

# Defective Guardrails on Our NATION'S ROADS

By Adam Graves & David Brose

In 2005, Trinity Highway Products LLC, one of the largest manufacturers of guardrail end terminals, made a deadly decision. The company secretly altered the design of its ET-Plus end terminal, rendering it a “roadway killer,” rather than a safety device that protects motorists as intended. The defective ET-Plus has caused severe injuries and deaths in auto crashes nationwide. For nearly a decade, the defect has gone uncorrected...until now.

As state and federal regulators investigate these dangerous guardrail end terminals, it is important that lawyers bringing lawsuits learn everything they can about the ET-Plus and competing guardrails. They also must act quickly to preserve evidence and obtain documents from government sources.

## IDENTIFYING THE PRODUCT

An end terminal is also known as the “head” of a guardrail. The ET-Plus end terminal, manufactured by Dallas-based Trinity Highway Products, has been embroiled in controversy and litigation since 2012, when a patent dispute revealed that Trinity had altered its guardrail end terminal design without

informing federal and state highway safety regulators.

Guardrail designs have evolved since their implementation decades ago. Originally, the ends of guardrails did not include any safety features. It was soon discovered that when a vehicle crashed into the end of a guardrail, the guardrail pierced the vehicle and caused severe injuries and deaths. Early designs to remedy this problem included downturned ends on guardrails, which resulted in vehicles catapulting up and over the guardrail and overturning.

Energy-absorbing guardrail end terminals were developed to remedy these problems by absorbing the impact from a vehicle and allowing the vehicle to “ride down” the crash, forcing the guardrail to curl away from the road without piercing or overturning the vehicle.

The Federal Highway Administration (FHWA) approves or certifies certain products installed on U.S. Highways, including the ET-Plus end terminals. The original ET-Plus (5-inch beam) was designed and developed by Trinity and the Texas Transportation Institute, a

subdivision of the Texas A&M University System. Trinity submitted the design for its ET-Plus to the FHWA in 1999. The FHWA approval process required scaled drawings, which had to include the critical dimensions of the end terminal. Trinity submitted drawings that showed a 5-inch guide channel width and 15.375-inch feeder chute height. This design was approved on January 18, 2000.<sup>1</sup> The feeder chute is a metal frame that helps direct the guardrail, on impact, to bend away from the road. Although up to seven crash tests are recommended to properly evaluate the design of a guardrail end terminal, Trinity performed only one, which involved a head-on crash of a pickup truck into the end terminal at 62 mph.

## IDENTIFYING THE DEFECT

In 2005, Trinity secretly began working on significant modifications to the ET-Plus by reducing the feeder chute’s width from 5 inches to 4 inches, reducing the feeder chute’s height from 15.375 inches to 14.875 inches, and decreasing the weight of the end terminal by 8.1 pounds. The FHWA and most state departments of transportation (DOT) require that any design changes be

submitted with appropriate evaluation, such as crash testing. However, Trinity made these critical changes with no notice to or approval from the FHWA or any of the state or foreign governments that purchase the end terminals.

The dimensional changes affect how the rail collapses on impact. The rail is supposed to turn away from the striking vehicle as a flat ribbon. Instead, the rail locks up inside the feeder chute and folds back, forming a spear that can slice right through a car or truck. The resulting injuries to occupants are horrendous.<sup>2</sup>

The defect in the Trinity ET-Plus end terminal was revealed in 2012, when hidden design changes came to light in a patent infringement case Trinity brought against a competitor, Joshua Harman.<sup>3</sup> The qui tam whistleblower suit was filed against Trinity, alleging False Claims Act violations.<sup>4</sup> During the trial, the jury learned that the ET-Plus end terminal had failed five undisclosed crash tests. Trinity argued the tests involved a different configuration never submitted for approval, but the ET-2000 designer, Dean Sicking, stated in an October 2014 letter to the FHWA that Trinity egregiously hid the failed crash test results of low angle, head-on and offset impacts of the ET-Plus—exactly the conditions in which the guardrails are failing on the highways.<sup>5</sup>

In October 2014, the Texas jury, in the qui tam trial, found against Trinity, awarding \$175 million, which is subject to trebling.

