

Ontario Regulation Allows Existence of Dangerous Drop Offs at Edge of Asphalt Rural Roads

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How often have you travelled along a curve on a rural road and found your right side tires slip off the pavement edge? Such a condition can be dangerous and deadly but it often depends on the condition of the edge drop off.



Figure 1: Vehicle Travelling Off A Pavement Edge

Edge drop off refers to the condition of the interface between the edge of the pavement and the gravel shoulder that abuts that edge. As vehicles slip off the asphalt edge the tires push the gravel away from the asphalt edge thereby creating a gully that often includes a sharp drop in elevation between the pavement edge and the reformed surface of the gravel shoulder below.

Safety experts have attempted to determine what level of edge drop off is acceptable. They have instrumented their test vehicles with accelerometers and had experimenters drive off a variety of edge drop offs to assess the effects on the vehicle and the test driver's reactions. They have concluded that edge drop offs of about 2 inches (5 centimetres) are the level at which maintenance to the shoulder should be commenced.

Unfortunately the research upon which this conclusion has been drawn is erroneous. Persons conducting research involving human behaviour should recognize that the knowledge that the human subject has about the expectations of the experiment will affect the results. This is why psychologists have used "double-blind" experimental set-ups to rid the results of the experimenter's bias.



Figure 2: Example of a dangerous edge drop-off

Additionally, controlled experiments are conducted with far too few tests. Consider that a two-lane, rural roadway may experience up to 5,000 to 10,000 vehicles per day. If one of these vehicles experienced a crash due to a roadway drop off per week then there could be 52 such involvements every year. But that would only be about one occurrence per 35,000 to 70,000 possible exposures. Yet controlled tests may be run up to several dozen times at best before the experimenter concludes that a specific level of edge drop off is acceptable. Many more trials are required before such a conclusion can be reached.

In fact, what is required is the natural reaction of a completely unsuspecting driver as he or she drives off a pavement edge. But how can this be done? It would seem un-ethical to place such a driver in a possible dangerous condition without knowing the possible

consequences. Unfortunately this is precisely what is occurring on many rural roads in North America. Unsuspecting drivers are being used as experimental subjects without their knowledge by those responsible for roadway maintenance and safety. As resources are squeezed through budget shortfalls, road maintenance personnel must juggle between their responsibilities to keep the public safe while working with insufficient resources. Yet the penalty for not keeping the public safe can be significant if a plaintiff can demonstrate negligence by the municipality. With no easy way out of the predicament many road maintenance departments are seduced to hide their lack of action. It is apparent that this is encouraged by their insurers and municipal defense counsel. Record keeping has been kept to a minimum and systems are geared to keep damaging information from the eyes of plaintiffs, their lawyers and the public.

In Ontario this problem has been intensified by a 1990's Conservative government that placed responsibility for roadway maintenance and standards in the hands of local municipalities. While under Provincial control the standards for maintenance and safety were relatively uniform throughout Ontario. But as these municipalities are faced with financial strains inequalities and differences in standards have taken hold, without apparent immediate repercussions.

There is also a conflict of interest in that the local police who investigate the causes of collisions are also paid by the municipalities who are responsible for the roadway problems. The result is that many roadway problems are simply hidden by the investigators. Often front line investigators are told it is not their job to police the conduct of municipal road departments. Many times problems are also hidden through direct ignorance because the investigators are not trained in identifying and understanding what constitutes a roadway safety problem. It is not uncommon in Ontario for police to call local maintenance personnel to an accident site and have a roadway problem repaired before any independent investigative agency is allowed onto the closed accident site. The police then report their findings of alcohol and speed involvement to the general media who then report these findings to the general public. Rightly, police identify issues such as speed or alcohol as being present in a collision situation. But they make the erroneous leap to conclude that the presence of the speed or alcohol caused the collision without that conclusion being put to a proper test. While speed and alcohol are obvious factors, roadway problems are hidden and rarely revealed to the public.

Rather than dealing with safety problems in a realistic and efficient way, much of the system in Ontario is geared toward a game of cat and mouse between plaintiff and defense camps. Fairness and efficiency are hard to achieve when there is no reward in achieving it.

Amongst this complicated mess Minimum Maintenance Standards (MMS) have been legislated in Ontario as a way of keeping the "fox honest in the chicken coup". But these standards were developed by the defendant municipalities and their representative organization (Ontario Good Roads Association) along with the Ontario Ministry of Transportation. These participants have a conflict of interest since they are the ones

that will be sued if they do not meet those standards. In fact the defense lawyers who represent the defendants in court are also sit as part of the panel of authors of the MMS. The initial development of the MMS was clearly biased as it allowed defendants to escape liability if they did not know that a roadway problem existed. So, if the municipality never sent out an inspector to examine if there was a problem with a road then it did not know that the problem existed and therefore they were scot-free. Clearly such an escape from responsibility was known to the authors of the Regulation and its passage demonstrates how easily unreasonable legislation can be made into law. Instead, an unbiased Regulation would have incorporated a term such as "constructive knowledge" whereby, even though a municipality may not have actual knowledge of a roadway problem, the circumstances would dictate that the municipality ought to have reasonably known of the problem if they acted as they should have.

