

HUMAN FACTORS/ENGINEERING INTERFACE

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As a point of departure for the Conference Session, the topic of this discussion is the concept of Human Factors/Engineering Interface. The concept refers to the manner in which the highway's information system of signs, signals, markings, and delineation interfaces with the driver and specifically, whether drivers receive, understand, and properly react to the array of traffic control devices designed and/or employed by highway and traffic engineers. Since the primary function of TCD's is to convey the operating condition of the highways to the motorist, at issue is whether messages utilized by those whose responsibility is to operate the roads in a safe and efficient manner are conveyed to those who are using the facilities.

Therefore, this discussion, as well as those to follow will explore the quantity and the quality of testing of signs, signals and markings. This pertains to both "standard" devices as well as nonstandard ones. Standard devices are those contained in the Manual on Uniform Traffic Control Devices (National Committee on Uniform Traffic Control Devices, 1978), and used in accordance with the criteria contained therein. All other devices are referred to as "nonstandard".

Several important issues are involved in quantity and quality. The first is how many of the devices that are standard have actually been tested? The second is how were those devices tested? Finally, how suitable has the testing been? Ultimately, there is a need to gauge both the effectiveness of the device, and the effectiveness and suitability of the testing methodology.

Before considering the testing of devices, the issues involving their suitability should be addressed. This means that, even when the methodology used to test devices is appropriate, if their designs and/or applications are improper, then their ultimate effectiveness in conveying information is reduced. The need for testing traffic control devices is lessened when standard devices are used, providing their effectiveness has been demonstrated empirically prior to their inclusion in the Manual on Uniform Traffic Control Devices. However, even when standard devices which have been evaluated through testing are used, if their application is improper or inappropriate for the situation, then these devices may require additional testing. Certainly, nonstandard devices should be evaluated empirically, and standard devices which have not been tested should be considered for evaluation as well.

One way to maximize information suitability prior to testing is to use standard, evaluated devices to the maximum extent practicable, and, when warranted, to apply these devices at problem locations in accordance with the Positive Guidance procedure (Report No. FHWA-TO-81-1, A Users' Guide to Positive Guidance).

Positive Guidance is an approach to enhance the safety and operational efficiency of hazardous or inefficient locations. The approach joins the highway and traffic engineering and human factors disciplines to produce an information system matched to the characteristics of the location and the

attributes of drivers. Positive Guidance is designed to provide spot and short-segment information system improvements to ameliorate safety and operational problems at relatively low cost. It is based on the premise that a driver can be given sufficient information to avoid accidents and/or drive efficiently at hazardous locations and locations with operational problems.

Once it has been established that the appropriate complement of devices has been utilized, it still remains to determine whether, how, and to what extent each device has been tested. From the perspective of the Federal Highway Administration, it is most important that uniformity and appropriateness of traffic control devices be maintained through standardization of devices and device applications. However, even with standard devices applied in accordance with the Manual on Uniform Traffic Control Devices, there is no certainty that there has been appropriate empirical evaluation of the device. As a matter of fact, until recently, there was little knowledge of what signs, signals, or markings have been tested.

An on-going study by Comsis, Inc. was commissioned by the Federal Highway Administration to assess all standard devices. One of the study's primary objectives was to trace each device from its inception and/or introduction into the current Manual (the first Manual was introduced in the 1920's). Some devices have always been in the Manual, others were gradually incorporated, and some were included through a mechanism of request for change and approval by an advisory committee. Over the years, a procedure evolved that included the need to experiment, but many devices were never tested, particularly those that were introduced early. It was found, when the evolutionary and literature history of each device was traced, that approximately 60 percent of all devices were empirically evaluated. Thus, only 6 out of 10 devices was tested. Furthermore, there is still information lacking on those devices which were tested as to the efficacy of the testing. Hence there is no assurance that the testing which was done was proper and conclusive.

In conclusion, while the state-of-the-art of testing of traffic control devices has gone forward, there is still much to be accomplished. Devices are still used that were never evaluated, and no single criterion exists for proper testing of devices in accordance with sound human factors principles. Much work still remains to develop such criteria and test devices on a priority basis.

INFORMATION PROCESSING AND PERCEPTION

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Speaking positively, our traffic control devices, in general, are performing successfully, as evidenced by steadily declining accident rates and comparative reports of driving experiences in foreign countries. As always, we are striving for improvements in traffic control devices by identifying and developing techniques for their evaluation before they go out for actual trial and error utilization on public streets and highways. Some laboratory research has been done on many devices currently in the Manual On Uniform Traffic Control Devices, but nearly half have not been formally tested.