The company could also be subject to an assessment of an additional \$200 million in fines.<sup>6</sup>

### Practice Tips

**Identify key documents.** The reason for Trinity's design change was simple: money. According to an internal company email, the reduction in material cost saved Trinity about \$2 per end terminal, resulting in an annual savings of \$50,000.<sup>7</sup> The email states, "we could make this change [from a 5-inch beam to a 4-inch beam] *with no announcement*."<sup>8</sup> An email later that day acknowledged that the 4-inch beam with its reduced weight "may give us a problem."<sup>9</sup> Despite acknowledging the potential danger the modified guardrail could pose to the motoring public, Trinity made these design changes without disclosing them.

**Compile evidence of the defect and causation.** A recent study conducted by the University of Alabama-Birmingham (UAB)—with funding from The Safety Institute and the Missouri Highways and Transportation Commission—compared the ET-Plus end terminal with several other end terminals, including the ET-2000.<sup>10</sup> The study examined eight years of data from hundreds of crashes with injuries and deaths in Missouri and Ohio involving five different models of guardrail end terminal design. This data was coded to show whether the crash involved a guardrail and, if so, what type of guardrail was involved, including whether the guardrail was the ET-Plus or

the ET-2000. The study found that Trinity ET-Plus guardrails "placed motorists at a higher level of risk of both serious injury and fatality relative to its predecessor, the ET-2000."<sup>11</sup> It also found that:

- About 75 percent of the fatal crashes involved the defective ET-Plus end terminal.<sup>12</sup>
- The ET-Plus is 3.95 times more likely to be involved in a fatal crash than the ET-2000.<sup>13</sup>
- The ET-Plus is 1.45 times more likely to be involved in a severe injury than the ET-2000.<sup>14</sup>

**Governmental Scrutiny.** The ET-Plus end terminal has been installed on highways in all 50 states. Before the qui tam verdict, three states—Massachusetts, Missouri, and Nevada—had dropped the ET-Plus from their approved highway equipment lists. Since the UAB study and the verdict, numerous states have taken action to stop installing the defective ET-Plus on their roadways by removing it from their qualified or approved products lists.<sup>15</sup>

In the two years leading up to the whistleblower trial, the FHWA defended the ET-Plus, despite a February 2012 email by its senior engineer, Nicholas Artimovich, saying, "there does seem to be a valid question over the field performance," after an engineer based in South Carolina raised questions about the guardrails.<sup>16</sup> In a separate email to an outside safety expert a month later, Artimovich wrote that it was "hard to ignore the fatal results."<sup>17</sup>

On the eve of the qui tam trial, the FHWA instructed states to provide ET-Plus crash data. The day after the verdict, the agency ordered Trinity to perform crash tests on the ET-Plus.<sup>18</sup> But the order has come under fire because the FHWA did not require that Trinity perform the lowangle, offset-impact tests the ET-Plus failed many times before.

**Safer Alternative Design.** While this article has focused mainly on the hidden changes made by Trinity between the 5-inch ET-Plus and the 4-inch ET-Plus, many people have asked whether the 5-inch ET-Plus is the safer alternative design. The short answer is no. The 5-inch ET-Plus and the 4-inch ET-Plus contain several deviations from the original ET-2000, which make both ET-Plus models unreasonably dangerous and defective. Below are two of the defective deviations:

**1. The Exit Gap:** After the guardrail passes through the feeder shoot and “flattens out,” the flattened guardrail exits the end terminal through the “exit gap”. In the original ET-2000, the exit gap was 2 inches wide. In both the 4-inch and 5-inch ET-Plus models, the exit gap was narrowed to 1 inch. How does this create a danger? During a collision, a vehicle will push the end terminal down the guardrail and will, in many cases, reach a joint in the guardrail where two sections of guardrail are joined. These joints are secured by four (4) 1.5-inch bolts. In the 4-inch and 5-inch ET-Plus models, the 1.5 inch bolts will not pass through the 1-inch

exit gap, thus causing the guardrail to jam within the end terminal and resulting in catastrophic failure.

