



U.S. DEPARTMENT OF TRANSPORTATION
OFFICE OF INSPECTOR GENERAL

**FRA Collects Reliable Grade Crossing
Incident Data, but Needs To Update Its
Accident Prediction Model and Improve
Guidance for Using the Data To Focus
Inspections**

FRA

Report No. ST2019063

September 4, 2019





FRA Collects Reliable Grade Crossing Incident Data, but Needs To Update Its Accident Prediction Model and Improve Guidance for Using the Data To Focus Inspections

Self-Initiated

Federal Railroad Administration | ST2019063 | September 4, 2019

What We Looked At

According to data from the Federal Railroad Administration (FRA), roughly 27,000 rail accidents and 29,000 highway-rail grade crossing incidents occurred between 2006 and 2018, causing 10,004 fatalities, 3,508 of which occurred at grade crossings. Crossing incidents are the second leading cause of rail-related deaths after trespassing, and the leading cause of all railroad accidents. Risk of incidents at grade crossings grows as highway and train traffic increase. Both FRA and Members of Congress have expressed concern about these numbers despite long-term focus on the area. Statutes such as the Rail Safety Improvement Act of 2008 and the Fixing America's Surface Transportation Act of 2015 require States to use data-driven action plans to improve crossing safety.

In 2005, we reported that FRA investigated very few crossing incidents, and in 2007, we reported that the information on grade crossing incidents in FRA's national accident database did not always include accurate or timely information, with some incidents being reported up to 3 years late or not at all. Due to the number of grade crossing fatalities and need to update OIG's prior work on this topic, we initiated this audit. Our objectives were to assess FRA's (1) collection of grade crossing incident and investigation data and (2) use of these data to reduce grade crossing collisions.

What We Found

FRA has effective procedures to determine whether grade crossing incident data are complete and accurate. We also found that FRA has not updated its accident prediction formula since 2013, and lacks a comprehensive compliance manual for grade crossing teams.

Our Recommendations

We made two recommendations to ensure FRA has the tools and guidance needed to effectively identify, inspect, and improve at-risk grade crossings. FRA concurred with both recommendations.

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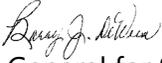
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Memorandum

Date: September 4, 2019

Subject: INFORMATION: FRA Collects Reliable Grade Crossing Incident Data, but Needs To Update Its Accident Prediction Model and Improve Guidance for Using the Data To Focus Inspections | Report No. ST2019063

From: Barry J. DeWeese 
Assistant Inspector General for Surface Transportation Audits

To: Federal Railroad Administrator

According to data from the Federal Railroad Administration (FRA), roughly 27,000 rail accidents and 29,000 highway-rail grade crossing incidents¹ occurred between 2006 and 2018. These rail accidents and grade crossing incidents caused 10,004 fatalities, 3,508 (35 percent) of which occurred at grade crossings. Crossing incidents are the second leading cause of rail-related deaths after trespassing, and the leading cause of all railroad accidents. Combined, railroad crossing and trespasser deaths accounted for approximately 95 percent of all rail-related deaths during the past 10 years. Risk of incidents at grade crossings grows as highway and train traffic increase. Both FRA and Members of Congress have expressed concern about these numbers despite long-term focus on the area. Statutes such as the Rail Safety Improvement Act of 2008² and the Fixing America's Surface Transportation Act of 2015³ require States to use data-driven action plans to improve crossing safety.

In 2005, we reported⁴ that FRA investigated very few crossing incidents, and in 2007,⁵ we reported that the information on grade crossing incidents in FRA's

¹ According to 49 CFR § 225.5, any impact between railroad on-track equipment and a highway user at a grade crossing is an "accident/incident." Throughout this report, we use the word "incident" to refer to crashes, collisions, accidents, and other rail events that occur at grade crossings.

² Pub. Law No. 110-432, Div. A. (2008).

³ Pub. Law No. 114-94 (2015).

⁴ *Audit of Oversight of Highway-Rail Grade Crossing Accident Reporting, Investigations, and Safety Regulations* (OIG Report No. MH-2006-016), November 28, 2005.

⁵ *The Federal Railroad Administration Can Improve Highway-Rail Grade Crossing Safety By Ensuring Compliance with Accident Reporting Requirements and Addressing Sight Obstructions* (OIG Report No. MH-2007-044), May 3, 2007.

national accident database did not always include accurate or timely information, with some incidents being reported up to 3 years late or not at all. Due to the number of grade crossing fatalities and need to update OIG's prior work on this topic, we initiated this audit. Our objectives were to assess FRA's (1) collection of grade crossing incident and investigation data and (2) use of these data to reduce grade crossing collisions.

We conducted this audit in accordance with generally accepted Government auditing standards. We focused on railroad-reported grade crossing incident data and investigations from calendar years 2006 through 2017. We also reviewed policies and procedures for railroads' reporting of incidents at grade crossings and use of these data to inform FRA's oversight of grade crossing safety. Exhibit A details our scope and methodology. Exhibit B lists the entities we visited or contacted.

