

Indiana Highway-Rail Grade Crossing Safety Action Plan

April 2022



INDIANA DEPARTMENT OF TRANSPORTATION

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Eric Holcomb, Governor
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May 16, 2022

TO: All Users of Indiana Public Roads and Highways

FROM: Michael Smith, Commissioner
Indiana Department of Transportation
100 North Senate Avenue,
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Subject: Indiana's Revised Highway/Railroad Crossing Safety Action Plan

Join me in supporting the 2022 Indiana Highway-Rail Grade Crossing Safety Action Plan (SAP). This plan presents achievable solutions to, "Improve safety at public crossings in Indiana where railroads interact with all other modes of transportation." This document builds on the successes and lessons learned from implementing the predecessor 2012 SAP and includes nine proven strategies to prevent and mitigate highway-rail grade crossing crashes.

Safety is always one of Indiana's top transportation priorities. We want our families, friends, and visitors to get home at the end of every day. The good news is the number of highway-rail grade crossing crashes have trended down since 2011. During the past decade we have closed and separated crossings to eliminate any possible interactions between trains and road users. Another focus has been to upgrade rail-grade crossing locations with gates and lights to provide more visual cues for a driver to stop. Education and enforcement have also played a critical role to inform the public of highway-rail grade crossing safety.

That said, our work is not done. Highway-rail grade crossing crashes are still occurring. Stakeholders from the Indiana Department of Transportation, Indiana Criminal Justice Institute, Indiana Operation Lifesaver, Class I and II Railroads, Federal Agencies, Metropolitan Planning Organizations, and Local Technical Assistance Program will implement the multidisciplinary strategies in this 2022 SAP to bring us closer to zero. Indiana will continue to save lives at rail-grade crossings by focusing resources to:

- Close and separating crossings
- Upgrade more crossings to lights and gates and maintain existing locations
- Educate local agencies on traffic signal preemption and how to implement this improvement
- Ensure signs and pavement markings are up to date and meet compliance standards

- Ensure accurate, usable, and accessible data to make informed decisions about safety priorities
- Inform and educate stakeholders
- Include the consideration of rail-grade crossing safety in every transportation project
- Collaborate with enforcement
- Continue ongoing dialogue with all stakeholders who play a role in transportation safety

Traffic crashes are preventable, and the Rail Crossing SAP is an important tool to help Indiana focus on system-wide and multidisciplinary improvements. Share this document - use this document – and continue to play a role in lowering transportation-related fatalities and serious injuries in Indiana.

I hereby concur with the strategies contained in the Indiana Highway - Rail Crossing Safety Action Plan.,

Regards,

A handwritten signature in black ink, appearing to read "Michael Smith". The signature is written in a cursive, flowing style.

Michael Smith, Commissioner

Indiana Department of Transportation

CC: FHWA Indiana Division, INDOT Traffic Engineering Division, INDOT Multimodal Division, INDOT Technical Planning Division, File



Acknowledgements

The INDOT Project Team would like to thank the following for their time, hard work and input to complete the Safety Action Plan:

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Cover Photo: SR 46 - LIRC Overpass Interchange

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Executive Summary

The State of Indiana has shown a longstanding commitment to improving safety for all users of the state transportation network. Indiana has 7,566 highway-rail grade crossings, which is the fifth highest in the United States. At these locations, cars and trucks, and sometimes pedestrians and bicyclists, cross paths with freight or passenger trains. The goal is to eliminate crashes with trains where someone is killed or seriously injured. The **2022 Indiana Highway-Rail Grade Crossing Safety Action Plan (SAP)** identifies the challenges related to rail grade crossing safety and actionable solutions to continue to keep people safe on Indiana’s roads. This plan builds on the success of its predecessor plan, the [2012 SAP](#).

Every strategy in the 2022 SAP support’s Indiana’s mission to: *“Improve safety at public crossings in Indiana where railroads interact with all other modes of transportation.”* To achieve this, the Indiana Department of Transportation (INDOT) and its partners will use effective methods to implement the following goals:

- Engineering solutions to eliminate crossings, separate crossings, upgrade passive locations, and update active warning devices at priority locations.
- Enforcement and education solutions to improve safety at all railroad crossings.
- Other critical needs to mitigate and prevent crashes, like data accuracy, risk analysis, design changes, equity concerns, and agency coordination.

INDOT manages the Federal Highway Administration’s (FHWA) Railway-Highway Crossings Program, also known as the Section 130 Program. These financial resources primarily support the engineering goal. Several strategies in this plan reflect how engineering countermeasures are used to eliminate crossings or improve crossing safety.

However, to address the multitude of crash causes, the large number of crossing locations, and the ability to leverage available resources, INDOT partners with several stakeholders. The organizations engaged in the 2022 SAP, who also support and share implementation responsibilities are:

Class I and II Railroads	Indiana Local Technical Assistance Program	INDOT Rail Programs Office
Federal Highway Administration	INDOT Local Public Agency and Grants Administrative Office	Indiana Operation Lifesaver
Federal Railroad Administration	INDOT Technical Planning & Programming	Metropolitan Planning Organizations
Indiana Criminal Justice Institute	INDOT Office of Traffic Safety	Rural Planning Organizations

The biggest challenges facing Indiana, which were identified through an analysis of the rail crossings, crashes, and stakeholder input, were brought to the forefront during this planning process. Challenges were discussed and evaluated on several occasions to determine which strategies would be the most effective. The 2022 strategies are intended to address:





- The 137 fatalities and 406 persons injured between 2011 and 2020 at highway-rail grade crossings.
- The sheer number of highway-rail grade crossings - focus on priority locations, systemic improvements, and coordinated efforts amongst stakeholders.
- Higher numbers of pedestrians in and around crossing locations and the possible eligibility of Federal funds to address non-motorized safety concerns.
- Engagement of INDOT's LPA Office, LTAP, Local Agencies, and MPOs due to most grade crossings being on urban local roads.
- Grade crossings with active warning devices interconnected with highway traffic signals.
- Upgrades to active warning locations since 77 percent of incidents occurred at crossings equipped with active warning devices.
- People driving around gates, not stopping when flashing lights are present, or not stopping at passive locations before proceeding across the crossing.

To address these challenges and mitigate and prevent highway-rail grade crossing crashes/incidents, INDOT and stakeholder partners finalized nine strategies in the 2022 SAP. These will be prioritized for funding and implemented over the next several years.



Grade Separations and Closures – Close crossing or create separations to eliminate interactions between trains and road users



Train-Activated Warning Enhancements - Upgrade passive to active warnings, upgrade crossings equipped solely with flashing lights, or improve existing active devices



Advanced Pre-Emption - Engage local agencies and provide education on the benefits of updating traffic signal preemption



Systemic Passive Warning Enhancements - Collaborate with the railroads and local agencies to explore the broader implementation and maintenance of systemic passive warning enhancements



Data Accuracy and Analysis – Ensure accurate, usable, and accessible data to make informed decisions on highway-rail grade crossing improvements



Communications and Outreach - Inform and educate stakeholders on highway-rail grade crossing topics through informational webinars, pamphlets, and presentations.



Project Scoping - Require the consideration of highway-rail grade crossings as part of the initial scoping process for each roadway project.



