

Highway-Rail Grade Crossings

The safest grade crossing is one that doesn't exist.



Federal Railroad Administration

Highway-Rail Grade Crossing

Resource Guide



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Quick Facts regarding Highway-Rail grade crossing Safety:

There are approximately 129,500 public at-grade crossings

- More than 50% have automatic warning systems
 - 34.7% have flashing lights and gates
 - 15.5% have flashing lights
- More than 60% of collisions occur at crossings with automatic warning systems.

- Almost 80,500 private at highway-grade crossings
 - Most do not have automatic warning devices

- Under federal law and regulations, maintenance of highway-grade crossings and tracks are the responsibility of individual railroads.
 - (Federal regulations do specify frequency of inspections required and those depend on the type of track. Federal regulations related to grade crossings can be found here: http://www.ecfr.gov/cgi-bin/text-idx?tpl=/ecfrbrowse/Title49/49cfr234_main_02.tpl)
 - Note: FRA does not have regulations pertaining to the crossing surface. Most states have regulations concerning the crossing surface but FRA does not.

- **Since 2008, FRA has worked with state DOTs and railroads to close more than 18,000 highway-grade crossings nationwide**

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Number of Crossings as of October 2014			
Crossing Type	How Many 2008	How many 2014	%Total
Total	266,786	250,711	100
Public At Grade	139,558	129,584	51.7
Private at Grade	87,589	80,120	31.9
Pedestrian at grade	1,982	2,189	0.9
Grade Separated (all)	37,657	38,818	15.5



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What is the issue:

- 94% of train-vehicle collisions can be attributed to driver behavior or poor judgment.
- 239 Highway-Rail deaths in 2014 (not including December figures) – up from 231 in 2013.
- Three out of four crashes occur within 25 miles of a person's home.
- 50% occur within 5 miles of home.
- A motorist is 20 times more likely to die in a crash involving a train than a collision involving another motor vehicle.
- The majority of highway-rail collisions occur when the train is traveling less than 30 mph.
- One out of five collisions involves the motorist striking the train.
- In America, every three hours a person is struck by a train. (This included trespasser incidents)
- Nearly all these deaths are preventable.
- A train traveling at 55 mph will take a mile or more to stop.

Improvement over the past decade (2004 to 2013)

- Collisions down by 35%
- Fatalities down by 38%
- Highway grade crossing and pedestrian trespassing accidents constitute 95% of all rail related fatalities.
(OIG "Audit of the Highway-Rail Grade Crossing Safety Program" report dated June 16, 2004.)

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Federal Regulations Railroad Crossings:

- FRA regulations can be located at the bottom of our Highway-Rail Grade Crossing and Trespass Prevention page: <http://www.fra.dot.gov/Page/P0040>
- Slide no. 4: Additional information on FRA's final rule on National Highway-Rail Crossing Inventory Reporting Requirements:
- The Crossing Inventory final rule furthers FRA's efforts to improve existing data on the characteristics of highway-rail and pathway crossings nationwide, which is currently provided by States and railroads on a voluntary basis. States and other public and private entities use the data in the Crossing Inventory, together with FRA highway-rail collision data, for planning and implementation of crossing improvement programs.
- -The following requirements are contained within the Crossing Inventory final rule:
- Railroads must submit data for previously unreported highway-rail and pathway crossings no later than March 7, 2016.
- Railroads must submit data for new highway-rail and pathway crossings no later than six (6) months after the crossing becomes operational (or no later than March 7, 2016 whichever occurs later).
- Railroads are required to update existing crossing data in the Crossing Inventory at least every three years.
- Railroads are required to report the sale of a crossing to the Crossing Inventory within three months of the date of sale.
- Railroads are required to report the closure of a highway-way or pathway crossing to the Crossing Inventory within three months.
- Railroads are required to report a change in crossing surface or a change in warning device at a public highway-rail grade crossing within three months.
- http://www.fra.dot.gov/eLib/details/L03266#p1_z5_gD_ksystems%20for%20telephonic



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Federal Regulations Railroad Crossings:

- In June 2010, FRA issued a final rule that required the ten States with the highest number of reported highway-rail grade crossing accidents/incidents during the three-year period between 2006-2008 to develop State action plans to improve grade crossing safety.
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 - The ten States subject to this requirement were: Alabama, California, Florida, Georgia, Illinois, Indiana, Iowa, Louisiana, Ohio, and Texas.
 - This requirement can be found in 49 CFR 234.11.
- FHWA - The ***Manual on Uniform Traffic Control Devices***, or **MUTCD** defines the standards used by road managers nationwide to install and maintain traffic control devices on all public streets, highways, bikeways, and private roads open to public travel. The MUTCD is published by the Federal Highway Administration (FHWA) under 23 Code of Federal Regulations (CFR), Part 655, Subpart F.
- [National Grade Crossing Inventory Overview](#)
- [Highway-Rail Grade Crossing & Safety Initiative](#)

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Grade Crossing Safety and Trespass Prevention – What has the FRA done?

- January 2015 FRA published the final rule on **National Highway-Rail Crossing Inventory Reporting Requirements**
- June 2013 - FRA **Launches New Smartphone App to Raise Awareness of Highway-Rail Grade Crossings**
- June 2012 FRA issued **Final Rule on Emergency Notification Systems at Highway-Rail Grade Crossings.**
- November 2011 – FRA developed **Model State Legislation for Highway-Rail Crossing Violations.**
- January 2011 – FRA issued guidance for **Guidance for Improving Safety at Highway-Rail Grade Crossings and Preventing Railroad Trespassing**
- The requirements described on this slide can be found in 49 CFR 213.347. These requirements were contained in a final rule that was published in the Federal Register on June 22, 1998.
 - With respect to highway-rail grade crossings located on track that is subject to train operations at maximum authorized speeds of 110-125 mph, 49 CFR 213.247(b) states that trains shall not be operated at speeds of 110 mph or more through the crossing unless the crossing is equipped with a properly functioning FRA-approved warning/barrier system.
- 2005 – FRA developed GradeDec.NET as an investment decision support tool for use by state and local authorities. *GradeDec.NET* is a web-based application that enables the analysis of impacts from grade crossing improvements and supports resource allocation and investment decisions. It allows state and local decision makers to prioritize highway-rail grade crossing investments based upon an array of benefit-cost measures.
- The FRA issued regulations requiring 10 States to issue State-specific action plans to improve safety at highway-rail grade crossings, as part of the Final Rule on Emergency Notification Systems at Highway-Rail Grade Crossings.

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Roles

FHWA

\$220 Million per year to the States specifically for public crossing safety improvements on a safety priority basis
States (typically the department of transportation) – determine which public crossing are improved and the type of warning devices to be installed

FRA

- Issues and enforces regulations on crossing safety. Railroads must:
 - Perform monthly tests of automatic warning devices
 - Place retro-reflective material on rail cars to enhance their visibility at night
 - Have additional set of lights (alerting lights) on locomotives to improve motorists ability to detect them
 - Sound the horn when approaching public crossings unless within a quiet zone established under FRA regulations
 - Post signs at crossing with an emergency telephone number so that the public call notify the railroad if a vehicle is stuck on the crossings, the warning signals are not working properly or other safety concerns
- Issues guidance and best practices to safety partners
- Conducts research on ways to improve crossing safety such as incorporating crossing safety as part of Connect Vehicles (intelligent transportation system)
- EDUCATION: Motorists must learn how to be safe at grade crossings as an estimated 94 percent of collisions and 87 percent of fatalities result from risky driver behavior or poor judgment.
- ENFORCEMENT: Consistent enforcement by local or state police of traffic safety laws, and a sustained effort by the courts to impose penalties on violators, discourage and deter motorists from making poor decisions at grade crossings.
- ENGINEERING: Engineering improvements such as installing flashing lights and gates, adding traffic dividers that deter motorists from driving around lowered gates, or physically separating the highway from the tracks greatly reduce or prevent the potential for train-vehicle collisions.