**2. The End Terminal Head:** As can be seen in the photo below, there is a significant difference between the terminal head on the original ET-2000 and both models of the ET-Plus. The original ET-2000 has a square 20-inch head, while both ET-Plus models have a much narrower rectangular design. In addition, the original ET-2000 has an anchorage lip on all four sides of the head, while both ET-Plus models only have anchorage lips on the sides. How does this create a danger? First, the greatly narrowed head of the ET-Plus models provides far less stability for the end terminal when it is in contact with the vehicle. Second, during a collision, the anchorage lips prevent the terminal head from slipping off of the vehicle. In the original ET-2000, the anchorage lips were on all four sides of the terminal head, thus preventing slippage in all directions. On both models of the ET-Plus, the anchorage lips on the sides help prevent slippage sideways; however, due to the lack of anchorage lips on the top and bottom of the terminal head, there is nothing to prevent the terminal head from slipping below or over the top of a striking vehicle.

As can be seen, there are significant design defect issues with both the 4-inch ET-Plus and the 5-inch model. Is the ET-2000 the safer model? There is no question that the original ET-2000 is

safer than both models of the ET-Plus; however, additional testing and discovery is necessary to further establish the ET-2000 as a safer alternative design.

## PREPARING YOUR CASE

Several lawsuits have been filed against Trinity for injuries or deaths caused by the ET-Plus. As states continue to evaluate the guardrail’s performance on their roads and new information is learned about Trinity’s deceptive practices, more suits will follow.

When evaluating whether you have an ET-Plus case, you should first look for evidence of some portion of the guardrail piercing the vehicle or the vehicle rolling over. If you find this evidence, determine whether the injuries were caused or enhanced by the defective end terminal.

Be sure you know how to distinguish the defective ET-Plus end terminal from other guardrail models. The ET-Plus guardrails have a distinctive rectangular design, while Trinity’s previous (and safer) design, the ET-2000, used a square end terminal. To distinguish between the 5-inch and 4-inch ET-Plus model, you can measure the width of the beam and the height of the guide channel.





Trinity ET-Plus (left) and Trinity ET-2000 (right). *Photo courtesy Langdon & Emison.*



Side view of 5-inch ET-Plus (front) and 4-inch ET-Plus (back). *Photo courtesy Langdon & Emison.*



Side view of Trinity ET-2000 (front) and Trinity ET-Plus (back). *Photo courtesy Langdon & Emison.*



ET-Plus 4-inch guide channel. *Photo courtesy Langdon & Emison.*

enhanced by the defective end terminal. It is also important to retain the appropriate expert witnesses. You'll need a biomechanical expert to establish that the defective guardrail end terminal caused or enhanced the occupants' injuries. The expert can determine the occupants' movement inside the vehicle relative to various structures, including the vehicle's interior and the intruding guardrail, which is critical. An accident reconstruction expert can determine important factors such as the speed of the vehicle, change in velocity, angle of impact and forces involved in the impact.

A design expert can establish that the design of the guardrail end terminal was defective and unreasonably dangerous and show how the design failed to prevent intrusion into the vehicle. This expert may also be able to evaluate the testing and failure analysis performed before the guardrail design was put into production.

If your client was injured, a life-care planner can provide critical evidence regarding the cost of future care and treatment your client will need. You should also retain an economist to identify your client's economic loss. Various other experts may also be necessary, depending on the facts of your case.

You should also find other similar incidents (OSIs) involving the ET-Plus end terminals. State and other government

Once you suspect that the defective ET-Plus end terminal caused or enhanced the vehicle occupants' injuries, you should immediately take the following actions to preserve evidence:

- Preserve the vehicle involved in the crash, with no modifications. Arrange to take possession of the vehicle and ensure that it is stored and maintained in a location that will not subject the vehicle to further deformation or deterioration from the elements.

- Send preservation letters to the government entity that has possession of the crashed guardrail and end terminal (most likely the state DOT). The guardrail and end terminal should similarly be preserved to avoid further deformation or deterioration of the evidence.

- Take statements from appropriate scene witnesses to document that the guardrail penetrated the vehicle, or the vehicle rolled over.

- Obtain medical records to document the occupants' injuries were caused or

investigations may reveal critical evidence in the OSIs to establish notice of the problem and causation. Media coverage can also be an integral tool to highlight the design hazard to the public and identify OSIs that may be used as evidence at trial.<sup>19</sup>

Trinity, like other manufacturers, will argue that its product was approved by government regulators and therefore could not have been defective or unreasonably dangerous. It is important to remind your judge that government approval or acquiescence is not a defense. In these cases, there is substantial evidence that Trinity hid the design changes from state and federal highway safety regulators. These surreptitious design changes were never evaluated or approved by government regulators.