We appreciate the courtesies and cooperation of Department of Transportation representatives during this audit. If you have any questions concerning this report, please call me at (202) 366-5630, or Wendy Harris, Project Director, at (202) 366-2794.

cc: The Secretary
DOT Audit Liaison, M-1
FRA Audit Liaison, ROA-2

Results in Brief

FRA has effective procedures to determine whether grade crossing incident data are complete and accurate.

Railroads are required to report incidents at grade crossings that meet criteria to FRA within 30 days of the month of the incident, and must⁶ correct or update their reporting once they become aware of an error or new information. FRA receives and processes late and amended reports for up to 5 years following the calendar year to which the report pertains.⁷ To help ensure that data collected are complete, FRA has procedures to check railroads' incident reports for errors—such as edit check controls on forms and reviews by contractors—and to identify unreported incidents when auditing railroad records. Based on our analysis of a random sample of incidents over 5 years, we found that most grade crossing incidents reported to the U.S. Coast Guard National Response Center were included in railroad-reported incident data in FRA's database between 2013 and 2017. Data reliability testing from our 2017 report⁸ on rail safety data indicates FRA's grade crossing incident data is reliable. Our testing for our current audit indicates these data are accurately reflected in FRA's publicly-available data and tools.

FRA has not updated its accident prediction formula since 2013 and lacks a comprehensive compliance manual for grade crossing teams.

To help reduce incidents, FRA provides web-based tools to their grade crossing teams and other public officials to analyze incident data and identify unsafe crossings, do risk-based crossing evaluations, and plan outreach. Some of these tools rely on an accident prediction formula designed to reflect current grade crossing conditions and accident trends with periodic adjustment to account for new data. FRA last evaluated and adjusted the formula in 2013. No regulatory requirement exists for regular evaluation to determine whether formula adjustment is necessary, but FRA's user guide for the formula calls for periodic updates. Instructions for contractors updating the formula call for evaluations every 2 years. FRA also has not provided comprehensive guidance to grade crossing teams on the use of these tools for risk-based oversight. FRA is currently

⁶ 49 CFR § 225.13.

⁷ This accommodation does not relieve a railroad of its obligation to promptly file a late or amended report when it becomes aware of an omission or error.

⁸ *FRA Has Taken Steps To Improve Safety Data Reporting But Lacks Standards Procedures and Training for Compliance Audits* (OIG Report No. ST2017045), May 3, 2017.

developing a comprehensive compliance manual for grade crossing specialists and inspectors. Given that it is not yet complete, the inspectors' approaches to using incident data and risk assessment tools, identifying and reviewing incidents, and conducting inspections or outreach differ among the regions. Additionally, inspectors may be missing opportunities to better focus their efforts.

We are making recommendations on FRA's evaluation of its accident prediction formula and finalization of a comprehensive compliance manual for grade crossing teams.

Background

A highway-rail grade crossing is a highway intersection where motor vehicle drivers and train operators meet. Railroads are required⁹ to report all highway-rail grade crossing incidents and other incidents that meet certain criteria to FRA within 30 days of the month of the incident, and must¹⁰ correct or update their reports if they become aware of errors or new information. FRA receives and processes late and amended reports for a period of 5 years after the calendar year the report pertains to.¹¹

Between 2006 and 2009, the numbers of incidents¹² at crossings declined by over 34 percent. After 2009, the numbers rose again then leveled off at over 2,000 incidents between 2015 and 2017 (see figure).

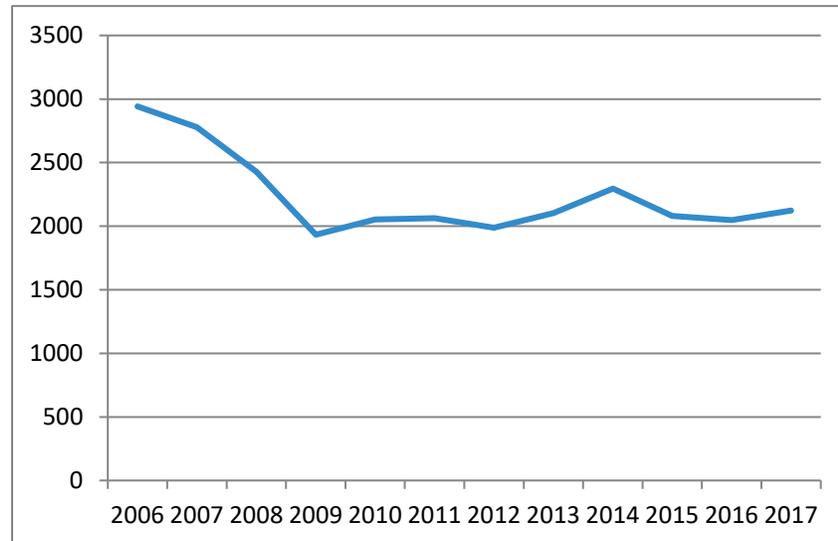
⁹ 49 CFR § 225.11 requires that certain railroad accidents/incidents are reported monthly to FRA. Railroads must report three groups of incidents described in 49 CFR § 225.19: all highway-rail grade crossing incidents regardless of the extent of damages or whether a casualty occurred; rail equipment accidents/incidents that result in damages that exceed the current reporting threshold; and each death, injury, or occupational illness that is a new case and meets the general reporting criteria.

