

ROAD PLATFORM INCREASED ROAD SAFETY

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ABSTRACT

The platform which supports automobiles on a highway is composed of the driving lanes and side shoulders.

Following the rules guarantees the driving safety of the vehicles that respect the recommended speed limits.

However, the number of accidents and deaths that occur every year on Spanish highways is high and this is a serious concern for highway authorities.

Most of these accidents occur off the driving platform or as a result of crashing against the safety barriers.

Distractions, sleepiness and the consumption of harmful substances are the principal causes.

The authorities continue to install increasing numbers of barriers and while the impacts against them have declined, they do not prevent accidents.

This paper defends the theory that care must be taken to avoid obstacles in proximity to the platform for vehicles that go out of control.

The adjoining elements: embankments, kerbs, must be accessible without the vehicles overturning.

The indispensable obstacles: piles, abutments, light posts and road sign supports, etc. must be located as far as possible from the platform.

The separation between carriageways must be ample.

The use of braking strips (like those on racetracks) is defended over the use of concrete or metal protections.

1. THE CURRENT SITUATION IN SPAIN.

In Spain today, there are numerous points on conventional motorways and on some expressways where dangers exist for vehicles that go off the driving platform.

There are deep ditches.

Very high embankments with sharp slopes.

And lateral obstacles.

Or rigid elements on bridges that pass over the highways.

For many years, highway authorities have been investing large sums of money to protect drivers from these obstacles and the most commonly used solutions consists of placing barriers in front of them.

Also, due to different circumstances, in Spain there has been a tendency to design very narrow medians, 4 m and less, which always have a central barrier which in some cases have not been able to prevent out of control vehicles from going through them.

All of this is positive, but the following considerations should also be taken into account:

The use of rigid concrete barriers on the edges of the hard shoulder prevent the vehicles from going off the road and this is good, but it also causes the vehicles to bounce off the barriers and be thrown back onto the roadway out of control, which can cause accidents.

The use of flexible metal barriers greatly reduces bouncing but enormously increases the damage to vehicles and to the barriers themselves on contact.

And another sensation, a personal but nonetheless real one. The user must drive caged in between two barriers for many kilometres.



2. NEW DESIGN PHILOSOPHY

The most important criteria defended in this presentation are as follows:

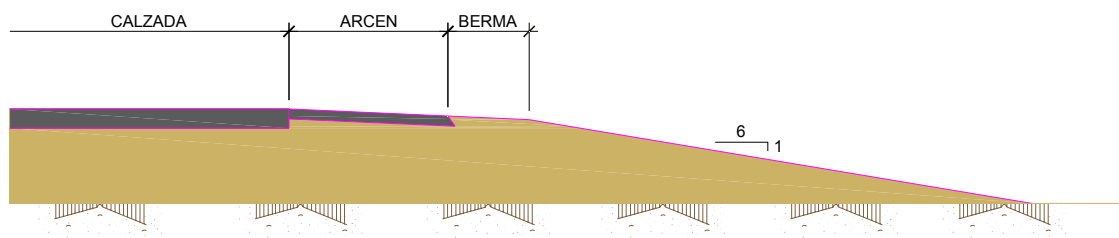
“It is much better to avoid an obstacle than to protect drivers against it later.”

“The best barrier is not the one of concrete or metal but rather the one that is not needed.”

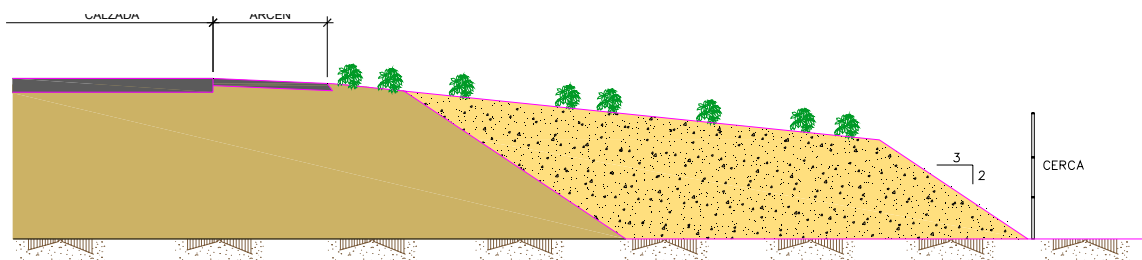
3. New Solutions.

In order for a vehicles driving on a motorway to go off the road and not have a serious accident, special care must be taken of all the surrounding elements.