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Role of States and Local Governments

- States and local governments play critically important roles in ensuring grade crossing safety by exercising their own responsibilities, including:
- Selecting appropriate highway traffic control devices, including grade crossing warning systems, advance roadway signage, and pavement markings;
- Determining, with the railroad, the need for, and design of, interconnections between grade crossing active warning systems and other highway traffic control signals.
- Investigating motor vehicle accidents occurring on public roads, including grade crossing collisions;
- Instructing, examining and licensing motor vehicle operators; and
- Enforcing state requirements, if any, regarding clearance of sight obstructions on railroad (or other) property at grade crossings.

Roles of motorists

- Approach crossings expecting a train
- Always comply with warning signals and signs
- Never attempt to beat a train at a crossing
- If the warning signals are malfunctioning, never drive around lowered gates unless directed to by a uniformed police officer or a member of the train crew.
- Never start to travel over a crossing unless there is enough room on the other side to allow the vehicle to be completely off of the crossing.

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Role of Railroads

- Railroads must
 - Properly maintain track and signals at the crossing;
 - Properly equip locomotives and freight cars with required safety appliances;
 - Sound the horn and use alerting lights when approaching public crossings;
- By law, trains have the right-of-way at highway-rail grade crossings since they cannot stop or change direction to avert collisions with motor vehicles or people. Railroads have important responsibilities that are critical to safety at grade crossings, including requirements to: **Inspect, test, and maintain grade crossing active warning systems;**
- Provide for alternate means of warning motorists (e.g., flagging traffic over the crossing) in the event of a grade crossing signal malfunction or when it is necessary to remove one from service, avoid interference in the normal functioning of these devices, and repair malfunctioning signals without delay;
- Report either telephonically and/or in writing as required **all grade crossing collisions**, as well as incidents involving the failure of an active warning device.
- Maintain the track structure including proper drainage to avoid disrupting the electrical operation of grade crossing signal systems and removing vegetation on railroad property that could interfere with the visibility of grade crossing warning signs and signals by both motorists and train crews;
- Sound the locomotive horn on approach to, and until occupying, all public grade crossings unless the crossing is part of an FRA recognized Quiet Zone;
- Properly maintain the event recorder (black box) on all locomotives to preserve data following any collision or incident which can aid law enforcement in their investigations
- Increase the visibility of trains by ensuring properly functioning auxiliary alerting lights on all lead locomotives and by affixing reflectorized tape to locomotives and rail cars.



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High-speed Rail at Grade Crossing

- For 110 mph or less: Grade crossings are permitted. States and railroads cooperate to determine the needed warning devices, including passive crossbucks, flashing lights, two quadrant gates (close only 'entering' lanes of road), long gate arms, median barriers, and various combinations. Lights and/or gates are activated by circuits wired to the track (track circuits). FRA advocates the use of a "Sealed Corridor" approach so that every crossing is evaluated and treated appropriately.
- For 111-125 mph: FRA permits crossings only if an "impenetrable barrier" blocks highway traffic when train approaches.
- Above 125 mph, no crossings will be permitted.
- The requirements governing locomotive horn sounding at public highway-rail grade crossings can be found in 49 CFR Part 222. These regulations were contained in a final rule that was published in the Federal Register on August 17, 2006.

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Category	CY 2006	CY 2007	CY 2008	CY 2009	CY 2010	CY 2011	CY 2012	CY 2013	CY 2014	% Change From CY 2013 to CY 2014	% Change From CY 2006 to CY 2014	Total For CY 2006 to CY 2014
HIGHWAY-RAIL INCIDENTS	2,942	2,778	2,429	1,933	2,052	2,062	1,985	2,096	2,068	-1.336	-29.708	20,345
..... RATE of Highway-rail incidents per mil train miles	3.616	3.500	3.138	2.894	2.911	2.874	2.713	2.800	2.951	5.414	-18.388	.
--- Highway-rail incidents deaths	369	339	290	248	261	250	230	231	239	3.463	-35.230	2,457
--- Highway-rail incidents injuries	1,070	1,059	990	743	888	1,045	972	972	763	-21.502	-28.692	8,502
--- Incidents at public crossings	2,517	2,354	2,081	1,644	1,771	1,787	1,698	1,780	1,781	0.056	-29.241	17,413
..... PERCENT of total Highway-rail incidents	85.554	84.737	85.673	85.049	86.306	86.663	85.542	84.924	86.122	1.411	0.664	.



