U.S. Department
of Transportation

**Federal Railroad
Administration**

1200 New Jersey Avenue, SE
Washington, DC 20590

JUN 13 2012

Mr. Michael B. Cline
Commissioner
Indiana Department of Transportation
100 North Senate Avenue
Indianapolis, IN 46204

Dear Mr. Cline:

Thank you for your June 5, 2012, letter and the updated Indiana Department of Transportation's (INDOT) State Action Plan. The Federal Railroad Administration (FRA) has completed its review of the plan, and appreciates all efforts INDOT has made to comply with this congressional requirement. Indiana's action plan discusses current and future plans related to highway-rail grade crossing closures, grade separations, and crossings with multiple incidents, and requires no significant changes or corrections.

Indiana's action plan also provides additional data to support the State's efforts in demonstrating its approach to enhance safety at or near highway-rail grade crossings. FRA understands that the action plan may be subject to subsequent adjustments or revisions to address context-sensitive data, incident trends, regulatory and legislative requirements, or other issues.

Thank you for your ongoing efforts to improve highway-rail grade crossing safety. If you need additional information, please feel free to contact Mr. Ronald Ries, Staff Director, Highway-Rail Crossing and Trespasser Programs Division, at (202) 493-6254 or Ronald.Ries@dot.gov.

Sincerely,

Robert C Lauby

Robert C. Lauby
Acting Associate Administrator for Railroad Safety/Chief Safety Officer

cc: Mr. Roger Manning, INDOT

INDIANA DEPARTMENT OF TRANSPORTATION

Driving Indiana's Economic Growth

100 North Senate Avenue
Room N755
Indianapolis, Indiana 46204-2216 (317) 232-3166 FAX: (317) 232-0238

Mitchell E. Daniels, Jr.,
Governor
Michael B. Cline, Commissioner

Tuesday, June 05, 2012

Mr. Robert Lauby
Acting Associate Administrator for Railroad Safety/Chief Safety Officer
U.S. Department of Transportation
Federal Railroad Administration
1200 New Jersey Ave. SE.
Washington, DC 20590

Via: rrs.correspondence@fra.dot.gov

Acting Administrator Lauby:

As directed by your letter of March 9, 2012, the Indiana Highway-Rail Grade Crossing Safety Action Plan (HRGCSAP) has been revised with the assistance of Ms. Tammy Wagner and Ms. Dee Chappell of the Federal Railroad Administration (FRA.) This new document addresses FRA's concerns regarding Indiana's original plan submitted September 30, 2010.

If you have any questions regarding the preparation of this new HRGCSAP, please contact Mr. Roger Manning, Strategic Highway Safety Plan Manager at (317) 232-5204 or email rmanning@indot.in.gov

As always, Indiana is eager to work with FRA in efforts to improve highway-rail grade crossing safety. I believe this action plan is fundamental in that endeavor.

Your partner in traffic safety,

Jason S. Wasson FOR

Michael B. Cline,
Commissioner

MBC/rm

HIGHWAY-RAIL GRADE CROSSING SAFETY ACTION PLAN

The Rail Safety Improvement Act of 2008 directed the Secretary of Transportation to identify the ten States that have had the most highway-rail grade crossing collisions, on average, over the past three years. Using data from the years 2006, 2007 and 2008, the Federal Railroad Administration (FRA) determined the ten States to be Alabama, California, Florida, Georgia, Illinois, Indiana, Iowa, Louisiana, Ohio, and Texas. Consequently, Indiana is required to create this action plan to identify specific solutions for improving safety at highway-rail grade crossings. Unless superseded by federal code or regulatory action this plan remains in effect for a period of five years from the date of FRA approval. This plan serves as a component of the Indiana Strategic Highway Safety Plan, and is reviewed annually.

Indiana Department of Transportation

6/1/2012

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Table of Figures

1 EXECUTIVE SUMMARY

Indiana's geographic location adjacent to the nation's largest rail hub in Chicago means several of the country's busiest rail lines cross it. The greatest impact from the state's frequent train traffic centers on the five northwest border counties of Lake, Porter, La Porte, St. Joseph, and Elkhart counties. The location of the state also means that it has among the greatest number of public grade crossings of any state in the nation, and sadly among the highest number of collisions, injuries, and deaths at grade crossings annually. However, with satisfactory human resources, funding, and leadership, a combination of engineering, education, and enforcement countermeasures can control it.

The safest grade crossing is the one that is not there. Indiana has the fifth highest density of public grade crossings of any state in the nation and will benefit from eliminating as many of them as is prudent. Although closures are often contentious, reducing the number of grade crossings through closures should help reduce the number of collisions. In addition, although grade separations are costly, they are often the best way to ensure safe mobility for both railway and roadway traffic at the junctions of the busiest railways and highways.

For more than 35 years, Indiana has worked to reduce the number of collisions and their resulting deaths, injuries, and economic loss to record lows. However, the biggest gains in reducing grade crossing collisions came in the early years of the reduction effort. Today, more than half of Indiana's public grade crossings are equipped with train activated warning devices of some kind. One in three grade crossings is equipped with gates. A large percentage of the critical needs backlog noted in the 1970's, is now equipped with flashing lights and gates.

Collision data indicates that to achieve further reductions in collisions at grade crossings, Indiana must make a change in its approach to grade crossing safety. Two out of every three collisions occur at grade crossings with train-activated warning devices already in place and nearly half of all collisions occur at gated grade crossings. Since the traditional infrastructure of flashing lights and gates relies on voluntary driver compliance, more and more crossings will need newer countermeasures, such as four-quadrant gate systems or channelized approaches, which further deter willful violations.

In the US DOT Inspector General's 2004 report to congress, analysis of data nationwide revealed that risky driver behavior or poor judgment accounted for 94 percent of public grade crossing collisions. Analysis of recent Indiana police collision reports leads to the same conclusion. Indiana will benefit from a continuous public outreach of grade crossing safety education. Those who respond positively to education will be safer. Conversely, those who still choose to risk the lives of themselves and those around them by willfully violating grade crossing warnings must be controlled through fair and effective law enforcement.

2 INTRODUCTION

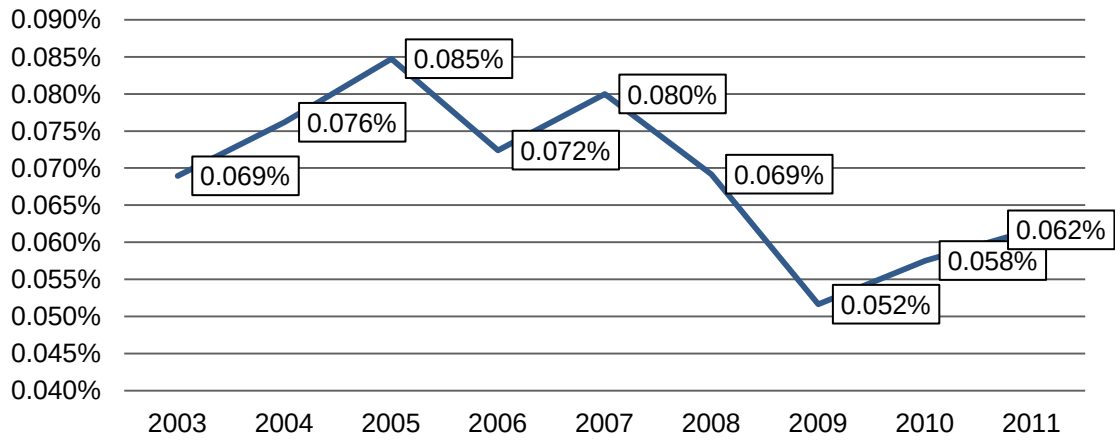
2.1 Link to Strategic Highway Safety Plan

As stated in the Indiana Strategic Highway Safety Plan (SHSP), Indiana's Highway Safety Mission is to ensure safe travel for all users of Indiana's streets, roads, and highways. Its vision is to reduce human suffering and economic loss from traffic collisions. The SHSP has an ultimate goal of eliminating traffic collision deaths and incapacitating injuries.

A railroad grade crossing collision is a targeted collision type within the Large Vehicle Conflict Collisions emphasis area of Indiana's SHSP. The goal is to continue the downward trend in the occurrence of grade crossing collisions and to accelerate the rate of decrease if possible.

The goal stated in the SHSP is a reduction of 12 grade crossing collisions (of any severity) over the previous year.

Figure 1 Percentage of All MV Collisions at Grade Crossings



As **Figure 1** indicates, grade crossing collisions are a tiny fraction of Indiana's overall motor vehicle collision problem. However, taking a narrow view of grade crossing collisions only in terms of motor vehicle damage and casualties overlooks the potential for significant hazards because of these collisions. Any collision between a motor vehicle and a train has the potential to initiate a derailment, which can result in injuries or deaths of train crew, passengers, and nearby residents as well as great property damage. Fire, explosion, or hazardous material release could result from a grade crossing collision induced derailment. One must also consider the costs arising from even minor collisions at grade crossings borne by railroads and their customers due to damage and delays.

2.2 Indiana's Rail System

Indiana officially adopted the state motto of "The Crossroads of America" in 1937 at a time when road building was increasing to meet the demands of the automobile. However, that term first became associated with Indiana in the 19th century, in part because of the many railroads that crossed the state. The 20th century builders of the highway system largely built at-grade across the existing rail system of the previous century. This convergence of railroads and highways makes Indiana home to more than 5,800 public grade crossings in the 21st century.