Trinity ET-Plus end terminals are the result of another decision by a big corporation to put profits over safety. As a result, many injuries and deaths will be needlessly caused by Trinity's tragic decision. The knowledge and understanding of the ET-Plus and its defects are evolving rapidly. As new information unfolds, attorneys can expect to learn even more about the design changes and resulting defects that are impacting the performance of the ET-Plus.

1. Defs. Opposition to Pls. Mot. to Enforce Settle. Agreement, Doc. 460, at 10, *Trinity Indus., Inc. v. SPIG Indus.*, No. 1:11-CV-937-CMH/TRJ (E.D. Va.

filed Mar. 1, 2013).

2. ABC's 20/20 featured an investigative report on defective Trinity ET-Plus guardrails on Sept. 19, 2014.

3. *Trinity Indus., Inc. v. SPIG Indus., LLC*, 1:11-cv-00937-CMH-TRJ (E.D. Va. filed Sept. 2,

4. *U.S. ex rel. Harman v. Trinity Indus., Inc.*, No. 2:12-cv-00080 (E.D. Tex. filed Mar. 6, 2012).

5. Letter from Dean L. Sicking, PhD, PE, University of Alabama-Birmingham to Acting Administrator Gregory G. Nadeau, Federal Highway Administration, Oct. 22, 2014.

6. *U.S. ex rel. Harman v. Trinity Indus., Inc.*, No. 2:12-cv-00089 (E.D. Tex. Oct. 20, 2014).

7. Boyd Email, Nov. 9, 2004, *U.S. ex rel. Harman v. Trinity Indus., Inc.*, No. 2:12-cv-00089-JRG (E.D. Tex.).

8. *Id.* (emphasis added).

9. *Id.*

10. Kevin Schrum, *Relative Comparison of NCHRP 350 Accepted Guardrail Terminals*, Univ. of Ala.-Birmingham, at i (Final Report Oct. 28, 2014), [www.thesafetyinstitute.org/wpcontent/uploads/2014/10/Relative-Comparison-of-NCHRP-350-Accepted-W-Beam-Guardrail-Terminals.pdf](http://www.thesafetyinstitute.org/wpcontent/uploads/2014/10/Relative-Comparison-of-NCHRP-350-Accepted-W-Beam-Guardrail-Terminals.pdf).

11. *Id.*

12. *Id.* at 12, 16.

13. *Id.*

14. *Id.* at 21.

15. Cindy Galli, Brian Ross & Kelly Kleber, *More Than Half Country Bans*

*Controversial Guardrail*, ABC News (Oct. 30, 2014), [www.abcnews.go.com/US/half-country-banscontroversial-guardrail/story?id=26577103](http://www.abcnews.go.com/US/half-country-banscontroversial-guardrail/story?id=26577103).

16. Email from Fed. Hwy. Administration Engr. Nicholas Artimovich to Frank Julian and Daniel Hinton, Subject: RE: Type T End Treatments Manufactured by Trinity (Feb. 27, 2012). *U.S. ex rel. Harman v. Trinity Indus., Inc.*, No. 2:12-cv-00089 (E.D. Tex. Oct. 20, 2014), Plaintiff's Exhibit 0403.

17. Danielle Ivory & Aaron M. Kessler, *Highway Guardrail May Be Deadly, States Say*, N.Y. Times (Oct. 12, 2014), [www.nytimes.com/2014/10/13/business/highway-guardrail-may-bedeadly-states-say.html](http://www.nytimes.com/2014/10/13/business/highway-guardrail-may-bedeadly-states-say.html).

18. Ltr. From Gregory G. Nadeau, Acting Adminstr., Fed. Hwy. Administration, to Gregory Mitchell, Pres., Trinity Hwy. Prods., LLC (Oct. 21, 2014), <http://www.fhwa.dot.gov/guardrailsafety/nadeautrinity20141021.cfm>.

19. Brett A. Emison, *Mastering the Media in a Products Liability Case* (ABA 2014).

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