¹⁰ 49 CFR § 225.13.

¹¹ This accommodation does not relieve a railroad of its obligation to promptly file a late or amended report when it becomes aware of an omission or error.

¹² The rate of grade crossing incidents per million train miles followed a similar pattern for the same period. The grade crossing incidents per million train miles fell from 4.00 to 2.89 from 2005 to 2009, and rose to 3.03 in 2017.

Figure. Numbers of Grade Crossing Incidents Between 2006 and 2017



Source: For 2006-2007, accident data as reported by railroads (Highway Rail Accidents (6180.57)) from FRA's Office of Safety Analysis website. For 2008-2017, grade crossing collision data from FRA's GX Dash.

In addition to their reports to FRA, railroads must report to the National Response Center (NRC) certain information within 24 hours of occurrence, including fatalities resulting from incidents at grade crossings. The NRC—operated by the U.S. Coast Guard—serves as the emergency call center that fields reports on pollution and railroad incidents and forwards the reports to the appropriate Federal or State agency.

FRA exercises safety jurisdiction over railroads operating on the general system network of track for transport of goods and passengers. As of 2018, the U.S. Railroad System included 210,000 grade crossings. FRA employs over 350 safety inspectors and specialists that work out of eight field offices across the country. These inspectors specialize in safety disciplines and recommend compliance actions for railroads when they find violations of Federal rules and regulations. The Agency recently began a transition to an expanded safety discipline¹³ with the addition of grade crossing inspectors and specialists to its existing Grade Crossing and Trespass Teams. Prior to fiscal year 2019, these teams had 19 grade crossing managers among the eight FRA regions. FRA recognized the need for a

¹³ FRA's other safety disciplines are Hazardous Materials, Motive Power and Equipment, Operating Practices, Signal and Train Control, and Track and Structures.

national approach to reduce risk at crossings and ensure compliance with regulations. Because trespassing causes a large portion of rail-related fatalities, the expanded grade crossing discipline includes a trespassing prevention component. The 32 grade crossing inspectors and specialists in the expanded discipline conduct safety inspections and other compliance activities at crossings in addition to performing outreach, coordination, and diagnostic review duties previously assigned only to grade crossing managers.¹⁴

FRA maintains several repositories of grade crossing data. The U.S. DOT National Highway-Rail Crossing Inventory contains detailed information on each crossing in the country. As of August 2016, railroads are required to report data on crossings to the Inventory, including warning device type, and periodically update them.¹⁵ The Agency encourages States to update their crossing inventory data as well, but Federal regulations do not require them to do so. A web-based application known as the Grade Crossing Inventory System (GCIS) receives information from railroads and States about new crossings and updated records on existing crossings in the Inventory.

Railroads also report all crossing accidents and incidents to FRA's accident database, the Railroad Accident/Incident Reporting System (RAIRS). In addition, FRA has created a Geographic Information System (GIS) program and database which uses spatial data. Grade crossing inspectors can use this GIS to identify grade crossings on a map and access inventory and accident data on particular crossings. All of this data is available on FRA's website for use by grade crossing teams, their partners, and the general public to run dynamic queries, download a variety of safety database files, publications and forms, and view current statistical information on railroad safety.

Additionally, FRA provides tools to inspectors and other officials to use these data to identify high risk crossings and support grade crossing investment decisions. GX Dash! and the Trespass and Suicide Dashboard provide visual representations of crossing collisions and incident data.¹⁶ The Trespass and Suicide dashboard displays additional information to FRA officials, such as a high-level overview of suicide trends and provides the user with a tool to analyze and

¹⁴ The transition to teams consisting of grade crossing specialists and inspectors is underway. FRA's Regional Offices are filling these positions and phasing out the manager positions.

¹⁵ 49 CFR Part 234 Subpart F.

¹⁶ With GX Dash! an inspector or other users can interact with FRA's grade crossing and inventory data at the national, state, and county levels. The dashboard includes mapping and trend line information about collisions, injuries, and fatalities, including information on warning devices at the crossing, vehicle and driver, and time of day.

compare rail-related suicide trends by specific factors such as age, time, and the physical act before a suicide.

Grade crossing inspectors and other users such as State and local officials can use FRA's Web Accident Prediction System (WBAPS) to rank grade crossings based on the output from an accident prediction model. WBAPS generates reports listing public crossings for a State, county, city, or railroad ranked by predicted incidents per year. State and local officials can also use another FRA tool, GradeDec.net, which allows users to change crossing parameters to assess the impact of safety improvement projects at grade crossings. State and local planners can use GradeDec.net to simulate crossing changes and identify efficient grade crossing investment strategies.