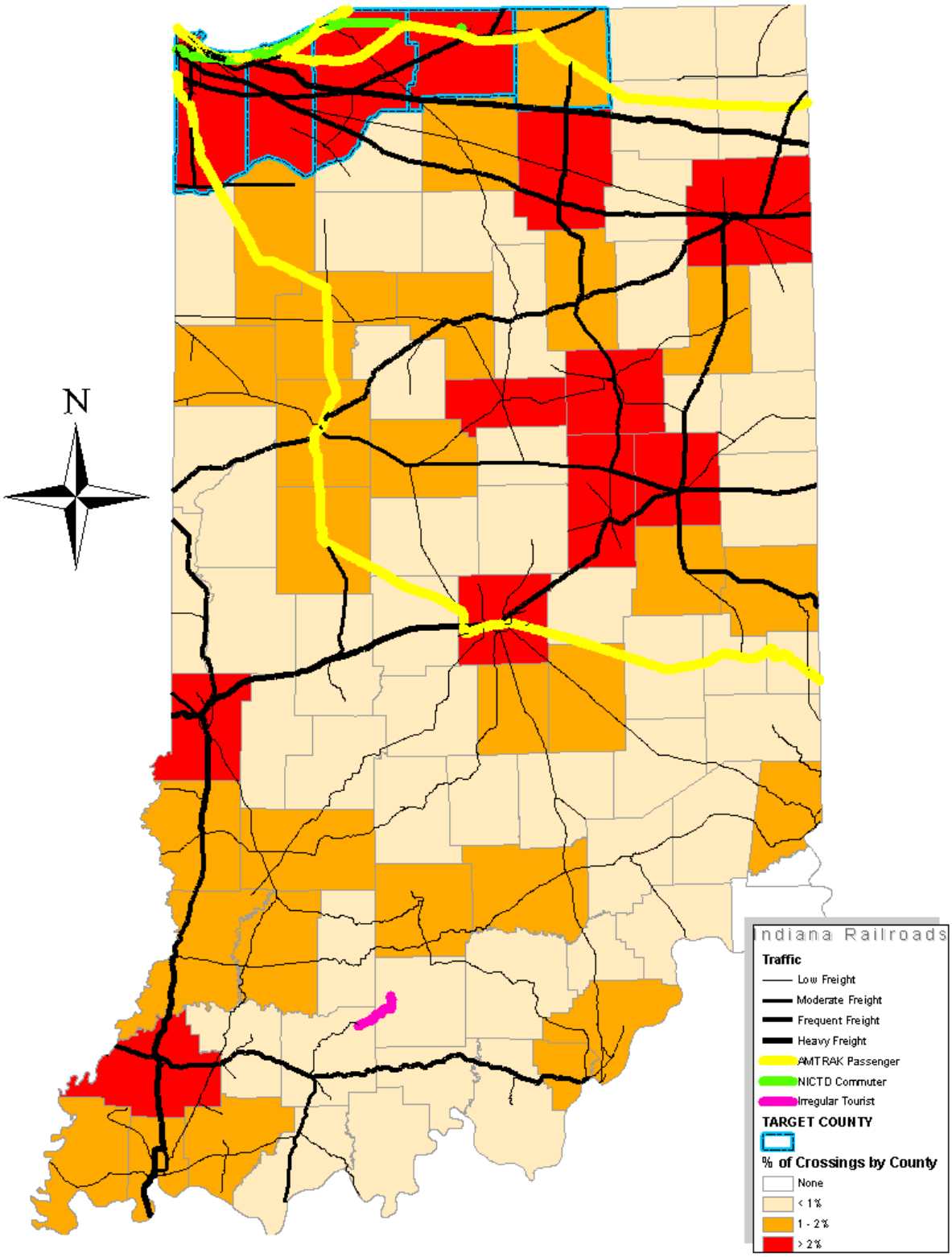
Many of the nation's busiest rail lines travel across Indiana leading to the nation's largest freight rail hub in Chicago, Illinois. Forty-two railroads operate over approximately 4,000 miles of track in Indiana. Freight lines carry in excess of 311million tons of freight annually, serving ports and intermodal terminals across the state. Changes in the operating strategies of freight railroads have also resulted in more and longer trains concentrated on fewer routes.

There is regular passenger service on AMTRAK routes through Indiana's northwestern border counties as well as Northwest Indiana Commuter Transportation District (NICTD) commuter service between South Bend and Chicago. Another AMTRAK passenger route crosses the state from the northwest to southeast. In addition, several tourist excursion trains operate on variable schedules throughout the year.

As illustrated on the Indiana Rail System Map (**Figure 2**), only two of Indiana's counties have no grade crossings. The 12 counties highlighted in red each contribute more than 2% of the total number of public grade crossings in the state. Together, they comprise roughly one third of all Indiana public grade crossings. The 24 counties highlighted in gold each contribute from 1% to 2% of the total grade crossings in the state. Together, they comprise roughly the second third of total grade crossings. The 54 counties highlighted in tan cover the remaining third of the state's grade crossings, each county contributing less than 1% to the state's total grade crossings.

The greatest concentration of conflicting railroad and highway traffic is within the five northwest border counties of Lake, Porter, La Porte, St. Joseph, and Elkhart. Together, these target counties comprise 15% of all grade crossings in the state. The rail corridors in these counties are subject to very heavy freight traffic, AMTRAK passenger service, and NICTD electric commuter train service.

Figure 2 Indiana Rail System



2.3 Private Grade Crossings

This plan is limited in its scope to address only grade crossings located on highways, roads, and streets maintained by a public authority. Privately owned roads or driveways leading into factories or onto farm fields are private grade crossings and operate under agreements between individual landowners and railroad companies. Presently, Indiana has no authority to regulate such grade crossings nor can it spend state or federal funds on their improvement.

From a safety perspective, the current treatment of private grade crossings is becoming increasingly problematic, which the challenges presented by High Speed Rail (HSR) corridors best illustrate. Currently under evaluation by the FRA are proposed safety principles such as:

- Eliminating redundant grade crossings and those that can't be made safe
- Installing state of the art traffic control/warning devices compatible with the location for train speeds between 80 and 110 mph
- Protecting rail movements with full width highway barriers or grade separation where train speeds are above 110 mph

Private grade crossings on high-speed rail corridors will also require these treatments before high-speed service can begin. The FRA is working to provide guidance to supplement existing regulations with respect to highway-rail grade crossings for use in funding HSR projects.

2.4 Mission & Vision

The intent of this safety action plan is to help ensure safe and efficient travel for all public roadway users as well as railroads. It has as an overarching goal the continued or accelerated downward trend in the occurrence of grade crossing collisions regardless of causation.

2.5 Evaluation Metrics & Goals

For purposes of evaluating this action plan there are three performance measures.

- **Three-Year Average Grade Crossings Collisions**

  Goal: Reduction of three-year collision average to below 100 by 2017

  Reason: *This measure is the methodology used by the FRA to identify the states required to produce a grade crossing action plan, a three-year average of collisions of any severity at both public and private grade crossings.*

Figure 3 Three-Year Average Grade Crossing Collisions

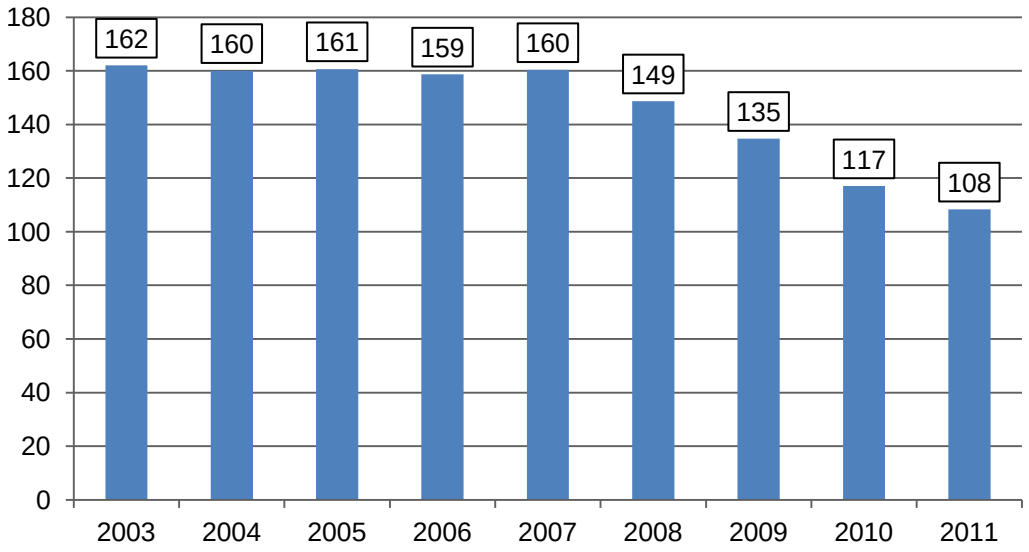
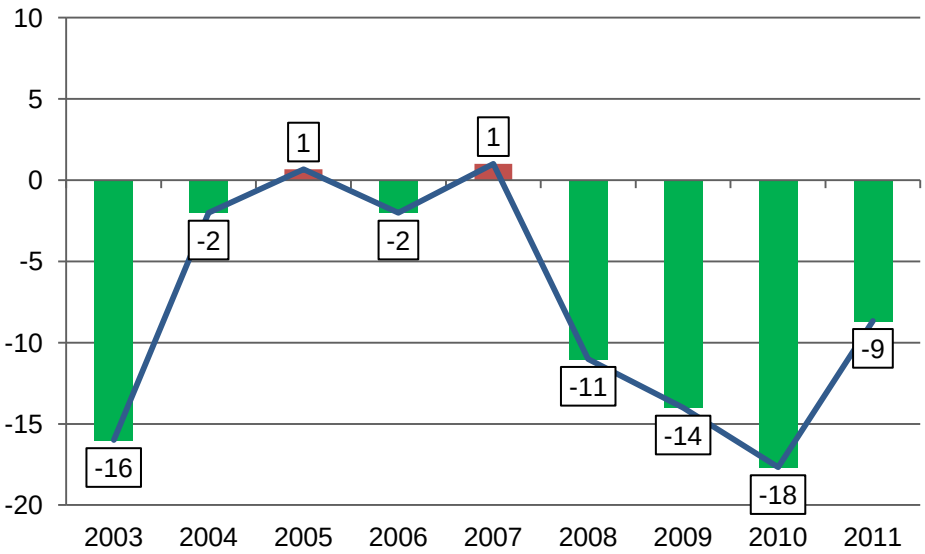


