

UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF NEW HAMPSHIRE

Cheryl Turgeon, et al.

v.

Case No. 15-cv-288-PB
Opinion No. 2018 DNH 179 P

Trinity Industries, Inc., et al.

MEMORANDUM AND ORDER

I must determine in this case whether federal common law should shield a state government contractor from product liability claims if the federal government has reimbursed the state for some or all of the cost of the product that gave rise to the claims.

Cheryl Turgeon was injured when the car she was driving struck a guardrail end terminal manufactured by Trinity Industries, Inc ("Trinity"). A contractor working for the State of New Hampshire purchased the end terminal from Trinity and installed it on a roadway that is a part of the National Highway System. The federal government ultimately reimbursed the State for the cost of the end terminal pursuant to a program that covers improvements to the National Highway System.

Turgeon and her husband later sued Trinity to recover for their injuries. Trinity responded with a motion for summary judgment arguing that the federal government contractor defense

recognized in Boyle v. United Technologies Corp., 487 U.S. 500 (1988) should be extended to cover the Turgeons' claims because the federal government reimbursed the State for the cost of the end terminal. I decline Trinity's invitation to extend the federal contractor defense to claims against state contractors.

I. BACKGROUND

On July 17, 2014, at approximately 10:35 A.M., Cheryl Turgeon was driving alone in her 2013 Dodge Durango, southbound on New Hampshire Route 9 ("NH Route 9") in Stoddard, NH. For reasons that are not specified in the record, her car drifted to the right, exited the single-lane roadway, and struck head-on the flat, steel face of a guardrail end terminal head-on. Instead of safely absorbing and dissipating her car's energy, as the device was designed to do, the end terminal allegedly malfunctioned and "jammed" at a critical point shortly after impact. Turgeon alleges that the jam was caused by several defectively designed components of the model at issue. The jam, in turn, triggered a rapid chain of events that ultimately resulted in the impalement of the vehicle's driver's side compartment by a jagged piece of folded guardrail. Turgeon's legs were severely injured in the process. She now claims that

the accident would not have unfolded as it did had the end terminal been safely designed and tested.¹

Trinity manufactured and sold the end terminal at issue under the "ET-Plus" brand name. It was installed at the direction of the New Hampshire Department of Transportation ("NH DOT") by a private contractor. Prior to the sale of the terminal in 2006, Trinity had sought and obtained an "approval letter" for the terminal from the Federal Highway Administration ("FHWA"). The approval letter signified that the FHWA had reviewed certain design specifications and crash-test reports submitted to it by Trinity, and determined that the ET-Plus was sufficiently "crashworthy" under relevant federal testing standards. As such, the FHWA deemed the ET-Plus "eligible" for federal reimbursement under the Federal-Aid Highway Program ("FAHP"). This meant that, pending further project approval, the NH DOT could have sought federal funding to help pay for the purchase and installation of ET-Plus terminals on NH Route 9 where the accident occurred.

Trinity contends that the FHWA's continued approval of the ET-Plus under the FAHP constitutes sufficient federal involvement to entitle it to the federal government contractor defense recognized in [Boyle v. United Technologies Corp., 487](#)

¹ Mr. Turgeon seeks damages for loss of consortium owing to his wife's injuries.

U.S. 500 (1988). It argues that the FHWA's review and approval of the device through correspondence with Trinity conclusively establishes the elements of the defense as outlined in Boyle, and therefore entitles it to summary judgment on all of the Turgeons' claims. Before addressing Trinity's argument, I first describe the design and relevant mechanics of the ET-Plus and the FHWA's role in administering the FAHP. I then explain the federally accepted testing standards used to assess the "crashworthiness" of equipment like the ET-Plus, and the FHWA's "approval" process for establishing reimbursement eligibility for such devices. Lastly, I discuss the FHWA's review of the ET-Plus and the specific design defects alleged by Turgeon in greater detail.

A. The ET-Plus & the Federal Highway Administration

1. The ET-Plus

The ET-Plus is an energy-absorbing guardrail terminal system installed on the exposed ends of "W-beam" roadway guardrails. The model is widely used on roadways throughout the country. Its general purpose is to mitigate the risks historically implicated when an automobile collides with the end of an exposed or buried guardrail. Generally, it does so by absorbing a vehicle's energy upon impact and dissipating it down the length of the guardrail. Made of steel, the terminal consists of four basic parts: (i) the strike plate, (ii) the

impact head, (iii) the extruder throat, and (iv) the feeder channel or "channel chute." See Apps. A & B. The strike plate is a flat, rectangular surface, with outward protruding edges along its vertical sides, known as "teeth." It is attached to, and reinforced by, an asymmetrical, quadrilateral-shaped block known as the "terminal head." The head tapers back from the plate and attaches to the "extruder throat," which in turn attaches to the "feeder channel." The three-foot-long "feeder channel" is an oblong, rectangular structure that attaches to the front of the "W-beam" guardrail to which the entire terminal is affixed.

In a head-on collision, the strike plate and impact head catch the vehicle's momentum and the entire assembly is designed to slide down the "W-beam" barrier until the vehicle comes to a relatively safe stop. As the terminal's feeder channel slides down the rail, the W-beam guardrail threads through the terminal's extruder throat. The throat flattens the guardrail out of its W-shape and passes it through a curved "exit gap" in the terminal head, pushing or "extruding" it out and away off the side of the road. The process produces a curled ribbon of steel that squeezes out through the exit gap of the terminal

alongside the edge of the roadway as the vehicle decelerates to a stop.²

The ET-Plus is the latest model of end terminals manufactured and sold by Trinity. It was preceded by the "ET-2000." See Apps. C & D. Both models function in the same general manner. See Doc. No. 46-7 at 12-19 (Expert Report of Dr. Marthinus van Schoor, Dec. 8, 2017). The ET-2000 was designed and developed by the Texas A&M Transportation Institute ("TTI") at Texas A&M University in the late 1980s and was manufactured and sold by Trinity from 1992 to 2004 pursuant to an exclusive licensing agreement with TTI. Doc. No. 46-8 at 28-33 (Dep. Of Brian Smith, Feb. 22, 2018). In 1999, TTI began to develop the ET-Plus. See Doc. No. 46-8 at 34, 37.

The ET-Plus was generally designed to function like the ET-2000 and closely resembles its predecessor-model, except for several specific design features that were modified between the two models. The strike plate on the ET-Plus consists of a narrower, 15-inch-wide rectangle, as compared to the ET-2000's 20-inch-wide square plate. The newer strike plate also abandons use of the horizontal "teeth" protruding from the top and bottom

² When hit at a pronounced angle, the ET-Plus performs differently, bending or "gating" out of the way to allow the impacting vehicle to slow down and pass behind the guardrail. Doc. No. 32-6 at 4 (FHWA, "Guardrail 101"). See also [United States ex rel. Harman v. Trinity Indus. Inc.](#), 872 F.3d 645, 648 (5th Cir. 2017) (briefly describing the extrusion process).

edges of the ET-2000's plate, leaving only vertical teeth aligning the sides for the ET-Plus. Additionally, the shape and position of the ET-Plus's impact head resembles an off-centered, asymmetrical quadrilateral favoring the side away from the road, whereas the ET-2000's head resembled a symmetrical triangle, centrally aligned with the axis of the feeder channel. See Apps. B & D. Among other changes, the exit gap, i.e. the available space for the flattened guardrail to slide through and exit the terminal head, was narrowed from 1.5 inches (ET-2000) to 1 inch (ET-Plus). See Doc. No. 46-7 at 32-34 (Dr. van Schoor Expert Report). In 2004, the ET-Plus was further modified to reduce the width of the feeder channel from five inches to four inches. Doc. No. 46-8 at 82-84 (B. Smith Dep.); see Doc. No. 46-9 (Email from S. Brown to S. Malizia, Nov. 9, 2004). In all, these changes reduced the weight of the ET-Plus by roughly 100 pounds.

Both the ET-2000 and the ET-Plus were originally designed to be used on 27-inch-high guardrails. At some point after September 2005, Trinity began selling a version of the ET-Plus for use on 31-inch-high guardrails and it is that version of the product that is at issue in this case.

2. The Federal-Aid Highway Program & the FHWA

State expenditures on end terminals like the ET-Plus are often eligible for federal reimbursement under the FAHP, as set

out in [23 U.S.C. § 101](#), *et seq.* The FAHP is a “federally assisted State program,” see [23 U.S.C. § 145](#), that enables states and localities to seek and obtain federal financial assistance for a variety of projects related to the construction, maintenance, and operation of the National Highway System (“NHS”). See [23 U.S.C. § 101](#), *et seq.*; [City of Cleveland v. Ohio](#), 508 F.3d 827, 832 (6th Cir. 2007). The NHS encompasses a vast network of public roadways that serve broad, national interests. See [23 U.S.C. § 103\(b\)](#). This includes the majority, if not entirety of NH Route 9.³ See *id.* The FAHP is administered by the FHWA, an agency within the U.S. Department of Transportation. See [49 U.S.C. § 104](#); [49 C.F.R. §§ 1.85\(a\)\(1\)](#), [1.84](#). The FHWA is empowered “to prescribe and promulgate all needful rules and regulations for the carrying out of [the FAHP],” see [23 U.S.C. § 315](#); [49 C.F.R. § 1.85](#), but states ultimately retain “their sovereign rights . . . to determine which projects shall be federally financed.” [23 U.S.C. § 145\(a\)](#); [City of Cleveland](#), 508 F.3d at 832. To avail itself of federal assistance, each state must at least maintain a transportation department (“State DOT”) capable of performing certain functions. [23 U.S.C. § 302](#) (West 2018); see [23 C.F.R. §](#)

³ See also Fed. Highway Admin., National Highway System: NHS Map of New Hampshire (April 22, 2015), https://www.fhwa.dot.gov/planning/national_highway_system/nhs_maps/new_hampshire/nh_newhampshire.pdf.

