

Fatal School Bus Collision North of London Ontario

Posting Date: 11-Oct-2016

News media reported that at approximately 0918 hours on Tuesday, October 4, 2016 emergency responders were called to site of a collision involving a school bus on Twelve Mile Road, north of London, Ontario. The bus had struck a tree and its driver died. The media reports indicated that the bus was westbound on Twelve Mile Road when the vehicle "struck" the north side shoulder of the roadway. It then travelled across the road and the front end of the bus slammed into the tree, causing the bus to roll onto its passenger side.

It was reported that the deceased driver was a 63-year-old female who was an employee of Huron Christian School in Clinton, Ontario, which is about an hour's drive further north of the London. The bus was being used to transport children to other private schools in London. There were no children on the bus at the time of the collision so one might assume that, shortly after 0900 hours in the morning, the children might have been dropped off at their destinations in London and the bus was returning toward the Clinton area when the collision occurred. Yet there was something unusual about the route taken by the bus and this will be discussed shortly.

The collision was being investigated by the Ontario Provincial Police (OPP) who released the photo of the crash site seen in Figure 1. In the photo it can be seen that the bus is lying on its passenger side and the struck tree is located in the background. The curiosity about this view is that the road surface is gravel. One would wonder why a full size school would be travelling along this gravel road when the driver's destination was still about an hour away. Travel on gravel roads might seem reasonable if the bus was picking up students at their rural residences which might often be located on local, gravel roads. But at the time of the collision the bus was empty and it would not be picking up students. Furthermore, travelling between London and Clinton would be expected to take certain well-established routes, over paved highways. Twelve Mile Road would not be a primary choice for long distance travel because not paved but contains a gravel surface.

The most obvious route to take from London to Clinton would be as shown on the maps in Figures 2 and 3. If the bus was travelling north on Highbury Avenue in London then this road would become Middlesex County Road 23. A driver would typically travel up County Road 23 to its T-Intersection with Highway 7, a left turn would be made onto Highway 7 and the driver would continue west a short distance to Highway 4, which is the main highway leading to Clinton.

As shown in Figure 4, the school bus took an unusual route by exiting from Middlesex County Road 23 at Bryanston, and turning left onto Twelve Mile Road.



Figure 1: Photo of the collision site released by the OPP.