Figure 4 Three-Year Average Grade Crossing Collisions DELTA



- **Number of Fatal and Injury Collisions at Public Grade Crossings**

  Goal: Reduce the annual total of injury and fatality producing collisions to 25 or fewer by 2017

  Reason: *This measure addresses the intent of the SHSP to reduce severe collisions, which INDOT defines as a collision that results in either a fatality or an incapacitating injury. As that level of detail is not available from FRA incident reports, this measure will use what INDOT defines as a serious collision, one that produces any injury up through and including a fatality.*

Figure 5 Fatal and Injury Collisions at Public Grade Crossings

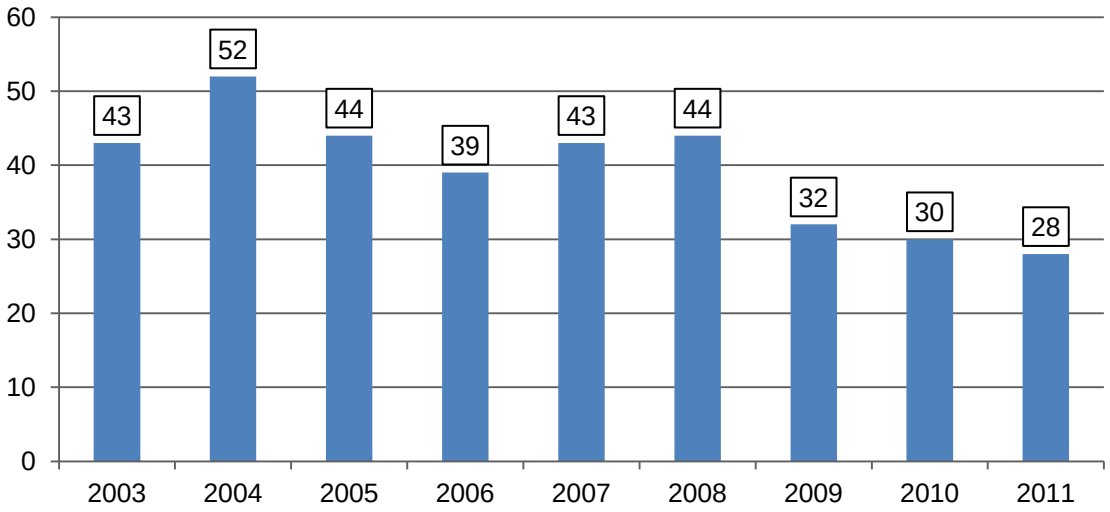
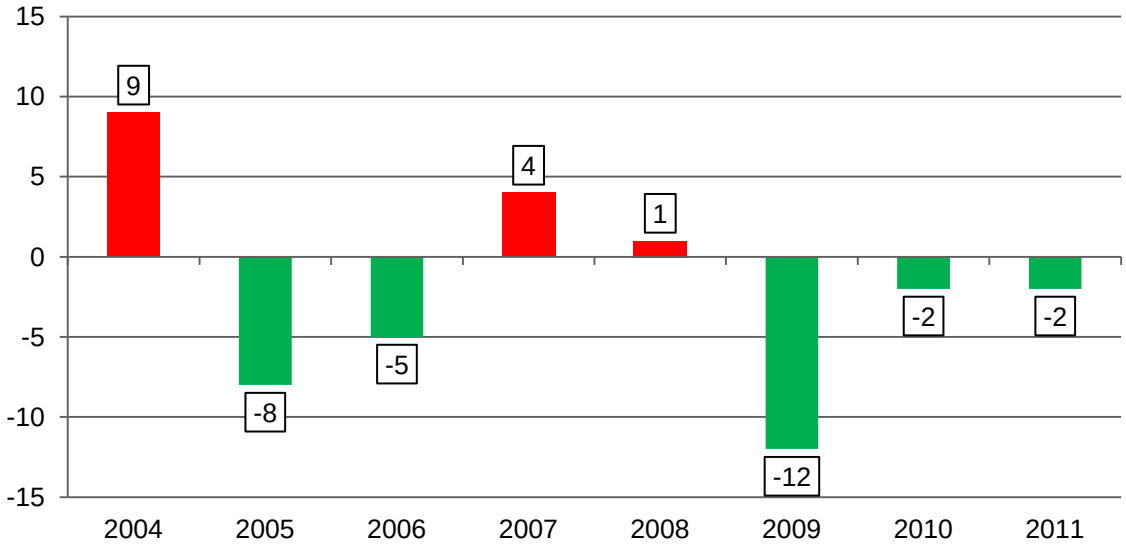


Figure 6 Fatal and Injury Collisions at Public Grade Crossings DELTA

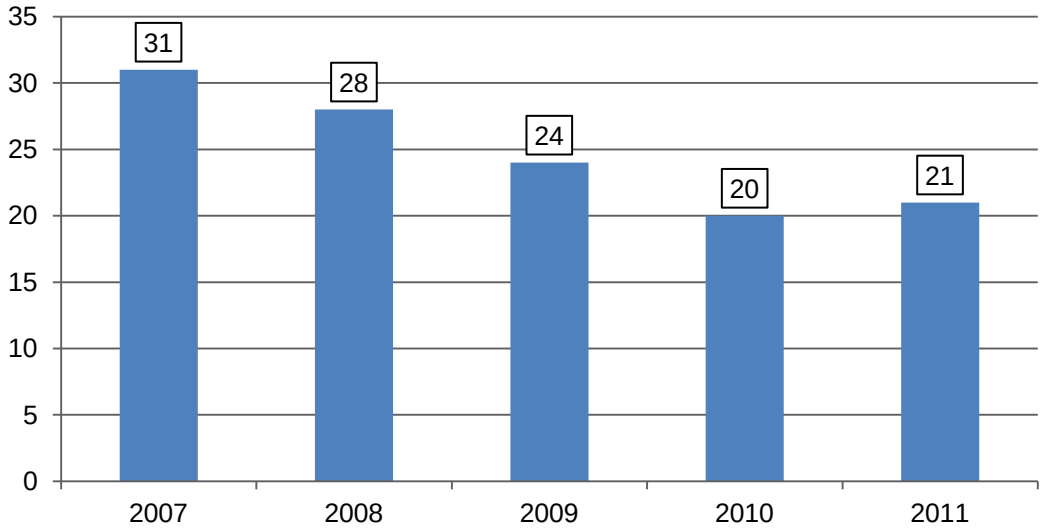


- **Number of Multiple Collision Crossings with More Than Two Collisions**

Goal: **Reduce the number of multiple collision crossings that experience more than two collisions to ten or fewer by 2017.**

Reason: *This measures a direct requirement of 49 CFR § 234.11 to "focus on grade crossings that have experienced multiple accidents or are at high risk for such accidents."*

Figure 7 Multiple Collision Crossings with More Than Two Collisions



2.6 Partners

This plan embraces participation from all roadway users, railroad companies, local law enforcement agencies, local highway agencies, and other stakeholders. Central to a multi-disciplinary approach to identifying and addressing problem areas and leaders in this action plan include:

- Indiana Department of Transportation (INDOT)
  - Rail Office
  - Office of Traffic Safety
  - Utilities & Railroads
- Indiana Criminal Justice Institute (ICJI)
- Indiana State Police (ISP)
- Federal Railroad Administration (FRA)
- Federal Highway Administration (FHWA)
- Indiana Operation Lifesaver (INOL)

Collectively, these organizations review current practice while exploring emerging concepts to continually improve safety and reduce collisions at highway-rail grade crossings.

Federal and state agencies as well as railroads and private organizations must work together if Indiana is to be successful in reducing the human and economic toll from grade crossing collisions. As best we can, we must work toward zero deaths, injuries, and collisions, consistent with the Indiana Strategic Highway Safety Plan.

3 PROBLEM IDENTIFICATION

3.1 Data Sources

To ensure consistency in collision evaluation, the source data used in the analysis of grade crossing collisions are the following:

- Highway-Rail Grade Crossing Accident/Incident Reports (FRA - Form 6180.57)
- National Grade Crossing Inventory
- Railroad Safety Statistics 2010 (Preliminary Data through 12/31/2012)
- Automated Reporting Information Exchange System (ARIES)

FRA form 6180.57 data provides the official record of grade crossing incidents. ARIES data (Indiana Motor Vehicle Collision Reports maintained by the Indiana State Police) provides additional information regarding contributing factors for motor vehicle collisions not captured by FRA incident reports. Where information from both databases is available, combined data provides a more complete picture of the contributing factors in those collisions.

3.2 Data Analysis

3.2.1 Grade Crossing Inventory

The source data in this section is from the National Grade Crossing Inventory as of December 31, 2011.

NOTE: INDOT has incorporated photo data to supplement the grade crossing inventory database. Public access to the enriched Indiana grade crossing inventory is available on the INDOT Web site at: ***http://dotmaps.indot.in.gov/apps/RailCrossings/***

Table 1 Public Grade Crossings by Warning Device

Active		
Four Quad Gates	11	.2%
Flashing Lights & Gates	2030	34.9%
Flashing Lights	1214	20.9%
HWTS, Bells	65	1.1%
Special Active	7	.1%
Passive		
Cross Bucks	1410	24.2%
Stop Signs	1003	17.2%
Other	81	1.4%
Total	**5821**	

As seen in **Table 1**, currently 57% of Indiana's public grade crossings are equipped with train activated warning devices of some kind. One in three grade crossings is equipped with flashing lights and gates. Only about 43% of public grade crossings have only passive warning devices.