1.3. The FHWA oversees certain activities of State DOTs electing to participate in the program, and it ultimately authorizes federal reimbursements by ensuring that projects seeking assistance comply with relevant federal law. See [Lathan v. Brinegar](#), 506 F.2d 677, 682 (9th Cir. 1974) (“[P]rimary responsibility for highway planning, design and construction rests on state highway departments, aided by federal assistance.”). It may withhold distribution of FAHP funds for “any cost which is not incurred in conformity with . . . [its] regulations . . . policies [or] procedures.” 23 C.F.R. § 1.9; see 23 U.S.C. § 315 (conferring rulemaking authority “needful . . . for the carrying out of the provisions of [Title 23]”); 23 C.F.R. §§ 1.32 (FHWA authority to issue directives), 1.36 (FHWA authority to withhold federal funds).

The funding process is rather complex and generally occurs through several stages of federal approval. State of La. ex rel. Guste v. Brinegar, 388 F. Supp. 1319, 1321 (D. D.C. 1975). First, specific sums of money are authorized by Congress to be appropriated from the Highway Trust Fund each fiscal year and made available to the FHWA for administrative expenses. See 23 U.S.C. § 104(a)(1). The FHWA is statutorily directed to distribute a “base apportionment” from that amount to each state in accordance with a statutory formula. See id. § 104(b),(c); 49 C.F.R. § 1.85 (delegating Secretary’s authority). Other

statutory provisions then dictate how that apportionment must be distributed among six component programs within the FAHP. See [23 U.S.C. § 104](#).⁴ Specifically, they prescribe the priority of distribution among programs, the method for calculating specific apportionment amounts, and formulae to determine the respective federal and state shares for any given project. See [23 U.S.C. §§ 104](#) (apportionment), [120](#) (federal share payable).

For each proposed project seeking federal financing, the State DOT is required to submit "to the [FHWA] for approval such plans, specifications, and estimates . . . as the [FHWA] may require." id. [§ 106\(a\)](#); see id. [§ 109](#) (charging the FHWA with ensuring that plans and standards adequately serve their intended purpose, and providing further instruction for their development). The FHWA must then act on that submission, and the two entities enter into a "project agreement . . . formalizing the conditions of the project approval." id. [§ 106\(b\)](#). Such project agreements are required before payment to states can be made. See id. [§ 121](#). The execution of a project agreement is "deemed a contractual obligation of the Federal

⁴ These programs include (i) the national highway performance program, (ii) the surface transportation block grant program, (iii) the highway safety improvement program, (iv) the congestion mitigation and air quality improvement program, (v) the national highway freight program, and (v) metropolitan planning program outlined in [23 U.S.C. § 134](#). See [23 U.S.C. § 104\(b\)](#).

Government for the payment of the Federal share of the cost of the project." [id.](#) § 106(c); [see also](#) 23 C.F.R. §§ 630.102-630.112 (FHWA regulations pertaining to project agreements).

It is uncontested that the NH DOT's installation of guardrail end terminals on NH Route 9 generally would have been an "eligible project" for federal funding. Federal funds would not be committed to such a project, however, until the FHWA approved relevant "plans, specifications, and estimates" and the two government entities executed a "project agreement" pursuant to 23 U.S.C. § 106. [See](#) [Movement Against Destruction v. Volpe](#), 361 F. Supp. 1360, 1380 (D. Md. 1973), [judgment aff'd](#), 500 F.2d 29 (4th Cir. 1974) (discussing a since repealed and amended provision of 23 U.S.C. § 105 pertaining to states' "program[s] for projects," which imposed similar requirements contained in the current regulations pertaining to statewide transportation improvement programs ("STIP"), 23 C.F.R. § 450.200, et seq.).

In 2006, Trinity sold an unspecified number of ET-Pluses end terminals to C.W. Sliter & Sons, a highway engineering and construction company based in New Hampshire. C.W. Sliter & Sons, in turn, contracted with the NH DOT to install those ET-Pluses onto guardrail systems throughout the State, including the portion of NH Route 9 where the accident occurred. [See](#) [Doc. No. 46-8](#) at 36, 140 (B. Smith Dep.). Absent from this record, however, is any evidence of "project agreement" between the FHWA

and the NH DOT pertaining to these installations. Instead, Trinity offers an "approval letter" that it received from the FHWA on September 2, 2005, see Doc. No. 32-14 at 2 (FHWA Approval Letter, Sept. 2, 2005) and a reaffirmance of that approval dated June 17, 2014. See Doc. No. 32-13 at 2 (FHWA Memorandum, June 17, 2014). Both documents reflect the FHWA's determination, after review of certain materials submitted by Trinity, that the ET-Plus was crash tested in compliance with federal testing standards and was found to be sufficiently "crashworthy."

B. Federal Testing Standards (NCHRP Report 350) & FHWA Approval

At all relevant times, the FHWA determined the "crashworthiness" of highway safety products based exclusively on the testing standards set forth in the National Cooperative Highway Research Program's ("NCHRP") Report 350 ("Report 350"). Published in 1993 by the Transportation Research Board of the National Research Council, Report 350, by its own terms, provides "recommended procedures for evaluating the safety performance of various highway safety features." See Doc. No. 46-6 at 5-7 (Report 350). End terminals, like the ET-Plus, are one of several features covered. See id. at 27. When Report 350 was published in 1993, it purported to "represent a comprehensive update of the procedures for safety performance evaluation," see id. at 6, according to the then-existing state

of the art. See id. at 5, 7. Its recommended “procedures are presented in the form of guidelines that describe how a feature should be tested and evaluated.” Id. at 11. Among other areas covered, it prescribes optimal parameters and conditions for testing end terminals, data acquisition requirements, evaluation criteria, and other guidelines pertaining to test documentation, implementation, and evaluation. See Doc. No. 46-6 at 8-10 (Report 350); see also [United States ex rel. Harman v. Trinity Indus. Inc.](#), 872 F.3d 645, 648 (5th Cir. 2017). A more detailed examination of its content will be discussed below.

The FHWA’s formal reliance on Report 350 grew out of the Intermodal Surface Transportation Efficiency Act of 1991 (“ISTEA”). See [PL 102-240](#), Dec.18, 1991, 105 Stat 1914. ISTEA directed the Secretary of Transportation to “initiate a rulemaking proceeding to revise the [FAHP] guidelines and establish standards for installation of roadside barriers and other safety appurtenances,” including end terminals. [PL 102-240](#), § 1073 ([23 U.S.C. § 109](#) note); see id. § 1049 (directing development of report on “crashworthiness” of such features). Consequently, on July 16, 1993, the FHWA promulgated a final rule adopting Report 350, which had been released that same year, “for guidance in determining the acceptability of roadside barriers and other safety appurtenances for use on [the NHS].” Design Standards for Highways; Requirements for Roadside

Barriers and Safety Appurtenances, 58 Fed. Reg. 38,293 (Jul. 16, 1993) (codified at 23 C.F.R. Part 625). In so doing, the FHWA "expect[ed] to advance the state-of-the-art in the evaluation and selection of traffic barriers to the point where one [could], with input needed from crash tests, analytically compare the merits . . . of alternative designs for use under specified conditions." 58 Fed. Reg. at 38, 296. The rule became effective on August 16, 1993, and a citation to Report 350 was thereafter added to the "Guides and References" portion of the Code of Federal Regulations, listing the standards as acceptable guidance. 58 Fed. Reg. at 38, 293; United States ex rel. Harman, 872 F.3d at 654 n.31.

Following a several-year grace period, on July 25, 1997, the FHWA issued a "policy memorandum" implementing a requirement for compliance with Report 350 ("July 1997 Policy Memo").⁵ It provided that, effective October 1, 1998, "all new or replacement safety features on the NHS covered by the guidelines in the NCHRP Report 350 . . . [and installed] by State forces . . . are to have been tested and evaluated and found acceptable in accordance with the guidelines [therein]." See FHWA July 1997 Policy Memo, supra note 5; Doc. No. 32-11 at 2.

⁵ Office of Eng'g, Fed. Highway Admin., OPI: HNG-14, Policy Memorandum on Identifying Acceptable Highway Safety Features (July 25, 1997) [hereinafter "FHWA July 1997 Policy Memo"], <https://www.fhwa.dot.gov/legsregs/directives/policy/ra.htm>.

1. Report 350

By its own terms, Report 350 "contains recommended procedures for evaluating the safety performance of various highway safety features." See Doc. No. 46-6 (Report 350) at 5. It prescribes testing conditions, evaluation criteria, and reporting requirements to aid developers in preparing and making safety assessments for covered products. See FHWA July 1997 Policy Memo, supra note 5. The 74-page document is subdivided into six chapters dedicated to (i) "test parameters," e.g. compatible soils, vehicles, and installation details for executing tests; (ii) "test conditions" for various types of features; (iii) "data acquisition" in preparing reports; (iv) testing "evaluation criteria," i.e. "structural adequacy, occupant risk, and post-impact vehicular trajectory"; (v) "test documentation"; and (vi) "implementation and in-service evaluation" for post-installation testing. See Doc. No. 46-6 (Report 350) at 8-10. Among other things, the report aims to provide "a basis on which user agencies can formulate performance specification for safety features." Id. at 13. The document summarizes its "purpose and scope" by stating the following:

Procedures presented herein involve vehicular tests to evaluate the impact performance of permanent and temporary highway safety features. Performance is evaluated in terms of the degree of hazard to which occupants of the impacting vehicle would be exposed, the

structural adequacy of the safety feature, the hazard to workers and pedestrians that may be behind a barrier or in the path of debris resulting from impact with a safety feature, and the post impact behavior of the test vehicle. Other factors that should be evaluated in the design of a safety feature, such as aesthetics, costs (initial and maintenance), and durability (ability to withstand environmental conditions such as freezing and thawing, wind-induced fatigue loading, effects of moisture, ultraviolet radiation, etc.) are not addressed.