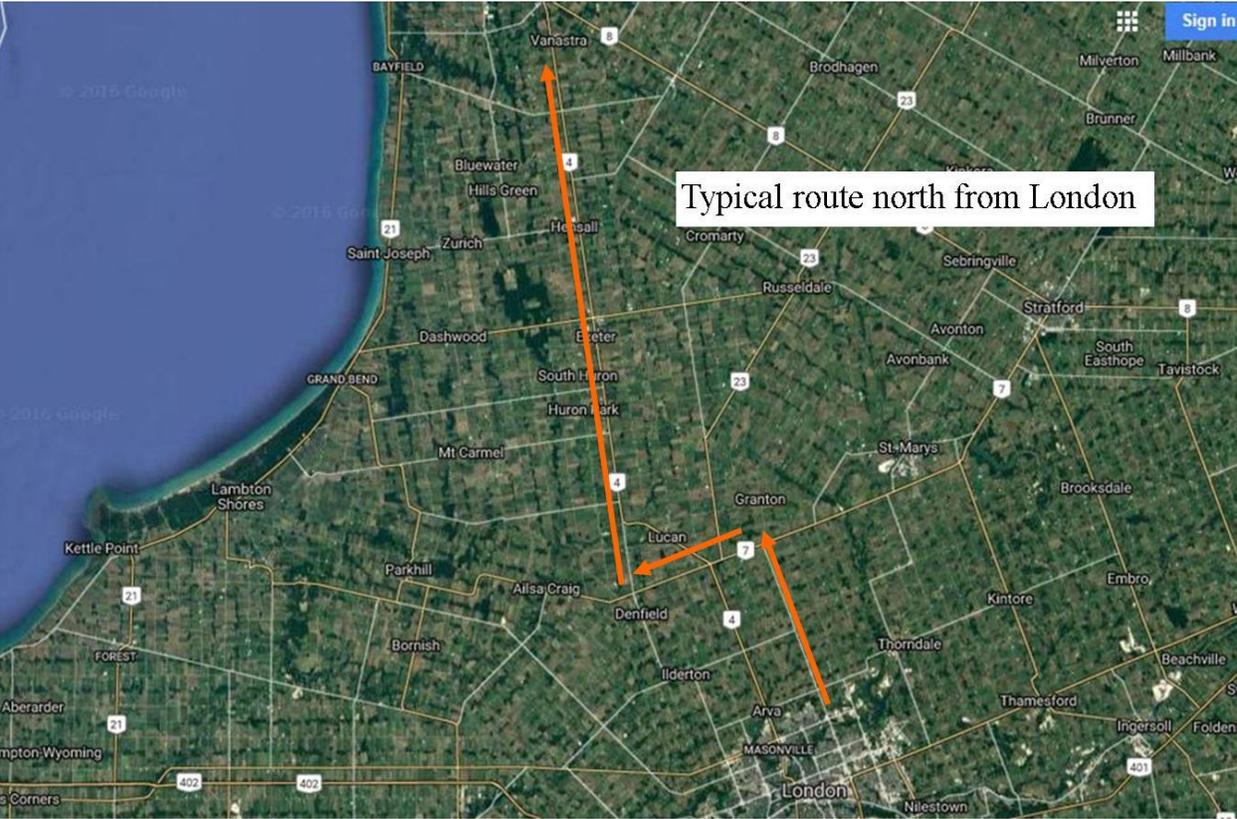


Figure 2: A typical route to travel north from London.

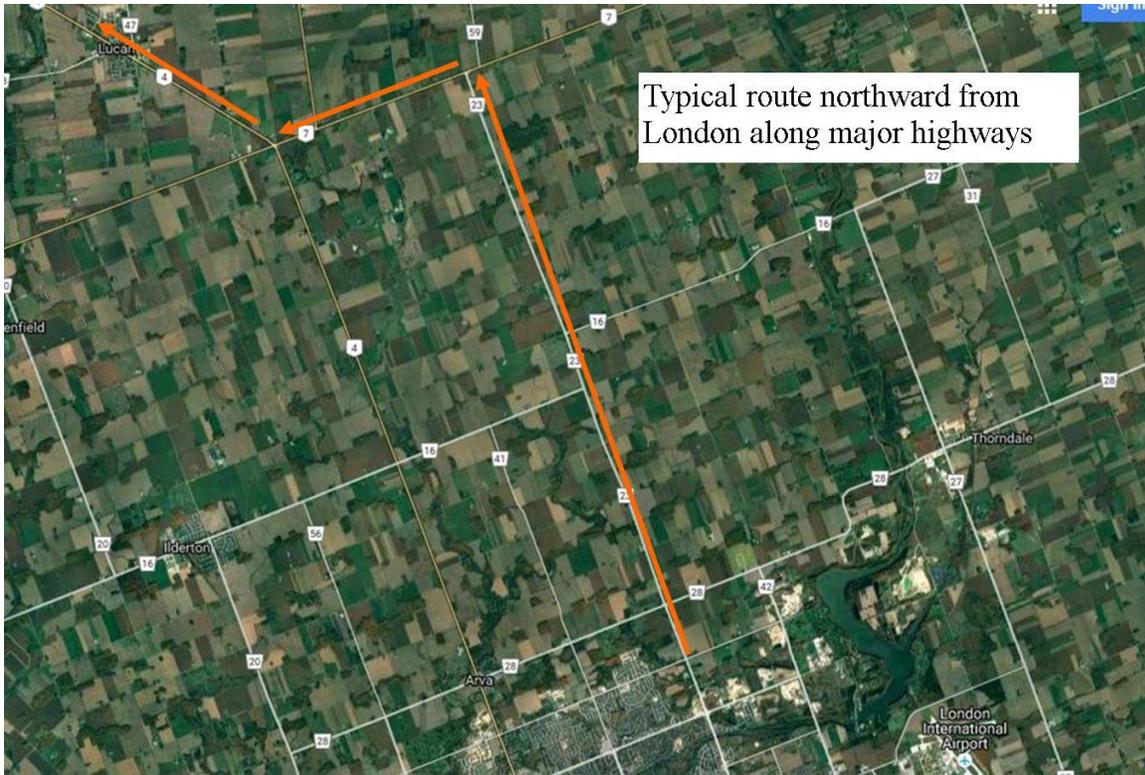


Figure 3: Typical route northward along Middlesex County Road 23, left onto Highway and then right onto Highway 4 to Clinton.



