

## **Camlachie Fatal Rollover at Low Speed Was Result of No Seat-Belt Use**

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It is unfortunate to be discussing preventable accidents after-the-fact but it serves to present the important point that seat-belt use is extremely important whenever and where ever we travel.

It was likely shortly after midnight, on August 4th, 2011, when Travis Sitter, 27, of Sarnia, Ontario was travelling northbound on Lakeshore Road, near Camlachie, Ontario in his Hyundai Accent and left the roadway resulting in his fatal injuries. I attended the site less than 12 hours after the occurrence and found the following evidence.

The photo below is a view, looking northbound, from about 250 metres south of the area where the Hyundai Accent came to rest.



As you can see, this is a straight and level roadway that is approaching a left curve, as indicated by the advisory sign on the right roadside. The pavement surface was in good

condition and there was no evidence of any excessive edge drop off on either side of the paved road.

I placed large cones on the right side of the road at 50 metre intervals commencing from the final rest position of the vehicle and you can judge the distance of my photos by counting the number of cones visible on the right shoulder.

Below is another view, looking north, from about 100 metres from the vehicle rest position.



If you look at some of my previous website articles on loss-of-control collisions you will have noticed that by the time we reach a location that is 100 metres from the rest position of a vehicle there should be evidence of loss-of-control (yaw) tire marks. It should be evident to you by looking closely at the above photo that no such marks exist.

Being educated from my previous discussions you would then say that I should be showing a view of either the right or left shoulders of the road because that is usually where these loss-of-control tire marks are found. So let me show you those shoulders. First the left (or west) shoulder, from 100 metres, is shown in the view below.



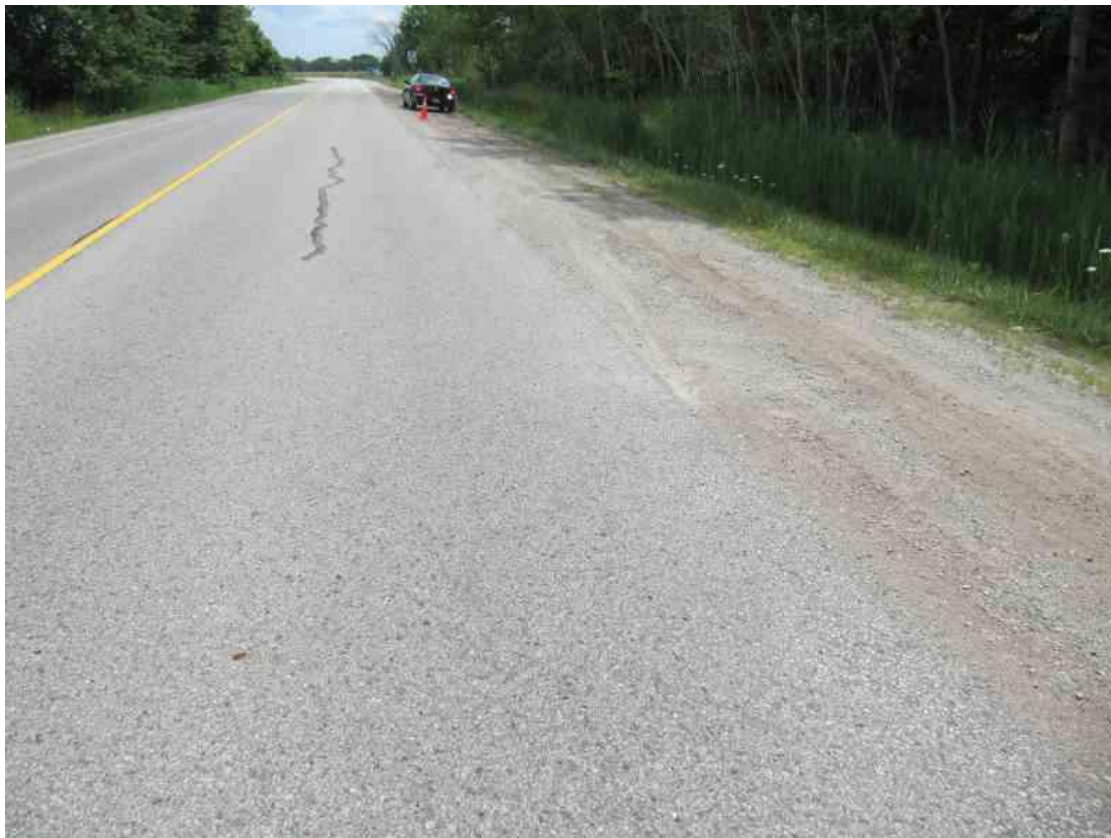
Unless you are far more gifted than I am, you should conclude that no such tire marks exist. And now let us look at the right (east) shoulder, still from 100 metres away, as seen in the photo below.