Table 2 Top Five States by Public Vehicle Grade Crossings 2010

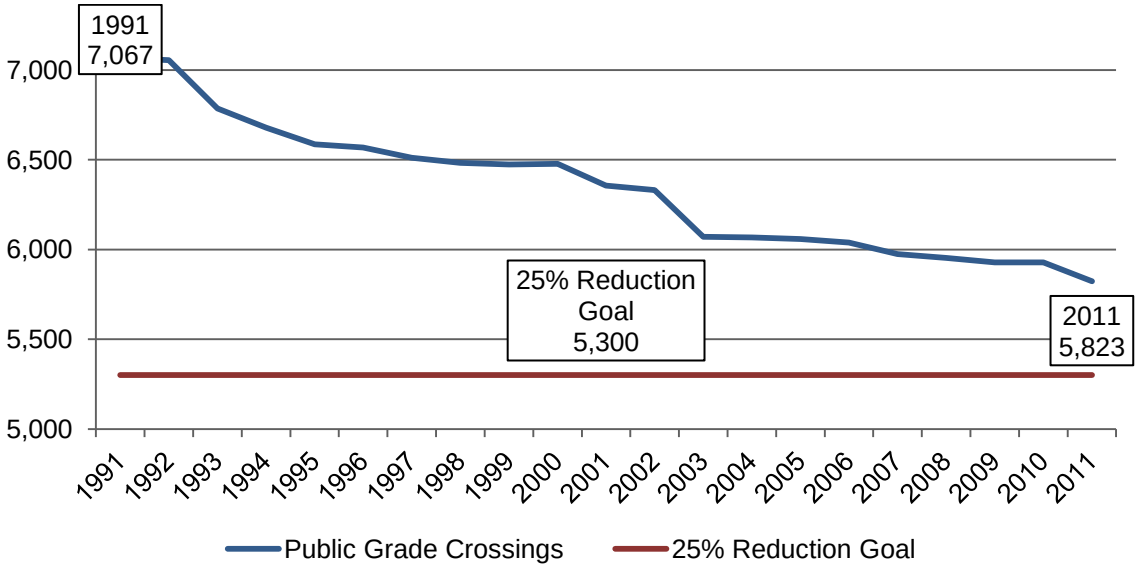
States	All Crossings			Private Vehicle			Public Vehicle		
	US Rank	#	US %	US Rank	#	US %	US Rank	#	US %
Texas	1	14,184	6.6	1	4,858	6.0	1	9,307	7.1
Illinois	2	12,035	5.6	2	3,902	4.8	2	7,807	6.0
California	3	9,239	4.3	3	3,190	3.9	3	5,894	4.5
Indiana	6	7,832	3.7	22	1,962	2.4	4	5,823	4.5
Ohio	4	8,645	4.0	5	2,833	3.5	5	5,771	4.4

As **Table 2** shows, with just over 5,800 public grade crossings, only three states have more public grade crossings. **Table 3** further reveals that Indiana ranks fifth nationally and third among action plan states in density of public grade crossings.

Table 3 Public Crossings Per Freight Track Mile (2009)

	Track Miles¤	US Rank	Public Crossings	US Rank	Crossings per mile	US Rank
Florida	2,983	27	3,767	15	1.3	1
Georgia	4,798	10	5,390	6	1.1	3
Indiana	5,400	8	5,928	4	1.1	5
Iowa	4,270	14	4,404	10	1.0	7
California	6,842	3	6,491	3	0.9	11
Ohio	6,535	5	5,848	5	0.9	15
Louisiana	3,439	22	3,027	18	0.9	16
US	170,450		134,161		0.8	
Illinois	9,982	2	7,838	2	0.8	24
Alabama	3,724	16	2,835	21	0.8	25
Texas	14,361	1	9,817	1	0.7	32
¤Source: Association of American Railroads						

Figure 8 Public at Grade Crossing Trend 1991-2011



As shown in **Figure 8**, when the FRA announced the national goal to close 25% of highway-grade crossings in the United States in 1991, Indiana had jurisdiction over approximately 7,000 public grade crossings. Through a combination of railroad abandonments and other actions, as well as state or locally initiated grade crossing closure agreements, there are approximately 16% fewer grade crossings today than when the goal was established. INDOT remains committed to pursuing achievement of the initial goal.

3.2.2 Collision and Casualties Summary

The source data in this section is from the FRA Highway-Rail Grade Crossing Accident/Incident database as of December 31, 2011.

NOTE: The FRA methodology used to identify the states required to produce a grade crossing action plan counted collisions at both public and private grade crossings. Consequently, collisions at private grade crossings are included in **Figure 9**. A second chart showing only public grade crossing collisions is included as **Figure 10** to show the small influence private grade crossing collisions have on the total.

Figure 9 All Grade Crossing Collisions 2003-2011

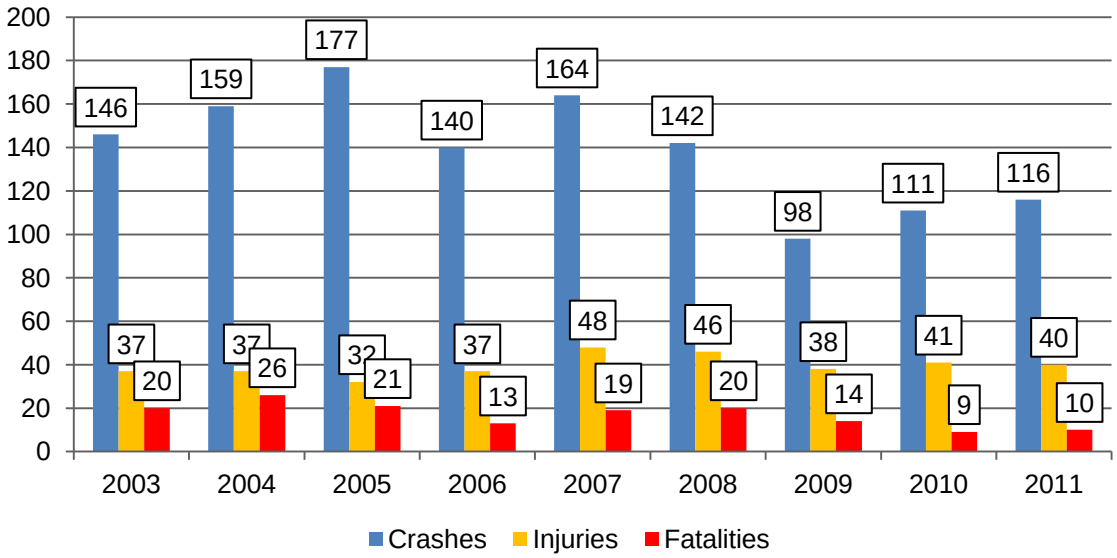
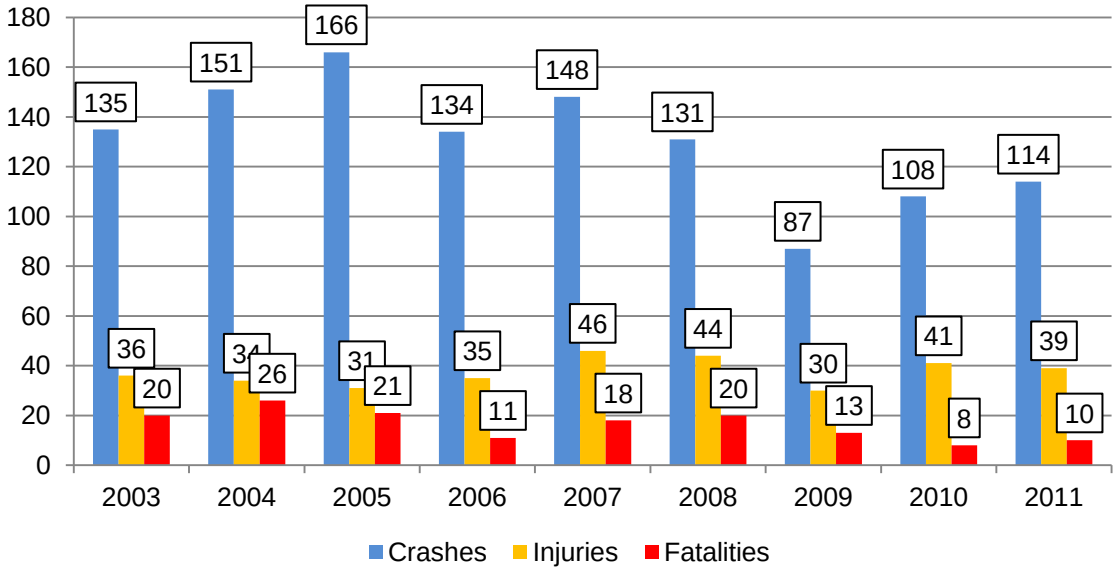


Figure 10 Public Grade Crossing Collisions



As seen in **Figure 9**, collision performance at highway-rail grade crossings in Indiana has been encouraging in recent years, with an overall downward trend in the total number of collisions. Since 2003, total collisions peaked at 177, but four years later had dropped to an all time low of 98. In 2010, the overall number of highway-rail grade crossing collisions rose to 111 and rose again in 2011 to 116. While a constant decline in collisions, injuries, and deaths would be preferred, a long-term downward trend is encouraging even as short-term statistics vary, indicating normal 'regression to the mean.'

As illustrated in **Figure 11**, the most rapid improvement in the reduction of grade crossing collisions occurred during the early years of the Section 130 program.

Since then, the rate of change has decreased, yet the long-term trend continues to show slow improvement.