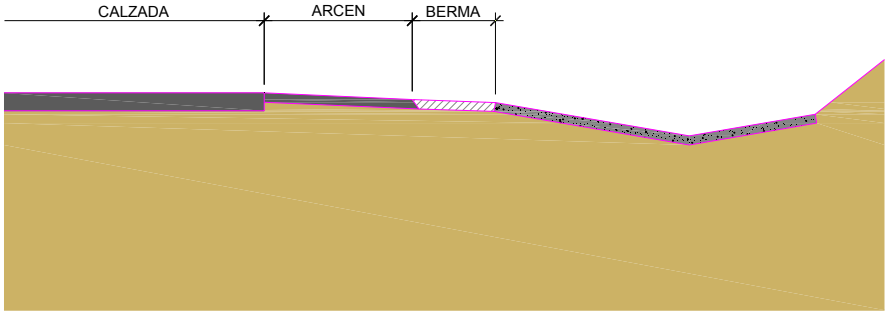
If the road runs along an embankment, the slopes to be protected are not the purely structural ones but also, if possible, the lateral slope must be made with minimum slopes of approximately 5H/1V to prevent vehicles from overturning.



Another possible improvement is to place the extra soil alongside the structural embankment rather than sending it to the dump. The adjoining embankment could bring the vehicle to a stop.



On the levelled side, the hard shoulders should be paved and the ditches should have very gentle slopes.

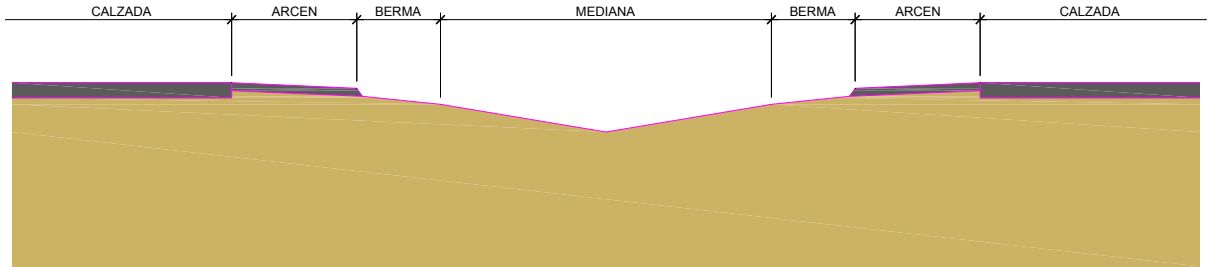


But perhaps the most important measure to be taken has to do with the median width.

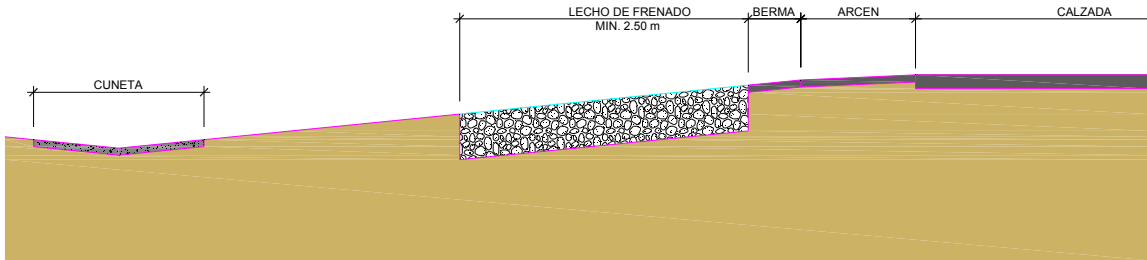
The separation between roadways should be such that defensive measures are not necessary, and to achieve this the separation between road surfaces must be about 14 m.

The inside slopes should be gentle as should the slopes of the median ditches.

