

Mr. LUNDSTROM. Now, I might continue by saying that in a little bit different way: The object of removing roadside hazards is to provide traversable roadsides, to give a driver time to recover, time to regain control of his car, either stop it or direct it back to the road. This is a rather simple statement, but a very important concept.

Now, we were very enthusiastic about this straightforward approach to this problem. And the early experience on these regraded roads justified this enthusiasm. The early results were good.

The drivers cooperated very well and it was difficult to keep ahead of their suggestions for roadside improvement. This again is perhaps a very significant point, that the drivers, once they understand the problem or once they understand what you are trying to do for them, will offer many suggestions and come in with their own comments, and again let me say it was difficult in those days to provide the improvements as fast as the drivers would ask for them.

They fully recognized it was for their own benefit, their own safety, and it was very encouraging to have their support as well as the support of our engineers who were designing and modifying these road systems.

Now we believed that this same approach could be applied to the public highways with equal effectiveness and we did begin then in 1958 to call attention to these improvements to those responsible for highway engineering throughout the country.

On our proving ground, as well as on public highways, there are some places where it is virtually impossible to remove obstacles. This could be a river or a drainage system. These things cannot be moved. And we do then have construction elements, such as bridge abutments; we must have high roadside fills in places where it is impossible to flatten the slopes, and things of this nature.

It was therefore necessary to develop systems such as guardrails to protect the occupants of cars in the areas where no other protection is feasible. In other words, if you cannot provide a clear, safe roadside, you have to provide a substitute and this is what we typically call highway guardrail.

Mr. CONSTANDY. Yes.

Mr. LUNDSTROM. Now, later in our discussion this morning, we will show motion picture sequences of a project which had the objective of developing adequate guardrail protection.

Back in 1958 we found that the materials currently available could be used to provide adequate control if properly installed and properly built. We did find, though, that the installations typically made on the State highways were rather minimum in strength and we found ways of improving them, ways of strengthening the installations to go beyond the minimum standards.

Probably the most serious problem in standard guardrail installations was that the end of the guardrail was exposed, and I think you have already reviewed some of this work, knowing if the automobile strikes the rail dead center so that the motor mass strikes the guardrail, the deceleration of the car is very high and the guardrail itself becomes a formidable obstacle. If the car strikes off center, the guardrail may and frequently does impale the car.