FRA Has Effective Procedures To Determine Whether Grade Crossing Incident Data Are Complete and Accurate

FRA has effective procedures to determine whether the data railroads report on grade crossing incidents are complete and accurate. The procedures that FRA has implemented since our review in 2007 have contributed to improvements in the quality of collected incident data and the data's use. In our 2017 audit,¹⁷ of rail safety data we found that FRA had procedures to check railroad reports for errors, such as edit checks on forms and incident report reviews. These procedures and the contractors who do these reviews remain in place. FRA also has procedures to detect unreported incidents when auditing railroad records. We found that only about 5 percent of the violation reports from FRA's audits cite problems with railroad reports on grade crossing incidents or fatalities/injuries from the past 5 years. Furthermore, we could reconcile all but 4 of 50 incident reports from a random sample of 10 railroad-reported incidents in FRA's database for each of the five years between 2013 and 2017, and incidents reported to the NRC during the same period. We also found that the grade crossing incident data FRA provides on its website and through its tools accurately reflect data reported by the railroads.

¹⁷ *FRA Has Taken Steps To Improve Safety Data Reporting But Lacks Standards Procedures and Training for Compliance Audits* (OIG Report No. ST2017045), May 3, 2017.

Regional FRA officials confirmed that only a few formal accident investigations¹⁸ take place each year. However, accident investigation reports do provide additional information about incidents. Our review of all 95 FRA accident investigation reports for grade crossing incidents from 2006 through 2017 indicated that the primary cause for 83 of the incidents was related to the highway driver. While they perform few formal accident investigations, grade crossing teams collect information about crossing incidents as they occur by reviewing related information to determine whether crossing improvements or outreach are necessary.

FRA Has Not Adjusted Its Accident Prediction Formula Since 2013 and Lacks a Comprehensive Compliance Manual for Grade Crossing Teams

FRA's data analyses use an accident prediction formula designed to reflect current grade crossing conditions. However, FRA last evaluated and adjusted the formula in 2013 despite the availability of current incident data and changes to grade crossing inventory reporting. Furthermore, the agency has not finalized a comprehensive compliance manual for the teams in the grade crossing discipline.

FRA Has Not Adjusted Its Accident Prediction Formula Since 2013

FRA has not adjusted parts of its accident prediction formula since 2013 to reflect current crossing conditions. Grade crossing inspectors use FRA's WBAPS to rank grade crossings safety based on the output from an accident prediction model. WBAPS generates reports listing public crossings for a State, county, city, or railroad ranked by predicted incidents per year. State and local officials use GradeDec.net to change crossing parameters to assess the impact of safety improvement projects at grade crossings.

Both WBAPS and GradeDec.net rely on the DOT Accident Prediction and Severity Model¹⁹ (APS) to predict accidents. The model has three components: a formula

¹⁸ Between 2006 and 2017, FRA investigated 95 (0.35 percent) of 26,837 reported grade crossing incidents, while the National Transportation Safety Board performed eight investigations.

¹⁹ We did not validate this model during this audit.

for accident prediction, a formula for severity prediction and a model for resource allocation. The formulas for accident prediction and severity are based on regression analyses of accident and grade crossing characteristics.

APS's accident prediction formula²⁰ uses three formulas that work together to predict accidents—a basic formula, a formula that incorporates accident history, and a formula that applies one of three normalizing constants (see exhibit D) These constants keep the accident predictions matched with current accident trends, numbers of open public grade crossings, and changes in warning devices. Each constant is a ratio of the actual number of accidents to the predicted number of accidents. The constant used in the formula depends on the type of warning device at the pertinent grade crossing—a passive warning device,²¹ a flashing light, or a gate. Once the normalizing constant is applied in the final formula step, the Accident Prediction Formula provides predicted accidents per year for the pertinent crossing.

FRA is not required by statute or regulation to adjust the constants and the Agency has no procedure for determining when the formula should be adjusted. The formula's design document says the constants should be adjusted periodically, while technical instructions used by contractors for updates indicate that the constants are adjusted every 2 years. Furthermore, an FRA official stated that the Agency usually adjusts the constants every 3 to 4 years. However, FRA has not adjusted the constants since 2013 despite the availability of more current incident data²² and changes to grade crossing inventory reporting.

FRA's regional grade crossing teams informed us that they often plan their work based on information provided by the tools. Furthermore, the Ohio Department of Transportation reported²³ that 19 States use the U.S. DOT Accident Prediction Model²⁴ to rank grade crossing safety. However, because FRA has not adjusted the formula's normalizing constants in 6 years, APS may not reflect current conditions and emerging grade crossing safety issues.

²⁰ Also known as the DOT Accident Prediction Formula.

²¹ For example, a passive warning device can be signage indicating a grade crossing such as a cross-buck.

²² The normalizing constants from 2013 use historical accident data from calendar years 2007 through 2011.

²³ Sperry, B. R., Naik, B., Warner, J.E., *Evaluation of Grade Crossing Hazard Ranking Models*, Prepared for the Ohio Department of Transportation, State Job Number 135243, May 2016.

²⁴ While the terms do not match exactly, it appears that the authors of this report were referring to APS.