Enforcement - Work closely with the Indiana State Police and other law enforcement agencies in Indiana to help prevent crashes at highway-rail grade crossings



Stakeholder Coordination – Have ongoing dialogue between INDOT and external partners on each of the strategies in this plan as well as other ongoing activities



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Glossary of Terms

FHWA – Federal Highway Administration	LPAP – Local Public Agency Program
FRA – Federal Railroad Administration	LRTP – Long Range Transportation Plan
FY – Fiscal Year	LTAP – Local Technical Assistance Program
HSIP – Highway Safety Improvement Program	MPO – Metropolitan Planning Organization
HSP – Highway Safety Plan	MTP – Metropolitan Transportation Plan
ICJI – Indiana Criminal Justice Institute	NICTD – Northern Indiana Commuter Transportation District
ILEA – Indiana Law Enforcement Academy	PDO – Property Damage Only
IMUTCD – Indiana Manual of Unified Traffic Control Devices	SAP – Safety Action Plan
INDOT – Indiana Department of Transportation	RPO – Rural Planning Organization
INOL – Indiana Operation Lifesaver	RRGCF – Railroad Grade Crossing Fund





Section 1. Introduction

The 2022 Indiana Highway-Rail Grade Crossing Safety Action Plan (SAP) updates the 2012 SAP developed by the Indiana Department of Transportation (INDOT), and other stakeholders, to address crashes/incidents at highway-rail at grade crossings. The 2022 plan utilizes the results of stakeholder engagement, data analysis, and lessons learned from the previous plan to inform the strategies in this document.

Federal Requirements and Checklist

In 2012, INDOT completed a SAP, as required by the Federal Railroad Administration (FRA) in the Rail Safety Improvement Act of 2008. In 2015, the Fixing America's Surface Transportation Act (FAST Act) (49 CFR § 234.11) required all states and the District of Columbia to develop or update existing plans that reduce crashes at highway-rail and pathway grade crossings. **Table 1** shows how Indiana met the Federal requirements for a plan update.

Requirement	Addressed
<p>Identify highway-rail and pathway grade crossings that:</p> <ul style="list-style-type: none"> ▪ Have experienced at least one accident/incident within the previous 3 years ▪ Have experienced more than one accident/incident within the previous 5 years ▪ Are at high-risk for accidents/incidents as defined in the Action Plan 	<ul style="list-style-type: none"> ▪ The Data Analysis Memorandum in Appendix C includes a table of public highway-rail grade crossing locations with multiple incidents in the previous five years (2016-2020). ▪ INDOT also utilizes a Hazard Rating Index to identify multiple crash locations and prioritize areas where train-activated warning enhancements are most critical. Hazard ratings were produced using the Federal Railroad Administration's Web Accident Prediction System (WBAPS).
<p>Identify data sources used to categorize the highway-rail and pathway grade crossings</p>	<ul style="list-style-type: none"> ▪ Section 1 of the Data Analysis Memorandum (Appendix C in SAP) details the data sources used to inform this plan, they are: ▪ Highway-Rail Grade Crossing Inventory Data – Current (Form FRA F 6180.71) ▪ Accident/Incident Data (Form FRA F 6180.57) ▪ Injury/Illness Summary – Casualty Data (Form FRA F 6180.55A) ▪ Indiana 2011-2020 Crash Data (ARIES)





Requirement	Addressed
Discuss specific strategies, including highway-rail grade crossing closures and grade separations, to improve safety at those crossings	<ul style="list-style-type: none"> The SAP used a data-driven process and stakeholder engagement to identify nine strategies to address safety need at highway-rail grade crossing. These strategies, including one to address closures and separations can be found in Section 3, <i>Action Plan Strategies</i>.
Provide an implementation timeline for the strategies	<ul style="list-style-type: none"> Each strategy described in Chapter 3, <i>Action Plan Strategies</i>, includes a subsection on the timeline for strategy implementation.
Designate an official responsible for managing implementation of the State highway-rail grade crossing action plan	<ul style="list-style-type: none"> Manager, INDOT Office of Traffic Safety
Designate a point of contact for the State highway-rail grade crossing action plan	<ul style="list-style-type: none"> Rail-Highway Safety Plan Engineer, INDOT Office of Traffic Safety

Table 1: Meeting Federal FAST Act SAP Requirements

Purpose of Plan



Photo 1: SR 46 Active Crossing, Bloomington

The SAP identifies Indiana’s challenges related to highway-rail grade crossing safety and describes data-driven strategies to address those needs. The primary purpose of this document is to provide guidance on the determination of actions and projects eligible for the Federal Highway Administration’s (FHWA) Railway-Highway Crossings Program, also known as the Section 130 Program. INDOT receives approximately \$8 million in Section 130 funds annually and programs about 20 to 25 projects per year. These projects specifically advance the following strategies: grade closures and separations, train activated warning enhancements, advanced pre-

emption, and systemic passive warning enhancements.

A secondary purpose of the SAP is to identify and address other critical strategies to reduce crashes/incidents. Actions undertaken may be eligible for Section 130 but are often funded with other Federal funds (Highway Safety Improvement Program (HSIP), State funds such as the Railroad Grade Crossing Fund (RRGCF), Highway Safety Office resources, or resources provided by Rail and other stakeholder partners. These strategies include data accuracy and analysis, communications and outreach, project scoping, enforcement, and stakeholder coordination.





Ultimately, the SAP provides a framework to guide project and program identification and the spending of Indiana's apportionment of FHWA Section 130 money and other related resources over the life of this plan.

Engaged Stakeholders

Indiana has 5,488 public highway at-grade crossings and of those, 5,353 are registered as having train traffic. Due to the high number of crossings, spread across the state; the fact that rail grade crashes occur for a variety of reasons; and the quantity of resources needed to address the challenges, several stakeholders were engaged in SAP development. Engaged participants included:

- Class I and II Railroads
- Federal Highway Administration
- Federal Railroad Administration
- Indiana Criminal Justice Institute
- Indiana Local Technical Assistance Program (LTAP)
- Indiana Operation Lifesaver
- INDOT Local Public Agency and Grants Administrative Office
- INDOT Technical Planning & Programming
- INDOT Office of Traffic Safety
- INDOT Rail Programs Office
- Metropolitan Planning Organizations (MPOs)
- Rural Planning Organizations (RPOs)

Mission, Goals, and Objectives

Strategies identified in the SAP will support the mission, goals and objectives to lower crashes/incidents at public highway-rail grade crossings.

- The mission statement expresses the purpose of Indiana's SAP.
- The goals identify the specific needs for the SAP and what is to be addressed.
- The objectives are the actionable and time-bound targets to evaluate the success of the SAP.



Photo 2: Full Cantilever US 41, Evansville

The mission, goals, and objectives for the 2022 SAP have their foundations in the stated intents and goals of the 2012 SAP and were critiqued, modified, and updated with input from the steering committee and stakeholders.

The **mission** statement for the 2022 SAP is to: *"Improve safety at public crossings in Indiana where railroads interact with all other modes of transportation"*

The **goals** to support the mission statement are:

- Use engineering solutions to eliminate crossings, separate crossings, upgrade passive locations, and update active locations at priority locations.
- Support the continued implementation of enforcement and education solutions at priority locations.



- Address other critical needs to mitigate and prevent crashes at highway-rail grade crossing locations, like data accuracy, risk analysis, design changes, equity concerns, and agency coordination.

The specific **objectives** that will be used to accomplish the above goals are:

- Eliminate and/or separate grade crossings
- Reduce the number of crashes/incidents at passive crossings
- Reduce the number of crashes/incidents at active crossings
- Reduce the number of crossing crashes/incidents involving all non-motorized modes of transportation
- Reduce the number of crashes/incidents at locations and along corridors with systemic active warning device improvements





Section 2. Background and Context

The 2022 SAP update followed a planning process that relied on several key inputs to inform the strategies. This included stakeholder engagement, an understanding of information in other plans, the results of the data analysis, and lessons learned from the 2012 plan.

Planning Process

The process used to inform the SAP relied heavily on regular internal project team meetings, stakeholder and steering committee engagement meetings, and data analysis. The tasks and purpose are shown in **Table 2**.