Only now a trial in underway (Silveira v Regional Municipality of York) that is to examine the legality of the MMS in Ontario. Ontario municipalities worry that the MMS will found to be "ultra vires" (meaning "beyond the legal power or authority of a person or official or body"). In response the Ontario Good Roads Association (OGRA) has asked their member municipalities to contribute sums to the defense in the subject trial, and municipalities have complied. This will be another test of our legal system's ability to make decisions that are not swayed or biased by the large funds that have been generated to attempt to sway or bias its verdict.

Although changes have been made to the original Ontario Regulation 239/02, how it has dealt with the maintenance of edge drop offs is still the same as it was. Here is an excerpt from the Regulation pertaining to this issue:

"Shoulder drop-offs

7. (1) If a shoulder drop-off is deeper, for a continuous distance of 20 metres or more, than the depth set out in the Table to this section, the minimum standard is to repair the shoulder drop-off within the time set out in the Table after becoming aware of the fact. O. Reg. 239/02, s. 7 (1)."

The noted table stipulated that the threshold allowable edge drop off should be 8 centimetres or 3.15 inches. Note that this depth is beyond the 2 inches that has been historically accepted in North American jurisdictions as the threshold at which maintenance should be required.

Also note the word "continuous" and what that implies. Let us consider the 20 metres of road edge that is to be evaluated for edge drop off. Let us say that this drop off is measured at 5 metre intervals so that 5 sample measurements are taken. What would happen if 4 of those 5 samples contained edge drop offs that were 7 inches deep while the final sample indicated a drop off of 3 inches. According to the Ontario Regulation the road edge would not be wanting of maintenance. In order to evaluate the reasonableness of this portion of the Regulation I want to introduce a specific site where excessive edge drop offs have been a continual problem.

For several years now I have been monitoring a site in the north-east portion of London, on Clarke Road, just a few hundred metres north of Fanshawe Park Road. This site came to my attention a number of years ago as I used it in my travels and noticed its particularly poor road surface and sub-standard geometrical characteristics. In 2008 the road was re-paved however some its geometric deficiencies persist to this day. In particular this roadway contains an "S" curve just north of Fanshawe Park Road where I have documented numerous loss-of-control events. As part of this S-curve the north portion contains an edge drop-off that is has regularly been of concern.

With respect to edge drop offs at the site, the table below summarizes my measurements over the last two years as well as the dates when maintenance personnel attended to repair the edge drop off.

Edge Drop-Off Measurements on Clarke Road North of Fashaw e						
Drop-Off In Inches						
Date	Zero	5 Metres	10 Metres	15 Metres	20 Metres	Sum Over 20 Metres
27-Jul-10	More Than 3	Not Measured	Not Measured	Not Measured	Not Measured	
3-Aug-10	5.00	3.00	2.75	2.75	1.75	15.25
6-Aug-10	Fresh Gravel Applied					0.00
24-Aug-10	3.00	2.75	3.25	2.25	1.75	13.00
20-Sep-10	3.00	3.75	3.75	3.25	1.75	15.50
29-Sep-10	2.75	3.75	3.50	3.50	2.25	15.75
18-Oct-10	2.75	3.50	3.50	3.25	1.75	14.75
25-Oct-10	3.00	3.50	4.25	3.75	2.25	16.75
24-Nov-10	Frash Gravel Applied					
Sum 2010	19.50	20.25	21.00	18.75	11.50	
17-May-11	1.00	1.75	2.50	1.25	1.25	7.75
13-Jun-11	1.50	2.75	2.75	2.25	1.50	10.75
12-Jul-11	2.25	4.00	4.50	3.75	2.50	17.00
7-Aug-11	2.50	4.50	4.25	4.25	3.00	18.50
Sum 2011	7.25	13.00	14.00	11.50	8.25	

In November of 2009 my communication with a reporter from the local TV news channel led to my comments about the unsafe conditions of the Clarke Road site and in particular the excessive edge drop off. These comments led to a TV news segment where both myself and London's Director of Roads and Transportation gave our sides of the story. Rather than addressing the persistent problem that existed the news segment went off as kind of a reminder to the public that they should not sound off to news media when they notice a road problem but that they should contact the roads department so

the problem can be rectified. And so the opportunity to advise the public that the Roads and Transportation Department itself was the problem was never brought forth. The futility of advising the Roads and Transportation Department became obvious as time moved on, as will be demonstrated shortly. As a result of the publicity the maintenance personnel were videotaped by the TV news crew as they took immediate action to re-grade the shoulder and get rid of the dangerous drop off.



Figure 3: Drop-off on Clarke, September, 2009 (left) and deposit of fresh gravel in November, 2009 (right)

Through 2010, there were two visits to the Clarke Road site by City of London road graders where repairs were made. For example, as can be seen in the above table, my measurements on August 3, 2010 revealed that the maximum edge drop off in one portion of the curve was 5 inches. But then the City of London road grader came along three days later (on August 6th) and corrected the problem. Then I measured the edge drop off on October 25th, 2010 and found the maximum was 4.25 inches. And again the City of London grader came along a month later (November 24th, 2010) and corrected the problem.