Doc. No. 46-6 at 13 (Report 350). In other words, the report is concerned with testing standards rather than design standards or specifications.⁶

Report 350 outlines ten different types of tests for end terminals that are "designed to evaluate one or more of [three] principal performance factors: structural adequacy, occupant risk, and post-impact behavior of [the] vehicle." Doc. No. 46-6 at 25 (Report 350). The guidelines also envision three different "Test Levels" at which individual tests can be conducted. See id. at 29-31 & Table 3.2. The different levels correspond to different classes of roadways or areas on which a given device may be installed, e.g. rural collector, urban street, freeway, etc. See id. at 13, 26-31 (Table 3.1 & 3.2).

⁶ At all relevant times, the NH DOT also required "impact attenuation devices" installed on its roadways to be "designed to meet the requirements of . . . Report 350 at a minimum Test Level 2 or Test Level 3." Doc. No. 32-12 at 2 (undated NH DOT "Qualified Products" document). It further prohibited devices filled with sand or water, and imposed "qualification criteria" to ensure that accepted devices are able "to stand up to the rigors of winter weather and maintenance operations." Id.

The three levels differ according to "impact conditions," i.e. speed of the test vehicle and impact angle, and "the type of vehicle" being used in the test, ranging from a small car to a fully loaded truck. See id. at 13. Test Level 3, for instance, is the level at which "most crash-tested safety features in use on U.S. highways have been qualified." Id. at 13. Report 350 recommends seven different tests for end terminals such as the ET-Plus to determine crashworthiness at Test Level 3, with variations for four of the seven that are considered "optional." See id. at 31; see also Doc. No. 32-14 at 3 (FHWA Approval Letter, Sept. 2, 2005).

The parameters for each type of test are prescribed by the report in relatively precise detail. For example, "Test 30" is "conducted with the vehicle approaching parallel to the roadway with the point of impact to the left or right of the vehicle's centerline." See Doc. No. 46-6 at 27 (Report 350). Test 30 requires that "[t]he vehicle should be offset to the most critical side, that is, the side which will result in the greatest occupant risk during and subsequent to impact," and provides some guidance for making that determination. See Id. at 27 (Report 350). By contrast, "Test 31" requires impact to be "at the vehicle's centerline." Id. (emphasis added). Both tests are designed to evaluate occupant risk and vehicle trajectory criteria. See id. at 27-28. Testing at Level 3 for

either test requires impact to occur at a zero-degree angle while traveling 100 km/hr, but Test 30 utilizes a "small car" as a test vehicle whereas Test 31 utilizes a "pickup truck." See id. at 20 (defining 820C and 2000P vehicles), 31 (Table 3.2). "Test 32" and "Test 33" entail the same conditions as those just discussed but at a nominal impact angle of 15 degrees instead of zero. Id. (Table 3.2). The six remaining tests vary in a similar manner, testing different aspects of the terminal feature under slightly different conditions to evaluate different performance factors. See id. at 27-29.

2. FHWA "Acceptance/ Eligibility Letters"

Since as early as 1997, it has been the practice of the FHWA, "[a]s a service to . . . state and local highway agencies, and industry," to "review crash test reports and other supporting documentation" submitted by developers and issue "acceptance letters to developers of crashworthy hardware." See FHWA July 1997 Policy Memo, supra note 5 (Attachment); Doc. No. 32-11 at 4. Pursuant to that service, the July 1997 Policy Memo attached "Submission Guidelines" for the purpose of "better describe[ing] what must be submitted by those wishing to take advantage of [the FHWA's] service." Doc. No. 32-11 at 3 (July 1997 Policy Memo). The FHWA does not conduct testing itself, rather it requires developers to contract with a testing agency to conduct the testing, prepare a report, and submit the results

to the FHWA along with other documentation specified in the Submission Guidelines. Id. at 4.

The Submission Guidelines provide minimum testing requirements with cross references to Report 350; an overview of acceptable approaches to crash testing specific features, including end terminals; and more detailed "submission requirements," outlining what specific materials must be submitted to obtain an acceptance letter. See Doc. No. 32-11 at 4-12 (July 1997 Policy Memo). The document states that an acceptance letter will issue if "the testing and performance of the feature are acceptable[,] and sufficient detail on the design and operation of the device are provided." Id. at 4. It explains, however, that acceptance letters are "not a requirement . . . for crashworthy devices to be used on the NHS." Id. It further states that, as long as a device has been "tested and evaluated" in accordance with Report 350, "and the results are satisfactory," a state may accept that device for use on the NHS with the concurrence of its FHWA field division. Id. at 5. Conversely, it explains, an acceptance letter "does not ensure acceptance or use by various state highway agencies." Id. The document acknowledges that state agencies "may reject a design or place limitations on its use for a variety of reasons—placing their own interpretation on test results, requiring additional testing, or requiring in-service evaluation." Id.

To obtain an acceptance letter, an application must "fully identify":

- (i) "the feature(s) tested";
- (ii) "the conditions and results of the testing," prepared in accordance with Report 350;
- (iii) the complete design, construction, installation details, and specifications for the versions of the feature for which acceptance is being sought;
- (iv) "a VHS cassette video of the full sequence of tests"; and
- (v) the "material and installation specifications for the proposed production model of the feature."

Id. at 10-11. As to the design of the feature, the guidelines further explain that a developer must submit "high quality, reproducible, letter-size, engineering [drawings] showing all pertinent details and installation requirements," and should also provide "[d]escriptions and material specifications for all components, including fastening hardware." Id. The July 1997 Policy Memo and Submission Guidelines remained fully in effect until January 2011, and partially in effect until November 2015.⁷

⁷ See Fed. Highway Admin., Memorandum on Federal-aid Reimbursement Eligibility Process For Safety Hardware Devices (Nov. 12. 2015) [hereinafter FHWA Memo, Nov. 2015], https://safety.fhwa.dot.gov/roadway_dept/countermeasures/reduce_crash_severity/policy_memo/mem0111215/.

3. Trinity's Acceptance Letters

Trinity presents two documents from the FHWA that reflect the agency's approval of the ET-Plus for FAHP eligibility. The first, dated September 2, 2005, is an official approval letter accepting the ET-Plus for use on the NHS with then-newly developed 31-inch-high guardrails, as it had previously been approved for use with only 27-inch-high guardrails.⁸ See Doc. No. 32-14 at 2 (FHWA Approval Letter, Sept. 2, 2005). The letter explains that although "Report 350 requires up to seven crash tests to determine the adequacy of a traffic barrier terminal at [Test Level 3]," the FHWA found only two tests to be necessary to assess the crashworthiness of the device with the newly raised guardrails. Id. at 3. This was based on its

⁸ Trinity received an approval letter for the earlier version of the ET-Plus that was compatible with 27-inch guardrails on January 18, 2000. See Letter from Dwight A. Home, Director, Office of Highway Safety Infrastructure, FHWA, to Dr. Hayes E. Ross Jr., Professor and Research Eng'r, Texas Transportation Institute (Jan. 18, 2000) [hereinafter Acceptance Letter CC-12g] https://safety.fhwa.dot.gov/roadway_dept/countermeasures/reduce_crash_severity/barriers/pdf/cc-12g.pdf. Although neither party cited to the January 2000 letter in their briefs, the letter is available in the public record, as acceptance letter CC12g. It states that the FHWA approved the ET-Plus to be used "in lieu of the original ET-2000 extruder head on any of the ET-2000 systems previously accepted for use on the [NHS]." Id. The letter attaches design specifications, prepared and submitted by Trinity, comparing specific features of the new ET-Plus with the predecessor ET-2000, and a lone crash report for Test 31 conducted at Level 3 (centerline impact, zero angle, pickup truck). Id.

estimation that the original design of the ET-Plus, built for use with 27-inch guardrails, had "proven to be crashworthy," and only two tests were likely to be affected by the modifications related to accommodating the higher guardrails. Id.⁹ The two tests conducted in May 2005 and reviewed by the FHWA were Test 3-30 and Test 3-35. The former involves a "head-on" collision with a 820-kg car and the latter involves a "20-degree impact [collision] with [a] pickup truck at post 3," i.e. the side of the guardrail just past the end of the terminal. Id. at 2-3; see also 46-6 at 27-29 (Report 350) (describing tests).

Relevant here, Test 3-30 is "intended primarily to evaluate occupant risk and vehicle trajectory criteria" as a "vehicle approach[es] parallel to the roadway, with impact to the left or right of the vehicle's centerline." See Doc. 46-6 at 27. The test report attached to the approval letter indicates that the Test 3-30 vehicle impacted the terminal at a 0.5 degree angle while travelling at 63.25 mph. See Doc. No. 32-14 at 7 (FHWA Approval Letter, Sept. 2, 2005). Furthermore, the letter

⁹ Such "abbreviated or unique qualification procedures" appear consistent with the July 1997 Policy Memo. See Doc. No. 32-11 at 4. As the Memo explains, some features, "by their nature, are nearly certain to be safe and others that are so similar to currently accepted features that there is little doubt that they would perform acceptably." See Doc. No. 32-11 at 4. The September 2005 Approval letter implies that the modified ET-Plus was such a device given the acceptance of its similarly designed predecessor models.

attaches three engineering drawings submitted by Trinity. See id. at 5-6. One drawing depicts the ET-Plus in full, affixed to a W-beam guardrail, with one view from the top and one from the side. Id. at 4. The other two drawings depict a 31-inch-high guardrail post on which the device was then tested, with one providing a vertical cross section, and the other providing a profile view with relevant measurements. Id. at 5-6.