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HIGHWAY-RAIL INCIDENTS (BY CALENDAR YEAR, Jan-Dec) AT PUBLIC AND PRIVATE CROSSINGS

Counties	Total		Total Year Counts			YTD Counts Jan - Dec		% Change Over Time		
	Accs	Pct of Total	2010	2011	2012	2012	2013	2010 to 2012	2011 to 2012	To Dec 2012 2013
GRAND TOTAL.....	8,195	100.0	2,052	2,062	1,985	1,985	2,096	-3.3	-3.7	5.6
Automobile	3,731	45.5	925	960	876	876	970	-5.3	-8.8	10.7
Truck-trailer	1,325	16.2	304	352	333	333	336	9.5	-5.4	0.9
Pick-up truck	1,093	13.3	308	270	265	265	250	-14.0	-1.9	-5.7
Truck	609	7.4	140	144	155	155	170	10.7	7.6	9.7
Pedestrian	568	6.9	144	133	133	133	158	-7.6	.	18.8
Other motor veh	400	4.9	111	93	100	100	96	-9.9	7.5	-4.0
Van	249	3.0	73	54	64	64	58	-12.3	18.5	-9.4
Other	187	2.3	39	49	49	49	50	25.6	.	2.0
Motorcycle	21	0.3	4	5	6	6	6	50.0	20.0	.
Bus	11	0.1	4	2	3	3	2	-25.0	50.0	-33.3
School bus	1	0.0	.	.	1	1