FRA Has Not Provided a Comprehensive Compliance Manual to Grade Crossing Teams

While FRA has increased its compliance and enforcement focus on grade crossing safety by expanding the grade crossing safety discipline, the Agency has not yet provided a comprehensive compliance manual for grade crossing teams. The national grade crossing team and strategy is intended to reduce risk and ensure compliance with regulations. FRA has begun generating a compliance manual for grade crossing inspectors and has an on-the-job training curriculum and guidance for completing specific activities such as grade crossing inventory inspections. However, the existing guidance²⁵ for the grade crossing discipline does not cover several other activities. For example, regional team members informed us that they try to look at incidents as they occur in their geographic areas so the team can promptly identify opportunities to inspect crossings, suggest improvements to prevent future incidents, or do other outreach²⁶ to railroads, States, or local officials. Teams in each region approach this activity differently.

The current guidance for the grade crossing discipline is not as comprehensive as that provided in compliance manuals for the other Agency safety disciplines. FRA's compliance manuals are discipline-specific and provide guidance to inspectors for evaluating regulated entities' compliance with Federal laws and regulations.²⁷ For example, FRA's Operating Practices Compliance Manual describes how an inspector should use specific data to prioritize time and resources to inspections focused on areas of concern. Current guidance for the grade crossing discipline does not comprehensively address the issue of focusing inspections and outreach efforts.

An FRA official informed us that the Agency is drafting the manual for the grade crossing discipline and expects to release it in 2019. Because grade crossing teams do not yet have a comprehensive discipline-specific manual, their approaches to using incident data and risk assessment tools, identifying and reviewing incidents,

²⁵ FRA's Signal and Train Control (S&TC) Compliance Programs and Policies technical manual describes how S&TC inspectors inspect and observe testing of S&TC systems for compliance with Grade Crossing Signal System Safety requirements, among other duties.

²⁶ This outreach may include briefings on at-risk crossings or general crossing safety to local law enforcement; attendance at public meetings about grade crossing improvements; and work with State officials to update commercial driver training to include information on grade crossings.

²⁷ FRA's compliance manuals for its safety disciplines include sections on topics such as roles and responsibilities, inspection procedures, enforcement and compliance tools, and focused inspection process.

and conducting inspections or outreach differ among the regions. Additionally, inspectors may be missing opportunities to better focus their efforts.

Conclusion

The number of incidents and fatalities at crossings has declined or remained constant despite additional exposure from increased vehicle traffic. FRA is focused on providing access to information and tools to support a data-driven, risk-based approach to oversight and resource allocation. However, the lack of current tools and comprehensive guidance make it difficult for officials responsible for grade crossing safety to focus inspection, improvement, and outreach resources in the right areas to reduce future incidents.

Recommendations

To ensure FRA has the tools and guidance needed to effectively identify, inspect, and improve at-risk grade crossings, we recommend that the Federal Railroad Administrator:

1. Establish and implement a procedure for determining when to evaluate and, if necessary, adjust the normalizing constants for the accident prediction formula in U.S. DOT's Accident Prediction and Severity Model to reflect current accident and grade crossing inventory data.
 2. Prepare and implement a comprehensive compliance manual for the grade crossing discipline that includes procedures for using grade crossing data to focus inspections and outreach.
-

Agency Comments and OIG Response

We provided FRA with our draft report on July 25, 2019, and received its formal response on August 20, 2019. FRA's response is included in its entirety as an appendix to this report. FRA concurred with our two recommendations and provided appropriate actions and completion dates.

Actions Required

We consider recommendations 1 and 2 resolved but open pending completion of planned actions.

Exhibit A. Scope and Methodology

We conducted our work from September 2018 through July 2019 in accordance with generally accepted Government auditing standards as prescribed by the Comptroller General of the United States. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

We identified criteria pertaining to FRA's collection and use of accident and incident data and related prior OIG and GAO audit findings and recommendations.²⁸ Criteria documents we reviewed included the Rail Safety Improvement Act, Fixing America Fixing America's Surface Transportation (FAST) Act, 49 USC Subtitle V Rail Programs, and the railroad incident reporting regulations at 49 CFR Part 225 (Part 225). We also reviewed the FRA Guide for Preparing Accident/Incident Reports; FRA Inspection Guidance for Grade Crossing Managers and Grade Crossing Inspectors for Reviewing 49 CFR Part 234; FRA compliance manuals²⁹ for safety disciplines; the FRA General Manual; and the FHWA Highway-Rail Grade Crossing Handbook. We reviewed FRA's Field Orientation Training Guide for its Highway-Rail Crossing and Trespass discipline. Additionally, we reviewed FRA's U.S. DOT National Highway-Rail Crossing Inventory rulemakings and related documents; State Action Plans from the 10 original states designated by the Railroad Safety Improvement Act of 2008 to prioritize safety improvements; and FRA's National Safety Program Plans for fiscal years 2015 through 2017.