And since November 24th, 2010 there has been no maintenance action performed by a City of London road grader at the site. This was manageable because throughout the winter of 2010-11 the shoulder remained frozen and the gravel did not move. And even in the spring of 2011 there was no major edge drop off problem. For example my table indicates that measurements were taken on June 13th, 2011 and these revealed that the maximum edge drop-off had only reached 2.75 inches.

But commencing in mid-June, 2011 the scenario changed. Suddenly the gravel shoulder began to erode rather rapidly. Such that a month later, on July 12, 2011 my measurements indicated that the maximum drop off had reached more than 4 inches at 2 of the 5 measurement stations. And on August 7th 3 of the 5 stations contained edge drop offs above 4 inches.

Yet, if we followed the Minimum Maintenance Standards, the City of London was not obligated to perform any maintenance of the shoulder up to this point. Why? Because every case shown in my table contained at least one measurement sample where the edge drop off was less than 3.15 inches. In effect it did not matter if there was a two foot

hole in the ground, the MMS would require that the two foot hole extend over the full 20 metres before maintenance was required.

So let us look at some recent photographs of the edge drop off at the Clarke Road site to see if the existing conditions appear reasonably safe. On August 4th, 2011 we attended the site and found deep scrapes along the asphalt edge as shown in the two photos below.



And again on August 5th, 2011 we observed an additional set of deep scrapes as shown in the photos below.



Neither of the incidents resulted in a collision and there was no physical evidence that a driver lost directional control of the vehicle. However is this due to proper decision making on the part of the maintenance personnel and the Province or simply short term luck? For example, a 5 inch edge drop off might be compared to the height of a railway rail or the height of a roadway curb. What if we placed a permanent railway rail in the lane of a rural roadway where there was a curve? Would it seem reasonably safe to do so? These are the kind of scenarios that the authors of the MMS have determined are acceptably safe.

In fact, I have also been monitoring loss-of-control events at the Clarke Road site and there are frequent occurrences where a vehicle spins out into the grass roadside or into a fence. In those occurrences the vehicle does not rollover and is often drivable. In those cases the driver simple backs out of the mess and continues driving or calls a tow truck without informing the police. These events are not documented in any official records that evaluate the safety of the road segment.

As an example, the following is a typical scenario that just occurred on the evening of August 8th, 2011. As shown in the photos below, a southbound vehicle came out of the subject curve on Clarke Road and we can see the typical loss-of-control yaw marks as the vehicle spins onto the east roadside.



As we draw nearer to the point where the vehicle came to rest the tire marks demonstrate that the vehicle rotated a complete 180 degrees and came to a halt facing opposite to the direction it was travelling.



As we look in the photos below we can see the tire marks near the point where the vehicle came to rest. Here we can see how the grass has been torn out and the loose grass has been thrown backwards indicating that the driver has pressed hard on the accelerator. The driver then accelerates forward onto the road and disappears.





This collision sequence was also witnessed by a local resident who attests to these facts.

This "collision" was not documented in any official records because, luckily, the vehicle did not strike anything while flying out-of-control through the opposing lane. But when will the luck run out? I have documented many fuel delivery trucks passing through this site. What if one of these fuel trucks happened to be passing through when this vehicle travelled out of control into its lane? But this is not the only problem. Many trucks, including the fuel trucks, pass the area of the edge drop off on the wrong side of the road as shown in the photo below. This occurs because of the characteristics of this particular S-curve which are unique.

The latest revisions of the MMS suggest that changes will be made to allow roadway maintenance personnel to patrol only "representative" roads when determining when they should proceed to perform maintenance. Here is an excerpt of that proposal:

"Municipalities establish a plan for patrolling **representative** roads to check for conditions on how the current winter storm event or pending winter storm event is or may impact the individual municipality. Patrol routes are chosen taking into consideration; the direction of the wind, the direction from which winter storm events

normally come, type of precipitation, hills, shade on road, and known unique subsurface temperatures. **Representative** roads are then chosen for patrolling to check for conditions that provide the necessary information to allow for planning and deploying of resources to deal with the storm event. Using the principle of **constructive knowledge**, then the roads connecting to and adjacent to the representative roads are deemed to have the same conditions as the representative roads."

This decision was a short-sighted focus on the specific problem of snow accumulation on roads and when plows should be sent out in winter months. This fails to recognize that this broad recommendation to other issues such as edge drops offs is completely inappropriate. In the case of the Clarke Road site there is no other site in the area that can represent the problems that are happening at this unique site. Patrolling of a nearby road will not inform the inspector that the edge drop off is excessive on Clarke Road. Patrolling a near-by road will not inform the inspector that fuel-carrying tanker trucks are cutting the curve at Clarke Road and travelling in the wrong lane. These are dangerous short cuts that are being proposed because this group of authors is comprized of a narrow segment of society that has a narrow objective in mind.

