

## Characteristics of Tire Marks Influenced by Soft Shoulders - Part 5

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Gorski Consulting has embarked on a research study to document the characteristics of tire marks that exist outside of a paved road surface. This study has involved documentation of hundreds of incidents, both collision-involved, but also incidents of simple travel onto a gravel shoulder.

Four previous articles have been posted to the Gorski Consulting website. The current article continues the preliminary work of the fourth article which presented a series of shoulder re-grading incidents. This evidence was important to introduce as the creation of soft surfaces on shoulders has a significant effect on the visibility and characteristics of the tire marks created on them.

Throughout this series examples have been used from only one site, Clarke Road north of Fanshawe Park Road in London, Ontario, Canada. This site has been useful in that Gorski Consulting has performed observations of various collision and traffic issues there regularly since 2009. However, the present article will take us to another location where we will study a set of tire marks on a freshly re-graded gravel shoulder. This site is located on Nauvoo Road, just south of the intersection with Egremont Road, in Lambton County, Ontario. On June 18, 2013 we examined the east shoulder of Nauvoo Road where we observed some evidence that readers who have followed this series would recognize. Figure 1 shows the east shoulder of Nauvoo Road, looking north toward Egremont Road.

After studying that view readers should come to the decision that this is a freshly re-graded shoulder, as evidenced by the quality of the surface. It should also be apparent that the double tire mark running parallel within the shoulder was caused by a road grader.

In Part 4 of this series we presented a number of situations showing a tire mark that was created by the right rear wheels of a road grader. The imprint left by those tires was not exactly the same as what we see in Figure 1 as there appears to be a wider "tractor" tire imprint as well as a narrower one just to its left. One might surmise that the wider tractor tire imprint would be positioned "outside" of the narrow one on a typical tractor and that possibly the narrower imprint is from the right front while the wider tractor tire is from the right rear wheel. If the tractor-like grader is travelling forward away from the camera in Figure 1 then the last tire that should make its imprint is the right-rear, or the wider tractor-like tire. So that wider tractor-like tire should ride over and destroy parts of the narrower tire imprint in those mutual locations where the imprints overlap.



**Figure 1: View, looking north, at the east shoulder of Nauvoo Road which was freshly re-graded by the vehicle that produced the two visible tire marks.**

So is that what we see in Figure 1? Does the wider, tractor-like tire appear to ride over and destroy a portion of the narrower tire imprint? Looking at the interface where those two tire marks come together the evidence is not particularly clear, but it may be that the opposite is true.

What if we look at another view of those tire marks as we move further north, as shown in Figure 2. Does the wider, tractor-like tire mark appear to destroy the narrower one to its left or is it the other way around? Some of the evidence would suggest that some of the gravel/soil debris lifted up by the narrower tire appears to be thrown onto the wider, tractor-like tire imprint and therefore it would seem that the narrow tire mark was the last one to pass by.

What also becomes apparent in Figure 2 is that we see a new tire mark showing up further to the left of the view and this is caused by an unrelated vehicle. We know this unrelated vehicle passed through the site after the re-grading was done because the tire imprint travelled over top of the newly re-graded, shoulder surface.



Figure 2: View, looking north, along the east shoulder of Nauvoo Road.

However, we still do not have conclusive evidence as to what type of road grader made the tire marks on the right portion of the shoulder.

So then we move further north and we see what is shown in Figure 3. Here we still see the two tire marks to the right which we believe are from the road grader. We also see the single tire mark to the left which we believe is from the unrelated, unknown vehicle. We look again closely at the interface between the two tire marks of the road grader to see which tire mark was created last. Again, bits of gravel/soil debris would appear to have been thrown onto the wider, tractor-like, tire mark suggesting that the narrower tire mark was created last and was likely at the back of the vehicle if it was moving northward as one would expect.

In the background of Figure 3 we begin to see a short trail of an object that is lying in the middle of the shoulder. We also see some additional tire marks in the distant background.



Figure 3: View, looking north, along the east shoulder of Nauvoo Road.

Figures 4, 5 and 6 are additional views that are further north along the east shoulder of Nauvoo Road. Here we obtain a closer view of the short trail and the object that caused it. The object is a rock and the trail indicates the direction that the rock was thrown as it slid to its rest position. It can be understood that, as the road grader moved northward it gathered the rock in its blade and pushed it northward in the direction it was travelling. So this gives the additional confirmation that the road grader was travelling northward.

