Here is the standard median barrier design erected on the test site. In this test series, all median barrier and guard railing installations were constructed on this simulated, flat, paved median, and were impacted from this 25 degree approach line. The impact speeds were approximately 68 mph for the median barriers and 60 mph for the guard railings.

The standard California beam type median barrier installed for the first test utilizes 8″ x 8″ treated Douglas fir posts and blocks at 6′-3″ centers. The 12-gauge galvanized steel "W" beams are mounted 30 inches above the pavement and the 6-inch, 8.2 lb. galvanized structural steel channel rubbing rail is centered 12 inches above the pavement.

This is the standard median barrier installation ready for impact Test #1. (Sound track of crash.) This view from the tower camera shows the 25-degree approach angle at 69 mph. Here is another tower view showing the 15-degree exit angle. Note the tendency for the car to roll slightly away from the rail rather than into it. The damage sustained was typical of that we have observed from operating experience on our freeways.

The rail was permanently deflected up, presenting a barrier more than a foot above the center of gravity of the average passenger vehicle. The vehicle was a total loss.

The same post and block system was retained for the second test. However, in Test #2, aluminum beams and rail were substituted for the steel members used in Test #1. The 0.125 inch thick beams were alloy 2024–T3, and the 6-inch, 3 lb. channel rubbing rails were alloy 6061–T6. These elements were mounted at the same heights above the ground as was used in Test #1.

This is the aluminum median barrier installation ready for impact Test #2. In this test, the splice of the aluminum rubbing rail was made the same as for the steel rail in Test #1. (Sound track of crash.)

The 25 degree approach angle at 68 mph. Notice that the beam fails first, then the aluminum channel rubbing rail fails at the splice. A majority of the flying debris is fragments of the aluminum beam.

This is a view from the data camera mounted above the back seat showing the kinematics of Sam during this roll-over. Again, flying debris is fragments of aluminum rail.

It was determined from the data film that the failure of the aluminum rubbing rail splice did not materially affect the results of this test. However, this splice was redesigned to provide more edge distance in subsequent tests.

Again the vehicle is a total loss.

For Test No. 3, the same aluminum channel rubbing rail was retained, but the thickness of the aluminum alloy "W" section beam was increased from 0.125 inches to 0.156 inches.

This is the barrier as constructed for Test No. 3, and here is the strengthened rubbing rail splice. (Sound track of crash.) The same 25 degree approach angle at 68 mph as for the previous tests.

Note the similarity in vehicle reaction between this test and Test No. 1 on the steel barrier. Barrier damage was also similar to that sustained in Test No. 1. However, this single successful retention of the vehicle was not conclusive based on the results of subsequent tests made on the same 0.156 thick aluminum "W" section beam in a *single* beam guard railing design.

Again the vehicle is a total loss.

For this fourth test we returned to the standard 30″ high steel beam design used in Test No. 1 and substituted a 12 guage galvanized steel roll-formed "hat" section rubbing rail for the 6″ structural steel channel.

Here is the barrier as constructed for Test No. 4 with the roll-formed "hat" section rubbing rail centered 12″ above the pavement.

At the same approach angle of 25 degrees at 68 mph, there was more vehicle rebound with this hat section design than with the structural channel rubbing rail design. Note the flying wood fragments from the crushed timber blocks.

Energy absorbed during the crushing of the timber blocks adds to the resiliency of this semi-rigid barrier system.

Although this design gave a passable performance, there was more of a tendency to pocket under these high speed test conditions than was shown by the channel rubbing rails in Tests No. 1 or No. 3.

Again the vehicle was a total loss.

The second phase of this research project consisted of four tests conducted on guard railing. Developed in 1960, this California standard blocked-out guard railing is placed for the motorists' protection on steep embankments. This design