Still no visible tire marks, right?

So now you might be a little puzzled, much like I was, and so too were the police. I say this because while attending the site the police reconstructionist, Constable Geoff Royer, re-attended the site and we both puzzled through the evidence together. What caused this unfortunate result?

Eventually there was physical evidence the vehicle going into the east ditch, but that was well short of 50 metres from the vehicle's rest position and this evidence was in the form of tire-marks on the gravel shoulder. You might be able to recognize some of those tire marks in the photo below.



To clarify any confusion, the final rest position of the Hyundai Accent was adjacent to the large orange cone that can be seen just behind the back of my vehicle parked on the east shoulder. What you should be looking for are the typical curved yaw marks in the shoulder that indicate the vehicle is rotating, clock-wise and out-of-control, toward the ditch on the right (east) side of the road. But I hope you will agree with me that any marks on the road are not visible. But we know that the vehicle was in an advanced stage of loss-of-control as it exited the road so surely visible yaw marks must be expected since there would be so much sliding involved between the rubber of the tires and the pavement. So why are there no tire marks on the pavement?

One confound is that yaw marks are not visible if the roadway is wet because that lubrication simply prevents the visible deposit or rubber. But it did not rain. Yet Constable Royer noted that, during the evening and night, he drove through areas of mist that required him to periodically turn on his windshield wipers to remove the haze that became deposited on his windshield.

This is the lubrication that we sometimes fail to recognize as significant. It does not have to be pouring rain or even drizzle to effect what happens between a tire and road surface. I believe this rather insignificant quantity of moisture was sufficient to prevent the visibility of the yaw marks on the pavement. And, unfortunately, this is what hid from us the details that we need to understand about what happened to Travis Sitter as he approached the area.

But what we do know is that the angle at which vehicles depart from the road is an indication of their speed or whether or not they had fallen asleep or suffered from some kind of medical condition. Recall that drivers who fall asleep leave the road a very shallow angles, less than 4 degrees with respect to the straight length of the road. Also very fast moving vehicles also tend to leave the road at rather shallower angles, although not quite as shallow as 4 degrees. But as a vehicle's speed slows down it has the opportunity to effect a greater change in lateral position with respect to the road length. And so when we look at the yaw marks, the larger the angle the slower the speed. So look at the angle of the yaw marks in the shoulder in the photo below.



My measurements indicate that the angle was about 18 degrees and that is substantial. The fact that it indicates a slow speed of the vehicle is further emphasized when we look at what happened as the vehicle slid into the east ditch. Leading with its left side you can see in the photo below how the tire marks to the right were produced by the front wheels while those to the left were produced by the rear wheels.



You should already note from the position of my car, shown in the extreme left corner of the photo that the final rest position of the Hyundai Accent must be relatively close to where it entered the ditch.

As the vehicle enters the ditch with its left side, it is not travelling perfectly sideways. I generally say that vehicles do not begin to rollover until they approach the nine-degree, sideways slide. And obviously everything depends. It depends on the quantity of plowing that takes place into the soil. It depends on the structure of the vehicle since vehicles with higher centres-of-gravity will obviously tend to tip over quicker. But this is a general rule of thumb. So as our Accent is entering the ditch it is mostly travelling sideways and slightly travelling forwards. And when the plowing of the earth takes effect the vehicle slows down beneath the driver's body. So, if unrestrained, we would expect the driver's body to move toward the interior of the driver's door and slightly forward toward the left A-pillar.