The second document is an FHWA memorandum issued June 17, 2014 ("June 2014 Memorandum"), which reaffirms that the ET-Plus in question became eligible for reimbursement under the FAHP on September 2, 2005, and remained eligible at all times thereafter. See Doc. No. 32-13 at 2 (FHWA Memorandum, June 17, 2014). The FHWA issued the memorandum following "reexamination of the documentation from [the] ET-Plus crash tests" submitted in connection with the September 2005 approval. Id. As the memorandum suggests, this reexamination was initially prompted in January 2012 when a former Trinity competitor, Joshua Harman, presented allegations to the FHWA that Trinity had failed to disclose certain modifications to the ET-Plus prior to its eligibility approval in 2005.¹⁰ Doc. No. 32-13 at 2 (FHWA

¹⁰ A few months after Harman presented his allegations to the FHWA, he filed a False Claims Act ("FCA") suit against Trinity in federal district court in Texas, alleging that Trinity had falsely certified to states that the modified ET-Plus designed for 31-inch guardrails complied with FHWA testing requirements, which in turn caused the states to submit false claims for

Memorandum, June 17, 2014). His principal claim, and the sole allegation addressed in the FHWA's memorandum, was "that the ET-Plus crash tests presented to the FHWA in 2005 did not document a dimensional change to the guide channels of 5 inches to 4 inches." Doc. No. 32-13 at 2 (FHWA Memorandum, June 17, 2014). The June 2014 Memorandum explains that, in response, the FHWA confirmed with Trinity that the detail had been "inadvertently omitted" from the documentation submitted in 2005, reexamined the crash test reports, and "validated that the ET-Plus with the 4-inch guide channels" was indeed the model crash tested in May 2005 and approved for reimbursement in September 2005. Doc. No. 32-13 at 2-3 (FHWA Memorandum, June 17, 2014). Accordingly, the FHWA announced that "an unbroken chain of eligibility for Federal-aid reimbursement [had] existed since September 2,

reimbursement to the FHWA. See [United States ex rel. Harman, 872 F.3d at 650, 654](#). The facts underlying those claims are set forth in the Fifth Circuit's recent opinion in [United States ex rel. Harman v. Trinity Industries Inc., 872 F.3d 645, 648 \(5th Cir. 2017\)](#), and will not be fully recounted here. For our purposes, it is only relevant to note that the basis for Harman's FCA claim was Trinity's alleged failure to disclose certain modifications made during the development of the ET-Plus, including, among other things, (i) the change from a five-inch to four-inch guide-channel width, and (ii) the narrower exit gap. See [id. at 649](#). As will be discussed, the channel width and exit gap modifications represent two of the five design features that Turgeon alleges were defective and caused her injuries. To the extent that Trinity relies on any facts discussed in the Fifth Circuit's opinion but that do not also find support in the instant summary judgment record, I do not consider them. Therefore, the June 2014 Memorandum represents the only relevant evidence of Harman's disclosure to the FHWA.

2005," and that the modified ET-Plus continued to be eligible through June 2014. [Id.](#)

C. Turgeon's Claims

On July 17, 2014, Turgeon's vehicle collided with an ET-Plus on NH Route 9 in Stoddard, NH. According to her accident-reconstruction expert, Turgeon's vehicle collided with the strike plate of the ET-Plus between the "centerline of the vehicle and the passenger's side frame rail" while traveling 55 miles per hour. Doc. [46-10](#) at 2 (Expert Report of Lawrence A. Wilson, P.E., Dec. 7, 2017).¹¹ Initially, the ET-Plus functioned appropriately, catching Turgeon's vehicle upon impact and dissipating its momentum as the terminal head slid down the extruding guardrail. But then, "[a]fter the ET-Plus had extruded approximately 14 feet of W-beam [guardrail]," the device "jammed," or "locked-up" somewhere in the extruder throat or exit gap. [Id.](#) The jam prevented the guardrail from continuing to pass through the extrusion throat, which abruptly hindered the dissipation of the vehicle's energy. As a result, the guardrail began to "buckle" downstream from the vehicle, causing it to "fold[]" back onto itself forming a stiff, rigid

¹¹ The point of impact and Turgeon's speed at the time are opinions of Turgeon's accident reconstruction and mechanical engineering expert, Lawrence Wilson. They have been challenged by Trinity and are among a group of opinions that Trinity seeks to exclude from evidence.

spear" pointing into the adjacent roadway and towards Turgeon's careening vehicle. Id. at 39, 41; see Doc. No. 46-7 at 59 (Dr. van Schoor Expert Report). At the same time, the jam also caused Turgeon's vehicle to begin to "rotate clockwise" as it continued to move forward on a "path closely aligned with, and parallel to, the guardrail." See Doc. No. 46-10 at 41 (Wilson Expert Report). The net result of the jam allegedly sent the rotating vehicle on a collision course with the sharp, protruding portion of the guardrail downstream. "Just before striking the [fifth] guardrail post, the [folded] W-beam impaled the [vehicle] in the vicinity of the rear left front wheel well," see id. at 42, "pierc[ing] the driver's floor pan and penetrat[ing] the vehicle's occupant space." Id. at 39. The penetrating rail "forcibly dislodged" Turgeon's seat "into [the] rear occupant area," see id. at 13, and the car came to a rest shortly thereafter, traveling a distance of approximately 49 feet from impact to final rest. Id. at 43.

Turgeon claims that the jam that occurred in the ET-Plus's feeder section and resulted in her enhanced injuries was caused by several design defects traceable to Trinity. She seeks damages from Trinity for both negligence and strict product liability. Her negligence theory is premised on her allegation that Trinity failed to exercise ordinary care in the design and testing of the ET-Plus, see Doc. No. 1-1 at 10-11 (Complaint),

¶¶ 36, 41-42, and should have known that the ET-Plus was “prone to premature rail buckling and subsequent vehicular impalements.” See Doc. No. 44-3 at 3, 11-14 (Expert Report of Kevin D. Schrum, Ph.D., Dec. 4, 2017). Turgeon alleges at least five design defects to support her product liability claim. Four of those alleged defects were first introduced in 2000, when the ET-2000 was modified to create the ET-Plus: (i) the narrower, rectangular strike plate (ii) the off-centered, asymmetrical terminal head (iii) the smaller, 1-inch exit gap, and (iv) the lighter weight of the overall terminal. See Doc. No. 1-1 at 8-10 (Complaint); Doc. No. 46-7 at 27-28, 62-72, 93 (Dr. van Schoor Expert Report). The fifth alleged defect was introduced in 2005, when the width of the feeder channel was narrowed from five-inches to four. See Doc. No. 1-1 at 8-9 (Complaint); Doc. No. 46-7 at 28, 60, 93 (Dr. van Schoor Expert Report). Turgeon alleges that each defect was a substantial cause of either the jam or the vehicular rotation that occurred when Turgeon’s vehicle collided with the ET-Plus’s strike plate. See Doc. No. 1-1 at 8-11 (Complaint).

II. STANDARD OF REVIEW

Summary judgment is appropriate when the record reveals “no genuine dispute as to any material fact and the movant is entitled to judgment as a matter of law.” [Fed. R. Civ. P.](#)

56(a); [Xiaoyan Tang v. Citizens Bank, N.A.](#), 821 F. 3d 206, 215 (1st Cir. 2016). In this context, a "material fact" is one that has the "potential to affect the outcome of the suit," see [Cherkaoui v. City of Quincy](#), 877 F.3d 14, 23 (1st Cir. 2017) (citations omitted), and a "genuine dispute" exists if a reasonable jury could resolve the disputed fact in the nonmovant's favor. [Ellis v. Fidelity Mgmt Trust Co.](#), 883 F. 3d 1, 7 (1st Cir. 2018). The movant bears the initial burden of presenting evidence that "it believes demonstrates the absence of any genuine issue of material fact." [Celotex Corp. v. Catrett](#), 477 U.S. 317, 323 (1986); [Flovac, Inc. v. Airvac, Inc.](#), 817 F.3d 849, 853 (1st Cir. 2016). Once the movant has properly carried that burden, the burden shifts to the nonmoving party to "designate specific facts showing that there is a genuine issue for trial," see [Celotex Corp.](#), 477 U.S. at 324, and to "demonstrate that a trier of fact could reasonably resolve that issue in its favor." [Flovac](#), 817 F. 3d at 853 (citations omitted); [Michelson v. Digital Fin. Servs.](#), 167 F.3d 715, 720 (1st Cir. 1999). If the nonmovant fails to adduce such evidence on which a reasonable factfinder could base a favorable verdict, the motion must be granted. See [Flovac](#), 817 F. 3d at 853. In considering the evidence presented by either party, all reasonable inferences are to be drawn in the nonmoving party's

favor. See [Anderson v. Liberty Lobby, Inc.](#), 477 U.S. 242, 249 (1986).

III. ANALYSIS

Trinity invokes the federal contractor defense recognized in [Boyle v. United Technologies Corp.](#), 487 U.S. 500 (1988), an affirmative defense available under federal common law. See [id.](#) at 514; [Bailey v. McDonnell Douglas Corp.](#), 989 F.2d 794, 802 (5th Cir. 1993). When proven, the defense completely shields federal contractors from state-tort liability arising from their performance of federal government contracts. Although Trinity does not claim to be a federal contractor, it argues that it is entitled to the defense as a state government subcontractor because the state was reimbursed by the federal government for the end terminals it acquired from Trinity. I evaluate this argument by first sketching out the relevant body of federal common law recognized in [Boyle](#). I then consider whether the federal contractor defense should be extended to protect Trinity from Turgeon's claims.

A. The Federal Government Contractor Defense

The federal contractor defense was first recognized by the Supreme Court in [Boyle](#), where the Court held that under certain circumstances, "a contractor providing military equipment to the Federal Government [cannot] be held liable under state tort law

for injury caused by a design defect." 487 U.S. at 502, 506, 512. The defense is a creature of "federal common law," i.e. "a rule of decision that amounts, not simply to an interpretation of a federal statute or a properly promulgated administrative rule, but, rather, to the judicial 'creation' of a special federal rule of decision." Atherton v. F.D.I.C., 519 U.S. 213, 218 (1997). As such, it evolved from the familiar, albeit limited, principle "that a few areas, involving 'uniquely federal interests,' are so committed by the Constitution and laws of the United States to federal control that state law is preempted and replaced, where necessary by . . . so-called 'federal common law.'" Boyle, 487 U.S. at 504 (citing Texas Indus., Inc. v. Radcliff Materials, Inc., 451 U.S. 630, 640 (1981) and United States v. Kimbell Foods, Inc., 440 U.S. 715, 726-29 (1979)). In recognizing this affirmative defense, the Boyle Court was careful to note that the "displacement" of state tort law is only justified where the imposition of liability would "significantly conflict" with some "uniquely federal interest." See Boyle, 487 U.S. at 504-07; see also Texas Indus., Inc., 451 U.S. at 640 (creation of federal common law appropriate when "necessary to protect uniquely federal interests"); Wallis v. Pan Am. Petroleum Corp., 384 U.S. 63, 68-70 (1966) (displacement of state law only appropriate where

there is a "significant conflict between some federal policy or interest and the use of that state law.").