Event	Purpose
Kickoff Meeting	<ul style="list-style-type: none"> Initiate project Discuss plan expectations Identify stakeholders Finalize work plan
Project Team Meetings	<ul style="list-style-type: none"> Working sessions to achieve project milestones and discuss ideas/next steps
Plan Coordination Memo	<ul style="list-style-type: none"> Coordinate information across Indiana’s safety and transportation plans that address highway-rail grade crossing safety
Stakeholder Survey	<ul style="list-style-type: none"> Obtain initial feedback on highway-rail grade crossing successes, challenges, and needs moving forward from stakeholders
Steering Committee Meeting #1	<ul style="list-style-type: none"> Review purpose of plan Review successes and challenges related to highway-rail grade crossing safety Review data analysis results Obtain input on draft mission, vision, goals, and strategies
Implementation Report Submitted	<ul style="list-style-type: none"> Federally required document describing how Indiana progressed toward implementing the strategies in the 2012 SAP
MPO Outreach Meeting	<ul style="list-style-type: none"> Review purpose of plan Review successes and challenges related to highway-rail grade crossing safety Review data analysis results Obtain input on draft mission, vision, goals, and strategies
Railroad Outreach Meeting	<ul style="list-style-type: none"> Review purpose of plan Review successes and challenges related to highway-rail grade crossing safety Review data analysis results Obtain input on draft mission, vision, goals, and strategies





Event	Purpose
Steering Committee Meeting #2	<ul style="list-style-type: none"> Obtain final input on mission, vision, goals, and strategies; and discuss outline and contents for 2022 SAP
Data Analysis and Memo	<ul style="list-style-type: none"> Memorandum describing rail inventory and crash history Shows locations with multiple crashes Problem identification to inform the strategies
Best Practices Table Completed	<ul style="list-style-type: none"> Tool to assist local agencies with implementation ideas to address strategies in the SAP
Draft and Final SAP Completed	<ul style="list-style-type: none"> Federally required document describing strategies Indiana will implement to reduce crashes at highway-rail grade crossings

Table 2: SAP Process Activities

Stakeholder Engagement

As part of the planning process, INDOT sought input and feedback from a variety of sources. All this feedback was used to inform and finalize the strategies in the SAP.

- A steering committee was formed and included representatives from INDOT Office of Traffic Safety, INDOT Rail Programs Office, INDOT Technical Planning & Programming, the INDOT LPA and Grants Administrative Office, FHWA, FRA, Indiana LTAP, ICJI, INOL, and the Indiana Law Enforcement Academy (ILEA). The steering committee met twice, and summaries can be found in **Appendix A**.
- Two special meetings were held. The first meeting was with Indiana’s MPOs and RPOs and the second meeting was with representatives from the railroads. The primary objective for both meetings was to obtain input on the draft strategies. The meeting summary for the railroad meeting can be found in **Appendix A**. The MPO/RPO meeting did not yield any feedback and was purely informational, therefore no meeting summary was produced.
- An online survey was emailed to approximately 58 stakeholders including INDOT offices, safety partners, rail partners, Federal liaisons, and MPOs and RPOs. The survey was three questions long and 39 individual responses were received. The results are shown in **Tables 3, 4, and 5**.



Photo 3: Typical Flashing Lights Only Installation in Need of Upgrade



Survey Question #1: What is working well to prioritize safety at public highway-rail crossings and should be continued?

Answer	Percentage	Answer	Percentage
Upgrading passive crossings to train activated warning devices	56.41%	Enforcement	12.82%
Grade separation	38.46%	Adding warning bells	10.26%
Upgrading flashing lights to gates	35.90%	Implementing solutions at multiple incident locations	10.26%
Railroad at-grade crossing closures	33.33%	Other (Please Describe)	7.69%
Replacing obsolete equipment	23.08%	Implementing solutions on railroad corridors	5.13%
Upgrading passive warning equipment (signs/markings)	17.95%	Ten percent match to determine crossing selection for upgrades	2.56%
Education (Indiana Operation Lifesaver efforts)	15.38%	Adding overhead cantilevers	2.56%

Table 3: Survey Question #1 Responses

Survey Question #2: What are your greatest concerns regarding safety at public highway-rail crossings?

Answer	Percentage	Answer	Percentage
Railroad crossing surfaces in need of repair	46.15%	Active warning devices not working properly, missing or damaged equipment	15.38%
Trains blocking crossings for a long period of time	46.15%	Other (Please Describe)	12.82%
Motorists driving around railroad gates	41.03%	Railroad pre-emption (coordination of traffic signals with rail grade crossing warning devices)	7.69%
Motorists disobeying flashing lights at railroad crossings	33.33%	Equipment, sign, or pavement deficiencies at passive locations	5.13%
Motorists stopping on tracks due to traffic backups	30.77%	Lack of enforcement	5.13%
Sight obstructions at railroad crossings	17.95%	Lack of warning bells	5.13%
People walking or riding bikes on or near railroad crossings	17.95%	Challenges educating the public	2.56%
		Lack of constant warning time (modern crossing signals provide better "warning times" for oncoming trains)	2.56%

Table 4: Survey Question #2 Responses





Survey Question #3: What else could be done to address safety at public highway-rail crossings?

Answer	Percentage	Answer	Percentage
Address crossing surface conditions	46.15%	More technical assistance to local agencies	15.38%
Reduce how long trains can block crossings (would require legislative action)	43.59%	Address traffic signal timing near railroad crossings	15.38%
Collaborate with local agencies on funding opportunities	30.77%	MPO allocating more funding to Railroad Safety	15.38%
Further prioritize pedestrian and bicycle safety	30.77%	Try different types of countermeasures	12.82%
Do more to educate drivers, pedestrians, and bicyclists	28.21%	Improving obsolete grade separations	7.69%
Encourage more law enforcement	17.95%	Other (Please Describe)	7.69%

Table 5: Survey Question #3 Responses

Coordination with Other Plans

The SAP is Indiana’s umbrella document, outlining the primary challenges and effective solutions to address highway-rail grade crossing safety in the state. Since other state and regional plans address this topic, relevant goals, objectives, strategies, countermeasures, and location priorities from those plans were reviewed and relevant information considered and included in the SAP. The complete Coordination Memo can be found in **Appendix B**.

Documents reviewed included:

- 2012 SAP
- 2018 State Freight Plan
- 2018 INDOT Long Range Transportation Plan (LRTP)
- 2020 Indiana Criminal Justice Institute (ICJI) Annual Report
- 2020 Indiana Highway Safety Improvement Program (HSIP)
- 2022 Highway Safety Plan (HSP)
- 2021 Indiana State Rail Plan DRAFT
- 2021 INDOT Active Transportation Plan DRAFT
- 2022 Indiana Strategic Highway Safety Plan (SHSP) DRAFT
- Indiana MPOs Metropolitan Transportation Plans (MTPs)

Items of note included in the 2022 SAP:

- Several of the strategies identified in the 2012 Indiana SAP are still being implemented successfully and were carried through to this plan.
- The 2022 SHSP includes an emphasis area on highway-rail grade crossing and supporting strategies. Those are reflected in the SAP.
- Indiana’s statewide transportation plans (Rail plan, Freight plan, Active Transportation plan, and Long-Range Transportation plan (LRTP)) reference highway-rail grade crossing safety. Notably, the Freight plan and LRTP recommend rail grade crossing closures and removals as priority strategies. That strategy is reflected in this SAP.
- Ten of the fourteen MPOs reference highway-rail grade crossing safety in their LRTPs. The most commonly cited needs are eliminating or separating at-grade crossings and





reducing issues associated with prolonged blocked crossings. Those strategies are also reflected in this SAP.

