The Seven S-Curves of Adelaide - Part 1

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This is a preliminary article in a series discussing testing at Gorski Consulting to document roadway effects on potential loss-of-control collisions at curves on Adelaide Street, north of the City of London, Ontario, Canada. This article will introduce the roadway and the characteristics of each curve through a series of photographs.

Gorski Consulting is a forensic, motor vehicle accident reconstruction firm that provides a variety of analyses both for clients involved in litigation as well as safety research examining the broad field of evidence surrounding real-life collisions. One of our interests involves the evaluation of roadways in relation to loss-of-control collisions.

Recently Gorski Consulting has been undertaking several research projects examining curves on rural highways and how these relate to the incidence of loss-of-control collisions. One of the studies that will be discussed in this series of articles involves testing conducted along seven S-curves that exist along a 12-kilometre distance of Adelaide Street, north of the City of London, Ontario, Canada. This introductory article will identify the curves and explain what can be seen in a series of photos taken of them in September of 2012.

The seven S-curves on Adelaide are located just north of the city limits of London, Ontario from Medway Road to the south and Highway #7 to the north. This section of road is approximately 12 kilometres in length and is generally straight and level. It passes generally through farming country where the primary crop grown in the area is corn. The southern portion of Adelaide Street North is also called Middlesex County Road 41 but as it reaches the intersection of Ilderton Road the Middlesex Road 41 designation ends and the roadway reverts back to being called Adelaide Street. In this southern portion of the road between Medway and Ilderton Roads Adelaide Street has characteristics of better service as its surface is in relatively new condition, it is wider, and contains better geometry and sight-lines. But as Adelaide Street crosses north of Ilderton Road its character becomes of lesser quality. Three of the seven S-curves are located in the newer southern portion of Adelaide while four are located in the older northern section. This provides the opportunity to compare the quality of the S-curves in terms of their design, signage, lines of sight and other safety features.

In the following text we will show some photographs depicting the general conditions of the seven S-Curves. The most southerly curve will be called Curve 1 and progressing northward the numbers will increase until Curve 7 which is close to Highway #7 at the north end of the study area.

Curve #1: North of Medway Road

The photo below provides a general view of Curve 1 from south of the curve looking northward.



It can be noted that upon approach toward the Curve there is a warning sign on the right roadside indicating the generally accepted symbol for an S-curve which is standard throughout North America. This sign is positioned a long distance from the start of the curve. The pavement is in good condition. There is an extra width of pavement between the white edge line and the edge of the pavement. the sight lines are excellent as there are no trees, crops or other obstacles that might hinder the driver's view ahead.

The quality standard of the curve is further exemplified in the two northward photos on Page 3 which show closer views of the Curve. One can note that super-elevations are evident to help drivers negotiate through the two portions of the S-Curve. The lines of sight are also excellent as one can see through most of the length of the curve.



Curve #2: North of Nine Mile Road

The two photos below show northward views of the conditions of Curve 2. The higher quality standards are apparent just as in Curve 1.





Curve #3: North of Ten Mile Road

The two photos below show northward views of the conditions of Curve 3. The higher quality standards are apparent just as in Curves 1 and 2.





As we travel further northward from Curve 3 we approach the intersection with Ilderton Road, also known as Middlesex County Road 16, as shown in the two photos below.





This is where Adelaide Street North loses its designation as Middlesex County Road 41. As can be seen in the bottom photo on Page 6 there are regulatory signs posted on the north east corner of the intersection indicating that northward travel on Adelaide is restricted for trucks above five tonnes per axle and we also see the "Middlesex County 41 Ends" sign. Even in this photo, by looking past the intersection, we can begin to recognize that the quality of the road surface is not to the standard shown at the first three curves.

The photo below is a zoomed-in view looking northward from just north of Ilderton Road. If you look closely you might be able to see a yellow warning sign in the far distance. That sign refers to the location of Curve 4.



