

## Trinity Guardrail End Cap Survey - Part II

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Certain guardrail end caps produced by Trinity Highway Products of Dallas Texas are alleged to be defective and dangerous. The truth of the allegations will be determined in a U.S. court case commencing in November, 2014. At the heart of the issue is a redesigned guardrail end cap or terminal, the ET-Plus.

The ET-Plus is made up of an end cap, terminal or head, and a channel that are attached to the end of a typical "W" rail of a roadside guardrail. When impacted by a wayward vehicle the end cap and channel are designed to ride on the "W" rail while allowing that rail to pass through the channel. The head is designed with a throat that causes the "W" rail to flatten out and deform into a ribbon. The rail is then redirected out the side of the head. This action absorbs the energy needed to bring the impacting vehicle to a controlled ride-down of the impact. It is alleged that the dimensions of the head and channel were altered by Trinity between 2000 and 2005 without informing the U.S. Federal Highway Safety Administration (FHWA). It was these dimensional changes that allegedly caused the rail to fail to pass through the channel and head and thus jam the system. The effect on impacting vehicles included inappropriate rollovers and instances of impaling of the vehicles by the rail.

It has been estimated that there could be as many as 500,000 installations of these units throughout the United States and it is likely that the product is similarly popular in Canada.

Given the large number of these units that are installed throughout North American highways Gorski Consulting has commenced a survey of roads and highways in Southern Ontario to document the locations of those units that resemble the described Trinity products and to provide photographic evidence of their present condition.

Our survey began with an article uploaded to the Articles page of the Gorski Consulting website entitled "Trinity Guardrail End Caps In & Near London Ontario - Survey of Locations & Condition" in which we documented the characteristics of 16 installations. Subsequently we decided to expand our survey resulting in several additional articles.

The present article will review the installations found primarily near Highway 401 in southern London, Ontario. As in the previous article we will provide photographic documentations of the installations with some minimal comments. This will be followed by a summary of our findings at the end the article.

To maintain some continuity we have decided to continue the numbering of the sites from the previous article.

## Survey of Trinity End Caps

### 10. First Eastbound Exit Ramp From Highway 401 to Highbury Avenue, London, Ontario; Ontario Ministry of Transportation



Figure 1: Overall view looking eastward.



Figure 2: View of end cap.



Figure 3: Street side view.



Figure 4: Ditch side view.



Figure 5: Base of cover is about 6.75 inches above the ground.



Figure 6: View of screw used to anchor the cover of the end plate.



Figure 7: View of 4 inch wide channel.



Figure 8: View of standard measurement used to document position of end cap.



Figure 9: Result of standard measurement indicating a distance of 36.5 inches.

**11. Second Eastbound Exit Ramp From Highway 401 to Highbury Avenue,  
London, Ontario; Ontario Ministry of Transportation**



Figure 10: Overall view of guardrail and end cap.



Figure 11: Street side view of end cap.



Figure 12: View of difference in angle of end cap versus the rail.



Figure 13: View of end plate showing standard width of 15 inches and missing black cover.



Figure 14: Base of end plate measures about 6 inches above the ground.



Figure 15: View of typical 4 inch wide channel.



Figure 16: Measurement taken to document position of end plate.



Figure 17: Result of measurement indicates 37.25 inches.



Figure 18: View of base of rail touching channel while there is a wide gap at the top.

**12. Eastbound Entrance Ramp from Wellington Road onto Highway 401, City of London, Ontario Ministry of Transportation**



Figure 19: Overall view of south guardrail and end cap.



Figure 20: Street side view of guardrail and end cap. Note the presence of the post of the hazard marker positions in front of the end plate.



Figure 21: Ditch side view of end plate.



Figure 22: Measurement indicates a typical, 15 inch wide end plate with no black cover.



Figure 23: Base of end plate is 7.5 inches above the ground.



Figure 24: view of typical Trinity Highway Products label.



Figure 25: Measurement of typical 4 inch wide channel with rail positioned low at the channel's rear edge.



Figure 26: View of measurement being taken to document the end plate's position.



Figure 27: Result of measurement indicates 37 inches.



Figure 28: View of measurement of distance between end cap and hazard warning sign.



Figure 29: Result indicates hazard sign is about 52 inches distance from the end plate.

**13. Northbound Highbury Ave East Guardrail Just South of Highway 401, City of London, Ontario Ministry of Transportation**



Figure 30: Overall, northward view of end cap and east guardrail.



Figure 31: Street side view of end cap.



Figure 32: Ditch side view of end cap.



Figure 33: View of difference in horizontal angle of end cap channel in comparison to the rail.



Figure 34: View of screw used to anchor the end plate cover.



Figure 35: Measurement showing typical width of 15.5 inches of the end plate cover.



Figure 36: Base of end plate cover located 16.75 inches above the ground.



Figure 37: View of misaligned and loose anchorage plate



Figure 38: View of typical 4 inch wide channel.



Figure 39: View of standard measurement to document end cap's position.



Figure 40: Result of standard measurement indicates a distance of 37 inches.



Figure 41: Overall view of guardrail and end cap looking southward.

**14. Southbound Highbury Ave West Guardrail South of Highway 401, City of London, Ontario Ministry of Transportation**



Figure 42: Overall view, looking south, of guardrail and end cap.



Figure 43: Overall view, looking north, of guardrail and end cap.



Figure 44: Street side view of end cap.



Figure 45: Ditch side view of channel showing the low position of the rail within the channel.



Figure 46: Measurement indicating typical width of 15 inches of the end plate.



Figure 47: Base of the end plate is 6 inches above the ground.



Figure 48: Typical measurement of 4 inch wide channel.



Figure 49: Standard measurement to document end cap's position.



Figure 50: Result of standard measurement indicates a distance of 38 inches.



Figure 51: Overall, backside view of end cap.

**15. Bradley Ave North Guardrail Approximately 1 Kilometre East of Highbury Ave., City of London**



Figure 52: Overall view, looking west, toward the north guardrail and end cap.



Figure 53: View of guardrail and end cap.



Figure 54: Street side view of end cap.



Figure 55: View of substantial difference in horizontal angle of the rail and channel.



Figure 56: View of typical 15.5 inch wide end cap cover.



Figure 57: Base of end cap cover is 8.25 inches above the ground.



Figure 58: View of typical, 4 inch wide channel.



Figure 59: View of standard measurement to document position of end cap.



Figure 60: Result of measurement indicates a distance of 36.75 inches.



Figure 61: Overall, backside view of guardrail and end cap.

## Discussion of Survey Findings

A total of 6 end caps were reviewed in this article. The majority of these were located along the Highway 401 corridor between Wellington Road and Highbury Ave in the southern district London, Ontario. The only exception was the end cap that was examined on Bradley Ave, east of Highbury Ave although it too was not too far from Highway 401.

The findings that were discussed in the initial article were repeated in this continuation of the survey. We remain concerned with the anchorage of metal posts that have a hazard marker attached to them and these appear to be too close to the end cap.

There continue to be installations that are missing the black cover over the metal end cap.

We also continue to see minor differences in each installation. There were several installations where the horizontal angle of the rail was significantly different than the angle of the channel. In another installation the anchorage cable at the back and bottom of the channel was loose, allowing us to be able to shake the unit sideways with minimal force applied by hand.

Our next survey article will discuss installations that were examined to the north-east of London, Ontario in the counties of Perth and Oxford.

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