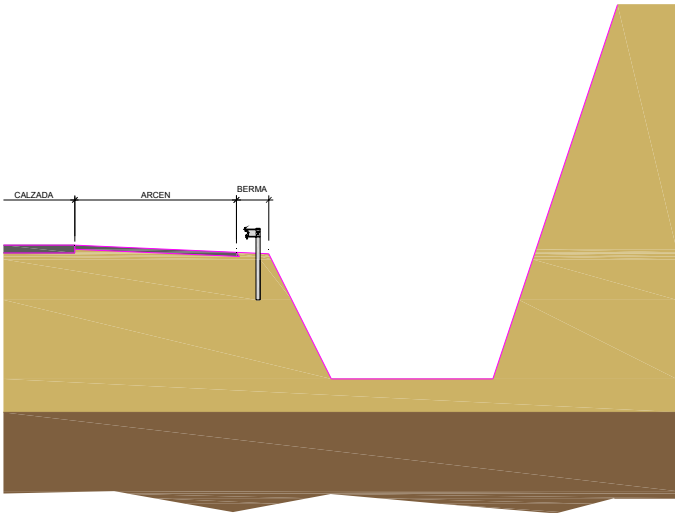
Central drainpipes should be avoided since their design includes cleaning and maintenance components that are also obstacles.



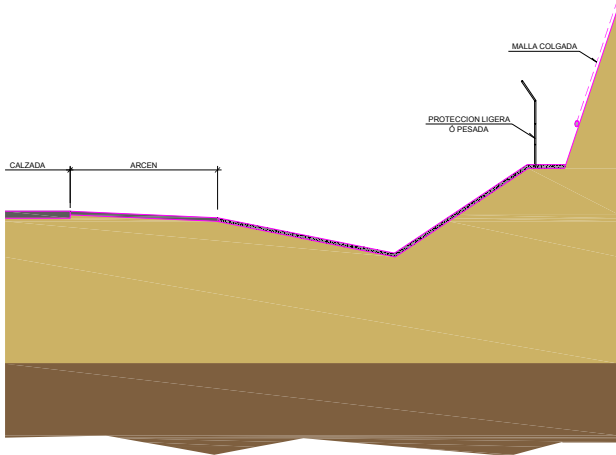
If due to the volume of traffic or the curve of the road it were necessary to use defensive elements, we would advocate the use of braking strips which have had such good results on car and motorcycles racetracks.



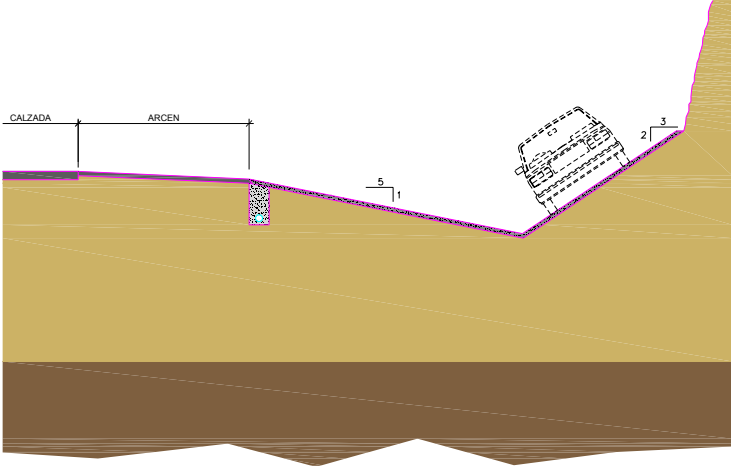
If the nature of the slope on the level side is such that it requires the use of a Ritchie type stone collector,



we suggest the use of hanging mesh on the slopes to collect the stones.

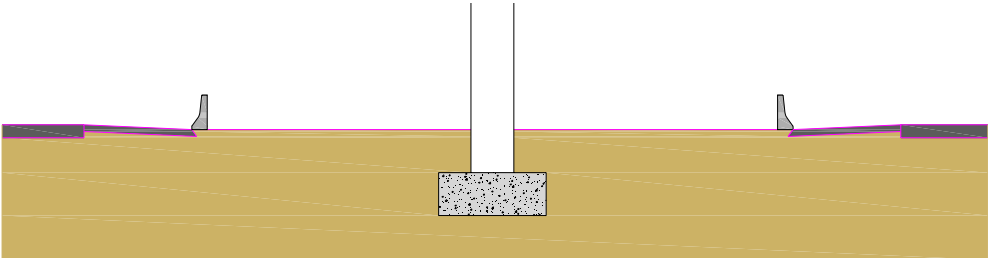


Another interesting suggestion consists of the construction of a counterslope coming out of the ditch with an inclination and width such that it could be accessed by a car out of control and the force of gravity would lead it back on to the road surface.