For testing of the systems FRA uses to collect and store safety data, including railroad-reported grade crossing incident reports, we relied on our 2017 audit that evaluated documentation of FRA's safety data collection and storage systems, and that performed data reliability tests using a representative sample of reporting forms submitted from July 2011 through December 2015. In that audit, we reviewed system development documentation for RAIRS and the Railroad Safety Information System (RSIS), including system requirements, the

²⁸ *Audit of Oversight of Highway-Rail Grade Crossing Accident Reporting, Investigations, and Safety Regulations* (OIG Report No. MH-2006-016), November 28, 2005; *FRA Can Improve Highway-Rail Grade Crossing Safety by Ensuring Compliance With Accident Reporting Requirements and Addressing Sight Obstructions* (OIG Report No. MH-2007-044), May 3, 2007; *FRA Has Taken Steps To Improve Safety Data Reporting, but Lacks Standard Procedures and Training for Compliance Audits* (OIG Report No. ST2017045), May 3, 2017; GAO, *Railroad Safety: Quiet Zone Analyses and Inspections Could be Improved* (GAO-18-97), October 31, 2017; GAO, *Grade Crossing Safety: DOT Should Evaluate Whether Program Provides States Flexibility to Address Ongoing Challenges* (GAO-19-80), November 8, 2018.

²⁹ FRA, *Signal and Train Control Compliance Programs and Policies* (2012); FRA, *Operating Practices Compliance Manual* (2012); FRA, *Hazardous Materials Compliance Manual* (2011).

configuration management plan, data dictionaries for the current configuration, and a recent rulemaking used to update the systems. We also reviewed system testing documentation and related contracts for system operation. We found that FRA's systems were well documented and the safety data was reliable.

To determine whether controls over data reported to FRA remained in place, we reviewed a list of defects and violations from FRA's audits of railroad accident/incident reporting to identify any concerns FRA's inspectors had about accuracy and completeness of grade crossing incident reporting. FRA provided a list of Part 225 defects and violations identified by inspectors from January 1, 2013 through December 31, 2017, for non-reporting or late reporting of railroad incidents and refined the list to show grade crossing incidents through key word searches of the narratives. The list showed a total of 1,091 Part 225 audit reports over a 5 year period. Fifty-five reports included grade crossing keywords (5 percent) that indicated that FRA reviewed Part 225 grade crossing reports.

To assess whether the data FRA provides in its web-based tools accurately reflects data reported by railroads, we reviewed railroad-reported grade crossing incident reports provided to FRA on the Agency's Form 57 from calendar years 2006 through 2017, and data from FRA's web-based tools from the same period using a data reliability checklist designed to test data completeness and accuracy. We found that these data were sufficiently reliable for the purposes of this audit. We also compared the Form 57 data to other summary data that the Agency publishes, including the Grade Crossing Dashboard (GX Dash!); Accident Trend Summary Statistics; and previously published Railroad Safety Statistics Annual Reports.³⁰ We found no major discrepancies in the data elements. FRA provided a sufficient explanation for the discrepancies that we did find. FRA informed us that suicides were included in some reports we found and that fatalities are not determined as suicides by the railroad but by a coroner, police officer, or other authority. Suicides are then removed from the fatality totals and the individual reports made publically available.

To further check the completeness of FRA's Form 57 data, we took a random sample of 10 incident reports that met criteria³¹ for immediate reporting for each year from calendar years 2013 through 2017 for a total of 50 reports out of 3,336. We compared the Form 57 data to the NRC data to identify any missing grade crossing reports, and were able to reconcile all but 4 of the total of 50 incident reports we reviewed. We made no statistical projections since the random sample

³⁰ Railroad Safety Statistics Annual Reports were last published in 2010 and were provided as a resource for FRA's safety partners and a general reference source for individuals and organizations with an interest in rail safety issues. The reports included statistical data, tables, and charts to show the nature and cause of many rail-related accidents and incidents that occurred in a given year.

³¹ 49 CFR § 225.9, Railroad Accidents/Incidents Reports Classification, and Investigations: Telephonic Reports of Certain Accidents/Incidents (2018).

is not representative of the entire population of data. We also interviewed the current contractor responsible for collecting and storing railroad safety data to identify any new procedures for collecting accident and incident data that railroads provide to FRA's public safety database or any new procedures for identifying reporting issues.

To assess FRA's collection of grade crossing accident investigation data, we reviewed investigation reports for grade crossing incidents from FRA's eLibrary. Between 2006 and 2017, FRA investigated 95 (0.35 percent) of 26,837 reported grade crossing incidents, while the National Transportation Safety Board performed 8 investigations. Finally, we interviewed FRA Regional grade crossing officials about the processes used for grade crossing accident investigations that were assigned by FRA Headquarters and those assigned by FRA Regional Offices.

To identify underlying background and data elements used to generate the DOT accident formula, FRA's WBAPS, and GradeDec.Net, we reviewed the 1987 description provided by FRA of the USDOT Rail-Highway Crossing Resource Allocation Procedure. We interviewed the contractor responsible for updating the mathematical formulas involved within the USDOT Resource Allocation Procedure. Additionally, FRA provided us with demonstrations of and access to its Trespass and Suicide Dashboard, a GIS-based tool, which is currently being developed for use by the inspectors and specialists in the grade crossing safety discipline.