Figure 4: School bus turned left at Bryanston onto Twelve Mile Road , possibly to connect to Highway 4 to the west.

One possibility is that the bus driver made the turn to reach Highway 4 to the west thus she could proceed north on Highway 4 directly toward Clinton. But that would be unusual as there were several paved roadways travelling east/west that could have taken her to reach Highway 4.

Figure 5 provides a closer view of the accident site, circled in orange, with respect to the intersection at Middlesex County Road 23 at Bryanston.



Figure 5: View of the accident site with respect to the intersection with Middlesex County Road 23 at Bryanston.

One can observe that Twelve Mile Road is essentially agricultural with farmsteads and farm fields on both sides of the road. Figure 6 brings us closer to the farmstead located on the north side of the area of impact while Figure 7 pinpoints location of the tree on the south side of the road where the impact occurred.

Figure 8 shows another view of the school bus at its final rest position and one can see the edge of the private driveway in the bottom left corner of the view, thus one can orient the position of the school with respect to the aerial photo in Figure 7. Figure 9 provides another view, looking east, of the vehicle's rest position. Figure 10 provides an indication of the extent of frontal crush to the bus as a result of the tree impact.

Prior to attending the collision site Gorski Consulting conducted an examination of the collision area via Google Maps. Figure 11 shows a view looking east along Twelve Mile Road toward the collision site. As we look into the background one can detect a difference in the shade of the gravel surface. This difference is more visible as we move further westward in Figures 12 and 13.



Twelve Mile Road route to collision site

Figure 6: View of farmstead in vicinity of the collision site on Twelve Mile Road.



Specific Location of tree impacted by school bus

Figure 7: An orange circle represents the approximate location of the tree, on the south side of Twelve Mile Road, that was struck by the school bus.



Figure 8: A view of the private driveway in the bottom left of this photo allows for an estimation of the bus position along the roadway.



Figure 9: View looking east along Twelve Mile Road with the school bus at its final rest position.



Figure 10: View showing the substantial frontal crush to the bus as a result of the tree impact.



Figure 11: A Google Maps view of the collision site looking east. The private driveway at the final rest position of the bus can be seen on the left of this view while the struck tree can be seen on the right.



Figure 12: Google Maps view looking east from the area of impact. The shade of the gravel further to the west is different on the north side versus the south side of the road.



Figure 13: Google Maps view looking east from a short distance east of the area of impact. There is clear evidence that a fresh layer of gravel had been deposited in the westbound lane.

What is clearly visible in Figure 13 is that a fresh layer of gravel has been laid in the westbound lane for a short distance.

If we rotate around to face westward, Figure 14 shows the same area of the road with the area of impact in the background. Again, what is visible is that a fresh layer of gravel has been laid down for a short distance in the westbound lane.



Figure 14: View looking west, showing the fresh layer of gravel that has been deposited for a short distance of the westbound lane.

This is an unusual occurrence. Gravel surfaces of roadways are often "stirred up" by road graders and sometimes fresh gravel is laid, however this action occurs over a long stretch of roadway and onto both lanes. The problem with application of a small amount of gravel along a short stretch of roadway is that drivers do not receive sufficient warning of the change in surface conditions. Riding on hard-packed gravel is substantially different than riding on loose gravel. For areas where the loose gravel does not exist a vehicle can travel much faster within the packed surface without jeopardy of going out of control. However if the tires on either side of a vehicle encounter loose gravel the situation can become precarious because the tire force can be significantly different. It is undesirable to create a condition where the tire force is different on one side versus the other because this is more likely to lead to a vehicle rotation and loss-of-control.

The conditions shown in the above photos would appear to have existed sometime prior to the fatal collision although it is not known when Google actually captured these views. Yet it is curious that the deposit of loose gravel was in the immediate vicinity of where the school bus ran off the north side of the road before crossing and colliding with

the tree. Further investigation would seem reasonable however Gorski Consulting is not in a position of authority to require that any agency conduct such an investigation.