Figure 11 Number of Grade Crossing Collisions 1975-2011

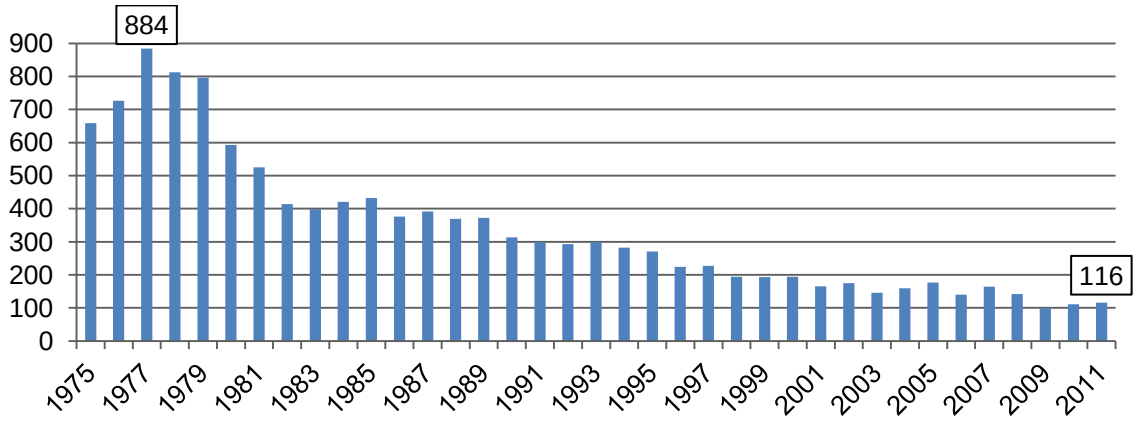


Table 4 Collisions by Warning Device 2003-2011

	2003	2004	2005	2006	2007	2008	2009	2010	2011
All Highway-Rail Collisions	146	159	177	140	164	142	98	111	116
Collisions at Passive Crossings	64	55	62	48	52	49	38	42	38
Collisions at Active Warning	82	104	115	92	112	94	60	69	78
Gates	55	70	68	52	72	58	42	50	55
Flashing Lights	26	33	47	39	39	36	17	18	22
% at Active Grade Crossings	56%	65%	65%	66%	68%	66%	61%	62%	67%
% at Gated Grade Crossings	38%	44%	38%	37%	44%	41%	43%	45%	47%

As **Table 4** indicates, as of 2011 two out of every three collisions occurred at grade crossings with train-activated warning devices already in place and nearly half of all collisions occurred at gated grade crossings.

Table 5 Primary Factors in Grade Crossing Collisions

Primary Factor	Number of Collisions	%
DRIVER	856	88.2%
Disregard Signal/Regulatory Sign	297	30.6%
Failure to yield right of way	265	27.3%
Ran off road right	31	3.2%
Alcoholic beverages	31	3.2%
Other driver factors	232	23.9%
OTHER (Environment, Vehicle)	115	11.8%
TOTAL	971	

As illustrated by **Table 5**, an analysis of nearly 1000 Indiana police reports on collisions at grade crossings from January 1, 2003 through April 5, 2012, reveals the primary factor for grade crossing collisions is driver decision making. This is consistent with the findings of the US DOT Inspector General's 2004 report to congress, which concluded through its analysis of data nationwide that risky driver behavior or poor judgment accounted for 94 percent of public grade crossing collisions.

3.2.3 Multiple Collision Grade Crossings

The source data in this section is from the FRA Highway-Rail Grade Crossing Accident/Incident database current through December 31, 2011.

NOTE: Indiana defines a "multiple collision crossing" as a public grade crossing that has experienced two or more collisions within 60 months.

Table 6 Multiple Collision Crossings (Period 2007-2011)

CROSSING	COLLISIONS	COUNTY	CITY	ROADWAY	DEVICE*	PROJECT	STATUS
879204S	9	DELAWARE	MUNCIE	MCGALLIARD RD	LIGHTS	Sec 130	Construction
163639F	5	LAKE	E CHICAGO	EUCLID AVE	GATES	Sec 130	Done 2011
326972X	5	LAKE	E CHICAGO	CHICAGO AVE	GATES	Sec 130	Programmed
155623N	4	PORTER	PORTAGE	SR 149	4Q GATES	Sec 130	Done 2010
155645N	4	LAKE	GARY	CLARK RD	GATES	Sec 130	Done 2005
510033V	4	ELKHART	GOSHEN	COTTAGE AVE	GATES	Sec 130	Annual Eval.
870876S	4	LAKE	GARY	COUNTY LINE RD	GATES	Dist Maint.	Done 2010
155637W	3	LAKE	GARY	LAKE ST	GATES	Sec 130	Done 2009
163643V	3	LAKE	GARY	INDUSTRIAL HWY	GATES	Sec 130	Annual Eval.
292252F	3	JOHNSON	BARGERSVILLE	CR 144	STOP SIGNS	Sec 130	Annual Eval.
342606M	3	POSEY	MT VERNON	GIVENS RD	XBUCKS	Sec 130	Annual Eval.
478576B	3	STARKE	KNOX	SR 8	GATES	Sec 130	Annual Eval.
522518A	3	ST JOSEPH	OSCEOLA	CHESTNUT ST	GATES	Sec 130	Done 1986
522538L	3	ST JOSEPH	MISHAWAKA	LOGAN ST	GATES	Sec 130	Annual Eval.
522546D	3	ST JOSEPH	SOUTH BEND	VERNON ST	GATES	Sec 130	Annual Eval.
538903B	3	DELAWARE	MUNCIE	CR 250 W	GATES	Sec 130	Annual Eval.
539251M	3	MARION	INDIANAPOLIS	34TH ST	GATES	Sec 130	Annual Eval.
870451D	3	LA PORTE	MICHIGAN CITY	VAIL ST	GATES	Sec 130	Done 2010
155465R	2	MARSHALL	TEEGARDEN	W. 1ST ST	GATES	Sec 130	Annual Eval.
163632H	2	LAKE	HAMMOND	COLUMBIA AVE	GATES	HES9	Done 2009
283200P	2	LAKE	GRIFFITH	MAIN ST	GATES	Sec 130	Done 2010
283354A	2	ST JOSEPH	SOUTH BEND	30TH ST	GATES	Sec 130	Done 1997
326879R	2	LAKE	E CHICAGO	DICKEY RD	GATES	Sec 130	Done 1982
326930L	2	LAKE	HAMMOND	136TH ST	XBUCKS	Sec 130	Annual Eval.

CROSSING	COLLISIONS	COUNTY	CITY	ROADWAY	DEVICE*	PROJECT	STATUS
326963Y	2	LAKE	HAMMOND	165TH ST	4Q GATES	Sec 130	Done 2010
341141A	2	LAKE	DYER	77TH ST	LIGHTS	Sec 130	Annual Eval.
342283U	2	VIGO	TERRE HAUTE	MARGARET AVE	GATES	Sec 130	Done 2009
342341M	2	SULLIVAN	SULLIVAN	DEPOT ST	LIGHTS	Sec 130	Annual Eval.
342396A	2	KNOX	VINCENNES	MINNEAPOLIS AVE	LIGHTS	Sec 130	Done 1989
342417R	2	KNOX	VINCENNES	BUNTIN ST	STOP SIGNS	Sec 130	Annual Eval.
342419E	2	KNOX	VINCENNES	BROADWAY ST	LIGHTS	Sec 130	Annual Eval.
342611J	2	POSEY	MT VERNON	O"DONNELL RD	XBUCKS	Sec 130	Annual Eval.
342780W	2	POSEY	MT VERNON	TILE FACTORY RD	GATES	Sec 130	Done 2008
342850J	2	VANDERBURGH	EVANSVILLE	OHIO ST	GATES	Sec 130	Done 2002
474801C	2	TIPPECANOE	LAFAYETTE	CONCORD RD	GATES	Sec 130	Annual Eval.
477207B	2	WELLS	BLUFFTON	MARKET ST	LIGHTS	Sec 130	Done 1983
477848H	2	ALLEN	WOODBURN	WOODBURN RD	XBUCKS	Sec 130	Annual Eval.
478275F	2	HUNTINGTON	HUNTINGTON	HITZFIELD ST	GATES	Sec 130	Done 2011
478312F	2	WABASH	WABASH	BOND ST	LIGHTS	Sec 130	Annual Eval.
478594Y	2	STARKE	KNOX	CR 100 E	GATES	Sec 130	Done 2010
478677M†	2	LAKE	GARY	RIDGE RD	GATES	Sec 130	Done 2002
478682J	2	LAKE	GARY	CALHOUN	GATES	Sec 130	Done 2009
478692P	2	LAKE	HAMMOND	169TH ST	GATES	Sec 130	Annual Eval.
478695K	2	LAKE	HAMMOND	165TH ST	GATES	Sec 130	Done 1976
483386H	2	MARSHALL	PLYMOUTH	W 13TH RD	STOP SIGNS	Sec 130	Annual Eval.
510016E	2	ELKHART	DUNLAP	CR 15	GATES	Sec 130	Annual Eval.
510019A	2	ELKHART	GOSHEN	BEAVER LN	GATES	Sec 130	Done 1983
510021B	2	ELKHART	GOSHEN	1ST ST	GATES	Sec 130	Annual Eval.
522503K	2	ELKHART	ELKHART	MCDONALD ST	GATES	Closing	Committed
522506F	2	ELKHART	ELKHART	MAIN ST	GATES	Sec 130	Done 1981
522536X	2	ST JOSEPH	MISHAWAKA	WELLS ST	GATES	Sec 130	Annual Eval.
522543H	2	ST JOSEPH	S BEND	ROBINSON ST	GATES	Sec 130	Annual Eval.
522562M	2	ST JOSEPH	S BEND	OLIVE ST	GATES	Sec 130	Programmed
522563U	2	ST JOSEPH	S BEND	MEADE ST	4Q GATES	Sec 130	Done 2009
522597N	2	LA PORTE	LA PORTE	MADISON ST	GATES	Sec 130	Annual Eval.
522599C	2	LA PORTE	LA PORTE	TYLER ST	4Q GATES	Sec 130	Done 2009
522639X	2	LAKE	GARY	COUNTY LINE RD	GATES	Sec 130	Done 2010
522783P	2	LAKE	LAKE STATION	CLAY STREET	GATES	Sec 130	Annual Eval.
522929F	2	LAKE	HAMMOND	CALUMET AVE	GATES	Sec 130	Programmed
527864G	2	HENRY	NEW CASTLE	22ND ST	LIGHTS	Sec 130	Annual Eval.
527899H	2	WAYNE	RICHMOND	NW L ST	GATES	Sec 130	Annual Eval.
533570K	2	KOSCIUSKO	WARSAW	MAIN ST	LIGHTS	Sec 130	Done 2003
533572Y	2	KOSCIUSKO	WARSAW	MARKET ST	LIGHTS	Sec 130	Done 2003

