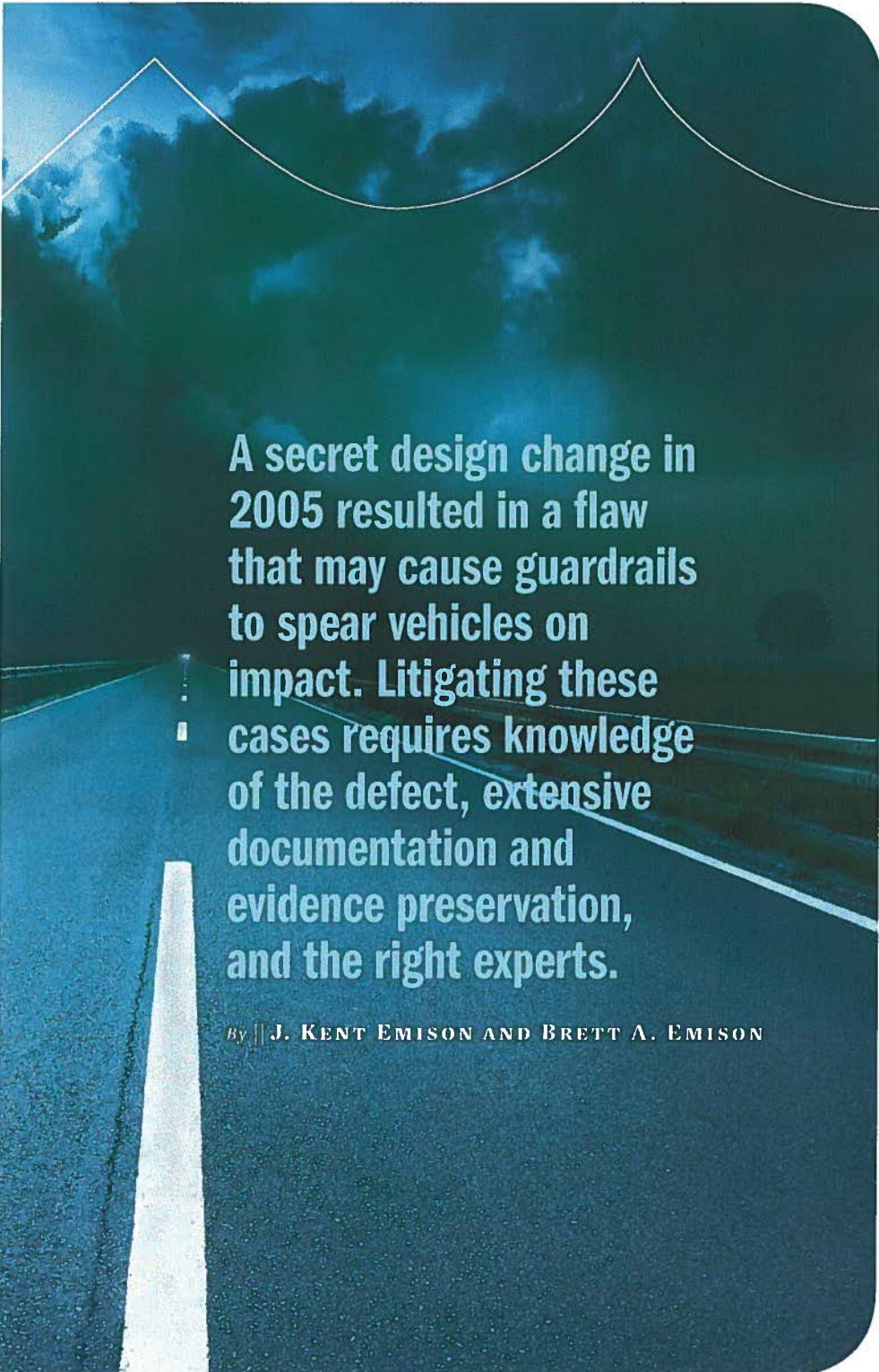




**DEFECTIVE  
GUARDRAILS  
ON  
AMERICA'S  
ROADS**



A secret design change in 2005 resulted in a flaw that may cause guardrails to spear vehicles on impact. Litigating these cases requires knowledge of the defect, extensive documentation and evidence preservation, and the right experts.

By || J. KENT EMISON AND BRETT A. EMISON

**GUARDRAILS ARE** supposed to protect motorists in a crash. Instead, thousands of guardrails across the country are injuring and killing the very people they should protect. Since 2005, virtually every driver in the United States has been passing a “highway killer” every day. The culprit is the end terminal, or “head,” of the guardrail known as the Trinity ET-Plus. The defect has gone uncorrected for nearly a decade—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.