Using this rock as a reference we can now turn our view around to face southward from the rock's rest position, as shown in Figure 7. We also provide further views, moving progressively southward, in Figures 8, 9 and 10, showing the tire marks produced by the road grader as they exist well into the southern distance. Thus it is reasonable that such tire marks would exist for this long distance if the road grader was moving along the shoulder and re-grading it. Certainly the evidence does not match that of a vehicle that has briefly strayed onto the shoulder as it would be unlikely that such an action would occur over such a long distance. So all the evidence confirms that we have two tire marks caused by a northbound road grader. These two marks are caused by the right side tires. The narrower tire mark is caused by the right rear tire, or the last tire to pass through the re-graded shoulder.



Figure 4: View looking north toward a rock on the east shoulder.



Figure 5: View looking north at a rock lying on the east shoulder.



**Figure 6: Close-up view of the trail produced by the rock as it was likely pushed northward by the road grader.**



**Figure 7: View, from the rock's resting position, rotated around to face southward.**



Figure 8: View, looking south from the rock's rest position.



Figure 9: View, looking south along the east shoulder of Nauvoo Road.



Figure 10: View, looking south, along the east shoulder of Nauvoo Road.

Having confirmed how the evidence was created up to the location of the rock, we can proceed further north to explore the rest of the evidence.

Figure 11 takes us a short distance north of the rock's rest position. Here we see a curving tire mark from a vehicle that exited the pavement and travels across the path of the tire marks caused by the road grader. That tire mark then curves back toward the pavement in the background as it re-enters the road. Figure 12 shows a view further north where we see that tire mark crossing back toward the paved road where it disappears as it regains the pavement.

Figure 13 takes us further north as we see the tire marks of the unknown vehicle that crossed the path of the marks created by the road grader. Here we can see more closely in the vicinity where that unknown vehicle re-enters the pavement. We are focused on the path of this unknown vehicle for the specific reason that we want to provide readers with the chain of evidence that leads to an interesting set of tire marks that begin to be visible in the background of Figure 13. In Figure 14 we see the interesting marks in the middle of the shoulder approximately in the area where the tire mark of the unknown vehicle re-enters the pavement.



Figure 11: View, looking north, from a short distance north of the rest position of the rock on the east shoulder of Nauvoo Road



Figure 12: view of the single tire mark that crosses over the tire marks of the road grader as it moves back onto the pavement in the background.



Figure 13: View, looking north, in the vicinity where the unknown vehicle's tire marks re-enters the pavement. In the background we begin to see some tire marks in the middle of the shoulder.



Figure 14: View, looking north, along the east shoulder of Nauvoo Road. At the approximate location of where the tire marks of the unknown vehicle re-enters the pavement there are some interesting tire marks in the middle of the shoulder.

In Figure 15 we now see the full view of the interesting tire marks that we described. A narrow tire mark that curves toward the bottom left of the view shows an exact resemblance to the narrow tire mark created by the road grader located to the left. Similarly, slightly further in the background, we see a wider, tractor-like, tire mark that has a similarity to the tractor-like, tire mark caused by the road grader to the right.



**Figure 15: View of the interesting tire marks in the middle of the shoulder which have a resemblance to the tire marks created by the road grader located to their right.**

Figure 16 provides a closer, northward, view of the wider tractor-like, tire mark. Obviously this tire mark stops in the foreground. It should be fairly obvious that this tire mark and the narrower one were caused by the road grader. Figure 17 provides a view, looking south, of these interesting tire marks.

So how did this interesting set of tire marks become created and at what time were they created with respect to the continuous marks of the road grader that were seen along the long length of the shoulder to the south?

There are clues that indicate that the road grader was travelling in opposite directions between the two sets of tire marks.

