

Road Authorities Faced With Difficult Decisions Regarding Replacement of Damaged Guardrail End Terminals

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What happens now? An older guardrail terminal has been damaged and it must be replaced quickly. But what will the replacement be?



Figure 1: View of older-style guardrail end that was struck on November 17, 2014 on Clarke Road, on the south end of the Thames River, in London, Ontario. This guardrail repair has been made quickly.

Like most areas in North America, southern Ontario has been monopolized by Trinity Highway Products guardrail end terminals. However, a recent court decision in the U.S. has just found Trinity liable for failing to disclose alterations to its end terminals that might make them defective and dangerous. Almost every jurisdiction across North America has some form of the alleged dangerous "ET-Plus" terminal on its roadways.

And whatever terminals exist, they will eventually be damaged and will need to be replaced. But what happens when the replacement of choice, the ET-Plus, has been removed from purchase by a steadily larger number of states in the U.S. for fear that they can cause unnecessary injury, as alleged? Roadway maintenance personnel, municipalities, states and province all know by now that the potential exists that the ET-Plus will be found inappropriate yet they have no assurance of that.

The U.S. Federal Highway Administration (FHWA) has done very little to investigate reports of the ET-Plus failings however now it is being pressured to do so. The FHWA is now asking Trinity Highway Products to re-certify the ET-Plus via a neutral testing facility that has no financial ties with Trinity. Obviously there are a lot of nervous agencies waiting for what will come next because, if the ET-Plus fails in the testing, then it is very likely that all the hundreds of thousands of installations throughout North America will be required to be replaced. A massive cost that could mean the collapse of the Trinity multi-national corporation whose affairs are world-wide. The best solution for all these agencies is that the ET-Plus will be found to comply with the NCHRP 360 or MASH protocols and there will be a lot of pressure from many directions to make sure that this happens. Alternatively, if the ET-Plus is in fact dangerous, but it remains on North American highways due to improper pressure from those with vested interests, then the general public in North America will suffer needless serious injury and death. And in the meantime, all the agencies that have ET-Plus terminals on their roadways can do little but wait for some kind of resolution. Yet, there is absolutely no time to wait, because terminals are being struck and damaged daily and they must be replaced.

In the current situation of the damaged guardrail on Clarke Road, the City of London will be placed in the same difficult position as all municipalities. What do about the damaged guardrail and what should be its replacement?

One might conclude that the older barrel-type terminal at the Clarke Road site appears to have performed rather strangely, as shown in some of the additional figures below.

A northbound vehicle striking such as terminal should have crushed it and then should have proceeded to deform the guardrail as this damage is necessary to dissipate the kinetic energy possessed by the striking vehicle. Thus, a lot of visible damage to a guardrail system is often a good thing, provided that the damage occurs in the way it is designed to occur. However, in the present scenario, there does not seem to be any evidence of the system being collapsed in a northerly direction, as would be expected from an impact by a northbound vehicle.

Although we were not present to examine the circumstances of this collision we suspect that the explanation for the damage is quite clear. The guardrail was not struck by a northbound vehicle, but rather, by a southbound vehicle.



Figure 2: In a peculiar result, the barrel terminal of this guardrail appears to have been pushed aside and the guardrail itself appears relatively undamaged and not collapsed.



Figure 3: Evidence of tire marks on the gravel shoulder next to the start of the damage to the guardrail suggest that a southbound vehicle crossed over to this east side of the road and struck the guardrail and continued southward.



Figure 4: Contact evidence exists along the face of the guardrail that indicates that the striking southbound vehicle was deflected and continued further southward.



Figure 5: View, looking south, along the east guardrail, showing the damage evidence and eventual impact with the barrel terminal in the background.



Figure 6: View of contact evidence along the face of the guardrail from impact by a southbound vehicle.



Figure 7: Close-up view of contact evidence on the rail indicating the deflection of the striking, southbound vehicle.



Figure 8: View of the south end of the guardrail where the barrel terminal was ripped off of its anchorage by the striking southbound vehicle.



Figure 9: View of the barrel terminal and the south end of the guardrail indicating no compression of the rail thus confirming the southward direction of the impact force.



Figure 10: View of south end of the guardrail where the anchor bolts for the barrel terminal were ripped out of the rail by the southward impact force.



Figure 11: Overall view of the relatively un-deformed shape of the barrel terminal.



Figure 12: Further evidence of the southward impact force is displayed by the southward deformation of the hazard warning sign.



Figure 13: close-up view of the torn south end of the rail where the barrel terminal was ripped away.

In summary, the collision evidence on the south end of the east guardrail, south of the Thames River bridge indicates that the damage was caused by a southbound vehicle that likely crossed over the centre-line of the road. The performance of this system is therefore not a good candidate to compare to the Trinity, ET-Plus system because the impact is from the opposite direction.

Yet, the complicated issue remains the same. How will the Road Works department of the City of London handle this challenging situation as they will have to make a repair very quickly? Something will have to be installed to replace this barrel terminal and we know the replacement of choice by the City has been the ET-Plus terminal. They cannot do nothing. Yet if they install the ET-Plus system and it fails the U.S. compliance testing then the City may be required to remove the terminal. And more importantly, if a significant collision were to occur with the newly installed ET-Plus terminal, resulting in serious injury, the City might be held liable, particularly if there were warnings existing of the potential malfunctioning of the ET-Plus, but the City installed the system anyway. It makes for a very difficult decision for all jurisdictions.

Yet, the question begs to be answered: How did this situation develop in the first place? How could North American highways become so monopolized by this ET-Plus system without anyone raising a red flag earlier that the system might not be performing as it should?

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