Dallas-based Trinity Industries is one of the world’s largest manufacturers of guardrails and guardrail end terminals. The ET-Plus 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 (with a 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 feeder chute width and 15.375-inch feeder chute height. The feeder chute (sometimes also referred to as the “guide channel”) is a metal frame that helps direct the guardrail, on impact, to bend away from the road.

The 5-inch ET-Plus design was approved on Jan. 18, 2000.<sup>1</sup> 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 changes to the design are illustrated in the diagram below. 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>4</sup>



The qui tam whistleblower suit was filed against Trinity, alleging False Claims Act violations.<sup>5</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>6</sup>

In October 2014, the Texas jury in the qui tam trial found against Trinity, awarding \$175 million, which is subject to trebling of damages, as well as statutory fines and penalties.<sup>7</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

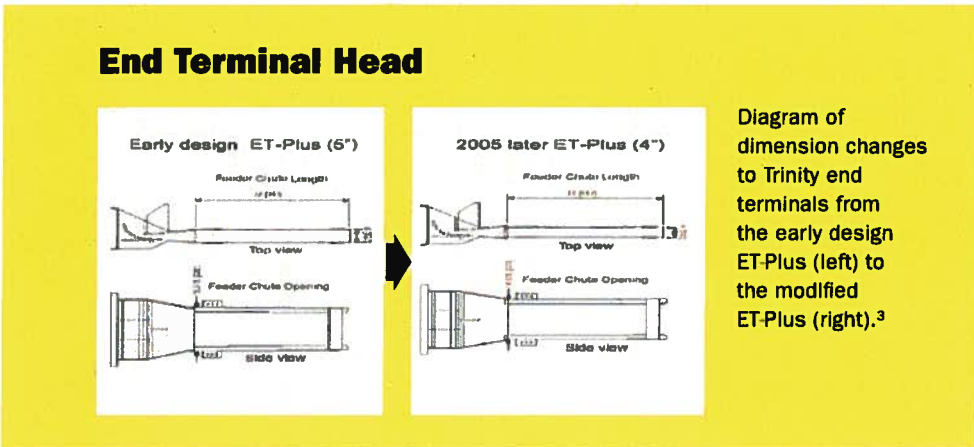


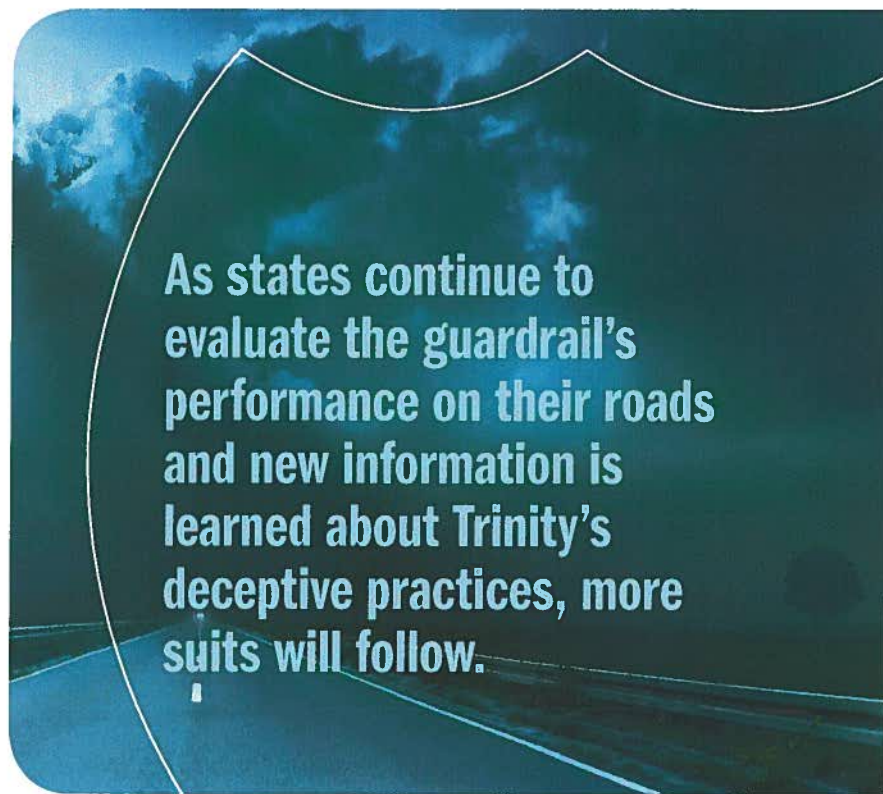
Diagram of dimension changes to Trinity end terminals from the early design ET-Plus (left) to the modified ET-Plus (right).<sup>3</sup>