CROSSING	COLLISIONS	COUNTY	CITY	ROADWAY	DEVICE*	PROJECT	STATUS
533573F	2	KOSCIUSKO	WARSAW	WINONA AVE	LIGHTS	Sec 130	Annual Eval.
535407V	2	SCOTT	AUSTIN	W MORGAN ST	LIGHTS	Sec 130	Annual Eval.
538939J	2	MADISON	ANDERSON	SCATTERFIELD RD	GATES	Sec 130	Annual Eval.
538992V	2	HANCOCK	FORTVILLE	CR 400 W	GATES	Sec 130	Annual Eval.
539176D	2	MARION	INDIANAPOLIS	WARMAN AVE	GATES	Sec 130	Annual Eval.
539258K	2	MARION	LAWRENCE	HUNTER ST	GATES	Sec 130	Annual Eval.
539268R	2	MARION	OAKLANDON	COUNTY LINE RD	GATES	Sec 130	Done 2005
539632B	2	GRANT	FAIRMOUNT	4TH ST	XBUCKS	Sec 130	Programmed
724880H	2	GIBSON	FRANCISCO	CR 850 E	STOP SIGNS	Sec 130	Annual Eval.
724901Y	2	GIBSON	OAKLAND CITY	HARRISON ST	LIGHTS	Sec 130	Annual Eval.
724909D	2	PIKE	WINSLOW	CR 375 S	STOP SIGNS	Sec 130	Annual Eval.
725087X	2	DUBOIS	ST ANTHONY	KYANA RD	XBUCKS	Sec 130	Annual Eval.
850412H	2	MARION	INDIANAPOLIS	MICHIGAN ST	LIGHTS	Sec 130	Annual Eval.
850435P	2	MARION	INDIANAPOLIS	CHURCHMAN AVE	LIGHTS	Sec 130	Annual Eval.
870380J	2	ST JOSEPH	S BEND	GREEN ST	XBUCKS	Sec 130	Annual Eval.
870677P	2	LA PORTE	MICHIGAN CITY	FRANKLIN ST	XBUCKS	Sec 130	Annual Eval.
870687V	2	LA PORTE	MICHIGAN CITY	CHICAGO ST	LIGHTS	Sec 130	Annual Eval.

***Device may differ from National Inventory record due to delay in transmitting updated data**

†478677M represents closed crossing ID 478678U, which was eliminated after an inventory correction. Both referenced different approaches to the same crossing located diagonally across an intersection.

Table 7 Multiple Collision Crossings with Nearby Signalized Intersections

Crossing	Preemption	Crashes
Intersection within 75' of crossing		
879204S	Simultaneous	9
155637W	Simultaneous	3
342419E	(Data Not Available)	2
522562M	Simultaneous	2
539258K	Not interconnected	2
539268R	Simultaneous	2
870677P	Simultaneous	2
	Total	22
Intersection 75'-200' from crossing		
870451D	Advance	3
510016E	Simultaneous	2
	Total	5
Intersection 201'-500' from crossing		
539251M	Not interconnected	3
163632H	(Data Not Available)	2
533573F	Not interconnected	2
	Total	7

Table 8 Multiple Collision Crossing by Warning Device

CROSS BUCKS	STOP SIGNS	FLASHING LIGHTS	GATES	FOUR QUAD GATES
9	6	**19**	**42**	**4**
11.25%	7.5%	**23.75%**	**52.5%**	**5%**

Table 9 Multiple Collisions Crossings by Railroad Class

	CLASS 1			CLASS 2 & 3			Commuter	
RR	NS	CSX	CN	IHB	INRD	LIRC	NICD	Total
XINGS	40	27	2	4	1	1	5	80
		86.3%			**7.5%**		**6.2%**	

Table 10 County Multiple Collision Crossing Percentage

COUNTY*	MULTIPLE COLLISION CROSSINGS	PERCENT	DEATHS	INJURIES
LAKE	***19***	***23.8%***	***13***	***19***
ST JOSEPH	***9***	***11.3%***	***2***	***4***
MARION	6	7.5%	0	6
ELKHART	***6***	***7.5%***	***2***	***2***
LA PORTE	***5***	***6.3%***	***1***	***0***
KNOX	3	3.8%	0	1
POSEY	3	3.8%	0	0
KOSCIUSKO	3	3.8%	0	2
MARSHALL	2	2.5%	0	0
GIBSON	2	2.5%	0	2
STARKE	2	2.5%	1	1
DELAWARE	2	2.5%	0	4
JOHNSON	1	1.3%	0	0
SULLIVAN	1	1.3%	1	1
HANCOCK	1	1.3%	0	0
VIGO	1	1.3%	0	1
VANDERBURGH	1	1.3%	0	0
GRANT	1	1.3%	1	0
SCOTT	1	1.3%	0	0
DUBOIS	1	1.3%	0	0
HENRY	1	1.3%	0	2

COUNTY*	MULTIPLE COLLISION CROSSINGS	PERCENT	DEATHS	INJURIES
HUNTINGTON	1	1.3%	2	0
TIPPECANOE	1	1.3%	0	1
PIKE	1	1.3%	2	0
PORTER	***1***	***1.3%***	***0***	***1***
WABASH	1	1.3%	0	0
WAYNE	1	1.3%	0	2
WELLS	1	1.3%	0	2
ALLEN	1	1.3%	0	1
MADISON	1	1.3%	0	1

Northwest Border Corridor Counties in Italics

The grade crossings listed in **Table 6** represent the most recent "snapshot in time" of multiple collision crossings. These grade crossings receive an annual assessment of hazard risk as part of the Section 130 program evaluation. Within the past five years, 22 of the 80 listed (27.5%) have received an engineering countermeasure or are awaiting completion of a programmed improvement. Particular attention is necessary for crossings with three or more collisions as they represent locations where traditional countermeasures either have been ineffective, or have been difficult to implement.

As shown in **Table 7**, 12 multiple collision crossings are located near signalized roadway intersections. Crossings with signalized intersections less than 75 feet away experienced 12.5% of all collisions at multiple collision crossings.

Table 8 illustrates, 80% of multiple collision crossings already are equipped with train-activated warning devices. Gated grade crossings make up 57% of multiple collision crossings.

Table 9 shows most multiple collision crossings are on Class 1 roads. The lone electric commuter line contributes nearly as many multiple collision crossings as all of the Class 2 & 3 roads combined.
As noted earlier, the five northwest border counties of Lake, Porter, La Porte, St. Joseph, and Elkhart together account for 15% of all grade crossings in the state so it is not surprising that **Table 10** indicates half of all grade crossings experiencing multiple collisions are located in these five counties. Lake County by itself accounts for nearly one out of every four multiple collision crossings.

3.3 Findings

1. Indiana has the third highest density of public grade crossings among states required to produce a safety action plan. That fact leads to the conclusion that reducing the number of grade crossings through closure or grade separation should reduce the number of collisions.

   Countermeasures:

   Grade Crossing Closure

   Grade Crossing Separation

2. In recent years, Indiana has recorded all-time low numbers of grade crossing collisions, injuries, and deaths; however, the rate of improvement has slowed since the earliest days of the Section 130 program. This suggests Indiana needs to implement corrective programs that are more aggressive if it is to achieve greater and more rapid reductions in grade crossing collisions and casualties.

   Countermeasures:

   Train-Activated Warning Device Improvement

   Passive Warning Device Improvement

3. As the percentage of grade crossings equipped with train-activated warning devices has increased, so has the percentage of driver violations resulting in collisions at grade crossings with active warning. This indicates that traditional engineering countermeasures of adding only flashing lights with standard gates may need enhancement to be more effective. In addition, over the five years of 2007 through 2011, eighty public grade crossings experienced more than one collision accounting for over one third of all grade crossing collisions. Ensuring that these grade crossings receive extra priority for evaluation and treatment is indicated.

   Countermeasures:

   Rapid Evaluation

   Priority Programming of Treatments

4. As noted earlier, the greatest concentration of conflicting railroad and highway traffic is located within in the five northwest border counties of Lake, Porter, La Porte, St. Joseph, and Elkhart, which also is home to the greatest number of multiple collision crossings. Targeted education and law enforcement programs centering on the Class 1 and commuter lines in these counties would most likely help ensure driver compliance with the existing and enhanced engineered grade crossing warning devices.

   Countermeasures:

   Education

   Enforcement

4 ACTION PLAN STRATEGIES

4.1 Grade Crossing Closure

Challenges to implementation

Funding to support implementation

Local municipality resistance to closure

The safest public highway-rail grade crossing is no crossing at all. For that reason, INDOT seeks to curtail the construction of new grade crossings, and actively seeks the consolidation of grade crossings where it is feasible and reasonable to do so. INDOT evaluates nearby grade crossings for closing whenever it invests in a project to upgrade warning devices or that involves an existing or new grade separation.

Indiana Code IC 8-6-7.7 authorizes the Indiana Department of Transportation to order any grade crossing closed if the enhancement of public safety resulting from the closing will outweigh any inconvenience caused, or based upon criteria specified in the Indiana Administrative Code (105 IAC 5-10-2.)

