



# Toward Railroad Trespassing Solutions

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National Transportation Safety Board

Above: Railroad trespassing injuries and deaths have prompted a new look at prevention. The articles in this issue of *TR News* explore data, research, countermeasures, and technology for railroad trespassing prevention.

**N**ational Transportation Safety Board (NTSB) board members and staff constantly survey the state of the literature on transportation safety topics, but our unique contribution to that literature comes from accident investigations—case studies. We have investigated every aviation accident that occurred since the Board was founded in 1967. In other modes of transportation, including railroad transportation, we investigate selected accidents.

Safety recommendations are the action items that stem from NTSB investigations. In the 1970s, an NTSB recommendation helped lead to the founding of the national organization Operation Lifesaver, Inc., which raises railroad safety awareness among the public.

In recent years, we have investigated railroad accidents involving trespassers in Jesup, Georgia, and Ellicott City, Maryland.

## Jesup, Georgia

On February 20, 2014, at about 4:30 p.m., a crew of at least 12 people was filming

a movie scene on a railroad bridge near Jesup, Georgia, when a northbound CSX freight train approached. The train struck a metal-framed bed that was being used as a prop in the scene. Debris from the prop struck crew members on the bridge walkway, killing one and injuring six.

Why would CSX authorize such activity without stopping train movements? It didn't. On multiple occasions, the filmmakers had asked in writing for permission to film on CSX property. CSX had denied the requests, also in writing.

The film crew was trespassing on the railroad tracks.

As the train approached, some film crew members ran to safety off the bridge, while others made for the bridge walkway. One or more of the crew members lifted the metal bed frame from the tracks and stood it upright next to the tracks, but the prop fell back down. The train struck the prop at about 56 mph—in a section of track that had a maximum authorized speed of 70 mph.

NTSB determined that the probable cause of the accident was the film crew's



Photo: Mike Haw, Flickr

In 2012, a train derailed on a railroad bridge in Ellicott City, Maryland, dumping its payload and killing two teens who were trespassing on the bridge tracks.

unauthorized entry onto the CSX right-of-way with personnel and equipment, despite CSX Transportation's repeated denial of permission to access the railroad property.

Following this incident, NTSB recommended that a variety of entertainment industry organizations work together along with Operation Lifesaver to create and distribute educational materials. These materials emphasize that railroads require the owner's permission to enter and that, if authorization is given, everyone on scene must follow the railroad's safety procedures to reduce hazards.

### Ellicott City, Maryland

On August 20, 2012, a CSX coal train derailed its first 21 cars while crossing the railroad bridge over Main Street in Ellicott City, Maryland. Seven of the derailed cars fell into a public parking area below the tracks to the north; the remainder of the derailed cars overturned and spilled coal along the north side of the tracks.

Before the derailment, two people had climbed over a short wooden fence and had entered CSX property without authorization to access the railroad bridge, on which they were sitting when the derailment occurred. Both were killed by the spilled coal.

NTSB determined the cause of the derailment—a broken rail—but did not specifically mention the role of trespassing in its statement of probable cause.

Laws and outreach programs to prevent trespassing already are in place in many states.

## 2015 NTSB Trespassing Forum

### BACKGROUND

On railroads, more people lose their lives accidentally to trespassing than to any other cause. In the wake of the Jesup and Ellicott City tragedies, a conversation about railroad trespassing began at NTSB.

Trespassing is so common that engineers and conductors report being told in training that, over the course of a career, they will kill somebody. I am not certain whether any other line of work comes with such a dire prediction. Trespassing casualties occur one or two at a time. Often, the train cannot stop and trains cannot turn to avoid the trespasser.

For NTSB, an effective recommendation to deter trespassers might result in a law—but a law against trespassing already has been enacted. An effective recommendation to reach the public might result in an outreach campaign—but NTSB already has played a role in the creation of Operation Lifesaver.

By 2015, our Office of Railroad, Pipeline, and Hazardous Materials Investigations had its hands full with railroad accident investigations, including specification U.S. DOT-111 tank cars erupting in fireballs and mass casualty accidents that would have been prevented by the implementation of positive train control (PTC)—a project which, at this writing,



Photo: Slyfry91, Wikimedia Commons



is still incomplete. It was not feasible to prioritize hundreds of such single-fatality accidents; taken together, however, these accidents represent the bulk of all life lost on our railroads.

## FORUM TAKEAWAYS

In March 2015, we held a public forum, “Trains and Trespassing: Ending Deadly Encounters.” We heard presentations from the railroads, Operation Lifesaver, the government, and the research community.