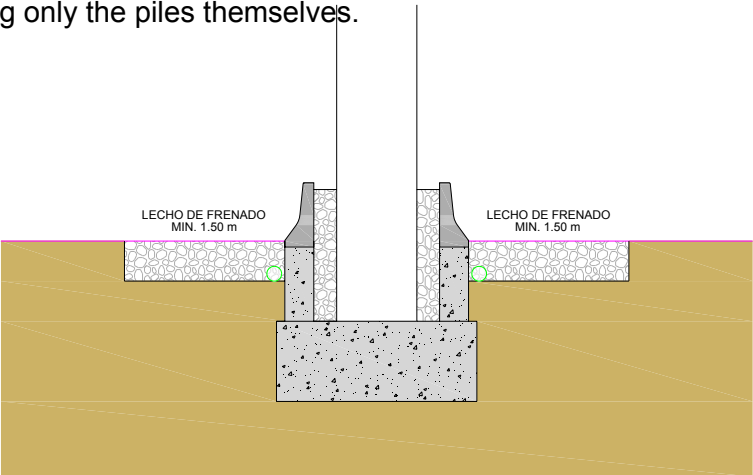


All of the measures mentioned here are intended to make the linear infrastructure of the highway a non-aggressive surface to vehicles, but the occasional obstacles required for the infrastructure itself to work properly must also be considered.

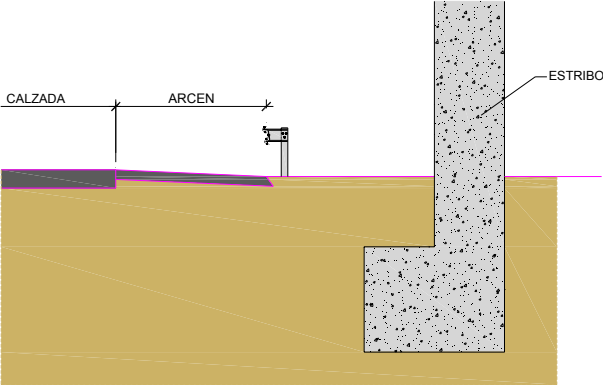
The piles of a bridge are usually protected with barriers on the side of the hard shoulder.



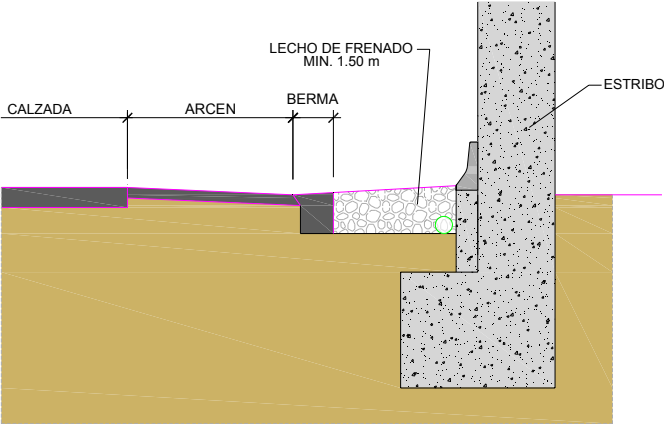
It would be less aggressive to vehicles if the barriers were farther away from the hard shoulder protecting only the piles themselves.



When the abutments of a bridge are near the road, they are normally protected with a barrier on the edge of the hard shoulder.

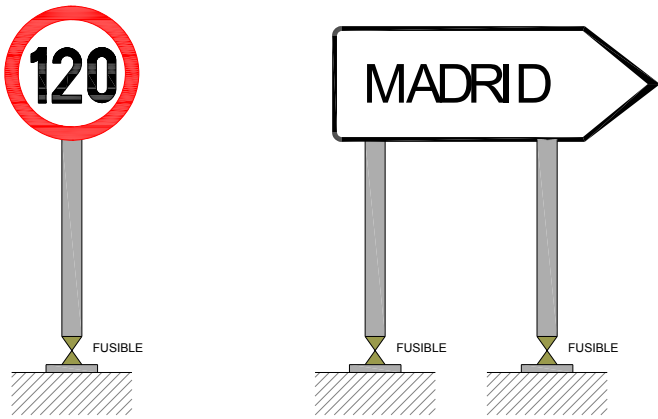


If there is enough space, the barriers can be placed adjacent to the abutment and, if possible, a braking strip would help to reduce the impact.



On a platform as generous as the one we are advocating here, it might be necessary to set up some small vertical road signs.

In these cases, the type of signs that “lay down” on impact would minimum the possible damage.