Data Analysis

Indiana’s grade crossing inventory and crash/incident history were examined as part of this planning process and shared with all stakeholders. The data helped identify safety challenges which then informed the strategies identified in this plan. The full data analysis can be found in **Appendix C**; however, the critical decision-making information is shown below.

Data Sources

The analysis used the following data sources:

- Highway-Rail Grade Crossing Inventory Data – Current (Form FRA F 6180.71) | The Grade Crossing Inventory System (GCIS) is an FRA database based on data provided by railroads, transit agencies, and states. The form collects key inventory information such as the physical characteristics, safety devices, traffic, status, and location of all the grade crossings in the nation.
- Highway-Rail Grade Crossing Accident/Incident Data (Form FRA F 6180.57) | This FRA form reports on any collision between on-track railroad equipment and highway user at a grade crossing. “Highway user” includes automobiles, buses, trucks, motorcycles, bicycles, farm vehicles, pedestrians, and all other modes of surface transportation motorized and unmotorized. The form collects key collision information such as the type of crossing, type of accident, type of vehicle, type of highway user, and highway user action for collisions between railroad equipment and highway users at grade crossings.
- Injury/Illness Summary – Casualty Data (Form FRA F 6180.55A) | Deaths, injuries, or occupational illnesses that occur on railroad property are collected using this FRA form.
- Indiana 2011-2020 Crash Data (ARIES) | The Indiana State Police maintains the central repository of all crash reports for the State of Indiana in the Automated Reporting Information Exchange System (ARIES). The crashes reported in this database include crashes that are not reportable to the FRA.

Public Highway At-Grade Crossings

There are 7,566 grade crossings in Indiana, but 5,488 are grade crossings for public highways and of those, 5,353 are registered as currently with train traffic as shown in **Table 6**. The grade crossing analysis for the SAP was limited to these public highway grade crossings with train traffic. Closed crossings were also excluded from the analysis.

Geography	Active	Passive	Total
With Train Traffic	3,216	2,137	5,353
Rural	1,580	1,535	3,115
Urban	1,634	595	2,229
Unknown	2	7	9
No Train Traffic	31	104	135
Total	3,247	2,241	5,488

Table 6: Indiana Grade Crossing Summary





Crashes/Incidents at Crossings

The number of incidents and number of injuries and fatalities at grade crossings found in the FRA database are shown in **Table 7**. Incidents without any injuries or fatalities are considered property damage only (PDO) incidents. Incidents involving injuries but no fatalities are considered injury only incidents. Incidents involving fatalities and any number of injuries are considered fatal incidents. All incidents involving rail equipment and on railroad property are required to be reported to the FRA. From 2011 to 2020, there were 1,110 incidents, 406 injuries, and 137 fatalities reported in the FRA database. Overall, 9 percent of incidents were fatal, and 26 percent of incidents were injury only. On average there were 4 injuries and 1 fatality for every 10 incidents.

Incident Type	Number of Incidents (FRA)	Number of Persons Injured	Number of Persons Killed	Average Persons Injured per Incident	Average Persons Killed per Incident
PDO	724	0	0	0	0
Injury Only	291	385	0	1.3	0
Fatal	105	21	137	0.2	1.1
Total	1,110	406	137	0.4	0.1

Table 7: Grade Crossing Incidents, Injuries and Fatalities, 2011 to 2020

Most incidents from 2016 to 2020 occurred at active crossings. Seventy-seven percent of incidents occurred at active crossings even though only 59 percent of crossings are active, as seen in **Table 8**.

Incidents Past 5-years	Rural	Urban	Unknown	Grand Total	Percent of Incidents	Percent of Crossings
Active Crossings	110	321	0	431	77%	59%
Passive Crossings	77	49	1	127	23%	41%
Grand Total	187	370	1	558	100%	100%

Table 8: Summary of Incidents at Grade Crossings, 2016-2020

Table 9 demonstrates that most incidents at active crossings are related to driver decisions such as willfully going around crossing gates or not stopping when flashing lights are present. Most incidents at passive crossings occur because the driver did not stop before proceeding across the crossing.



Photo 4: Typical Rural Railroad Crossing



Action of Motorist	Active	Passive	Grand Total
Went around the gates	114	0	114
Stopped and then proceeded	19	18	37
Did not stop	93	79	172
Stopped on Crossing	128	27	155
Other	48	2	50
Went around/thru temporary barricade	4	0	4
Went thru the gate	19	0	19
Suicide/Attempted	6	1	7
Grand Total	431	127	558

Table 9: Driver Contributing Action for Incidents, 2016-2020

The breakdown of injuries, fatalities and incidents are shown in **Figure 1** by the type of highway vehicle or user. Most injuries, fatalities, and incidents at grade crossings involve passenger vehicles such as cars, pick-up trucks, and vans.

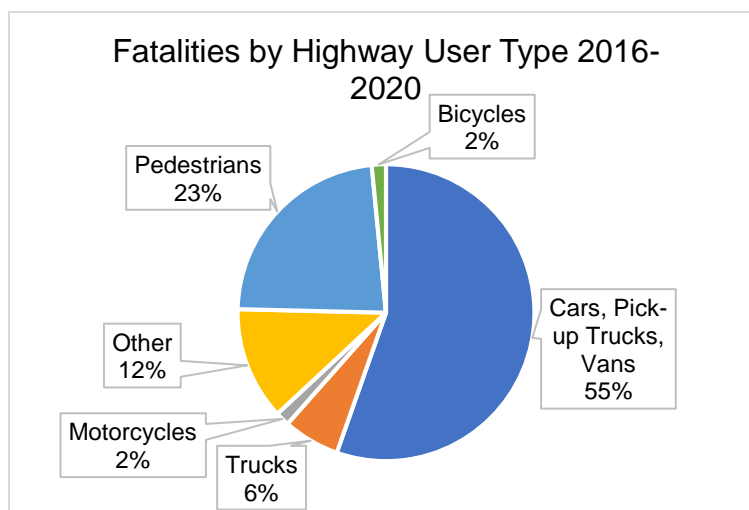


Figure 1: Injuries and Fatalities by Highway User Type, 2016-2020

Multiple Crash Locations

Incidents history at grade crossings within the last 5 years in the FRA database are shown in **Table 10**. The FRA defines recent incidents as one incident within the past three years and multiple incidents as more than one incident within the past five years. The crossings with incidents in the past 5 years are also listed, this is the total number of crossings with any number of incidents in the past five years. Most grade crossings with incidents are in urban areas. Incidents occur more frequently at urban grade crossings even though there are fewer urban grade crossings than rural grade crossings. The final column to the right shows the number of crossings with incidents in the past five years compared to all crossings present in those areas.





Geography	Crossings with Multiple incidents	Crossings with a Recent incident	Crossings with Incidents Past 5-Years	Percent of Crossings w/ Incidents	Percent of Total Public Crossings w/ Incidents Past 5-years
Rural	20	95	165	38%	3.1%
Urban	58	128	264	62%	4.9%
Unknown	0	1	1	0%	0%
Total	78	224	430	100%	8%

Table 10: Grade Crossings with Multiple Incidents, 2016-2020

Hazard Index Rating

INDOT also uses a hazard index rating in the prioritization process of improving at grade railroad crossings. INDOT uses the hazard rating methodology used by the FRA to determine a given location's hazard index rating. If the Index is greater than 0.07, it indicated the need for a study and if the Index was greater than 0.10, it usually requires a mitigation approach, if and where possible. This rating tool, along with a detailed analysis of available data and a diagnostic, INDOT can focus improvements at approximately 20 locations each year, where the safety need is greatest.