Then, as now, there was no such thing as a typical trespasser. Then, as now, railroads and train tracks exercised a glamorous pull. At our forum, a film industry representative went into depth on the American love affair with trains and the use of trains and tracks in motion pictures. We also had the opportunity to discuss amateur photography and filming such as selfies and web video.

Then, as now, some trespassers showed no indication of glamorizing trains and tracks; they simply trespassed on their way to and from work or school or walked along the right-of-way because it was the only easily walkable surface.

Then, as now, the same number of casualties occur year after year—approximately 1,000. About one-half of annual trespasser casualties still are fatal. At NTSB, we investigate accidents in transportation; nonetheless, railroad suicides, whose numbers are compiled separately by the Federal Railroad Administration, continue to account for hundreds of additional fatalities every year.

And then, as now, trespasser deaths and injuries struck all age cohorts and all walks of life. The persistent stubbornness of this safety challenge is matched only by the diversity of trespassers themselves and trespassing incidents.

## Perspectives on Trespassing

### BROAD CHALLENGE

From a system safety perspective, the most preferred intervention—“designing out” the problem—is attempted only at limited locations. We see new design solutions that keep people separated from



Photo: National Archives and Records Administration

A Western movie is filmed on a set of train tracks in 1918. America’s love affair with trains has existed for as long as railroads have existed.

trains at and around stations, for example. The more recent the construction of the station and surrounding infrastructure, the more likely that somebody has thought of the design with pedestrian safety in mind.

Like design, the second most preferred intervention—installing guards against the trespassing hazard (for example, fencing)—typically is not envisioned as a systemwide intervention. Also, without public recognition of the hazard, fencing can be defeated—where it exists at all.

The third- and fourth-tier solutions traditionally have been viewed as practical: alerting to the imminent hazard (that is, effective signage) and implementing procedures and rules. For a problem affecting the general population, the latter solution takes the form of laws, enforcement, and public awareness, as much as the rules and procedures followed by the railroad itself.

I raise the system safety order of precedence not because it is the traditional or even the most salient way to view trespassing, but because it illustrates the assumed



Photo: Kabeller\_David Gubler, Wikimedia Commons

The vastness of the nation’s rail system demands that we examine new approaches to trespassing prevention.

status of the trespassing challenge: system-wide, the most effective interventions are treated as impractical on a grand scale and applicable only to select hot spots.

Viewed through the more familiar lens of the engineering–education–enforcement approach—the three E’s—these are engineering solutions. Although railroads should be applauded for every step that they take to engineer out trespassing at specific locations, the very ubiquity of railroad tracks forces an unspoken caveat for every such project: “of course, we can’t do this everywhere.”

### REFOCUSING AWARENESS

So we arrive at the present status quo: trespassing is thought of largely as a public outreach challenge. This viewpoint is underscored by the fact that the legal onus for a trespassing casualty falls on the trespasser. Advocacy organizations such as Operation Lifesaver have worked tirelessly to hold the line at the present casualty numbers, but as is the case with other transportation safety problems affecting the population at large, the numbers characterizing trespassing ap-

pear to have a floor given the interventions attempted to date.

Yet unlike some other safety challenges that also are crimes—drinking and driving, for example—trespassing raises little social outcry. A striking train can be, and often is, operated by a perfectly compliant train crew. The defining behavior that precedes these encounters is the trespassing itself.

Additionally, as diverse as these encounters are, they do have one thing in common: they rarely, if ever, harm train occupants physically. Unlike some drunk drivers, a trespasser does not take out an innocent family; they suffer the harm themselves. (Train crew members fall victim to a range of psychological effects, however, including but not limited to post-traumatic stress disorder.)

The loved ones of a victim of drunk driving can press for harsh penalties. They can decry the irresponsible behavior that led to their loss. They can join a national campaign against drunk drivers. Once organized, the moral authority of their losses can be—and has been—the catalyst for sweeping change.

In contrast, the family of an injured or killed railroad trespasser quickly learns that, by definition, their loved one had only him- or herself to blame. The family can request action by the railroad, but they cannot demand it. Their options are constrained to helping discourage trespassing by others.

Sometimes a community mobilizes for a local design improvement in response to a local tragedy. Proactive, preventive activities against local trespassing often are sponsored by the railroads themselves. National campaigns, however, focus on awareness on the part of the potential trespasser.

Perhaps this has to do with blaming the victim—with trespassing, we’ve done it in the very definition of the precipitating event.

