

FEDERAL PERSPECTIVE ON WARRANTS FOR HARDWARE DESIGNED TO MEET NCHRP REPORT 350 REQUIREMENTS

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With the formal adoption of the *NCHRP Report 350* as the document governing the testing and eventual acceptability of roadside hardware, the highway designer's task has become more challenging. Whereas previously a single series of crash tests determined acceptability for use, the new guidelines specify six distinct test levels for longitudinal barriers, three for terminals and crash cushions, and two each for sign and luminaire supports, utility poles, and truck mounted attenuators (TMA's).

Before, a designer had only to determine if a barrier or breakaway support was warranted and to specify a standard piece of hardware if the answer was yes. Now, in addition to deciding if a barrier or other safety feature is warranted, a designer must also select an appropriate performance level. In other words, a decision must now be made regarding the degree of protection to use, or looked at slightly differently, how much risk can reasonably be assumed in the selection process. Should the system selected be capable of redirecting vehicles larger than a 2000 kilogram pickup truck, for example, or would a system tested only at 50 or 70 kph suffice? The designer's task would be greatly simplified if guidelines or warrants for each test level existed. My remarks will be limited to barrier warrants because, with six test levels available, the designer has a great deal of latitude in the selection of an appropriate system.

How are barriers currently selected? Informal warrants generally exist to determine if any barrier is needed, but the specific type of barrier seldom requires a conscious decision. Each agency has its favorites, be it w-beam on strong posts (wood or steel), one of the weak post systems or a concrete safety shape (usually the New Jersey profile). Thus, the current barrier selection procedure is quite subjective. In addition, the distinction between warranted and cost-effective is often vague. Simply stated, a barrier is warranted if it will reduce the severity of a run-off-the-road accident, i.e., hitting the barrier would be less damaging than leaving the roadway and striking the shielded hazard. However, since resources are limited, the likelihood of such an occurrence is a valid and necessary consideration. This generally means more hazards are left unshielded on lower volume, lower speed roads. Guidelines used by an agency should reflect this consideration.

Developing guidelines for the higher test levels should be relatively easy, since test levels 4, 5, and 6 are intended to retain and redirect trucks. Thus, the guidelines would consider total traffic volumes, percent trucks, truck types, operating speeds, likelihood of impacts (geometrics) and the consequences of such impacts. Many State agencies look at these factors subjectively now, but few if any have formal warranting procedures or selection guidelines. The use of higher test level median barriers and bridge pier protection are two examples of continuing concerns where little has been done to date to develop and use more stringent warrants.

Guidelines for the lower test levels (1 and 2) become more problematical, since these levels are for speeds of 50 and 70 kilometers per hour (30/42 mph) and do not include truck tests. If there were roads where motorists drove at these lower speeds, guidelines might be useful and easy to develop. Judgment and experience suggest that few motorists run off the road while travelling at these speeds, and when they do, the consequences are not generally life-threatening. If the highway engineer's goal is to reduce accident severities with the judicious use of barriers, these barriers must be designed to function at anticipated impact speeds. Thus, for the class of highways currently under the Federal sphere of influence, mostly high speed, high volume roads, test levels 1 and 2 for barriers may not be appropriate. State highway agencies are cautioned to use barriers (and other roadside features) that meet the real needs of the travelling public.

Low volume roads may very well be a separate issue. This term is, of course, not synonymous with low speed—oftentimes just the opposite. Operating speeds on these roads are governed by what the drivers feel comfortable with, and are often significantly faster than the posted speed limit. Volume alone should not be the sole determining factor for selecting a barrier. However, it can be used to set more stringent warrants. In other words, a barrier will still need to contain and redirect a 2000 kilogram pickup truck impacting at 100 kilometers per hour, but it will be used only at the sharpest curves and steepest slopes along a given section of roadway.

So what then, is the Federal position on guidelines for selecting an appropriate test level for roadside barriers?

First, a rational selection procedure is critical to answer the question what type of barrier (performance level) is best, given that a barrier is warranted. This is not generally done at present, except after-the-fact as a result of a serious accident or series of accidents.

Second, guidelines should be developed by the State highway agencies, ideally as a cooperative, coordinated effort. The important issue is to decide when higher test level barriers are appropriate. Those States using lower test level barriers should proceed with caution as suggested above.

Finally, the highway community should keep the end result or goal in clear sight: a logical, rational selection process (or warranting procedure) whereby the most cost-effective barrier system will be installed at any given roadside location. The selection of the best barrier for each site should not be left to chance.