Boyle involved a wrongful-death suit against the manufacturer of a marine helicopter "built . . . for" the U.S. Navy. See 487 U.S. at 502-03. The father of the helicopter's deceased co-pilot, who drowned in an over-water crash, faulted the contractor for the design of the helicopter's escape hatch, which opened outward instead of inward and was therefore "ineffective in a submerged craft because of water pressure." Id. at 502. In evaluating whether and when federal law should protect military contractors from such liability, the Court began its analysis by holding that the federal government had a "uniquely federal" interest in its military procurement contracts. See id. at 506-07. The Court reasoned that "the civil liabilities arising out of the performance of federal procurement contracts . . . [would] directly affect the terms of [those] contracts . . . [and] the interests of the United States." Id. at 507. It explained that the risk of such liability would cause federal contractors to either "decline to manufacture the design specified by the Government, or . . . raise [their] price[s]." Id. In the decades since Boyle, many lower courts have extended the defense's availability to also protect *nonmilitary* contractors from liability arising out of federal procurement and services contracts for civilian

projects. See, e.g., Carley v. Wheeled Coach, 991 F.2d 1117, 1124-25 (3d. Cir. 1993), cert. denied, 510 U.S. 868 (1993); (manufacturer of ambulance designed for and sold to the U.S. General Services Administration); Andrew v. Unisys Corp., 936 F. Supp. 821, 830 (W.D. Ok. 1996) (manufacturer of a "letter-sorting machine designed under the authority of, and purchased by the [U.S.] Postal Service"); Johnson v. Grumman Corp., 806 F. Supp. 212 (W.D. Wis. 1992) (manufacturer of special postal delivery vehicles pursuant to procurement contract with U.S. Postal Service). But see Cabalce v. Thomas E. Blanchard & Assocs., Inc., 797 F.3d 720, 731 & n.5 (9th Cir. 2015) (explaining that the defense is only available to federal military contractors under Ninth Circuit caselaw).

The existence of a "uniquely federal interest," however, "merely establishes a necessary, not a sufficient, condition for the displacement of state law." Boyle, 487 U.S. at 507. A second necessary condition is the existence of a "significant conflict" between the application of state law and the federal interest at issue. See id. at 507-08. In Boyle, the Court elaborated on its conception of "conflict," by considering a spectrum of potential fact patterns that could present a conflict between federal and state interests. See id. at 508-09. At one extreme, illustrating an obvious conflict, it pointed to the case then-before it: where the state-imposed duty

to design a safer escape-hatch was "precisely contrary to the duty imposed by the Government contract," i.e. "the duty to manufacture and deliver helicopters with the sort of escape-hatch mechanism shown by the specifications." [Id.](#) at 509. At the other extreme, to exemplify an obvious absence of conflict, it discussed its prior decision in [Miree v. DeKalb County, Georgia](#), 433 U.S. 25 (1977), where the state-imposed duty was identical to the one assumed under federal contract, i.e. where third-party beneficiaries of a federal government contract brought a breach-of-contract action against the federal contractor. [See Boyle](#), 487 U.S. at 508-09. In between these extremes, to exemplify a less-obvious absence of conflict, the court described a hypothetical "intermediate situation, in which the duty sought to be imposed . . . is not identical to one assumed under the contract but is also not contrary to any assumed [duty]." [Id.](#) at 508-09. It stated:

If for example, the United States contracts for the purchase and installation of an air conditioning-unit, specifying the cooling capacity but not the precise manner of construction, a state law imposing upon the manufacturer of such units a duty of care to include a certain safety feature would not be a duty identical to anything promised the Government, but neither would it be contrary. The contractor could comply with both its contractual obligations and the state-prescribed duty of care. No one suggests that state law would generally be pre-empted in this context."

Id. at 509. Thus, under Boyle, courts have held that “[t]he requisite conflict exists only where a contractor cannot at the same time comply with duties under state law and duties under federal contract.” Barron v. Martin-Marietta Corp., 868 F. Supp. 1203, 1207 (N.D. Cal. 1994); see Ripley v. Foster Wheeler LLC, 841 F.3d 207, 210 (4th Cir. 2016)(same); see also Adams v. Alliant Techsystems Inc., 201 F. Supp. 2d 700, 706-07 (W.D. Va. 2002) (no significant conflict existed between factory-workers’ negligence claim against federal ammunitions contractor for exposure to excessive noise and the federal contractual and regulatory obligations governing acceptable noise levels, because contractor could have complied with both state and federal duties).

The Court in Boyle continued to note, however, that even where a state-imposed duty of care is precisely contrary to the one assumed under federal contract, there is not “always a ‘*significant* conflict’ between the state law and a federal policy or interest.” Boyle, 487 U.S. at 509 (emphasis added).¹² Thus, to delineate more precisely what constitutes a “*significant* conflict,” the Court looked to the discretionary

¹² For example, no “significant conflict” would exist where a federal procurement contract provides for the purchase of a stock item available to the general public, without some indication that the federal government had a significant interest in the particular feature alleged to be defective. See Boyle, 487 U.S. at 509.

function exemption to the Federal Tort Claims Act ("FTCA"), see id. at 511 (emphasis added) (discussing 28 U.S.C. § 2680(a)), which has long been construed to preclude tort claims challenging federal conduct involving "the exercise of discretion in furtherance of public policy goals." See Evans v. United States, 876 F.3d 375, 380-81 (1st Cir. 2017) (quoting United States v. Gaubert, 499 U.S. 315, 334 (1991)); see also 28 U.S.C. § 2680(a) (excepting from tort liability any claim arising out of a federal employee's performance or failure to perform a "discretionary function"); Ayer v. United States, 902 F.2d 1038, 1044 (1st Cir.1990) (a discretionary function "often involves not merely engineering analysis but judgment as to the balancing of many technical, military, and even social considerations, including specifically the trade-off between greater safety and greater combat effectiveness" (quoting Boyle, 487 U.S. at 511)). The Court reasoned that, under certain circumstances, the federal policy judgments sought to be insulated by the exemption could just as easily be thwarted, or "second-guess[ed]," through state tort suits against federal contractors. See Boyle, 487 U.S. at 511-12.

The Court then crafted a three-part test designed to determine the ultimate "scope of displacement" under the defense. Id. It held that:

Liability for design defects in military equipment cannot be imposed, pursuant to state law, when (1) the United States approved reasonably precise specifications; (2) the equipment conformed to those specifications; and (3) the supplier warned the United States about the dangers in the use of the equipment that were known to the supplier but not to the United States.

[Id.](#) at 512. The Court explained that the first two of these considerations are particularly instructive, and “assure that the suit is within the area where the policy of the ‘discretionary function’ would be frustrated-i.e., they assure that the design feature in question was considered by a Government officer, and not merely by the contractor itself.” [Id.](#)¹³ Thus, many lower courts have postulated that “[s]tripped to its essentials, the [government] contractor’s defense under [Boyle](#) is to claim, ‘The Government made me do it.’” E.g., [In re Hawaii Fed. Asbestos Cases](#), 960 F.2d 806, 813 (9th Cir. 1992) (quoting [In re Joint E. & S. Dist. N.Y. Asbestos Litig.](#), 897 F.2d 626, 632 (2d Cir. 1990)).

B. Extending the Boyle Defense to State Contractors

Trinity concedes that it was acting as a state sub-contractor rather than a federal contractor when it sold the

¹³ The Court also noted that the third factor is simply necessary to eliminate any potential incentive contractors might have to withhold information regarding known risks. See [Boyle](#), 487 U.S. at 512.

product at issue here. Nevertheless, it contends that the federal contractor defense should shield it from liability on Turgeon's claims because the ET-Plus is generally eligible for federal reimbursement under the FAHP.¹⁴ To accept Trinity's argument requires an extension of the existing defense into an area to which it has not heretofore been applied because, as far as I have been able to determine, no court has yet made the defense available to a state contractor as a matter of federal common law. See, e.g., United States ex rel. Ali v. Daniel, Mann, Johnson & Mendenhall, 355 F.3d 1140, 1147 (9th Cir. 2004) ("Neither the Supreme Court nor the Ninth Circuit nor any other court of which we are aware has applied the [Boyle] defense to state contractors."); Jones v. Houston Comm. College System, 816

¹⁴ Although there is no project agreement in this record evincing the FHWA's payment to the NH DOT for the ET-Plus in question, Turgeon does not appear to contest that the ET-Plus was at the time eligible for federal funding. See Doc. No. 46-1 at 8 ("FHWA's role is [limited to] determining eligibility for federal funding."). Because the parties have not produced the project agreement, however, I cannot determine how much, if any, of the NH DOT's expenditure on the ET-Plus at issue was actually reimbursed by the FHWA. Moreover, Trinity has neglected to provide details as to which provision of Title 23 the ET-Plus was specifically eligible for reimbursement under, i.e. whether its installment called for 80 percent federal reimbursement, see 23 U.S.C. § 120(b), 100 percent, see id. § 120(c)(1), or some amount in between. Nevertheless, Turgeon does not appear to challenge Trinity's assumption that the State's payment for the ET-Plus at issue was at least partially reimbursed by the FHWA. For purposes of analysis, I will assume that the federal government reimbursed the state for the full cost of the end terminal that is at issue in this case.