2012 SAP

A key consideration in developing the strategies for this plan were to review the successes and challenges related to the strategies in the 2012 SAP. The **2022 Indiana Highway-Rail Grade Crossing Implementation Report** evaluates each strategy based on a crash trend analysis, what was implemented, the key challenges, and programmatic highlights. Stakeholders were also asked to comment on the success of the 2012 strategies.

In general, the strategies have been successful. Over the life of the previous SAP (2011- 2020), total crashes decreased 22 percent; crashes at active locations decreased 21 percent; and crashes at passive locations decreased 23 percent. The decrease in total crashes is significant considering both vehicle miles traveled (VMT) and railroad ton-miles hauled (an indicator of train frequency) experienced increases during the same period.

Based on information collected, the following strategies were retained for the 2022 plan:

- Crossing Closures and Separations
- Train Activated Warning Enhancements
- Passive Warning Enhancements
- Communications/Outreach
- Enforcement
- Data and Administration
- Statewide Coordination

Strategies from the 2012 plan that are included in the 2022 plan, but are no longer separate strategies are:

- Crossings with Multiple Crashes – This is now a sub strategy under the Train Activated Warning Enhancements.





- Innovative Countermeasures – Indiana has identified countermeasures that work well with available resources. They are still considering innovative countermeasures but have included them as a sub strategy under the Train Activated Warning Enhancements and Passive Warning Enhancements strategies.

One strategy from the 2012 plan was not included in the 2022 plan:

- Review Indiana Drivers Manual – This strategy was completed, and highway-rail grade crossing safety information was added to the Manual.





Section 3. Action Plan Strategies

Nine strategies were identified for implementation to mitigate and prevent highway-rail grade crossing crashes. For each strategy, the following information is provided:

- Strategy definition
- Timeline for implementation
- Indiana's approach to implementation
- Key Metrics
- Implementation Roles
- Opportunities to Build On
- Known Challenges

Grade Closures and Separations



Definition

Closing highway-rail grade crossings is a proven method to reduce crashes, by eliminating the locations where they occur. Due to effectiveness and relative cost, closing highway-rail grade crossings is the preferred method to address severe crashes. Crossing closures are facilitated by either closing the crossing to vehicle traffic and removing the crossing surface or by the relocation or abandonment of a rail line.

Grade separations at highway-rail grade crossings are the next preferred alternative to closures—these are achieved by relocating the rail line, relocating a roadway, or constructing a roadway overpass. Grade separations are seldomly implemented due to their high project costs.

At grade highway-railroad crossing closures and separations enhance safety by eliminating interactions between trains and road users. Additionally, closures and separations often streamline the roadway network, reducing waits for emergency response vehicles that result from waiting for a train to cross the roadway.



Timeline of Implementation

Grade closures and separations are classified as short-term and ongoing strategies by INDOT.



Indiana's Approach

Historically, Section 130 funds have not been used to close crossings and have been used sparingly for separations. From changes made to the Section 130 program in the Bipartisan Infrastructure Law, the program no longer requires local grantees to provide 10 percent of the total project funds. With the removal of the matching fund requirement, local agencies will be better positioned to benefit from the crossing warning improvements performed by INDOT. INDOT will collaborate with LTAP to provide education on changes to the Section 130 funding and development of crossing closure or separation plans.

The Indiana State Legislature established the Railroad Grade Crossing Fund (RRGCF) (I.C. 8-6-7.7-6.1) in 1979 to provide funding for railroad-highway crossing improvement projects throughout the state. This is the one of the primary funding mechanisms for closing highway-rail grade crossings in Indiana. Between 2011-2022, 24 crossings were closed. These state funds will continue to be an available resource to close crossings. Every year, local agencies and





entities can apply for RRGCF funding but INDOT does not maintain a multi-year project list, therefore the amount of closings from year to year is variable.

The INDOT Local TRAX program, established in 2017, provided grants to local public agencies for crossing closures and separations. Thirty-two public at-grade crossings are set to be closed, 10 grade separations are planned, and one road relocation project is going to let between 2022-2024. The TRAX program incentivized local agencies to agree to crossing closures as part of the grade separation project commitment process.



Photo 5: Local TRAX Multiple Crossings Planned Closures, Gary

The plan is to support renewed legislation to continue the Local TRAX program, although there is no guarantee that such a program will be funded.



Key Metrics

- Number of crossings closed per year
- Number of separations opened to traffic per year

To evaluate progress on this strategy, INDOT will track the number of closings and separations annually, documenting the sponsoring agency, INDOT District, county, project location and description, and funding amount.



Key Implementation Roles

Stakeholder	Role
INDOT Rail Programs Office	<ul style="list-style-type: none"> Administer RRGCF funds; Project Development
INDOT Office of Traffic Safety and Corridor Development Office	<ul style="list-style-type: none"> Analyze crash statistics to identify potential crossing closure locations Conduct mobility studies Seek opportunities to utilize Section 130 funds for closings
INDOT LPA and Grants Administrative Office	<ul style="list-style-type: none"> Administer TRAX funds (as available) Project Development
LTAP	<ul style="list-style-type: none"> Continued support and education to local agencies interested in a crossing closure/separation
Railroads	<ul style="list-style-type: none"> Provide match funds Coordinate project construction Cosign any projects that affect railroad right-of-way
MPOs	<ul style="list-style-type: none"> Include grade separations in the MPO Transportation Improvement Plan as applicable Pursue funding from multiple sources.

Table 11: Grade Closures and Separations Key Implementation Roles



Opportunities to Build Upon

- Available funding through RRGCF for closures
- Interest from MPOs and local agencies to pursue crossing closures and separations
- Financial and technical support from railroads to support crossing closures and separations



Known Challenges

- Potential loss of TRAX funding to support future closures and separations



Train-Activated Warning Enhancements



Definition

Train-activated warning enhancements are upgrades to control devices that give visual and audible notice of the approach of a train and are typically activated by the passage of a train over a detection circuit in the track. The principal benefit of train activated enhancements is they take some responsibility off the road user to look for an approaching train and provide additional warning to a motorist when a train is approaching or at the crossing. Beyond alerting drivers, warning gates create a physical barrier between roadway users and an at-grade crossing, preventing an interaction.



Timeline of Implementation

Train-activated warning enhancements is considered a short-term and ongoing strategy by INDOT.



Indiana's Approach

A large portion of the INDOT annual Section 130 Program is dedicated to train-activated warning device improvements. Improvement projects usually include upgrades from passive to active warnings, upgrading crossings equipped solely with flashing lights to installing gates and overhead cantilevers, or improving existing active devices including installation of constant warning time circuitry and replacement of obsolete equipment.



Photo 6: Typical Section 130 Project

A Hazard Index developed by FRA is utilized to identify multiple crash locations statewide and prioritize areas where train-activated warning enhancements are most critical. If the Index is greater than 0.07, it indicates the need for a study and if the Index is greater than 0.10, it usually requires a mitigation approach which typically includes a train-activated warning enhancement. On average, INDOT will address needs at 20 locations a year.

The effectiveness of train-activated warning enhancements is bolstered by additional, complimentary, low-cost investments. Four-quadrant gates and concrete median barriers can prevent drivers from going around gates. In the past ten years, INDOT has installed four-quadrant warning gates at 12 locations and will continue to look for locations that merit their installation. Median concrete barriers serve a similar purpose to the four-quadrant gates but are less expensive and are implemented more widely across the system. INDOT will continue to look for opportunities to implement complimentary countermeasures that work in conjunction with train-activated warning devices.