While attending the collision site a day after the collision there was further evidence that caused us concern. For example, Figure 15 shows a view of the collision site during our site visit, looking west, in the direction that the bus was travelling. A typical gravel road will contain three patches of compressed surface that match with the typical travel paths of passing vehicles. Thus, for westbound vehicles such as the bus, the path will be such that the left side tires of the vehicle will travel approximately in the middle of the road. Conversely, for eastbound vehicles, the left side tires will ride within the same centre portion of the road. What is apparent in Figure 15 is that there are only two wheel-tracks and these are in the westbound lane.



Figure 15: View of collision site looking west, taken the day after the collision. There are only two wheel-tracks visible on the road surface when, typically, there are three such tracks.

As a comparison, Figure 16 shows a view of another gravel roadway where a pick-up truck went out of control, rolled over, and an occupant was killed. The vehicle passed a cross-road and entered a downgrade. One can see that in the vicinity where the loss-of-control occurred there were only two wheel tracks whereas, in the background, there are typically three such tracks. The presence of loose gravel on the downgrade, in this isolated location likely contributed to the vehicle's loss-of-control.

On Twelve Mile Road the full road segment between Middlesex County Road 24 and Adelaide Street (Middlesex County Road 41) contained this unusual, two wheel-tracks. The question is why?

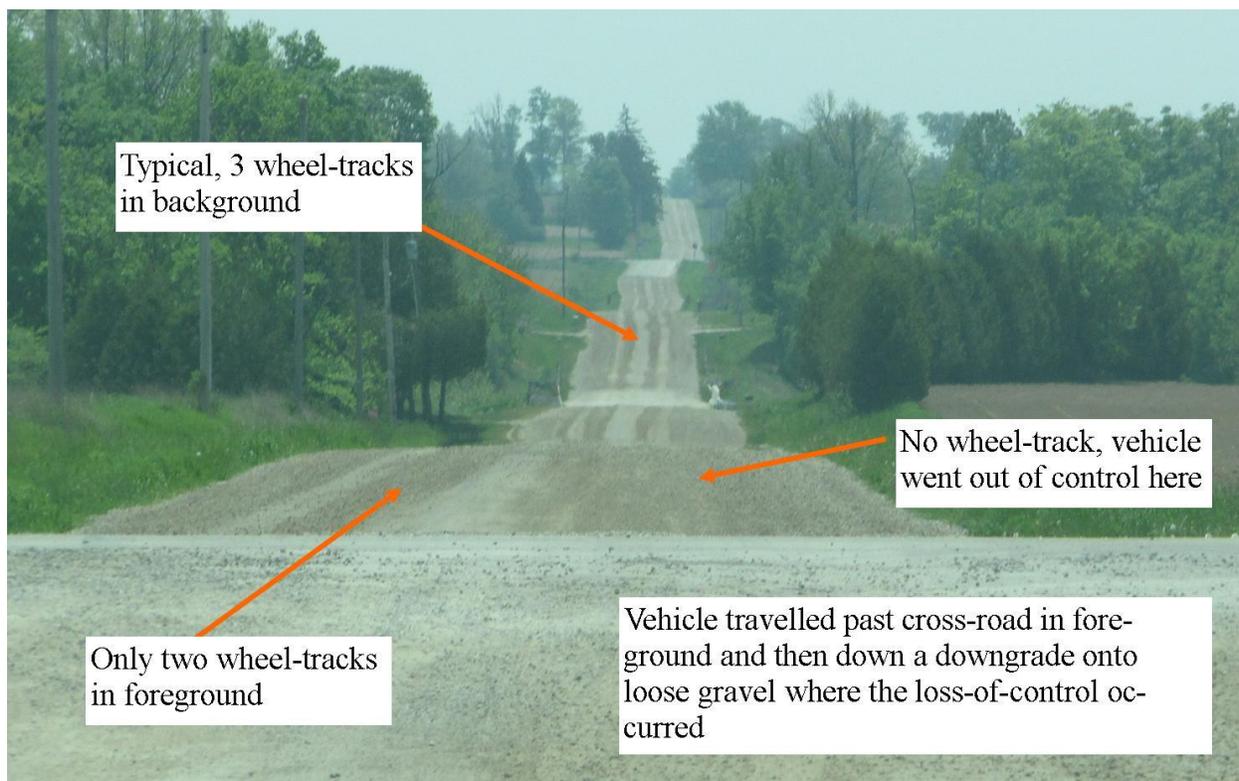


Figure 16: Example of another fatal collision site where there were only two wheel-tracks in an isolated section of the road.