We reviewed studies examining the effectiveness and use of the USDOT Resource Allocation Procedure. One study included a 1997 Westat Inc. analysis³² prepared under contract to FRA offering an update of the model, though FRA determined the update to be only marginally better and not cost-effective to implement. An Ohio DOT³³ study that evaluated grade crossing hazard ranking models reported that nearly half of the States used the USDOT Accident Prediction model to prioritize grade crossing improvement projects.

We interviewed FRA Headquarters staff from the Office of Railroad Safety and FRA Regional Office grade crossing staff at all eight regions about the transition to the grade crossing safety discipline and ongoing FRA grade crossing activities. We also attended FRA's 2018 Trespasser and Grade Crossing Fatality Prevention Summit. Specifically, we interviewed FRA's Grade Crossing discipline's regional specialists and inspectors using a series of questions in a data collection instrument to identify data they collect and the tools they use to identify at-risk crossings. The questions were designed to identify the policies and processes FRA uses for coordinating its grade crossing safety discipline, conducting outreach to States and localities, identifying focus areas, and conducting regional accident

³² Westat Inc., *Highway-Rail Accident Prediction Models: 1996 Updates*, March 1997.

³³ Ohio DOT, *Evaluation of Grade Crossing Hazard Ranking Models*, May 2016.

investigations. We interviewed staff in three Regional Offices in person³⁴ and staff in the remaining five Regional Offices by telephone.

We did not review Federal funding for grade crossing projects which includes FHWA Section 130 funds or the quality of data in the U.S. DOT National Highway-Rail Crossing Inventory, because in November 2018, GAO reported³⁵ the results of its review of FRA's grade crossing safety research, State project selection and execution, and FHWA's assessment of the Section 130³⁶ Program's effectiveness. As part of its State project selection objective, GAO assessed the reliability of the data in the U.S. DOT National Highway-Rail Crossing Inventory. Lastly, we did not review violations and penalties assessed for violations of accident reporting requirements since this topic was covered in prior OIG audit work.

³⁴ We interviewed Region 1 in person because of its geographic proximity to the audit team and selected Regions 3 and 7 for in person interviews based on the number grade crossing incidents and/or fatalities in their States.

³⁵ GAO, *Grade-Crossing Safety: DOT Should Evaluate Whether Program Provides States Flexibility to Address Ongoing Challenges* (GAO-19-80), November 2018.

³⁶ Fixing America's Surface Transportation Act (FAST Act), Pub. Law No. 114-94 (2015), continues the annual set-aside for railway-highway crossing improvements under 23 U.S.C § 130(e)(1) through fiscal year 2020.

Exhibit B. Organizations Visited or Contacted

FRA Facilities

FRA Office of Railroad Safety, Headquarters, Washington, DC

FRA Region 1 in Cambridge, Massachusetts

FRA Region 2 in Crum Lynne, Pennsylvania

FRA Region 3 in Atlanta, Georgia

FRA Region 4 in Chicago, Illinois

FRA Region 5 in Fort Worth, Texas

FRA Region 6 in Kansas City, Missouri

FRA Region 7 in Sacramento, California

FRA Region 8 in Vancouver, Washington

Exhibit C. List of Acronyms

APS	U.S. Department of Transportation Accident Prediction and Severity Model
DOT	Department of Transportation
FAST Act	Fixing America Fixing America's Surface Transportation Act
FHWA	Federal Highway Administration
FRA	Federal Railroad Administration
GAO	Government Accountability Office
GCIS	Grade Crossing Inventory System
GIS	Geographic Information System
Inventory	U.S. DOT National Highway-Rail Crossing Inventory
NRC	National Response Center
NTSB	National Transportation Safety Board
OIG	Office of Inspector General
Part 225	49 CFR Part 225 - Railroad Accidents/Incidents: Reports Classification, and Investigations
RAIRS	Railroad Accident/Incident Reporting System
WBAPS	Web Accident Prediction System

Exhibit D. Accident Prediction Components of the DOT Accident Prediction and Severity Model