During the planning process, stakeholders expressed interest in using Section 130 to address crossing surface conditions. While this is possible, current INDOT policy is to focus Section 130 funds on train activated warning enhancements due to the large backlog of crossings that





require upgrades. Outside of the Section 130 program, the RRGCF state grant program will provide up to \$40,000 per crossing for Class II and III railroads for surface condition repairs.

INDOT will also more formally address pedestrian needs at active crossings. The focus of Federal funds will be to make improvements to sidewalks and ADA treatments at grade crossings. The INDOT Sidewalk Safety Program, will be used to ensure the pedestrian network is ADA compliant and cohesive. Twenty-five million is designated annually through the Surface Transportation Block Grant (STBG) for pedestrian safety projects and additional funding from the Highway Safety Improvement Program (HSIP) could be further leveraged. Grade separated crosswalks, typically tunnels, are also an effective countermeasure. However, opportunities to implement these are less common and the treatment is usually prohibitively costly unless there is a partner such as a city or university with a large pedestrian population.



Photo 7: Four-Quadrant Gate, Tipton



Key Metrics

- Number of Train-Activated Warning Enhancements Upgraded
- Number of Train-Activated Warning Enhancements Installed
- Number of locations with multiple crashes

To evaluate progress on this strategy, INDOT will track the number of train activated warning devices that have been installed at a location previously without any train-activated warning devices and the number of train activated warning devices that have been enhanced or upgraded. In doing so, INDOT will document the funding year and source(s), INDOT district, county, project location and description, and the cost of the project.



Key Implementation Roles

Stakeholder	Role
INDOT Office of Traffic Safety	<ul style="list-style-type: none"> ▪ Project development and prioritization
INDOT Technical Planning & Programming	<ul style="list-style-type: none"> ▪ Work with the office of traffic safety to develop pedestrian projects at railroad crossings
Railroads	<ul style="list-style-type: none"> ▪ Provide match funds ▪ Coordinate project construction
INDOT LPA and Grants Administrative Office	<ul style="list-style-type: none"> ▪ Disbursement of Section 130 monies for projects

Table 12: Train-Activated Warning Enhancements Key Implementation Roles





Opportunities to Build Upon

- Over 2,000 locations with passive warning devices could be upgraded to active warning enhancements, including many on lines where Amtrak operates passenger trains



Known Challenges

- Numerous locations are eligible for upgrades and there is limited funding available to complete them
- Designating responsibility and authority for maintaining devices i.e., the local agencies, railroads, etc.
- INDOT would need to create a standardized rating of crossing surfaces to better understand good versus poor conditions to be able to prioritize crossing surface needs



Advanced Pre-Emption



Definition

Advanced pre-emption allows highway traffic signals to be controlled in real time either by remote control from a fixed location or by emergency vehicles. The primary function of preemption timing is to ensure a vehicle that may have stopped on the railroad tracks queued at a red light is given enough time to clear the tracks prior to the arrival of the train. It is also used to restrict movements toward the tracks from the traffic signal when a train is approaching or within the crossing limits.

Preemption circuitry should be installed any time an at-grade crossing is within 200 feet of a signalized intersection but can also be considered at any locations where traffic frequently backs up onto the tracks.



Timeline of Implementation

Advanced pre-emption is considered a long-term strategy by INDOT since the focus of this strategy is to improve existing pre-emption where rail tracks cross local roads.



Indiana's Approach

Advanced pre-emption and signal timing analysis is conducted for state road highway intersections with pre-emption. INDOT conducts regular field checks of the advanced pre-emption signaling to ensure equipment is in working order on the state roadway system.

INDOT will work with LTAP to engage local agencies and educate them on the benefits of improving traffic signal preemption. INDOT's Office of Traffic Safety, Traffic Management Division, and Local Public Agency Program will explore opportunities to assist locals in implementing and maintaining these systems. In most cases the local road agencies would require engineering assistance for evaluation of existing pre-empted crossings. An engineering study is required to determine the need for advance preemption. Testing the operation of existing devices requires specialty engineering expertise. A state-wide on-call consultant or funding availability for local road agencies to engage consulting engineers to evaluate systems is an opportunity to ensure reduction of injury and fatal crash risk preempted crossings.



Key Metrics

- Percentage of state roadway system that interacts with highway-railroad at grade crossings that are equipped with advanced pre-emption capabilities



Key Implementation Roles

Stakeholder	Role
INDOT Traffic Management Division	<ul style="list-style-type: none"> ▪ Conduct pre-emption and queuing analysis ▪ Conduct field checks of equipment
INDOT LPA and Grants Administrative Office	<ul style="list-style-type: none"> ▪ Build local agency capacity to utilize and install advanced pre-emption systems
INDOT Office of Traffic Safety	<ul style="list-style-type: none"> ▪ Assist Traffic Management Division and Local Public Agency Program on their initiatives and track progress
Emergency Response Agencies	<ul style="list-style-type: none"> ▪ Ensure vehicles are equipped with advanced pre-emption equipment and operators are trained in how to use it

Table 13: Advanced Pre-Emption Key Implementation Roles



Opportunities to Build Upon

- Continue implementing the most advanced dynamic signal timing and advanced pre-emption technology on the state system
- Look for opportunities and means to have advanced pre-emption integrated on the local road system



Known Challenges

- No dedicated funding to implement advanced pre-emption technologies on the local roadway system



Systemic Passive Warning Enhancements



Definition

Passive warning devices are static preventative measures at grade crossings - they provide messages of warning and guidance for drivers, cyclists, and pedestrians at crossings. Ensuring improvements such as posts, crossbucks, reflectorized striping and the addition of STOP and YIELD signs are up to date and meet compliance standards is critical at passive locations, especially when it is not feasible nor necessary to upgrade to active warning devices.



Photo 8: Advance Warning Signs



Timeline of Implementation

Systemic passive warning enhancements is considered a short-term and ongoing strategy by INDOT.



Indiana's Approach

Passive locations are upgraded to meet the signage requirements in the Indiana Manual of Uniform Traffic Control Devices (IMUTCD). INDOT conducts regular review of the MUTCD, with emphasis on doing so after each update to ensure all passive crossing upgrades meet the most recent specifications.

INDOT will provide guidance to local public agencies on how to request systemic passive warning enhancements at highway-rail grade crossings by partnering with LTAP and the Indiana MPO Council to provide education to local agencies.

INDOT will collaborate with the railroads and local agencies to explore the broader implementation of systemic passive warning enhancements to increase visibility at crossings and prevent vehicles from running off the road. Specific treatments include edge reflectors illuminating the edge of the right-of-way, flexible delineators, and LED warning signs. Additionally, INDOT will collaborate with local officials and agencies to ensure there is a sustainable maintenance plan in place for any of the new and innovative treatments that are implemented.

The greater interest local agencies take in installing and maintaining passive warning devices and pavement markings, the more effective the overall strategy will be. INDOT has limited resources to track of the condition at all passive locations but will collaborate with local agencies that request upgrades. Additionally, when the INDOT Rail Programs Office observes passive warning deficiencies at railroad crossings, it will officially notify the relevant local agency of the challenge. And while INDOT does not currently have the authority to require local agencies to upgrade their passive warning markings and signage, they do make RRGCF monies available.



Photo 9: Think Trains Sign





LTAP now offers a training module on the IMUTCD, which includes a segment on rail grade crossing signs. This can be further disseminated to broaden local public agency knowledge on systemic passive warning enhancements.