An answer is forthcoming shortly. In the meantime it can be highlighted that the loss of control of a vehicle on a packed, gravel surface can be identified by yaw marks that will be visible as shown in Figure 17. The angle of the striations within the mark will indicate whether any braking or acceleration occurred when the mark was produced. With respect to the site on Twelve Mile Road no such yaw marks were found.

A source, who will remain unidentified, reported that the bus was observed by several witnesses. At least one witness claimed that the bus travelled off the north road edge, at least two times. This was then followed by the vehicle's rotation across the road and into impact with the tree. The suspicion of investigators was that the driver could have suffered a pre-crash medical condition since the bus did not slow down during its travels and it was still travelling quickly at the tree impact as evidenced by the significant frontal crush of the bus and the fatal injuries to the driver.



Figure 17: Yaw marks indicative of a vehicle's loss-of-control rotation can be detected on the packed portion of the surface. As typical, the angle of the striations within the mark will reveal any indication of braking or acceleration.

In an official analysis Gorski Consulting would have access to the police investigation materials, including all photos, measurements and statements of the witnesses. Without these materials we can only consider the opinions and conclusions based on what evidence is available at the site. While the information provided by witnesses is often helpful, sometimes it is also a well-greased slippery slope that pulls the investigation into the obvious pitfall of the most easy and obvious. While one or more witnesses may have claimed that the bus left the roadway several times, caution must be exercised in interpreting what that information means and what the witness(es) actually saw.

For example, the source pointed to a location well east of the area of impact where there were tire marks on the north road edge and where it was believed that the bus initially exited the road. Figure 18 is a view looking west showing a set of tire marks on the north roadside at a substantial distance east of where the impact occurred.



Figure 18: View, looking west, at a set of tire marks on the north roadside. Investigators may have interpreted that these were some of the marks created by the bus during its loss-of-control.

Moving further westward Figure 19 shows another set of tire marks on the north roadside. This same set of marks is shown in the eastward view of Figure 20.



Figure 19: View looking west, showing a set of tire marks on the north roadside at a considerable distance east of the area of impact.