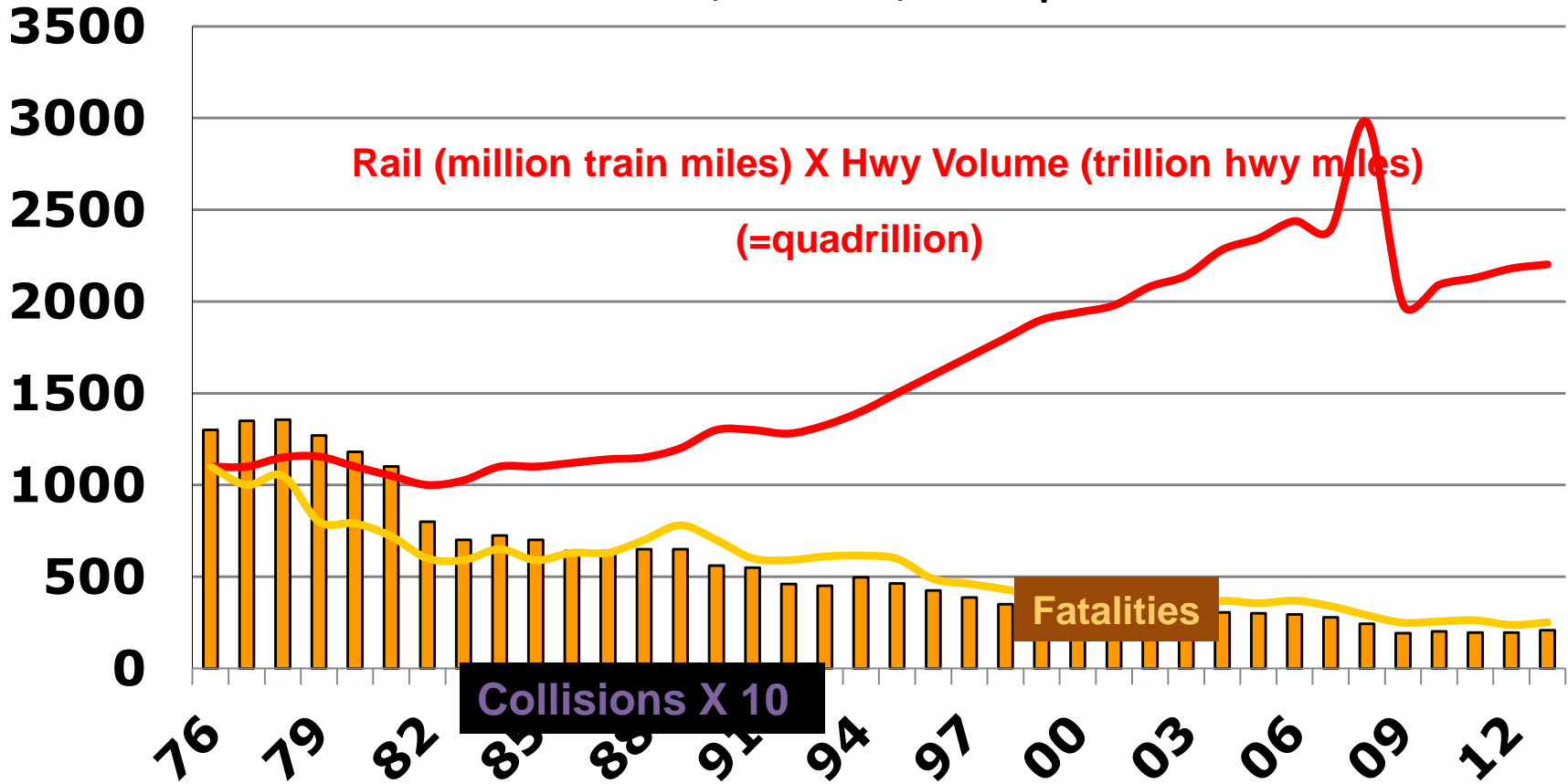


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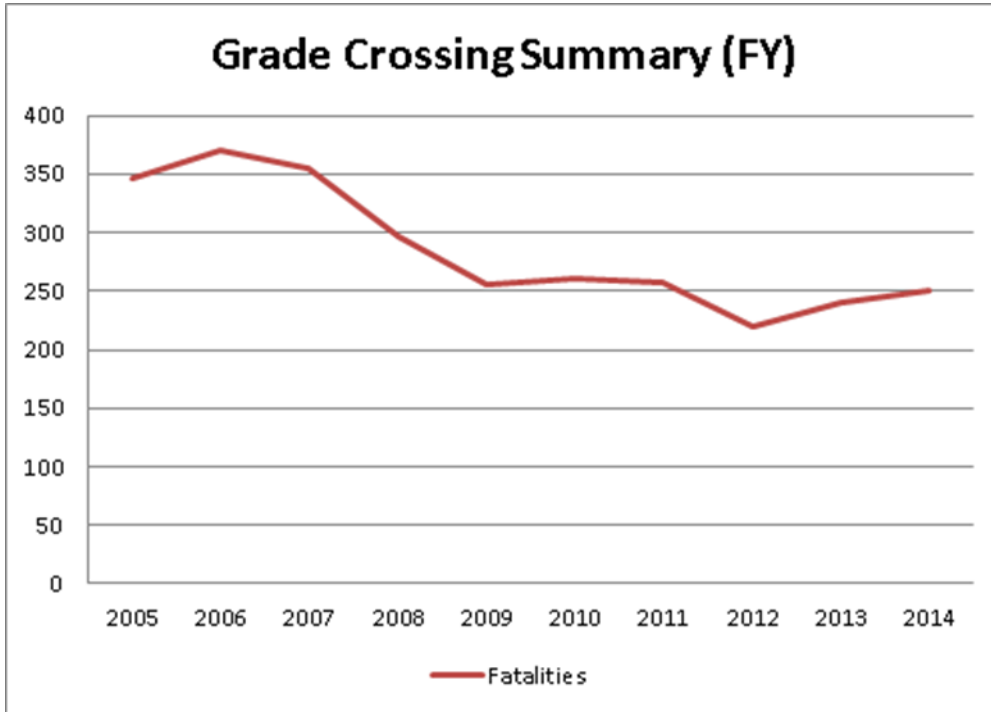
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Collisions, Fatalities, and Exposure