material cost saved Trinity about \$2 per end terminal, resulting in an annual savings of \$50,000.<sup>8</sup> The email states, “we could make this change [from a 5-inch beam to a 4-inch beam] *with no announcement.*”<sup>9</sup> An email later that day acknowledged that the 4-inch beam with its reduced weight “may give us a problem.”<sup>10</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 School of Engineering (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>11</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. The data were 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>12</sup> It also found that:

- About 75 percent of the fatal crashes involved the defective ET-Plus end terminal.<sup>13</sup>
- The ET-Plus is 3.95 times more likely to be involved in a fatal crash than the ET-2000.<sup>14</sup>
- The ET-Plus is 1.45 times more likely to be involved in a severe injury than the ET-2000.<sup>15</sup>

**Government 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>16</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>17</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>18</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>19</sup> But the

order has come under fire because the FHWA did not require that Trinity perform the low-angle, offset-impact tests the ET-Plus failed many times before.

**Safer alternative design.** Much of the discussion of the ET-Plus has focused on the surreptitious design change from the 5-inch ET-Plus to the 4-inch ET-Plus, so you may wonder whether the 5-inch ET-Plus is a safer alternative design. The short answer: no. Both versions of the ET-Plus contain several deviations from the original ET-2000, which render the ET-Plus (regardless of model) unreasonably dangerous and defective. For example, two of the defective conditions include:

**The exit gap.** During a collision, the guardrail should flatten and pass through the feeder chute. The flattened rail then exits the end terminal through the “exit gap.” The exit gap was 2 inches wide in the ET-2000. However, in both the 5-inch and 4-inch versions of the ET-Plus, the exit gap was narrowed to only 1 inch.

Why is this important? During a collision, a vehicle will often push the end terminal down the guardrail and reach a joint where two sections of rail have been joined. These joints are secured by four 1.5-inch bolts. In the ET-Plus, the 1.5-inch bolts will not feed through the 1-inch exit gap and will cause the guardrail to jam inside the end terminal, resulting in a catastrophic failure of the system.

*The end terminal head.* There is a significant difference between dimensions of the end terminal head for the ET-2000 and those of the ET-Plus. The ET-2000 is designed as a 20-inch square head, while both ET-Plus versions have a much narrower rectangular design. In addition, the ET-2000 head design included an anchorage lip on all four sides of the square head, while the ET-Plus versions have anchorage lips on only two sides.

Why is this important? The narrowed end terminal head of the ET-Plus provides much less stability for the end terminal as it engages the vehicle. In addition, removal of the anchorage lips on the upper and lower edges of the end terminal head permit a striking vehicle to slip above or below the guardrail, potentially causing serious injury for vehicle occupants.

There are substantial design defects with both the 5-inch and 4-inch ET-Plus designs. Data have shown the ET-2000 to result in a lower frequency of serious injury and death events. There is no question the ET-2000 is safer than both models of the ET-Plus; however, further testing and discovery are necessary to establish the ET-2000 as a bona fide 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



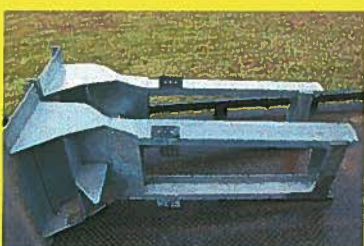
Trinity ET-Plus (left) and Trinity ET-2000 (right)



ET-Plus 4-inch guide channel



Side view of Trinity ET-2000 (forefront) and Trinity ET-Plus



Side view of the 5-inch ET-Plus (forefront) and 4-inch ET-Plus

about Trinity's deceptive practices, more suits will follow.

When evaluating whether you have an ET-Plus case, you first should 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 defective end terminal

caused or enhanced the injuries.

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. Both end terminal models are shown together at left. To distinguish between the 5-inch and 4-inch ET-Plus models, you can measure the width of the beam and the height of the guide channel.

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

- 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 that the occupants' injuries were caused or 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 also may 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 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>20</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 secret design change to save \$2 per end terminal. ■



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