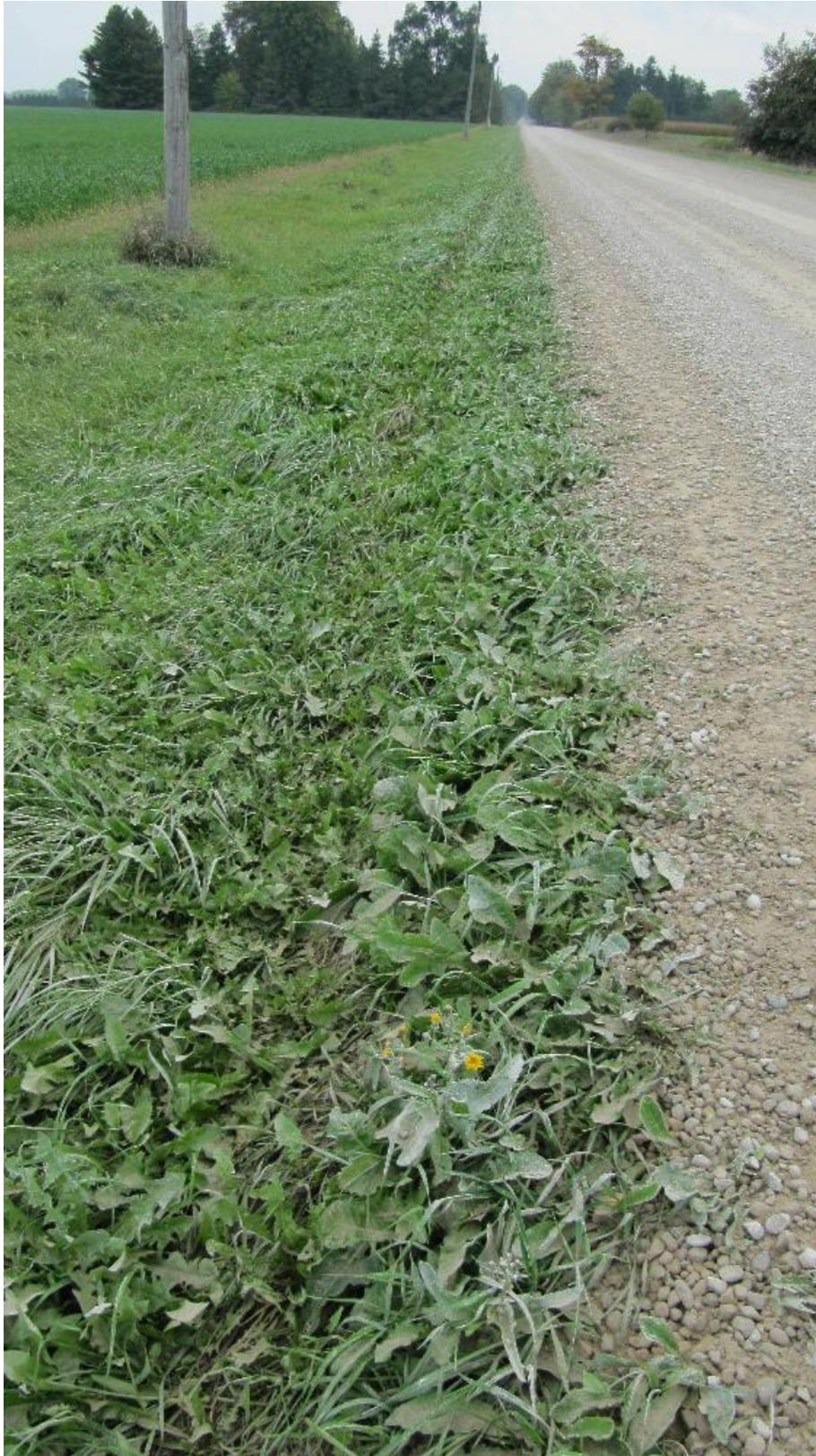


Figure 20: View, looking east showing a set of tire marks in the north roadside at a substantial distance east of the area of impact.

It was not specified by the source which set of marks was being attributed to the bus. However the location of both of these marks were a long distance from the location where the bus eventually crossed the road. Thus this could be the basis used to suggest that the bus driver was not slowing down while the bus was moving off the road.

We offer the caution that the presence of either of these sets of marks may have nothing to do with the motion of the bus. While witnesses may claim that they observed the bus go out of control and travel onto the north roadside, there can be a misunderstanding of where that loss of control occurred. It is conceivable, and quite possible, that the bus only travelled onto the north roadside at a location closer to the tire marks located closer to the area of impact and that the above-noted marks were unrelated to this event. The marks shown above may be related to other westbound vehicles that might have left the roadway but successfully returned and left the area.

The tire marks that can be firmly attributed to the bus are shown in Figures 21 to 27 below.



Figure 21: View looking east from just east of the area of impact. Tire marks exist just beyond the parked position of the black car and this were likely caused by the school bus as it initially left the road surface.

These markings indicate that the bus travelled only a short distance off the road surface. However there was a substantial vertical drop of the earth immediately adjacent to the gravel of the road. This vertical drop caused the greater difficulty for the bus to regain the road. A harder steering action to the left would be required to exit out of this vertical drop and this could have led to the sudden veering of the bus across the road.

Figure 28 shows the area of impact on the south side of the road.



Figure 22: View, looking west, at the tire marks near the edge of the grass that can be firmly attributed to the pre-crash motion of the school bus.



Figure 23: View, looking west, at the tire marks near the edge of the grass that can be firmly attributed to the pre-crash motion of the school bus.



Figure 24: View, looking west, at the tire marks at the edge of the north grass roadside that were caused by the school bus.



Figure 25: View, looking west, at the tire marks on the north roadside that were caused by the school bus just before in crossed to the south side of the road.



Figure 26: View, looking east, of the tire marks caused by the school bus just before it crossed to the south side of the road.



Figure 27: View, looking east, of the tire marks caused by the school bus just before it crossed to the south side of the road.



Figure 28: View of the struck tree where the school bus came to rest.

The bus driver was reported to be pinned underneath the right side of the bus at its doors. While there could be situations where a driver may become ejected even though a seat-belt is worn those situations are quite rare.