The INDOT Rail Office applies a portion of the Railroad Grade Crossing Fund (IC 8-6-7.7-1) to an ongoing program to encourage permanent closing of redundant grade crossings (**Table 11**). The Rail Office manages this program as a lump sum payment to communities upon the closing of a public highway-rail grade crossing. The municipality may use the funds for any public purpose. The award amount varies according to the predicted collision rate for the closed grade crossings and generally ranges from $15,000 to $60,000 depending on funding availability. During ongoing inspection of crossings, whenever code enforcement officers believe a crossing closure would not affect highway users or emergency vehicles, they propose a closure to the authority having jurisdiction over the roadway.

Table 11 Rail Grade Crossing Fund Closing Awards

Year	Crossing ID (s)	Municipality	County	Award
2007	292348V, 292345A	Town of Dugger	Sullivan	$95,000.00
2009	522536X	Mishawaka	St. Joseph	$60,000.00
2009	352361B, 345227X	Town of Borden	Clark	$105,000.00
2009	735863X	Town of Chrisney	Spencer	$45,000.00
2010	535874H	Town of Lapel	Madison	$30,000.00
2012	372976X, 372974J		Greene	$60,000.00
2012	538302S	City of Indianapolis	Marion	$26,500.00

4.2 Grade Separation

Challenges to implementation

Funding to support implementation

Grade separation eliminates the hazards inherent in grade crossings and provides greater mobility for both rail and roadway traffic. However, due to the high costs and extended development time required for environmental review, right of way acquisition, and construction, use of Section 130 funds is not reasonable.

INDOT and local roadway owners advance grade separation projects (**Table 12**) in locations where high volumes or high speeds of both roadway and rail traffic make at grade crossings with any type of warning device (passive or active) undesirable. This plan seeks to identify grade crossings statewide for which grade separation would be a cost-effective benefit and to work with local interests to develop plans for their replacement.

Table 12 Grade Separation Projects Eliminating Crossings

Crossing ID	Project Number	Design	Location
509843R	0088720	Local	Allen Chapel Rd Bridge over NS RR
163637S	0200188	Local	Railroad Ave Bridge over CSX RR
916439E	0200586	State	US 231, Over AEP Railroad Spur
725075D	0200614	State	SR 145, Over Norfolk Southern RR, 3.95 miles N of Perry County Line
522526S	0200989	State	SR 331, Bridge NS RR
484282E	0400991	State	CR 500 E over SR 25 & NS RR
484278P	0400992	State	CR 625E over SR 25 & NS RR
484272Y	0400996	State	CR 900E over SR 25 & NS RR
484244V	0401299	State	CR 500 S over SR 25 & NS RR
484240T	0401301	State	SR 25 Bridge over NS RR Spur
484239Y	0401302	State	CR 325 W over SR 25 & NS RR
484265N	0500632	State	SR 25 over US421/SR39 & NS RR
533210M	0900141	State	SR 25 Bridge over CR 400 W & WSRR
916928P	9300360	State	US 231 Bridge over AK Steel Railroad Spur
735867A	9300440	State	US 231 Bridge over ISRR
522502D	9881990	Local	Indiana Avenue Bridge over NS RR
474798W	9900510	State	US 52 Bridge over NS RR

The INDOT Rail Office Manger is working closely with the Northwestern Indiana Regional Planning Commission (NIRPC) on efforts to develop construction projects for grade separations at high priority locations. The metropolitan

planning organization's rail working group identified high priority locations to provide both safety improvement and congestion reduction.

As noted in **TABLE 13** seven multiple collision crossings are among the 23 grade crossings the proposed projects would separate. The NIRPC planning area of northwestern Indiana covers three of the five counties with the greatest concentration of conflicting railroad and highway traffic. High-speed rail projects are also in development for the area and a portion of the AMTRAK line on one corridor is now operating at 110 mph between Porter, Indiana and Kalamazoo, Michigan making extraordinary consideration for this line necessary and prudent.

Table 13 NIRPC Proposed Grade Separation Projects

CROSSING(s)	CITY	LOCATION	RAILROADS
522628K 232115K 548529M	Chesterton	15th St.	NS, CSX
163639F‡	East Chicago	Euclid Ave.	CSX
326879R‡	East Chicago	Dickey Rd.	IHB
260718H 326972X‡	East Chicago	East Chicago Ave.	IHB, CN
478669V	Gary	Broadway Ave.	NS
260729V 155645N‡ 522646H	Gary	Clark Rd.	CN, NS, CSX
155633U	Gary	Old Hobart Rd	CSX, CSS
283202D	Griffith	Colfax St.	CN
163627L 870916M	Hammond	Calumet Ave.	CSS, CSX
478695K‡	Hammond	165th St.	NS
326963Y‡ 327022G	Hammond	165th St.	IHB
283195V	Munster	Calumet Ave.	CN
478642L 283239T 522873N	Porter County	Tower Rd.	CN, NS, CFE
155623N‡	Porter County	SR 149	CSX

‡ Multiple Collision Crossing

4.3 Train-Activated Warning Device Improvement

Challenges to implementation

Funding to support implementation

The INDOT Office of Traffic Safety administers the federal aid highway-rail grade crossing program under United States Code Title 23, Section 130. The goal of this safety fund, commonly referred to as 'Section 130', is to improve the safety of the most hazardous grade crossings in the State of Indiana.

NOTE: The future of the Section 130 program is uncertain as federal authorizing legislation is under revision. In its current form, section 130 is a special set-aside of the Highway Safety Improvement Program, which provides Indiana with funding to accomplish approximately 20-25 projects annually.

INDOT typically uses Section 130 funds to install train-activated warning device improvements and does not require matching funds for projects from local government authorities. Section 130 provides upgrades from passive to active warning or improvements to existing active devices including installation of overhead cantilever flashing lights, constant warning time circuitry, and other current state of the practice train-activated warning equipment. It also funds the

replacement of obsolete equipment such as constant flashing red lights or crossings with warning bells only.

Typical highway-rail grade crossing upgrades using Section 130 funds generally fall into two categories:

1. With existing passive protection (such as cross bucks and/or stop signs) at the grade crossing, a safety project would install train-activated warning devices such as warning bells, flashing lights, overhead cantilevers with flashing lights, and gates.
2. With existing train-activated protection (such as flashing lights and/or gates), a safety project could upgrade the existing signal equipment, install an overhead cantilever with flashing lights, upgrade circuitry to add constant warning time, add four-quadrant gates, or other enhancements to improve safety at the highway-rail grade crossing.

Section 130 improvements require no matching funds by local government authorities.

4.4 Passive Warning Device Improvement

Challenges to implementation

Funding to support implementation

Coordination between railroads and local road authorities

The INDOT Rail Office conducts approximately 2,500 on-site inspection of public rail-highway crossings throughout the year for the purpose of verifying the following information:

Correct signage and pavement markings

Both rail and roadway view sights

Grade crossing surface condition

Inventory updates

When deficiencies are noted, the railroad or the road authority is contacted about correcting the problems. Often, financial assistance is available from the Indiana Railroad Grade Crossing Fund (RRGCF). Towns, cities, and counties are eligible to apply for these funds as a 100% reimbursement for expenditures to upgrade advance signage, pavement markings, and nighttime illumination. Class II and III railroads and port authorities operating a railroad also may apply, however some items require a 50% match.

As noted earlier, while 23 CFR 646.206 permits use of Section 130 funds for the installations of standard signs and pavement markings, Indiana has traditionally reserved Section 130 funds for projects that add or improve train activated warning devices. However, the 2009 Manual of Uniform Traffic Control Devices (MUTCD) requires changes in signage at all public passive grade crossings. MUTCD section 8B.04 directs that all cross buck assemblies must also carry

YIELD or STOP Signs and added retroreflective striping by December 31, 2019. To accelerate these improvements, INDOT will use contributions of Section 130 funds on a 50-50 cost sharing basis toward a railroad company's upgrade of passive grade crossing signage to meet the new requirement.

In 2010, INDOT entered into an agreement with CSX Transportation Corporation to upgrade all of the passive public grade crossings on its Indiana trackage (597 grade crossings). This project developed the necessary implementation process as well as evaluated the benefits of such agreements.

In 2012, INDOT is working with Norfolk Southern on a similar cost sharing agreement that will provide funding to accelerate the program to upgrade the cross bucks at Norfolk Southern's approximately 580 passive public crossings in Indiana. The Indiana Rail Road has expressed interest in taking advantage of the funding offer, which would improve roughly 80 passive grade crossings.

INDOT would fund improvements to smaller short line railroads with 50 crossings for fewer with the state's RRGCF.

Additionally, in INDOT's Local Highway Safety Improvement Program Project Selection Guidance, local public agencies may apply for funding of projects to install (after agreement with the railroad owner) new cross buck assemblies in compliance with the 2009 MUTCD at grade crossings currently equipped with only passive warning devices. INDOT's intent for this funding approach is to help accelerate improvements at grade crossings of short line and regional railroad corridors.

4.5 Multiple Collision Crossings

Challenges to implementation

Funding to support implementation

Staff resources

If a grade crossing experiences two collisions within a five-year period, it is considered a multiple collision crossing and will receive greater scrutiny. INDOT conducts an on-site inspection as soon as practicable to determine if there are traffic control measures or code enforcement conditions that can be addressed immediately.

INDOT communicates with entities that may have additional helpful information with the intent of encouraging a multi-disciplinary approach to determine effective countermeasures for any problems found. These would include but not be limited to, the railroad involved, local law enforcement, and the roadway owner.

At any point during the evaluation, the INDOT Traffic Safety Office may conduct a formal road safety audit to accomplish a comprehensive engineering, education, and enforcement approach to address the collision problem.

