest is rarely a certainty.

Secondly, the driver's need for information varies. Service information is needed sporadically, most other information is only needed when it is the exception to the norm.

Third, drivers are getting the information now, although frequently in an imperfect form and almost always by the one channel of eyesight. Hearing and tactile channels are infrequently utilized.

DESIRABLE FEATURES OF AN IMPROVED INFORMATION SYSTEM

From these common features, it is possible then to set at least some of the desirable criteria for an improved communication system.

First, it should be available to the driver when he needs it, which usually means while the vehicle is in motion.

Second, it should carry current information relative to the actual present situation. This means that the system must have a capability to gather and digest current status information.

Third, it should present most information on demand only, to avoid overburdening the driver.

Fourth, it should utilize to the maximum possible extent channels other than eye-sight.

Fifth, it must be highly reliable and fail safe in case of malfunction.

Sixth, it must be a cost effective improvement over the present situation, and,

Seventh, it must be acceptable to the driving public and capable of incremental achievement in a nation of 125 million drivers, over 100 million vehicles and 30,000 road agencies.

INCREASING DEMANDS FOR IMPROVED INFORMATION SYSTEMS

For each of the categories of information previously listed there is now one or more device under development or in use. Unfortunately, most are capable of serving one purpose only. It seems to me essential that the total spectrum of need be examined and no system adopted that does not have the ultimate capability of expansion to meet the total need. Thus, I look on the roadside emergency telephone approach as only a stop-gap which must ultimately be abandoned in favor of a truly comprehensive information system. And,

of course, I don't know when "ultimately" is, although I suspect that it is sooner than many imagine.

The need for highway improvement will continue. The Department of Transportation estimates that transportation demand will double in the next 20 years. The public's insistence on safer highways will not diminish—in fact, it will grow as the potential for greater safety through vehicle design is exhausted. The public's expectation of a higher level of service in terms of less congestion, speedier assistance, fewer misadventures, will also surely grow. In all of these areas a new, much improved driver information system could make a major contribution.

CONCLUSION

I would like to close with a quotation which I hope will give you pause to consider, as it did me. The quotation, from a Harvard Business Review article on transportation, is as follows:

"Our transportation system suffers increasingly from things left undone; it is not inconceivable that someday we may all be damned by default."