Investigators can become confused when observing substantial crush and make the quick conclusion that there had to be a very large speed involved. However consideration has to be made as to the stiffness of the bus front end. There is not a great deal of data available to determine a bus's stiffness and the crush could be related to a softer structure. Also the fact that that the bus was more massive than a typical light vehicle means that more kinetic energy is available to be dissipated in such a crash. This dissipation of energy should result in more visible "damage". Thus while the frontal crush to the bus was substantial, the evidence would support that survival was likely if the driver had remained in her seat and was restrained by a seatbelt, even if an air bag was not available.

We now return to the issue mentioned earlier in this article: the unusual travel path taken by the driver onto a low volume gravel road and the unusual pattern of two tire-paths along westbound lane rather than the typical three tire-paths that are commonly seen on gravel roads.

Upon completing our assessment of the site we travelled eastward on Twelve Mile Road toward Middlesex County Road 23 (Highbury Ave). It was at this intersection where the driver would have turned left onto Twelve Mile Road. Figures 29 and 30 show that there is a road closure sign at the intersection and an arrow pointing traffic to the east. Yet the bus travelled to the west, in opposition to the advisement.



Figure 29: View, looking north along Middlesex County Road 23 (Highbury Ave) toward its intersection with Twelve Mile Road. A road closure sign exists at the intersection.



Figure 30: View of road closure sign advising drivers to turn left (east) to follow the detour.

In fact, we can say that a large amount of traffic made the left turn to travel west along Twelve Mile Road rather than following the detour. This was why there were only two tire-paths visible on Twelve Mile Road. While at the site for a couple of hours we observed no eastbound vehicles using the road yet we saw a steady number of westbound vehicles. It is highly likely that these westbound vehicles had been travelling northbound on the busy County Road 23 and turned west just like the school bus. But Why?

One needs to refer back to Figures 2, 3 and 4 which show the typical paths of vehicles that use County Road 23 to travel north. The drivers of these vehicles want to follow the route along Highway 7 to the west and then Highway 4 to north. Thus it would make no sense to these drivers to turn right (east) at the closed intersection. It would seem more sensible to turn right and take either Middlesex County Road 41 (Adelaide Street North) or progress further west to Highway 4 (London Road). The beaten down tracks of two tire-paths on Twelve Mile Road confirmed that this is exactly what drivers were doing, just like the school bus driver.

The reason why there was a right turn arrow on the road closure is that to the east Twelve Mile Road is a hard surfaced road and is renamed County Road 16 (Plover Mills Road). Thus the Middlesex County employees wanted to direct traffic onto this paved road which would be in better condition to handle such traffic. However, it should have been obvious to them that a large percentage of traffic on Middlesex Road 23 (Highbury Ave) was intending to travel north and drivers would be wanting to travel west. It should have been obvious to them also that many drivers would ignore the advisement on the sign to turn right and that most traffic would turn left, and this obviously occurred.

Thus, these are the details that the public does not see or read about when the official news agencies report on collisions. These details are also not explained when police provide their information to the news media. Yet it is a relevant and important matter that the road closure caused traffic to be diverted onto a low volume gravel road. The tire marks that we showed in Figures 18, 19 and 20 may not have been caused by the bus but could have been caused by other westbound traffic that also experienced loss-of-control conditions because of the character of the road.

When a gravel road surface is been down into hard-packed channels it is possible for traffic to move more quickly along these channels because there is no loose stone within them. However this can be precarious because just to the left and right of these narrow channels there is loose gravel and if a vehicle's tires stray out of those tires the road surface becomes substantially more likely to create a loss-of-control. The unidentified source to our information indicated that there was a witness on the road at or near the area of impact just before the collision occurred. A natural tendency of drivers approaching pedestrians on the road is to steer away from them, even if slightly. But if the bus driver performed this steering action the wheels of her bus may have moved out of the narrow channels of packed-down gravel and onto the loose gravel and this could have been the impetus for commencing the loss-of-control. Obviously, these comments cannot be firmly established however they should be thought provoking and educational.

We reiterate that many collisions being reported to the public are not being reported to the degree that the public comes to a correct understanding of what actually occurred. As we have stated before on numerous occasions, it is important the public have a thorough understanding of the events that could lead to the death or permanently life-changing injury of themselves or their relations. This is one of the goals of Gorski Consulting as we continue to present articles on our website.

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