Before getting to Curve 4 we want to show you some of the surface changes in the road just north of Ilderton Road. For example, the photo at the top of Page 8 is a northward view and you can judge its location by noting the back of a warning sign located at the extreme left edge of the view. That is the same sign as the one shown in the photo above on the left side of the photo. In the photo at the top of Page 8, if you look closely at the road surface in about the middle of the photo, you should be able to recognize the dividing line between the asphalt paved surface to the south (bottom) versus the tar and

chip surface to the north (top). It is our observation that tar and chip surfaces have a generally inferior quality of evenness to them and they are more likely to contain safety-related characteristics that can destabilize a vehicle. So regardless of any additional factors, this portion of the road is already at a disadvantage compared to the southern portion shown earlier.



Curve 4: North of Ilderton Road

The photo at the top of Page 9 is a northward view looking toward Curve 4 while standing on the east edge line of the road. We have taken the photo in this fashion to exaggerate the extent to which a driver's view is obstructed from seeing most of the curve by the curve's geometry but also by the existence of trees close to the right roadside. The photo at the bottom of Page 9 provides a more realistic view of what the driver would see yet the limited line of sight is still obvious as we can see a southbound car just coming out from being the trees. While factors such as these are not going to lead to an astronomical difference in the number of collisions, every small deficiency such as this has its effect.

The two photos on Page 10 provide additional views of Curve 4 as we progress further northward into the Curve.





Curve 5: North of Thirteen Mile Road

The two photos below show northward views of the beginning of Curve 5. Again the level of service is diminished here by the obvious presence of the trees blocking the line of sight. However, there are further issues.





Note in the photo below that maintenance personnel recognized a problem with the disintegration of the right edge of the pavement and they have attempted to solve the problem by placing the dark line of cold patch along that edge. This may appear helpful but sometimes the medicine is more harmful than the decease.





Looking closely at the patch in the photo below, which is a southward view, shows that it is rough and uneven and that there is actually a substantial slope to the patch which could affect the tire force in close to maximum conditions.



There are also the usual issues of blockage of the line of sight within the Curve. In this particular instance the crop of corn is the issue as shown in the two photos below.





Curve 6: North of Fourteen Mile Road

The two photos below show the conditions leading up to the curve.





In this instance someone has left a vehicle parked on the west roadside. Looking at the vehicle in the photo at the bottom of Page 15 would lead one to conclude that there is no problem. But looking at the view that drivers might have shows a different situation, as shown in the two photos below.





From a driver's eye-height it is not clear whether the parked vehicle is on the roadside or in the road. This uncertainty could cause a driver to take evasive action when none is required. Looking at the situation from a southbound view shows a similar problem as shown in the photo below.



Much of the problems with this curve have to do with its geometry and that is not apparent in the photos. Results from our testing will reveal how the shortness of the curve and the short distance between its left and right components can lead drivers to mis-judge how much change-in-direction is required over a short time. This issue will be discussed in a future article when we discuss the results of our testing with a vehicle instrumented with video cameras and an accelerometer.

Curve 7 North of Fifteen Mile Road

The characteristics of the seventh and final S-curve are shown in the northward views in the two photos on following page.



As we follow through this curve we note that there is an additional curve warning sign that becomes visible after passing through most of the first, right curve, as shown in the bottom photo of this page.





In the photos below we get closer to that warning sign and recognize that it is not in ideal condition. In fact it is quite old and faded.





At night-time the headlights of vehicles would be pointing away to the left of the sign so it would already be difficult to see regardless of its condition. However, when we get a good close-up look we can really see the extent of its deterioration as shown below.



As mentioned earlier, small issues like these will not lead to major changes in the occurrence of collisions, but combined, they do make a difference.

So, in summary, we have shown that seven S-curves exist on Adelaide Street North and these can be generally divided into two groups where the first three curves south of Ilderton Road contain a "good" set of characteristics while the four curves north of Ilderton Road contain some obvious deficiencies. These matters have been discussed through a review of photographs taken at each curve. But that is not the full extent of what can be done to evaluate these curves. Testing with an instrumented vehicle can provide additional information at relatively low cost if one is willing to accept some comprise.

The next article in this series will discuss the instruments we used in our test vehicle when we rode up and down this roadway. We will also present some of the results of the testing.

Gorski Consulting London, Ontario, Canada

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