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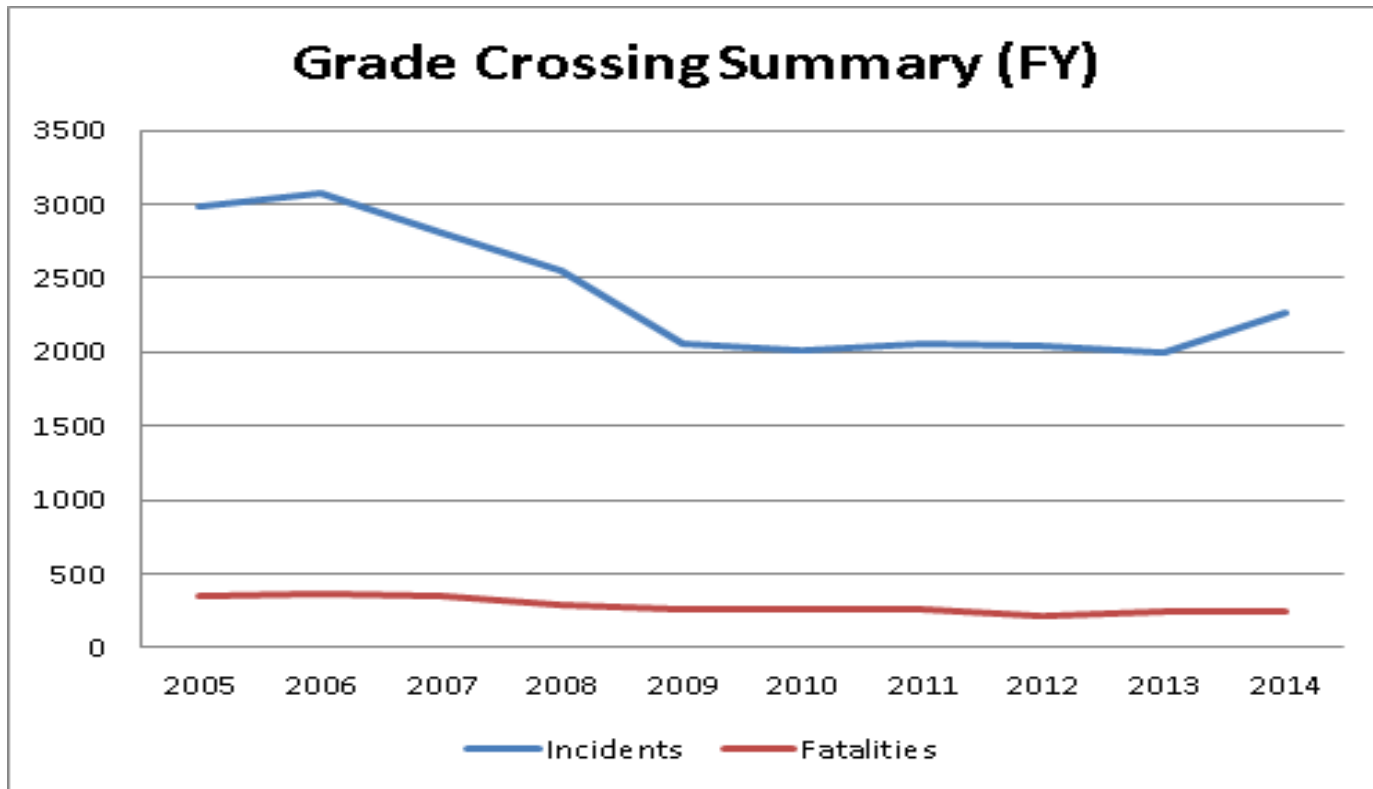
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Fiscal	Incidents	Fatalities
2005	2986	346
2006	3070	371
2007	2812	354
2008	2547	296
2009	2054	256
2010	2009	261
2011	2055	258
2012	2046	220
2013	2003	240
2014	2262	250