Key Metrics

- Number of locations enhanced passive warning devices
- Number and type of each passive warning devices installed



Key Implementation Roles

Stakeholder	Role
INDOT Office of Traffic Safety	<ul style="list-style-type: none"> ▪ Project development and prioritization ▪ Management
LTAP	<ul style="list-style-type: none"> ▪ Provide guidance to local agencies on how to recognize potential crossing locations for upgrades and how to start the project development process
INDOT Rail Programs Office	<ul style="list-style-type: none"> ▪ Coordinate with local agencies and railroads to upgrade and maintain passive warning enhancements at crossings ▪ Administer RRGCF funds
Local Government Agencies	<ul style="list-style-type: none"> ▪ Request projects and provide crossing locations ▪ Coordinate project programming
Railroads	<ul style="list-style-type: none"> ▪ Provide match funds ▪ Coordinate project construction
MPOs	<ul style="list-style-type: none"> ▪ Provide informational materials and coordinate appropriate funding
INDOT LPA and Grants Administrative Office	<ul style="list-style-type: none"> ▪ Disbursement of Section 130 monies for projects

Table 14: Systemic Passive Warning Enhancements Key Implementation Roles



Opportunities to Build Upon

- Upgrade all eligible crossings passive warning enhancements
- Upgrade passive crossing locations to active warning devices where possible
- Increased help to identify enhancements from informed local government agencies



Known Challenges

- Identification of incomplete or obsolete passive devices is difficult with the limited staff available. For example, many industrial sidings at various crossings still need to be upgraded to be compliant with the IMUTCD standards
- Explaining the responsibility and authority for maintaining devices i.e., the local agencies, railroads, etc.



Data Accuracy and Analysis



Definition

Accurate, usable, and accessible data are critical for informed decision making on highway-rail grade crossing improvements. Identifying and addressing inconsistencies between FRA and INDOT data ensure crash trends, rail inventory, and risks are being effectively mitigated through identified strategies. Without accurate data and regular analysis, it would be impossible to establish performance baselines, effectively measure which mitigation strategies are most effective, and identify priority locations.



Timeline of Implementation

Data accuracy and analysis are classified as an ongoing strategy by INDOT.



Indiana's Approach

INDOT now uses ArcGIS Field Maps to improve railroad inventory collection. The information enters INDOT's Geographic Information System (GIS) database and then is automatically sent to the FRA's crossing inventory database daily. INDOT Rail Programs Office electronically forwards changes via an automated nightly sync with the FRA inventory database system. These automated data gathering and sharing systems have increased the quality of data and made it more available to partners and stakeholders.

INDOT Office of Traffic Safety attempts to match every FRA incident report with a corresponding Indiana State Police (ISP) report, with an emphasis on fatal and injurious crashes. Close to 90% of the FRA reports can be matched and joined to ISP reports. This percentage is expected to improve over time as database specifications and features improve- for example, geocoding has become much more accurate and reliable.

Additionally, INDOT offers the railroad crossing locator on its website. This interactive map allows the public to locate any railroad crossing in the state and view the US DOT Crossing Inventory Form that includes the most current data reported for each crossing, including the railroad owner, the locality, the crossing identification number, the cross street, warning devices, available photos, and other data- including the reported accident history dating back to 1970.



Key Metrics

- Percentage of FRA incident reports matched with Indiana law enforcement crash reports
- Before/After data at project locations



Key Implementation Roles

Stakeholder	Role
INDOT Rail Programs Office	<ul style="list-style-type: none"> Maintain and innovate INDOT's data collection systems and ensure coordination with the FRA
Indiana State Police	<ul style="list-style-type: none"> Maintain accurate and accessible crash data
INDOT Office of Traffic Safety	<ul style="list-style-type: none"> Match ISP crash reports with FRA incident reports

Table 15: Data Accuracy and Analysis Key Implementation Roles



Opportunities to Build Upon

- Continue to iterate processes to create more accurate data with increased synchronicity between the FRA and INDOT.



Known Challenges

- Field data collection can be limited by INDOT Rail Programs Office capacity and means



Communications and Outreach



Definition

The communications and outreach strategy is broad and varied, with a focus on providing information on topics such as how to access funding for safety projects, proper safety procedures and education for road users, and recourse information for when trains are blocking crossings. Communications and outreach regarding safety at highway-grade rail crossings is a key tenet of the SAP- it is a ubiquitous strategy that has a supporting role in the effectiveness of each of the other strategies. With increased outreach and messaging about safe road use at highway-railroad at grade crossings, there will be a higher proportion of the road using public armed with this knowledge and more likely to utilize safe practices on a regular basis.



Timeline of Implementation

Communications and outreach are classified as short-term and ongoing strategies by INDOT.



Indiana's Approach

INDOT will inform its local agency and railroad partners on how to apply for funding for safety projects through methods such as regular direct communications, webinars, pamphlets, and presentations. Funding programs and sources that will be highlighted are the Railroad Grade Crossing Fund, current and future federal transportation funding bills, LTAP resources, HSIP funding, and TRAX funding, if available.



Photo 5: INOL Digital Billboard

Beyond information about how to apply for safety funding, INDOT will inform its partners and relevant stakeholders on the benefits of train-activated warning enhancements and other at grade safety improvements.

INDOT and its safety partners will place increased emphasis on reaching the pedestrian and non-motorized road users regarding their specific safety concerns at highway-railroad at grade crossings through the creation of additional informational materials and establishing relationships with advocacy organizations and campaigns that focus on bicycle and pedestrian safety. Non-motorized and pedestrian one-page leaflets regarding railroad safety can go through existing communications channels that already speak to pedestrian and biking communities. For example, there will be a program launched in the summer of 2022 (BikeIN Safe) that includes bike helmet giveaway event and an informational website, both of which are opportunities to communicate proper safety procedures for cyclists at railroad crossings.

Much of the outreach to the general public and law enforcement will occur with the coordination of Indiana Operation Lifesaver (INOL), a non-profit public safety education and awareness





organization dedicated to reducing collisions, fatalities, and injuries at highway-rail grade crossings and trespassing on or near railroad tracks. INOL will continue to be a primary producer in the development of the annual Indiana Rail Safety Week, a week-long outreach event that has occurred since 2009. They also lead other engagement/educations opportunities as needed. For example, they will be training commercial truck drivers to use Emergency Notification Signs (ENS) and have recently added a member of the Indiana Motor Truck Association to their board. Staff from INDOT will create materials and participate in events annually during Rail Safety Week.



Key Metrics

- Number of outreach events organized
- Outreach event attendance (individuals reached)
- Number of pieces of safety outreach materials produced
- Outreach material pieces produced
- Outreach material dissemination (individuals reached)

To evaluate progress on this strategy, INDOT will track the number of outreach events produced, either virtual or in-person, regarding safety at grade crossings and document the audience reached. INDOT will also produce, share, and track the amount of one-page informational pamphlets for the public, including specific information on pedestrian and non-motorized crossing information, updates from INDOT and the FRA, and blocked crossing information.



Key Implementation Roles

Stakeholder	Role
INDOT Communications Office	<ul style="list-style-type: none"> ▪ Develop safety awareness materials such as one-page informational pamphlets with input from the Office of Traffic Safety
INDOT Rail Programs Office	<ul style="list-style-type: none"> ▪ Support INOL on rail safety week
INDOT Technical Planning & Programming	<ul style="list-style-type: none"> ▪ Establish connections between the Office of Traffic Safety and pedestrian and non-motorized safety advocacy organizations and campaigns
LTAP	<ul style="list-style-type: none"> ▪ Act as a resource to local agencies regarding funding sources and requirements
Indiana Operation Lifesaver	<ul style="list-style-type: none"> ▪ Organize and produce rail safety week
MPOs	<ul style="list-style-type: none"> ▪ Act as a conduit and resource for safety information and materials for local agencies ▪ Incorporate safety communications in MPO planning efforts

Table 16: Communications and Outreach Key Implementation Roles



Opportunities to Build Upon

- Reach new audiences regarding safety at grade crossings, including all types of road users
- Use new and innovative methods of outreach, including digital platforms



Known Challenges

- Limited funding
- Ability to gauge effectiveness of messaging
- Establishing relationships with advocacy organizations



Project Scoping



Definition

All roadway projects need to consider at grade railroad crossings when they are near or within the project limits. Roadway projects that do not properly account for crossings at the beginning of the project development process are more likely to experience schedule delays and cost over-runs.