F. Supp. 2d 418, 426 (S.D. Tx. 2011) ("Boyle's reasoning does not support extending the government-contractor defense to state contractors."); Smith v. Louis Berkman Co., 894 F. Supp. 1084, 1094 (W.D. Ky. 1995) (Boyle defense inapplicable where defendant met state bid specifications for design and sale of salt-spreader machine for State DOT, with no federal involvement); see also City of Walker v. Louisiana, 877 F.3d 563, 569-71 (5th Cir. 2017) (state contractor working highway construction failed to establish government contractor defense as requisite "colorable federal defense" for federal-officer removal purposes, despite evidence that the state project at issue was federally approved and funded through FAHP, because defendant was not "operating as a federal contractor"); Jackson v. Alert Fire & Safety Equip., Inc., 567 N.E.2d 1027, 1034 (Ohio 1991) (Boyle defense does not apply to city contractor absent any procurement contract with United States). Although this case presents the issue in a somewhat different context because the costs incurred by a state in purchasing the ET-Plus were eligible for reimbursement under the FAHP, caution is nevertheless warranted when considering any attempt to expand the reach of a federal common law rule. See, e.g., Atherton, 519 U.S. at 218 ("[C]ases in which judicial creation of a special federal rule would be justified . . . are . . . 'few and restricted.'" (internal cites omitted)).

In the sections that follow, I examine Trinity's request to extend the reach of the federal contractor defense. I heed Boyle by first considering whether Trinity's liability in this case would "directly affect" a "uniquely federal interest." Although my analysis could end there, I then consider whether Trinity has identified a "significant conflict" between the federal interest and operation of New Hampshire tort law. See Boyle, 487 U.S. at 507.

1. Uniquely Federal Interest

Under the framework employed in Boyle, the first step in determining whether the federal contractor defense should extend to state contractors who provide a product that is eligible for federal reimbursement is to consider whether a "uniquely federal interest" is at stake. See 487 U.S. at 504-07; see also In re World Trade Center Disaster Site Litig., 521 F.3d 169, 196-97 (2d Cir. 2008) (applying Boyle's rationale to determine whether to recognize "derivative immunity" for private contractors and state agencies under the Stafford Act for claims arising from their assistance in disaster relief effort coordinated by federal agencies). Trinity, who largely overlooked this threshold matter in its briefing, suggested at oral argument that the FHWA has a "uniquely federal interest" in ensuring the safety of highway equipment installed on the NHS. Doc. No. 62 at 10-11 (Summ. J. Hr'g Tr., July 24, 2018). Alternatively, it

contended that the FHWA has such an interest in funding highway safety projects through the FAHP. Either way, it argued that exposing a developer like Trinity to the risk of liability arising from the use of its products on the NHS would directly affect those interests, because the FHWA would indirectly bear the cost of liability judgments, i.e., state contractors will raise their prices and the added cost will trickle down through State DOTs to the FHWA. I am unpersuaded by these arguments for several reasons.

First, the federal government's asserted interest in ensuring the safety of NHS highway products is not "unique" to the FHWA because the State of New Hampshire has an at least equally compelling interest in ensuring the safety of highway equipment installed *on its own roadways*. The fact that some of those roadways also comprise portions of the NHS does not diminish that interest. Indeed, the FAHP self identifies as a "federally assisted *State program*" that "shall in no way infringe on the sovereign rights of the States to determine which projects shall be federally financed." [23 U.S.C. § 145](#) (emphasis added). Thus, the FAHP does not change the fact that the governmental interest in maintaining safe state highways is primarily an interest of the states. See [id.](#); [City of Walker](#), [877 F.3d at 570](#) ("[T]he federal government's usual approach to highway construction [is that] it approves the project and

provides most of the funding, but states build and own the highway."); [Lathan](#), 506 F.2d at 682 ("Under the Federal-Aid Highway Act, 23 U.S.C. § 101 et seq., primary responsibility for highway planning, design and construction rests on state highway departments, aided by federal assistance." (internal citations omitted)); see also [Bibb v. Navajo Freight Lines, Inc.](#), 359 U.S. 520, 523 (1959) ("The power of the State to regulate the use of its highways is broad and pervasive."); [Friends of the Earth v. Carey](#), 552 F.2d 25, 38 (2d Cir. 1977) ("The regulation of traffic on roads and highways . . . has long been considered to be a cooperative effort between City, State and federal authorities, with no single entity being able to provide or impose a comprehensive traffic system, and with federal power, where necessary, taking precedence.").

Although the FHWA is charged with developing minimal standards for the selection of acceptable safety devices for use on the NHS, see 23 U.S.C. § 109, the FHWA's enforcement authority for noncompliance with those standards is limited to withholding federal funding. See 23 C.F.R. §§ 1.9, 1.36 (promulgated pursuant to 23 U.S.C. § 315); [State of Neb., Dep't of Roads v. Tiemann](#), 510 F.2d 446, 447-48 (8th Cir. 1975) ("While the state is constitutionally free to operate its own highway system, the federal government is not bound constitutionally or statutorily to grant federal highway funds

to states which do not operate their systems in accordance with federal guidelines."). Naturally, its interest in ensuring the safety of such devices only extends to developers and State DOTs wishing to participate in the FAHP. In the event that a state chose to forgo federal reimbursement, nothing prohibits a product developer from having its product purchased and used by a State DOT that is either uninterested in federal reimbursement for an NHS project or intends to install the device on a non-NHS roadway.¹⁵ See, e.g., 23 U.S.C. § 109(o) ("Projects (other than

¹⁵ Although Trinity contends that compliance with Report 350 testing standards is required before a State DOT can install any end terminal "on the NHS," see Doc. No. 62 at 13-15 (Summ. J. Hr'g Tr., July 24, 2018), it fails to provide any specific statutory or regulatory support for its contention. Instead, it can only cite to the FHWA's July 1997 Policy Memo, which provides that "all new or replacement safety features on the NHS . . . that are included . . . in work done by force-account or by State forces on or after October 1, 1998, are to have been tested and evaluated and found acceptable in accordance with the guidelines in the NCHRP Report 350." FHWA July 1997 Policy Memo, supra note 5; Doc. No. 32-11 at 2; Doc. No. 62 at 14 (Summ. J. Hr'g Tr., July 24, 2018). In order to read that statement as broadly as Trinity would (i.e. to encompass even those products for which a State DOT does not seek federal reimbursement), one would have to virtually ignore its regulatory context and statutory enabling source entirely. The clearest statutory authority for the policy memorandum appears to be 23 U.S.C. § 109, which authorizes the FHWA to adopt certain standards germane to "plans and specifications for each proposed highway project under this chapter." Id.; see also 23 U.S.C. § 315 (authority to promulgate "all needful rules and regulations for carrying out of the provisions of this title"); 23 C.F.R. §§ 1.32 (authority to "require observance of policies and procedures" limiting federal participation) 1.36 (authorizing FHWA to withhold funds where State has "failed to comply with Federal laws or the regulations in this part with respect to a project."). As an unpromulgated internal agency

highway projects on the [NHS]) shall be designed, operated, and maintained in accordance with State laws, regulations, directives, safety standards, design standards, and construction standards."). Cf. Trump Hotels & Casino Resorts, Inc. v. Mirage Resorts Inc., 963 F. Supp. 395, 405-06 (D. N.J. 1997) (state agencies and developers need not comply with environmental impact conditions of 23 U.S.C. § 109 where no federal funds had been sought or approved for highway and tunnel construction project linking Atlantic City Expressway, an NHS roadway, to local road). Accordingly, compliance with Report 350 and approval by the FHWA only ensures general reimbursement eligibility. See FHWA July 1997 Policy Memo, supra note 5 (Attachment); Doc. No. 32-11 at 6. Actual reimbursement for the

guideline, however, it is doubtful that the FHWA's July 1997 Policy Memo itself carries the force of law. Although I need not decide the question and decline to do so here, the policy memorandum would be entitled to deference only insofar as it has the power to persuade if a state chooses to forego federal reimbursement for a product installation on the NHS. See Christensen v. Harris County, 529 U.S. 576, 586-87 (2000); Skidmore v. Swift & Co., 323 U.S. 134, 140 (1944). Not only is Trinity's interpretation contextually unpersuasive, but its implication would allow an administrative policy statement to effectively expand the scope of the statutory scheme under which it was issued from a self-proclaimed "federally assisted State program," see 23 U.S.C. § 145, to a full-fledged regulatory regime covering any and all installations on state roadways within the NHS. The better reading of the policy is that the FHWA requires compliance with Report 350 as a condition for participation in the federal-aid program. This latter reading is both fully consistent with the statutory scheme and faithfully cognizant of our constitutional system.

device is ultimately contingent upon its compliance with applicable state regulations, see 23 C.F.R. § 1.9(a), its acceptance by the State DOT, its inclusion in a duly-executed project agreement, and its purchase and installation by the state. See 23 U.S.C. §§ 106, 121; FHWA July 1997 Policy Memo, supra note 5 (Attachment); Doc. No. 32-11 at 6. (“[A]cceptance of a design by the FHWA does not ensure acceptance or use by the various state highway agencies. They may reject a design or place limitations on its use for a variety of reasons . . . If, for a particular device, it can be demonstrated to the satisfaction of a state highway agency that [the] device has been tested and evaluated in accordance with acceptance procedures recognized by the FHWA, and the results are satisfactory, *that device could be accepted by that state*, with concurrence by its FHWA division office, for use on the NHS within the state.”). In sum, the governmental interest in testing standards for highway safety devices installed on the NHS cannot reasonably be considered “uniquely federal” because it is inextricably entwined with the interest of the states in ensuring safe highways.