The final documentation for the investigations consists of internal INDOT documents such as:

1. Field check minutes -or-
2. E-mail correspondence regarding the police collision report

No formal engineering report is anticipated or required for multiple collision crossing investigations and there is no requirement to report findings to the FRA.

Table 14 Engineering Options

Existing Condition	Possible enhancements
Passive	Upgrade to 2009 MUTCD compliant cross buck device Change to "Stop" condition - (only after completion of an engineering study) Add/improve pavement markings, advance signage, illumination Code enforcement (Clear brush, etc) *Sec. 130 Add Flashing Lights and Gates, Overhead Cantilever, Bell , Constant Warning Time circuitry*
Flashing Lights only	Pavement markings, advance signage Code enforcement (Clear brush, etc) *Sec. 130 Add gates, Overhead Cantilever, Constant Warning Time circuitry*
Flashing lights plus gates	Pavement markings, advance signage Code enforcement (Clear brush, etc) *Sec. 130 Add Overhead Cantilever, Constant Warning Time circuitry, upgrade old equipment, approach median barriers, Four-Quadrant gates* Grade Separation

4.5.1 Rapid Evaluation

As part of the INDOT Office of Traffic Safety regular monitoring of highway traffic collisions, all collisions occurring at grade crossings are immediately directed to the Section 130 program manager and the INDOT Rail Office. This allows for quick review of all grade crossing collision police reports (at public or private grade crossings) and the corresponding inventory record and collision history for the grade crossing involved when a collision is reported.

As soon as a police collision report is available, the findings of the investigating officer(s) as to the contributing factors in the collision are evaluated to guide INDOT's response.

4.5.1.1 Motor Vehicle Collision at a private grade crossing

As noted earlier, INDOT has no authority over private grade crossings; consequently, data from private grade crossing collisions is maintained for reference only.

4.5.1.2 Motor Vehicle Collision at a public grade crossing due to driver behavior

In cases of motor vehicle vs. train collisions at public grade crossings, where the findings of the investigating agency indicates reckless or unlawful driver behavior such as driving around construction barriers, suicide, flight from law enforcement, or the abandonment of a vehicle that is not disabled; INDOT may choose not to pursue any engineering or regulatory action. This applies regardless of the warning devices in place at the highway rail grade crossing.

However, cases of motorists intentionally driving around activated grade crossing gates are of particular interest as an indicator that additional engineering, education, or enforcement countermeasures may be necessary to ensure compliance. Enhanced engineering treatments could include adding constant warning time circuitry, median barriers, or four-quad gate systems.

4.5.1.3 Motor vehicle collision at a public grade crossing unintentional/unknown

At public grade crossings, where the finding of the investigating agency indicates no reckless or unlawful driver behavior, INDOT will initiate a review of all data regarding the collision and grade crossing involved.

4.5.2 Priority Programming of Treatments

4.5.2.1 Section 130 Project Prioritization Methodology

Annually, INDOT calculates a hazard index for each public highway-rail grade crossing in the state using FRA formulas and guidelines. The Railroad-Highway Grade Crossing Handbook – Revised Second Edition (the handbook) is the basis for the hazard index calculation and is a single reference document based on the prevailing and best practices as well as adopted standards relative to highway-rail grade crossings. The guidelines and alternative improvements presented in the handbook are primarily those that have proven effective and are accepted practice nationwide.

The hazard index is a measure of the potential for collisions (or predicted number of collisions per year) at the highway-rail grade crossing. The FRA safety database serves as the source of information for train traffic and collision history. The hazard index is based on many factors including the number of trains and vehicles at the grade crossing, the number of main tracks, the road surface type, maximum train speed, and the number of highway lanes.

Because the FRA safety data cannot describe the precise characteristics of each grade crossing, such as sight distances, the calculation of predicted collision rates is improved by the addition of actual collision experience at a highway-rail grade crossing. The predicted collision rate is calculated using the factors above and the result is then multiplied by a factor containing the actual collision experience (usually the collision rate over a five-year period). The final hazard index is obtained after applying a normalizing constant. The normalizing constant correlates the collision prediction formulas with actual collision rates on a nationwide basis. This collision prediction and resource allocation procedure normalizing constant is provided by the FRA.

The hazard index is used to compare the collision potential (predicted number of collisions per year) of one grade crossing to another in a consistent manner. Grade crossings with the highest hazard index value are studied in detail. In order to gauge effectiveness of likely countermeasures, grade crossings selected for improvement are analyzed based upon seven decision criteria to generate a final score or ranking.

The seven decision criteria applied are:

1. The hazard index
2. The type of improvement selected
3. The type of protection already on the rail corridor
4. The type of development near the highway-rail grade crossing
5. The motorist expectancy about train movements
6. The type of highway
7. The public/local authority interest or comments on safety of the grade crossing

These seven decision criteria allows INDOT to incorporate into the project selection process the concerns of local officials and citizens, new development issues (such as a change of traffic patterns), and rail corridor projects.

Locations that demonstrate the most critical risk factors such as excessive skew angle, poor geometrics, reduced sight distance, high hazard index, increase in rail traffic, new industry or schools, passenger trains, high-speed freight, etc. also receive increased consideration.

After the FRA hazard index is calculated and all the public grade crossings ranked in order, a short list of candidate project locations is developed. In order to set priority and gauge effectiveness of likely countermeasures, grade

crossings on the short list will have various decision criteria applied, be ranked, and the final list of project locations is generated based on the funding available for the fiscal year. The seven decision criteria are applied to each location on the short list to generate a relative score on a zero to 100-point scale.

At the end of the Section 130 program statewide analysis and project selection annual cycle, the selected locations are programmed as projects in INDOT's master project scheduling database. Most projects can be constructed within 18 months after they are programmed.

After more than 35 years of section 130 public grade crossings projects, a large percentage of the historic critical needs backlog, such as grade crossings with only passive warning devices located on the high speed, high volume (greater than 40 trains per day), multi-track rail lines are, for the most part, now equipped with flashing lights and gates. INDOT may investigate rail corridors on the medium volume (between 5 to 39 trains/day) rail lines that also carry AMTRAK service to locate any gaps in the grade crossing warning devices in order to program appropriate projects.

4.5.2.2 Optional Local Project Funding

Local government agencies may fund and improve grade crossing protection at public highway-rail grade crossings under their jurisdiction at any time. There is a common misconception that because the INDOT Office of Traffic Safety administers the Section 130 federal funds, it is therefore responsible for funding all highway-rail grade crossing safety improvements. Local government agencies must remember that Section 130 funds are reserved to address the most critical grade crossing needs statewide. Local safety concerns and knowledge are very important and there is nothing in Indiana law that prohibits a county, city, or town with jurisdiction over a grade crossing from funding safety improvements on their own. Local agencies are encouraged to initiate projects for grade crossing safety improvements using locally available highway safety funding or funds from any other source.

With more than 3,700 grade crossings statewide as potential candidates for improvement, local agencies need not wait for INDOT involvement. If a local agency wishes to fund a rail safety improvement project at a public highway-rail grade crossing under its jurisdiction using their own funds, the INDOT Office of Traffic Safety, INDOT District rail-utility coordinators, and INDOT Rail Office can assist with developing the project.

The INDOT Rail Office provides assistance in drafting agreements with the affected railroad when local agencies initiate a highway-rail safety project. INDOT reviews the project to insure that it meets all of the necessary requirements under Indiana Code and State of Indiana Special Provisions for Installation of Active Warning Devices at Highway-Railway Grade Crossings.

4.6 Education

Challenges to implementation

Funding to support implementation

Staff resources

4.6.1 Operation Lifesaver

Indiana Operation Lifesaver (INOL) is a 501(c) (3) nonprofit public safety program dedicated to reducing deaths and injuries at highway-rail grade crossings and along railroad rights-of-way. INOL was established in 1984 as a member of the national organization, Operation Lifesaver, Inc.

Since that time, INOL has been the lead organization providing education about the dangers surrounding highway-rail grade crossings and railroad rights-of-way through free Operation Lifesaver presentations made by trained, certified presenters. The program strives to improve driver and pedestrian behavior at railroad grade crossings by encouraging compliance with traffic laws relating to grade crossing signs and signals. In addition to its education program, INOL encourages the enforcement of existing traffic and trespassing laws.

The Manager of the INDOT Rail Office serves as a member of INOL's board of directors. INDOT coordinates with and supports INOL activities such as, "Rail Safety Week" activities.

Coordinate with Indiana Operation Lifesaver to focus grade crossing safety public awareness outreach particularly in counties with the highest levels of highway-rail collision frequency.

4.6.2 Driver Education

Collaborate with the Indiana Bureau of Motor Vehicles regularly to evaluate the Indiana driver manual and driving test with the intent of improving grade crossing safety education. For example, add information on four-quadrant gate installations, what is expected of drivers at grade crossings protected only by flashing lights, information on reporting collisions, malfunctioning signals, or hazardous spills at grade crossings and what to do if your vehicle stalls on railroad tracks. Discussion will include adding questions on any new information to the driver written test and state mandated curriculum for accredited driving schools.

4.6.3 Stakeholder Coordination

Shared duty and partnerships are important elements in reducing highway fatalities in Indiana. Better communication, coordination, and cooperation between state, federal, regional, and local agencies as well as with railroads and rail safety organizations are vital to successful implementation and deployment of strategies intended to keep the public highway-rail grade crossing portion of Indiana's transportation network operating safely and efficiently.

No funding sources for an on-site annual conference are currently available either from state or federal sources. Establishing regular Web-based meetings of grade crossing safety stakeholders to discuss safety efforts could allow for an exchange of ideas, reports on activities, and lessons learned from grade crossing collision investigations.

4.7 Enforcement

Challenges to implementation

Funding to support implementation

Staff resources

Indiana will seek involvement from municipal law enforcement agencies and railroad police to explore targeted enforcement tactics that will lead to increased compliance with traffic safety laws.