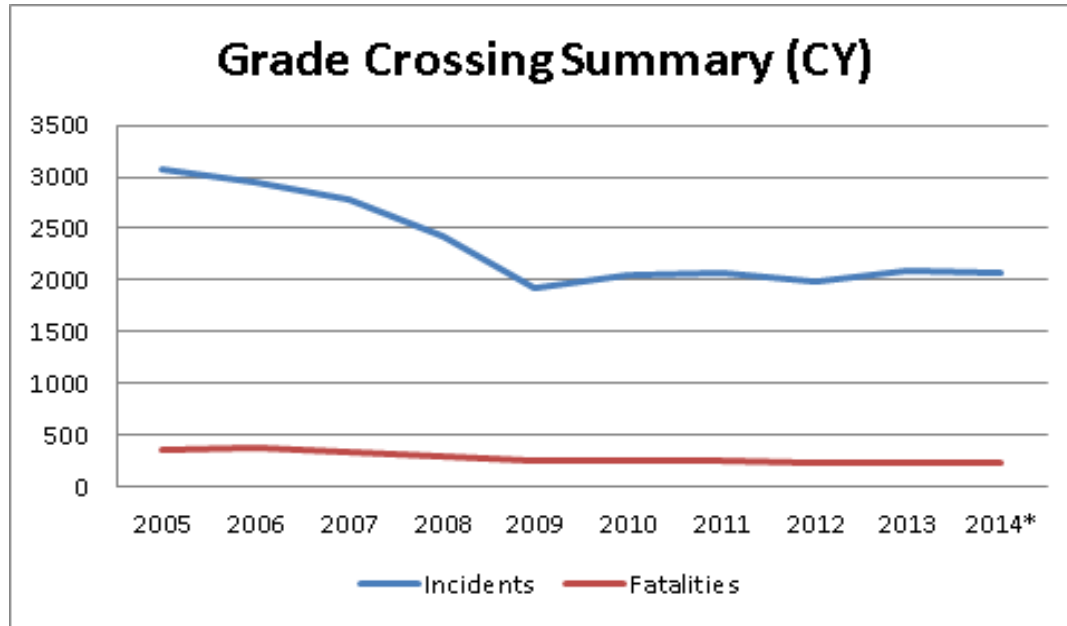
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Calendar	Incidents	Fatalities
2005	3066	359
2006	2942	369
2007	2778	339
2008	2429	290
2009	1933	248
2010	2052	261
2011	2062	250
2012	1985	230
2013	2096	231
2014*	2068	239

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FRA's Grade Crossing Mobile App (for Android and Apple devices):

- Download for Android devices at The Google Play Store or Apple devices at The Apple APP Store or from the FRA website, [here](#). Information about the App can be located at the same link.
- The Crossing Locator was developed to provide users with access to the highway-rail grade crossing database and map features from a mobile device. The tool allows users to locate crossings by USDOT Crossing ID, address or geo-location; access inventory records submitted by states and railroads; and view accident history.
- Users may also use the app to find and call the Emergency Notification Number (ENS) in case of an emergency or a safety concern about a specific highway-rail grade crossing. The information accessed in the mobile application is derived from the Safety Data website using information submitted by States and Railroads.
- Driver Behavior Analysis – study with cameras installed in cars
 - 4,215 grade crossing events involving light vehicle drivers analyzed
 - Drivers were likely to engage in secondary tasks (distractions) over 46% of the time
 - Drivers failed to look either left or right on approach to passive grade crossings approximately 35% of the time
- New technologies being tested to improve grade crossing safety:
 - Dynamic Envelope pavement marking to improve visibility of tracks – study shows 45% reduction in the number of vehicles that stop on tracks
 - Install gate skirts to reduce pedestrian violations (going under lowered crossing arms) – 55% reduction in horizontal gate violation
 - 4 quadrants gates reduces violations of the gates by 86%

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Other Regulatory issues: 49 CFR

Monthly test requirements:

- 234.249 – Grounds tests
- 234.251 – Standby power
- 234.255 – Gate arms and gate mechanisms, including observation to confirm proper operation
- 234.257 – Grade crossing warning system operation, including warning bells or other stationary audible warning devices

90-day test requirements:

- 234.261 – Highway traffic signal pre-emption interconnections

Annual test requirements:

- 234.269 – Cut-out circuits
- 234.271 – Insulated rail joints, bond wires, and track connections
- 234.253 – Flashing light units and lamp voltage
- 234.255 – Hold-clear devices
- 234.259 – Prescribed warning time
- 234.265 – Timing relays and timing devices



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