To the extent that Trinity asserts that cost control is a “uniquely federal” interest, i.e., that product liability judgments will drive up the cost of products subject to reimbursement under the FAHP, its argument is equally

unavailing. Report 350 states that "costs" of a safety feature, whether "initial or maintenance . . . are not addressed" in its guidelines. See Doc. No. 46-6 at 13 (Report 350). Thus, in relying exclusively on those guidelines in determining whether a product is crashworthy and eligible for reimbursement, the FHWA does not consider a product's cost. And neither the report nor the FHWA's July 1997 Policy Memo prohibit states from setting higher safety standards for products than Report 350 requires, regardless of whether those higher standards increase costs. See FHWA July 1997 Policy Memo, supra note 5 (Attachment); Doc. No. 32-11 at 6. Clearly, the FHWA is in a better position than a federal court to balance safety and cost considerations when determining whether a product is eligible for reimbursement under the FAHP. Because Congress has not instructed the FHWA to consider a product's cost when determining whether it is eligible for reimbursement, it would be particularly inappropriate for a court to conclude as a matter of federal common law that a uniquely federal interest in cost control requires the displacement of state tort law. See, e.g., Texas Indus., Inc. v. Radcliff Materials, Inc., 451 U.S. 630, 646-47 (1981) (Congress better positioned than federal courts to recognize a right to contribution among antitrust wrongdoers given the far-reaching policy implications); Museum of Fine Arts, Bos. v. Seger-Thomschitz, 623 F.3d 1, 10 (1st Cir. 2010)

("Whether latent federal power should be exercised to displace state law is primarily a decision for Congress, not the federal courts." (quoting [Atherton](#), 519 U.S. at 218)).

2. Significant Conflict

Even if I were to assume that the governmental interest in safe highways is uniquely federal, "that [would] merely establish a necessary, not a sufficient condition for the displacement of state law." [Boyle](#), 487 U.S. at 507. Here, displacement is also unwarranted because New Hampshire tort law does not conflict with any identifiable federal interest or legislative objective. See id. at 507-08. Trinity's principal counter argument is that Turgeon's use of state tort law amounts to an improper attempt to "second guess" the FHWA's approval of and payment for the ET-Plus. See Doc. No. [32-1](#) at 10, 25. Although a threat of "second guessing" federal policy decisions has been sufficient to establish the requisite conflict in other contexts, see, e.g., Boyle 487 U.S. at 511 (quoting [United States v. Varig Airlines](#), 467 U.S. 797, 814 (1984)), Trinity's argument fails because New Hampshire's tort law is in no way inconsistent with the federal policy enforced by the FHWA.

Report 350, on which the FHWA based its approval of the ET-Plus, contains only testing procedures for evaluating safety performance. See Doc. No. [46-6](#) (Report 350) at 8-10. It makes no attempt to prescribe design specifications for any particular

safety feature. In fact, it makes clear that "design . . . aesthetics, costs (initial and maintenance), and durability" are beyond the document's purview. See Doc. No. 46-6 at 13 (Report 350). Moreover, the FHWA's July 1997 Policy Memo and Submission Guidelines make equally clear that, although end terminals must be "tested, evaluated[,] and found acceptable" in accordance with Report-350 guidelines to be eligible for federal reimbursement, see Doc. No. 32-11 at 2, a State DOT is free to impose more rigorous standards before purchasing and installing any given terminal. See Doc. No. 32-11 at 5 (July 1997 Policy Memo). Thus, as the Policy Memo recognized, if a device had been "tested and evaluated" in accordance with Report 350, "and the results [were] satisfactory," a State was free to accept it for use on its NHS roadways or reject it for whatever reason it deemed appropriate. See Doc. No. 32-11 at 5. For example, it could have "reject[ed] [the] design . . . place[ed] limitations on its use . . . require[ed] additional testing, or require[d] [additional] in-service evaluation." See id.

Clearly, the dynamic between the respective state and federal duties is much different from that presented in Boyle. In Boyle, the Court determined that the state-imposed duty to design a safer escape hatch was "precisely contrary" to the federal "duty to manufacture and deliver helicopters with the sort of escape-hatch mechanism shown by the [contract]

specifications.” See [Boyle](#), 487 U.S. at 509. Thus, “compliance with both federal and state mandates at once was impossible.” See [In re Joint E. & S. Dist. Asbestos Litig.](#), 715 F. Supp. 1167, 1169 (E.D.N.Y. 1988). In reaching its conclusion that the conflict at issue was sufficient to trigger displacement, however, the Court also recognized that certain “intermediate situation[s]” would not be sufficient. See [Boyle](#), 487 U.S. at 509. To illustrate that point, Justice Scalia hypothesized a situation in which the federal government contracts “for the purchase and installation of an air-conditioning unit, specifying the cooling capacity but not the precise manner of construction.” [Id.](#) at 509. He observed that, under such circumstances, a state-imposed duty “to include a certain safety feature would not be a duty identical to anything promised the Government, but neither would it be contrary.” [Id.](#) Accordingly, he surmised, “state law would [not] generally be preempted in [that] context.” [Id.](#)

The dynamic at issue here, between Report 350 and the operative state duty of care, is no different from that “intermediate situation” he discussed in [Boyle](#). Report 350 itself does not establish maximum safety standards, and the FHWA does not employ it for that purpose. Although the FHWA requires a device to be tested to those standards to be eligible for federal reimbursement, it in no way restricts a state’s ability

to impose more exacting standards for the testing or design of such devices. Thus, Report 350 merely establishes a minimum, safety-performance baseline for devices seeking FAHP eligibility, and a device's compliance with a higher, state-imposed duty of care has no bearing on that federal determination. These minimum safety-performance standards are virtually indistinguishable from the cooling-capacity specifications contained in the Court's example in Boyle. See 487 U.S. at 509. Much like a federal contract "specifying the cooling capacity but not the precise manner of construction," see id., Report 350 prescribes testing methods and performance results but does not require any particular product design. In both cases, the federal duty is exclusively concerned with performance criteria and silent as to physical design specifications.¹⁶ Thus, in either case, there is no reason to doubt that any one of innumerable product designs could achieve the federally-prescribed performance results.¹⁷ Therefore, the

¹⁶ Although the FHWA required developers seeking eligibility approval to submit design specifications with their Report-350 crash test reports, see Doc. No. 32-11 at 10-11 (July 1997 Policy Memo), there is no evidence of any federal *design criteria or specifications* that were used to scrutinize those materials. The only "federal specifications" at issue here pertain to the testing procedures outlined in Report 350.

¹⁷ That is especially apparent here, where the ET-Plus was subjected to only two tests prior to seeking approval in 2005, instead of the seven recommended under Report 350. See Doc. No. 32-14 at 2 (FHWA Approval Letter, Sept. 2, 2005); supra, note 13.

state-imposed duty of care as to the design of the product in either case is not "contrary" to any federally-imposed contractual or regulatory obligation. See Boyle, 487 U.S. at 508-09. In other words, just as Boyle's hypothetical contractor was free to design his air-conditioner to satisfy both state and federal duties, Trinity was free to design a reasonably safe product and test it to Report 350 standards without encountering a conflict with any significant federal interest.

Other courts have recognized that the absence of any "conflict" between federal and state duties, as evidenced by a contractor's ability to comply with both, precludes application of the Boyle defense. This has been particularly evident in the failure-to-warn context. For example, in In re Joint Eastern and Southern District Asbestos Litigation, 715 F. Supp. 1167 (E.D.N.Y. 1988), the court denied a U.S. Navy contractor's attempt to assert the Boyle defense in response to a failure-to-warn claim brought by a Naval yard-worker exposed to asbestos-containing products supplied by the defendant. Although the contract in that case explicitly called for the use of asbestos in the products at issue, the federal specifications did not prohibit the contractor from including health warnings with them. Id. at 1168. The court analogized the situation to that hypothesized in Boyle, as discussed above, and held that the defense was inapplicable because there was no conflict between

the state-imposed duty-to-warn and the federal specifications that were silent on the matter of warnings. Id. at 1169. Many courts have endorsed this line of reasoning in finding the defense inapplicable to failure-to-warn claims when the federal specifications at issue do not mandate or prohibit warnings. See, e.g., [In re Hawaii Fed. Asbestos Cases](#), 960 F.2d at 812-13; [Dorse v. Armstrong World Indus., Inc.](#), 716 F. Supp. 589, 590-91 (S.D. Fla. 1989); see also [Densberger v. United Tech. Corp.](#), 297 F.3d 66, 75 (2d Cir. 2002) (For failure-to-warn claims, "the government contractor defense would seem to make sense only when the government, for reasons of federal interest, chooses to limit the warnings provide by the seller to *end-users*."); [Barron](#), 868 F. Supp. at 1206 ("Whether viewed as an independent requirement or part-and-parcel of Boyle's three-part inquiry, for the government contractor defense to apply, there must be a significant conflict between duties under state tort law and duties imposed by federal contract."). Under such circumstances, a contractor can "comply with everything 'promised the Government' while at the same time following the 'state-prescribed duty of care' to both warn [users] and to create procedures to avoid potentially fatal exposure." See [Epperson v. Northrop Grumman Sys. Corp.](#), No. 05-cv-2953, 2006 WL 90070, at *4 (E.D. Va. Jan. 11, 2006) (citations omitted).

This principle has also been applied outside the failure-to-warn context. For example, in [Adams](#), 201 F. Supp. 2d 700, former employees of a U.S. Army ammunitions plant operated by federal contractors sought damages under Virginia tort law on the basis of negligent exposure to excessive noise. The court rejected the contractors' invocation of the [Boyle](#) defense despite evidence of federal regulatory provisions governing "noise levels" within the plant. [Id.](#) at 705-707. Specifically, the court considered the defendants' assertion that, in operating the plant, they were not "at liberty to stray" from their contractual obligation to follow Army regulations "mandate[ing] educational programs informing employees about hearing loss, noise levels and preventative measures to avoid hearing loss." [Id.](#) at 707 n.8. The court held that the defense was inapplicable, despite the existence of a uniquely federal interest in Army munitions production, because the contractor had failed to demonstrate that the state-imposed duty of care regarding acceptable noise levels "conflict[ed] with or even burden[ed] [its] federal regulatory or contractual obligations." [Id.](#) at 707.

