G. Comments on NCHRP Report 230 Related to In-Service Evaluations

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The Colorado Department of Highways has just completed a four-year in- service evaluation of three highway safety appurtenances. Covered in this study were the SERB and Modified Thriebeam guardrails and the Colorado Type 3F Median Barrier End Treatment. In addition, Colorado has an on-going study which is monitoring 2300 feet of IBC Median Barrier installed in the Denver area.

It sometimes seems like a big step to go from full-scale crash testing to the "real world" where every car that comes along is not a Honda Civic or a Plymouth Fury. The possible range of vehicles, their modifications, and the range of skill with which they are driven make interpretations of the collected data difficult. In addition to this, most of the "high performance" barriers are installed in areas which are very different from that of the test site. As an example, the location of the SERB guardrail in Colorado is near the bottom of a 1.9 mile long grade of 6.2% and on the outside of a left curve of 760 foot radius.

The problems associated with in-service evaluations begin right after the device has successfully completed its crash testing program. In most cases, highway designers are reluctant to specify large numbers of a safety appurtenance which has no maintenance or repair history. In addition, what are the liability issues introduced by not specifying the "tried-and-true" device? On the other hand, it is necessary to have a large enough sample size to get statistically valid data and to draw some sort of conclusions from it. Colorado's SERB installation has been in service since the fall of 1983 (almost five years now). To date, only two accidents have been reported.

Even if several of a new appurtenance are installed in areas with a high probability of an impact, what seems to happen is that a certain number of the impacts which occur are not "typical." For example, the direction of the impact was exactly opposite to that for which the appurtenance was designed, or a piece of farm machinery hits the device, or a vehicle rolls over onto the appurtenance. It is not that we can't learn anything from these types of impacts, just that care must be taken not to draw any general conclusions from them.

Another problem with data collection is the unreported hit. The closer the barrier approaches "ideal" performance, i.e., safely redirecting the vehicle, no snagging, minimizing exit angles, etc., the more impacts seem to go unreported. It is often possible to get some information on the impact based on skid marks or vehicle debris but usually the data is sketchy at best. Some of these incidents are caused by drunk drivers, uninsured motorists, and drivers whose licenses are under suspension. Their last thought is to call the police because they scraped a guardrail. It is also possible that many other motorists simply want to avoid the "hassle" of a police investigation as long as damage to their vehicle is relatively minor. This happened several times during a study of the SERB and Modified Thriebeam guardrails where evidence of heavy impacts appeared on the guardrails but no accident reports were ever filed.

Once appurtenances have been damaged and require repair, several other problems often show up. If a highway safety appurtenance contains any components which are not "off-the-shelf," there are often delays in getting the device repaired. It would seem that the obvious answer is to stockpile spare parts, but maintenance is reluctant, and probably justifiably so, to buy special parts for one or two appurtenances on the chance they might be needed. An example of this is the SERB guardrail. An accident occurred in July of 1986, but due to a combination of problems and delays, the repairs were not completed until almost 2 years later.

Another problem is with the drawings that maintenance uses to rebuild an end treatment or guardrail. More often than not, the copy they have is a third generation copy of plans which were crowded and confusing in the original. The use of isometric sketches, still photography or video seem to me to be a more natural method of communicating this type of information to these people. The Colorado Department of Highways is planning on making some video tapes which provide step-by-step instruction for repairing specific appurtenances. Perhaps every new appurtenance should come out of the testing program with a repair video. This is a serious problem as systems are becoming more and more complex. The addition or absence of a washer in a critical connection or a weakening slit facing the wrong direction can have serious results.

Another related problem which should be discussed is that of modifications. Often times construction or maintenance people see a better way to do things. What may seem to be a minor modification to an appurtenance could lead to poor performance. It may be possible during the testing phase of an appurtenance to identify those areas where details are very crucial and others where they are somewhat more forgiving.

In conclusion, it seems there are many reasons why an in-service evaluation cannot possibly draw any conclusions, but these studies still provide the best way we know of providing important information about a highway safety appurtenance under actual conditions. This information is invaluable for highway designers and therefore needs to be collected in a rigorous, scientific manner.