### Constraints

The harder the constraint, the harder it is to implement systemwide. This state of affairs is not unique to trespassing, but is one that railroad trespassing features in stark relief.

As the reader will recognize in the pages to come, however, research into this

## Operation Lifesaver and the Three E’s

Operation Lifesaver, Inc., is a nonprofit public safety education and awareness organization dedicated to reducing collisions, fatalities, and injuries at highway–rail crossings and lowering rates of trespassing on or near railroad tracks.

Operation Lifesaver was founded in 1972, at a time when the annual average number of collisions at U.S. highway–rail grade crossings numbered more than 12,000. The organization’s nationwide network of authorized volunteer speakers and trained instructors offer free rail safety education programs to school groups, driver education classes, and community audiences, as well as specialized training for professional drivers, law enforcement officers, and emergency responders. These programs are cosponsored by federal, state, and local government agencies; highway safety organizations; and America’s railroads.

The goal of Operation Lifesaver is to promote the three E’s—education, enforcement, and engineering—

to keep people safe around railroad tracks and railway crossings:

- › **Education:** Operation Lifesaver provides information on how to stay safe around railroad property and rights-of-way, from rail trespassing laws to facts about trains to safe ways to navigate highway–rail grade crossings.
- › **Enforcement:** The Grade Crossing Collision Investigation course teaches law enforcement officers and first responders how to ensure their personal safety while responding to rail-collision incidents and during related investigations.
- › **Engineering:** Operation Lifesaver supports and encourages research on and innovations in engineering technologies that can help minimize and reduce rail-related collision risks.

For more information, visit <https://oli.org/about-us>.



stubborn safety issue continues. The efforts of the research community, innovative railroads, and public transit rail agencies are the focus of this issue of *TR News*.

The authors will shine a light on new approaches throughout the railroad safety community writ large. They have collected research results on trespass mitigations in freight, passenger, commuter, and transit rail.

These run the technological gamut from newly poured concrete to intrusion detection technology; from security fencing to drones. Authors have gathered information on demonstration and pilot projects to address security risks associated with trespassers.

Regrettably, progress toward infrastructure designed with public safety in mind seems likely to be incremental. To get the most out of its efforts, the railroad industry needs to know what works—and the research presented here is an important place to start.

When it comes to detection of trespassers and enhanced enforcement of trespassing laws, however, the potential for action is growing. As our railroads deploy security countermeasures against a whole different class of trespassers—those who would harm others—they are laying the same groundwork that can help detain or discourage trespassers who only risk harming themselves.

## Power of Research and Data

Pedestrians routinely carry personal devices that could enable personal technology solutions, particularly if the owners of the devices are incentivized. Data can be collected on a large scale and challenges to gathering raw data no longer seem as insurmountable as suggested by the extensiveness of our rail infrastructure. Even analysis of these data is becoming manageable through artificial intelligence.

With all of this technological progress, effective policy about sharing data might be as important as the ability to gather and analyze it. For example, we could learn a great deal about interventions by determining the composition of the pyramid of injury specific to trespassing.

To get the most out of safety efforts, the railroad industry needs to know what works—and the research presented here is an important place to start.

We know how many people are struck and how many die. Railroad police know how many trespassers are apprehended and sent away from the property, as well as how many are charged with trespassing—but these numbers are not compiled across the many transit, freight, and passenger railroads.

Furthermore, we don't have good data on the total incidence of trespassing—the base of the pyramid. Are police apprehending every tenth trespasser? Every hundredth? Every thousandth? The answer would speak to the relative effectiveness of various railroad policing strategies and the resonance of antitrespassing messages.

The law goes so far as to say that the trespasser is at fault. Given the hazards of trespassing, it is right that the activity is against the law, and the law should be vigorously enforced. The safety view, however, is that the safety issue involves a breach of the law—not that it is thereby

explained. This is also true for many other transportation safety issues. The existence of such a law can never be an excuse to justify complacency.

As the old saying goes, the definition of insanity is continuing to do the same thing and expecting different results. The railroad safety community is fortunate to be reexamining this issue at a time when it is possible to do different things and to evaluate what is working and what is not.

It is my hope that this issue of *TR News* helps to empower engineering, enforcement, and education solutions to the railroads' statistically deadliest safety issue.

The *TR News* Editorial Board thanks Lisa Staes, Center for Urban Transportation Research, and Karen S. Febey and Claire E. Randall, TRB, for their work assembling and developing this issue.



Photo: National Transportation Safety Board

Operation Lifesaver, Inc., is an educational awareness campaign, part of the three E's approach to reducing rail casualties.