In sum, nothing in this record would preclude a developer like Trinity from complying with both its federal testing obligations and its state-prescribed duty to design a reasonably safe product. Nor can it seriously be asserted that the

imposition of a state-prescribed duty to refrain from the use of unreasonably dangerous and defective products on the NHS "would 'frustrate specific [legislative] objectives,'" see Boyle, 487 U.S. at 507 (quoting United States v. Kimbell Foods, 440 U.S. 715, 728 (1979)), in "establish[ing] standards for installation of roadside barriers and other *safety* appurtenances." See ISTEA, PL 102-240, § 1073. Thus, the present case simply does not present the type of significant conflict between state and federal interests that must be present to justify the extension of Boyle that Trinity proposes.¹⁸

¹⁸ Trinity's attempt to invoke the federal contractor defense fails for the reasons I have described. However, even if Trinity had sufficiently demonstrated both the requisite "uniquely federal interest" and the "conflict" necessary for the defense to apply, it has failed to establish the first prong of Boyle's three-part test. As discussed in Boyle, once it has been established that displacement is warranted, and the defense is available, the "scope of displacement" is determined using a three-part test. See 487 U.S. at 511-12. The first part of that test requires evidence that the federal government "approved reasonably precise specifications." Id. at 512. Because this element is designed to discover the extent of federal discretion exercised over the allegedly defective features, see Brinson v. Raytheon Co., 571 F.3d 1348, 1351 (11th Cir. 2009), the approved specifications must address the particular features at issue in reasonable detail and the government's "approval" must follow from its "substantive review" of those specific features, rather than a "mere bureaucratic rubber stamp" of the overall product. Trevino v. Gen. Dynamics Corp., 865 F.2d 1474, 1479-80, 1486 (5th Cir. 1989); see In re Agent Orange Product Liability Litig., 517 F.3d 76, 89-90 (2d. Cir. 2008). Thus, were it entitled to assert the defense to begin with, Trinity would be required to present evidence that the FHWA "actually participated in discretionary design decisions," Harduvel v. Gen. Dynamics Corp., 878 F.2d 1311, 1316 (11th Cir. 1989), cert. denied, 494 U.S. (1999), pertaining to the ET-Plus's (i) narrow strike plate, (ii) asymmetrical terminal head, (iii) smaller, 1-inch exit gap, (iv) lighter weight, and (v) narrowed, four-inch guide channel. See Doc. No. 1-1 at 8-9 (Complaint); Doc. No. 46-7 at 28, 60, 93 (Dr. van Schoor Expert Report). It has simply failed to do so. As previously discussed, Report 350 does not contain reasonably precise specifications as to any covered product's preferred design. It only contains testing and safety-performance standards. Although the FHWA required submission of design specifications in addition to Report-350 testing reports to obtain an approval letter, there is no evidence that the FHWA's review of a device's

IV. CONCLUSION

The Supreme Court has advised "judicial caution" when considering arguments for new federal common law causes of action. [Sosa v. Alvarez-Machain](#), 542 U.S. 692, 725-26 (2004). Because the Court's advice is grounded in principle rather than mere political expediency, it must apply with at least equal force to proposals to extend federal common law defenses. This is particularly true in cases such as this one, where the federal interest on which the proposed defense is based is enforced through a legislative and regulatory program that gives no hint to unsuspecting states that their tort laws will be displaced if they accept an offer of federal funds. For the reasons discussed, I decline Trinity's invitation to extend the federal contractor defense recognized in [Boyle](#) to state

design had any bearing on the product's eligibility approval. Rather, agency guidance only explicitly required a device seeking reimbursement eligibility to comply with Report 350's "test[ing]" and performance "evaluat[ion]" criteria. See Doc. No. 32-11 at 2 (July 1997 Policy Memo). Indeed, both the 2005 FHWA approval letter and the 2014 FHWA memorandum presented here by Trinity strongly suggest that the FHWA's review of the ET-Plus, at least on a substantive level, was limited to assessing its "crashworthiness" as determined under Report-350 testing standards. Doc. No. 32-13 at 2 (FHWA June 2014 Memorandum) ("In general, FHWA's eligibility letters confirm that roadside safety hardware was crash tested to the relevant standards, that those crash test results were presented to FHWA, and that FHWA confirmed that the device met [those] standards."). Neither document discusses any of the allegedly defective features in sufficient detail to reflect the level of federal engagement necessary to satisfy [Boyle](#)'s first prong. Thus, a reasonable trier of fact could easily find from the evidence presented that "no more than a rubber stamp" was obtained from the FHWA with respect to the design specifications addressing the features relevant to Turgeon's claim. See [Trevino](#), 865 F.2d at 1479-80 (quoting [Boyle](#), 487 U.S. at 515 (Brennan, J., dissenting)); [Snell v. Bell Helicopter Textron, Inc.](#), 107 F.3d 744, 748 (9th Cir. 1997). Trinity's motion would have therefore been denied even if the [Boyle](#) defense was available.

contractors under the circumstances presented by this case.

Trinity's motion for summary judgment (Doc. No. 32) is denied.

SO ORDERED.

/s/ Paul Barbadoro
Paul Barbadoro
United States District Judge

September 5, 2018

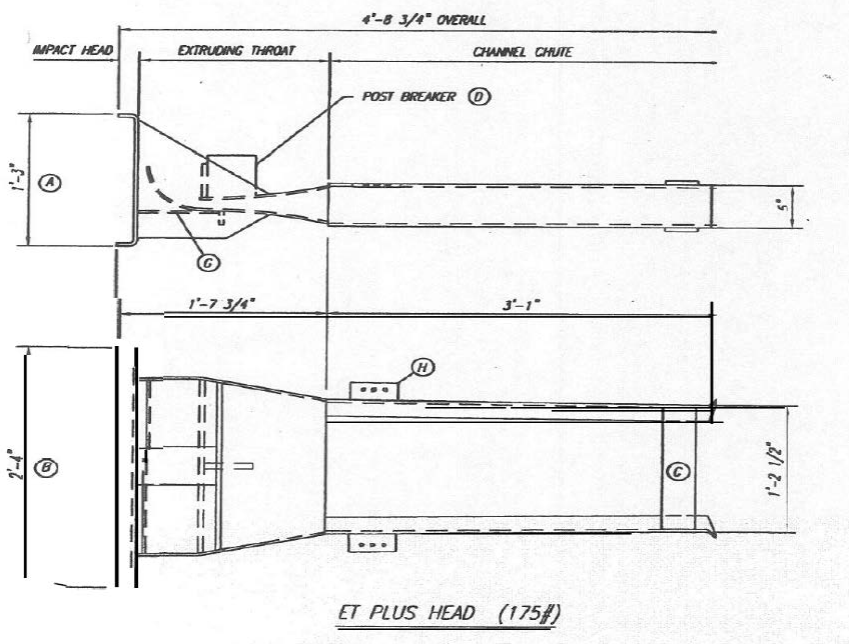
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Appendix A



A picture of an ET-Plus end terminal installed on a W-beam guardrail of an unspecified height, taken from the expert report of Dr. Marthinus van Schoor, one of the Turgeons' proposed expert witnesses. See Doc. No. 46-7 at 25.

Appendix B



Engineering drawings depicting the ET-Plus that are publicly available as an attachment to a letter dated January 18, 2000 from the FHWA to the Texas Transportation Institute ("TTI"). See Letter from Dwight A. Home, Director, Office of Highway Safety Infrastructure, FHWA, to Dr. Hayes E. Ross Jr., Professor

and Research Eng'r, Texas Transportation Institute (Jan. 18, 2000)

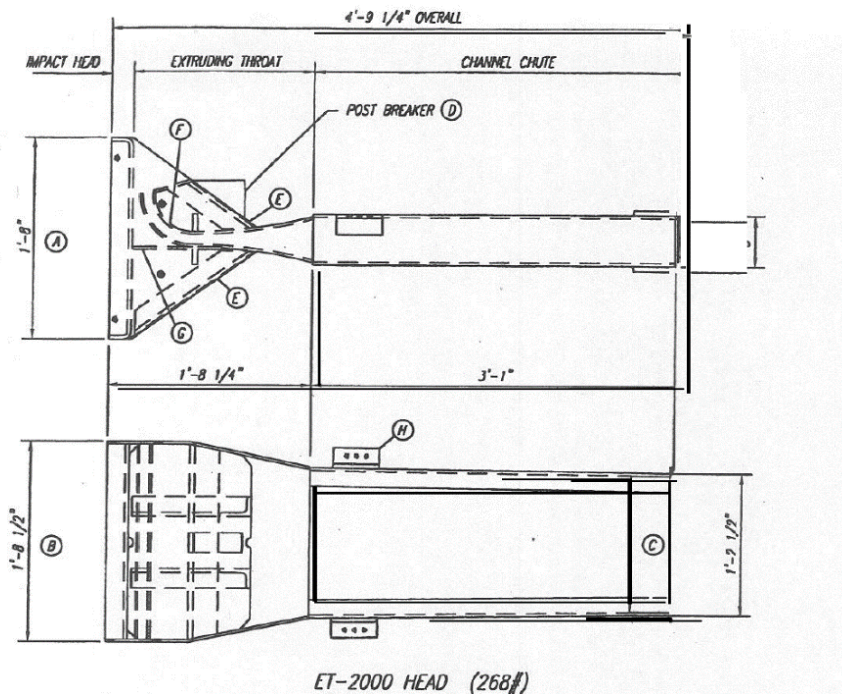
https://safety.fhwa.dot.gov/roadway_dept/countermeasures/reduce_crash_severity/barriers/pdf/cc-12g.pdf. The circumstances surrounding the letter are more fully discussed infra note 7.

Appendix C



A picture of an ET-2000 installed on a W-beam guardrail of an unspecified height, taken from the expert report of Dr. Marthinus van Schoor. See Doc. No. 46-7 at 16.

Appendix D



Engineering drawings depicting the ET-2000, also attached to the January 18, 2000 letter from the FHWA to TTI. See infra note 7.