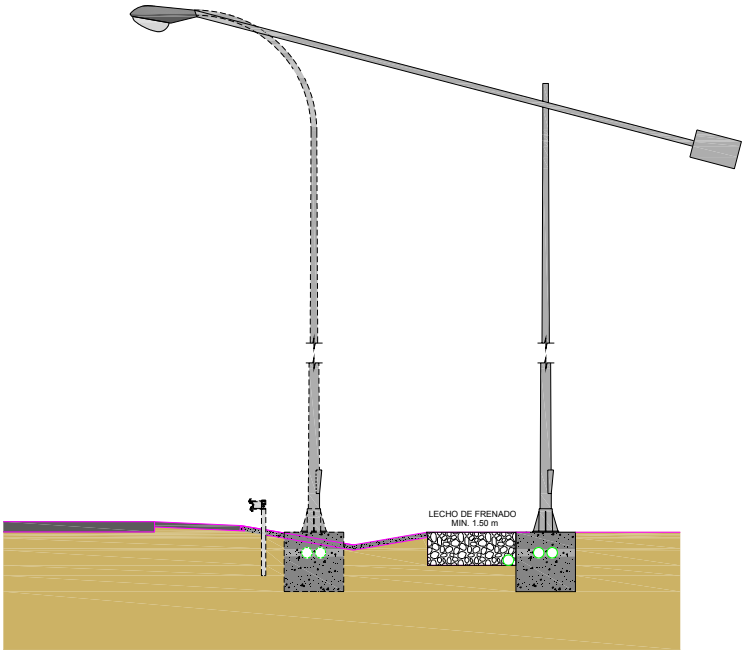


Conventional light posts are placed near the hard shoulder to optimise performance.

But the most important thing is that the light should be close to the road, not the post.

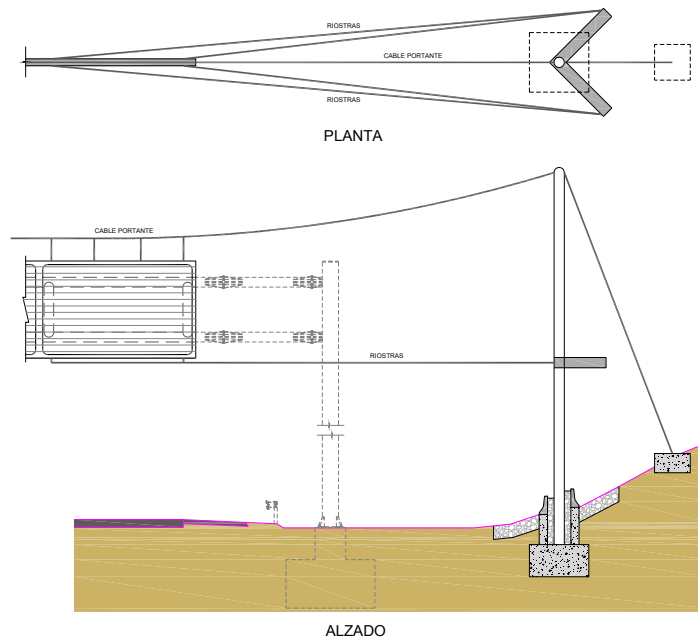
Light posts with two arms are more expensive but they are less dangerous and just as effective.

If one compares the increased cost of the post with the 20 m. of barrier that are no longer needed, perhaps there is not that much of a difference in cost.



Highway infrastructures also require vertical signs and I.T.S. messages.

The possibility of replacing the heavy metal portico type signs with posts and cables that are farther away is a subject for investigation and development, but certainly less dangerous.



Placing SOS posts farther away from the road does not alter their functionality and reduces the danger.

In conclusion, the idea of this presentation is not so much to defend the specific solutions mentioned herein as it is to foster a clear movement toward increased road safety by clearing the sides of highways of all the dangers that exist on them today.

4. INCREASED COST

I suppose some readers and listeners might be thinking to themselves that all of these measures raise the price of the produce and by extension the cost of highway construction and they would be right.

But people used to think the same thing about the measures taken to mitigate environmental impact or the increased health and safety costs associated with construction but today these costs are accepted by society.

For a highway on land that is fairly even, the measures suggested herein would increase the cost between 5% and 1.5%. This would appear to be reasonable and I would hope that the listeners or readers of this presentations would proceed to implement them.

5. CONCLUSION

It is technically possible to design and build highways that are less dangerous than the current ones if highway authorities keep this new objective in mind: "clear highway sides".