curred in 1964 and 1965 on California freeways in which vehicles struck some kind of guardrail. Included in this category are 41 where the guardrail was a median barrier.

The dilemma persists. In order to solve it, the probability of a few cross-median accidents must be weighed against the certainty of many accidents of other types, and therefore barriers are only placed when the probability of their doing more good than harm can be demonstrated.

In general, when traffic volume is very high, the number of potential head-on accidents is high enough that their prevention outweighs the negative aspects. But at low traffic volumes and where the divider strip is wide, the chance for a cross-median accident is so small that the added accidents the barriers cause are considered to be too high a price to pay. As traffic volume increases, more barriers will be installed. California motorists may be sure that proven safety devices and safer design standards will be adopted for the California Highway System as fast as they are developed.

Mr. CONSTANDY. Will you continue then, Mr. Beaton.

Mr. BEATON. Our median barrier program testing new ideas and refinements of old went on through 1964. However, during the early part of this project and as a supplementary program we determined that our then 1958 standard guardrail was not as effective as desired. We therefore changed from the curved beam type to a W-section beam on blocked out posts.

Improved bridge rail designs was our next objective. Testing was started in this area in 1965. As I stated earlier, our 1955 program had developed effective concrete bridge rails that were topped with a metal tubular railing. Tests in 1963 further refined these designs and improved the strength of the metal posts and rails. In addition to these concrete bridge rails, we found that we had a need for a railing that would improve visibility, be self-cleaning, and esthetically acceptable. Based on past dynamic studies, our bridge department therefore designed an all steel bridge barrier railing consisting of two horizontal rails mounted on steel posts. This railing proved to be both pleasing in appearance and very effective in redirecting colliding vehicles. It is of special value on interchange structures where visibility of approaching traffic is very important.

Its use, however, is otherwise limited, in that it is important in the normal structure of any length that the driver not be distracted by objects along the side, such as boats and so forth, and also that the rail be somewhat substantial looking so as to give the driver every confidence in the world in them.

Concurrent with our bridge railing studies, we were also conducting a program on guardrailing. This was started in 1964. Our traffic department had observed during their continuing accident studies that the then current standard design of metal beam guardrail was diminishing in its effectiveness due apparently to the higher speeds and heavier weights of the modern vehicle. During this project we therefore studied the effect of various modifications to the metal beam type of guardrail. You have already seen the picture, and we changed our standards, we raised the beam and we cut down the post spacing.

During this time and still underway, we are testing short sections of guardrailing which are used to deflect vehicles away from collision with various objects along the side of the road. Our tests confirmed the findings of others that guardrailing less than 100 feet in length is ineffective unless adequately anchored. We are not satisfied with any of the current anchoring systems and are therefore attempting to develop a better system.