And as is typical, the vehicle's front end reaches the maximum depth of the ditch and there the underside of the left front also begins to plow into the earth. This can be seen if we follow the tire path on the right side of the photo below. You may be able to detect evidence where the front underside tore up the earth.



When the front underside dug in this accentuated the rate of clock-wise rotation that was already present and this is why we see that the path of the rear tire mark begins a greater change in direction, or the arc carved out by that rear tire has a smaller radius. It is precisely because of this accentuated rotation. So the vehicle wants to rollover onto its left side but it is also rotating rapidly in a clockwise direction. This rotation is what prevents the vehicle's full rollover and this is why the vehicle begins to slide backwards along the ditch.

Of course I have not seen the damaged vehicle so how can I say that? Well, Constable Royer noted that, at final rest the vehicle was lying with its front end facing back toward the road. The unfortunate deceased was lying to the right side of the vehicle and partially ejected. I also know that, once the tire marks ended then this is the point when the roll began and the final rest position of the vehicle was only about 3 to 4 metres from from that end point. So the only logical conclusion is that the vehicle slid backwards as well as onto its right side and perhaps partially onto its roof before settling down. We did not get into details of the precise angle of the resting vehicle so I cannot be more specific than that.

The photo below is a view looking north along the ditch from the end point of the tire marks and toward the rest position of the vehicle in the background.



And again, the photo below is a view looking further north along that ditch and closer to the vehicle's rest position



And as we progress further east we can see by the area of trampled grass that the vehicle came to rest in the ditch. The position of my car parked on the shoulder should give you some perspective as to the short distance of rollover that we are talking about.



Now, we can estimate the rollover speed of the vehicle by simply applying a "tumble number" equal to about 0.5 g. This is what is found to be an average rate of deceleration for vehicles involved in soft rolls. We can also exaggerate slightly and say that the rollover distance was 5 metres even though it was likely just a little less. Applying these numbers in a typical "slide to stop" formula leads to an initial speed in the range of 25 kilometres per hour! Yes, I did write 25 km/h. When this vehicle began to roll it was only travelling about 25 km/h, or 30 km/h, whatever. The point is that this was a very, very slow speed.

The tragedy is that if this driver had remained in his vehicle it is likely that he could have crawled out without any injury. Yet, from the large quantity of blood pooled next to the right side of the vehicle it is obvious that he sustained a major head injury. This head injury cannot come from contacting the inside of the vehicle. Why? Because there was insufficient difference in speed between the interior of the vehicle and the driver's body. Recall that, in order to sustain injury you have to sustain a change-in-velocity and acceleration. A major head injury from striking something on the inside of a vehicle requires a major difference in speed between the striking head and the thing that it strikes. And there was nothing there that could cause such a difference.

The only factor existing in this equation is the driver's partial ejection out of the vehicle. Unfortunately, this Accent may be a small car but it may still weigh a 1000 pounds, and when you add the fact that its slow speed may apply a force that could be several times greater than its standing weight that is something that a human body cannot withstand without injury.

So the unrestrained driver was not thrown clear during ejection. And this is the fallacy that is demonstrated in many arguments for not wearing seat belts. You are generally not thrown clear. You are generally not projected cleanly through the side window and you do not have the luxury of striking something in the exterior environment. Instead, you are crushed by your own vehicle as both you and your vehicle tumble to final rest. Time and again I have seen this scenario unfold. It is tragic when it occurs in a scenario that is as innocuous as this very low speed rollover.

If nothing else I hope the presentation of Travis Sitter's accident will make those of you who still drive while not wearing a seat belt realize that it takes very little speed and collision severity to cause a death if the wrong circumstances happen to be set in place. Think of the many times you may be travelling faster than 25 km/h and recognize the danger that you place yourself in because you do not force yourself to develop that habit of buckling up. It is not just some nonsense propaganda as the results of this collision clearly demonstrate.