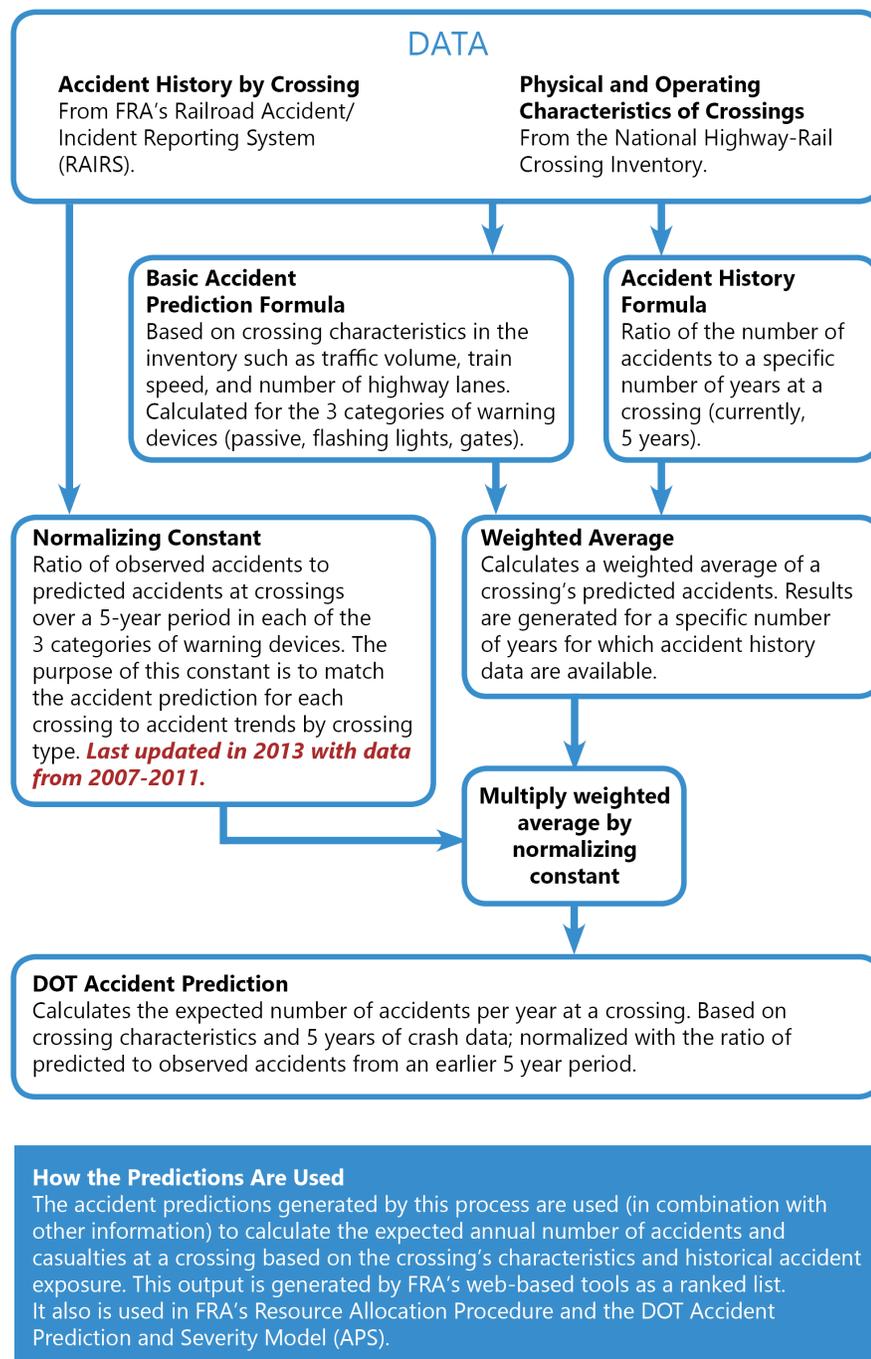


Exhibit E. Major Contributors to This Report

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Appendix. Agency Comments



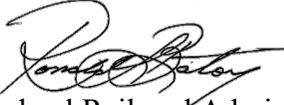
U.S. Department
of Transportation

Administrator

1200 New Jersey Avenue, SE
Washington, DC 20590

Federal Railroad Administration

Subject: INFORMATION: Management Response to OIG Draft Report: FRA Collects Reliable Grade Crossing Incident Data, But Needs to Update its Accident Prediction Model and Improve Guidance for Using the Data to Focus Inspections Date: August 20, 2019

From: Ronald Batory 
Administrator, Federal Railroad Administration

To: Barry J. DeWeese
Assistant Inspector General for Surface Transportation
Audits

The Federal Railroad Administration (FRA) is committed to reducing fatalities and collisions at highway-rail grade crossings, one of the leading causes of rail-related deaths in the United States. Collecting grade crossing collision data and providing tools to analyze the data are fundamental to designing and implementing effective countermeasures. As the Office of Inspector General (OIG) acknowledged in the draft report, FRA has significantly improved the quality of incident data we collect and how we use it. In addition, over the past two years, FRA has increased the staffing levels in each of our eight regional offices, with 32 additional grade crossing inspectors, specialists, and managers who are focused on grade crossing and trespassing safety.

FRA is developing a comprehensive manual for grade crossing inspectors to use when assessing railroad compliance with FRA's grade crossing safety regulations. In addition, FRA has the following tools to assist FRA staff and external stakeholders in evaluating highway-rail crossing data:

- GX Dash!, which provides a summary and detailed data on collisions at crossings;
- Trespass and Suicide Dashboard, which provides a summary and detailed data on trespassing incidents;
- Geographic Information System (GIS) database, which provides information on community features, risk factors, and hot spots for grade crossings and trespassing; and

- Web-Based Accident Prediction System (WBAPS), which ranks the relative risk of crossings within a state or county, based on the Department's National Highway-Rail Crossing Inventory and collision data.

Based on our review of the draft report, we concur with both recommendations as written. We plan to complete actions to implement the two recommendations by March 15, 2020.

We appreciate the opportunity to review the OIG draft report. Please contact Rosalyn G. Millman, at 202-493-1339, with any questions.

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