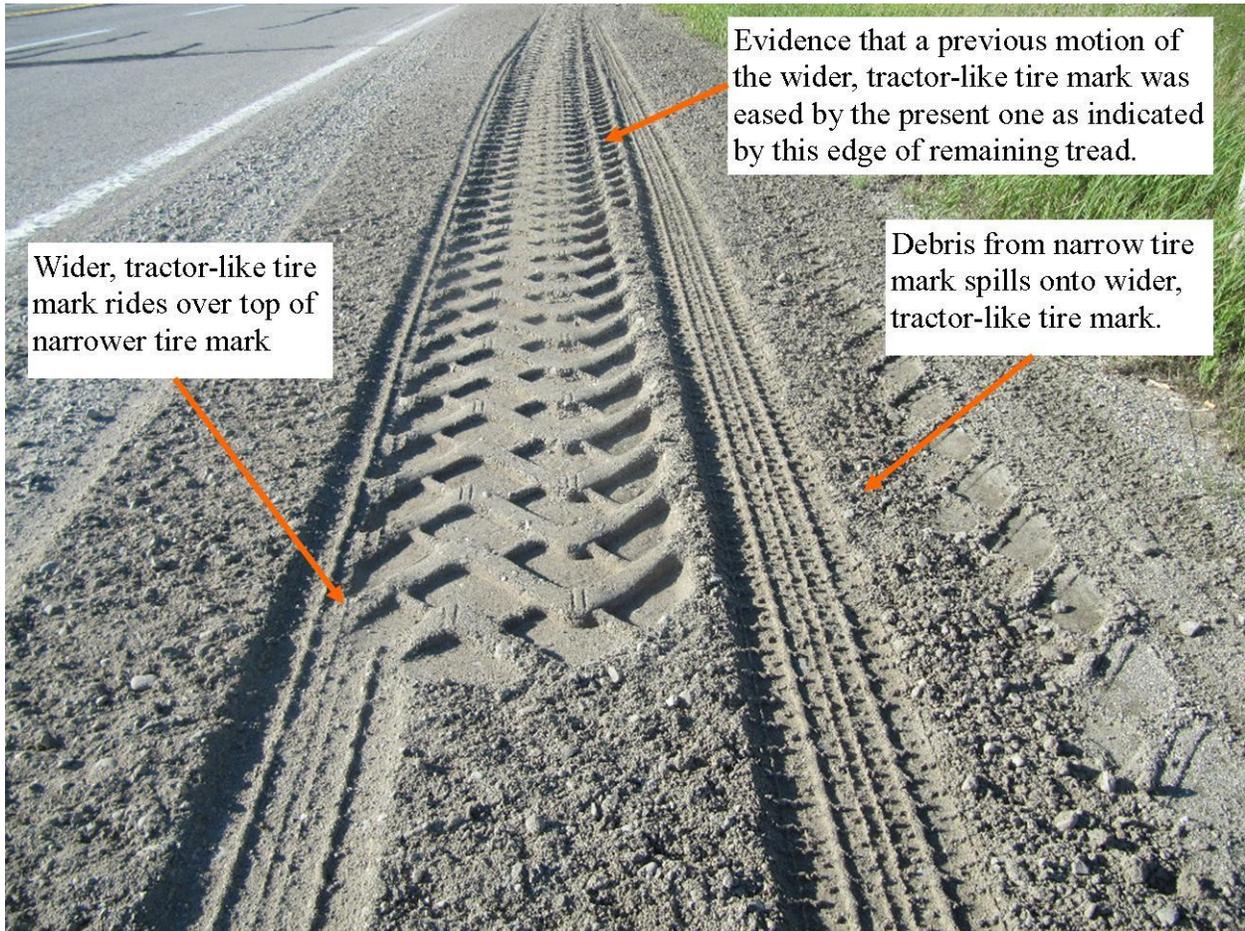


Figure 16: View, looking north, at the end of the tractor-like tire mark on the east shoulder of Nauvoo Road.



Figure 17: View, looking south, at the interesting tire marks that were created by the road grader.

As shown in Figure 18, the set of tire marks on the right confirm that the road grader was initially northbound because the narrower tire that was at the rear of the grader trailed behind the wider one as evidenced by the debris that was thrown onto the imprint of the wider tire. However, the set of tire marks on the left show the opposite: the wider, tractor-like tire erases the narrower one confirming that the road grader was travelling in the opposite (southbound) direction.



**Figure 18: View showing evidence that the road grader was initially northbound and the second set of tire marks indicate that the grader was moving southbound or possibly backing up.**

Because the southbound motion ran over the freshly-graded gravel/soil of the initial, northbound run this confirms that the southbound run was performed after the northbound run. Thus it is likely that the second, southbound run involved a reversing action of the grader.

The remaining mystery for readers to solve is why, after apparently reversing southbound, there is no other tire mark evidence to indicate where the road grader travelled. For example, assuming that the road grader reversed and came to a stop at the end of the wide tractor-like tire mark shown in Figure 18, where did it go afterwards? As it stands, with the end of the wider tire clearly visible in Figures 16, 17 and 18, it

would appear as if the vehicle levitated upwards, rising above the surface. As this is an extremely improbable happening, what actually occurred?

Gorski Consulting would be happy to receive any thoughts or conclusions on this via the Gorski Consulting website Contact page. We will share the thoughts of those who wish to have their thoughts posted.

In the meantime, this article represents a further review of tire mark evidence on unpaved surfaces and how its meaning may be interpreted. Soft shoulders make tire marks more visible and when a shoulder is freshly re-graded it causes tires of vehicles travelling over the shoulder to imprint their treads very clearly. As time passes these clear imprints begin to decay or become destroyed by other factors such as wind, rain and vehicular traffic. It becomes a greater challenge to uncover what occurred, after some time has passed, and tire marks are no longer as visible or have been partially destroyed. It is helpful to examine these marks in their pristine phase to recognize certain characteristics or the factors that might be at play so that we can extrapolate to those situations where those characteristics may not be as visible and the actions of those factors may not be as obvious.

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