Timeline of Implementation

Project scoping is classified as short-term strategy by INDOT.



Indiana's Approach

INDOT will now require the consideration of highway-rail grade crossings as part of the initial scoping process for each roadway project. If proposed projects are within 200 ft of an existing highway-railroad at grade crossing, or has a railroad crossing within the project limits, the initial scope must include considerations about the crossing as outlined in the scoping engineer's manual.



Photo 6: Median Barrier, South Bend



Key Metrics

- Number of crossings selected annually for investigation for improvements

To facilitate this process, INDOT has developed an online scoping tool to be used by district scoping engineers for roadway projects. This tool will include and consider the project requirements for railroad crossings when applicable.



Key Implementation Roles

Stakeholder	Role
INDOT Statewide Technical Services	<ul style="list-style-type: none"> ▪ Write new protocols for considering highway-rail at grade crossings in the scoping process
Design Consulting Engineers	<ul style="list-style-type: none"> ▪ Will apply new scoping protocols to all relevant roadway projects ▪ Will use automated scoping tool when developing projects

Table 17: Project Scoping Key Implementation Roles



Opportunities to Build Upon

- Reducing overall project costs by identifying and addressing railroad crossing concerns early in the project scoping process
- Educate all in-house roadway engineers using forthcoming automated scoping tool



Known Challenges

- Educating internal and local agency staff. Many local agencies do not have an in-house engineer that can perform scoping work



Enforcement



Definition

Law enforcement staff and agencies serve as a direct first line of emergency response when rail-highway grade crossing crashes occur. They also serve an important role in enforcement efforts at crossings to prevent crashes- the deterrent created by consistent enforcement is one of the most important drivers of road user behavior.



Timeline of Implementation

Enforcement is classified as a short-term and ongoing strategy by INDOT.



Indiana's Approach

INOL works closely with the Indiana State Police and other law enforcement agencies in Indiana to help prevent crashes at highway-rail grade crossings. INOL hosts a training for law enforcement officials titled Railroad Investigation Safety Course (RISC). The RISC prepares law enforcement staff to use the proper safety techniques while investigating or responding to a grade crossing collision or trespasser incident, in addition to maintaining safety unique to the railroad environment. About 75% of crash reconstructionists in the Indiana State Police have received the RISC training and every recruit that comes through the Northwest Police Academy in Indiana undergoes the training. Operation Lifesaver, Inc. is currently developing RISC modules for adapted for fire and emergency medical responders to be used in their training.

Emergency Notification Signs are posted at railroad crossings and have an emergency number to call if there is a problem or potential for incident at a crossing. Currently, all law enforcement personnel are trained to use ENS as part of INOL's law enforcement training module.

Additionally, INOL and local law enforcement conduct regular safety blitzes at priority crossing locations, especially focusing on violations by trucks carrying hazardous material. These blitzes are planned several times a year and their results are shared with INOL and participating law enforcement entities.



Key Metrics

- Number of RISC trainings held
- Number of individuals receiving RISC training
- Number of violations recorded during coordinated enforcement blitzes at railroad crossings

To evaluate progress on this strategy INDOT will coordinate with INOL and INDOT will report on progress toward the key metrics.



Key Implementation Roles

Stakeholder	Role
INOL	<ul style="list-style-type: none"> ▪ Coordinate safety enforcement blitzes ▪ Develop training and information materials regarding ENS for commercial truck drivers
Law Enforcement Agencies	<ul style="list-style-type: none"> ▪ Coordinate safety enforcement blitzes ▪ Record and disseminate results of safety enforcement blitzes
INDOT Rail Programs Office	<ul style="list-style-type: none"> ▪ Supports the efforts of INOL and the law enforcement agencies in their safety efforts

Table 18: Enforcement Key Implementation Roles



Opportunities to Build Upon

- Educate all first responders, including firefighters and ems on how to respond to incidents at rail crossings



Known Challenges

- Law enforcement has many priorities and limited resources to dedicate to activities at railroad crossings



Stakeholder Action Coordination



Definition

Coordination and communications between the railroads, INDOT, FHWA, FRA, local agencies, Operation Lifesaver, railroads, Metropolitan and Rural Planning Organizations (MPOs and RPOs), and other stakeholders was essential to implement the strategies in the 2012 SAP. Rarely does one office within INDOT plan and implement highway-rail grade crossing safety projects without coordinating with another INDOT office or agency. Additionally, INDOT plays a central role of coordinating data and funding exchanges with FRA, which is critical for all stakeholders.



Timeline of Implementation

Stakeholder action coordination is classified as a short-term and ongoing strategy by INDOT.



Indiana's Approach

INDOT plans to continue collaborating with both internal and external partners on each of the strategies in this plan as well as all other ongoing activities. Ongoing dialogue between INDOT and stakeholders will include:

- Information and awareness on the Section 130 program
- Changes to rail safety funding indicated in the Infrastructure Investment and Jobs Act
- Crossing closures, consolidations, and separations
- Impacts of blocked crossings and possible mitigation actions for local agencies
- Division of construction and maintenance responsibilities between the railroads and public agencies
- Technical information and assistance related to signing, striping and vegetation at crossings
- Awareness and information regarding surface hazard mitigation

More specifically, the INDOT Rail Programs Office will continue to coordinate with FRA on maintaining and updating data.

The Office of Traffic Safety will work with the rail programs office, INOL, the railroads, and other relevant safety stakeholders to increase the focus on non-motorized and pedestrian safety at railroad crossings. Additionally, INDOT will foster new relationships and partnerships between stakeholders that have the potential to be fruitful, such as between local agencies and the railroads.

INDOT Offices of Traffic Safety and Rail Programs will have increased engagement with MPOs and RPOs regarding planned improvements to their areas and will leverage them to have a productive coordination with local agencies.

One of the products that resulted from this planning process that is designed to foster effective stakeholder coordination is a best practices table, intended to be used by local agencies, MPOs, and other relevant stakeholders involved in programming safety projects at highway-railroad at





grade crossings. This table was tailored specifically to address the central concerns to Indiana at grade crossings expressed by stakeholders during the planning process. The table will be published on the INDOT Office of Safety webpage and shared with LTAP, MPOs and RPOs following the formal adoption of the 2022 Safety Action Plan. The full table can also be seen in **Appendix D**.



Key Metrics

- Number of opportunities for engagement



Key Implementation Roles

Stakeholder	Relationships
<p>INDOT Office of Traffic Safety</p>	<p><u>Local Agencies</u></p> <ul style="list-style-type: none"> • Provide information regarding funding opportunities and technical assistance <p><u>MPOs and RPOs</u></p> <ul style="list-style-type: none"> • Incorporate rail safety projects into planning efforts <p><u>FHWA</u></p> <ul style="list-style-type: none"> • Coordinate commitment of Section 130 funds
<p>INDOT Rail Programs Office</p>	<p><u>FRA and Law Enforcement</u></p> <ul style="list-style-type: none"> • Coordinate to update data with the FRA on the US DOT Crossing Inventory Forms <p><u>Railroads</u></p> <ul style="list-style-type: none"> • Continue to communicate and coordinate safety improvement projects and provide grants for the RRGCF and the Industrial Rail Service Fund projects <p><u>Indiana Operation Lifesaver</u></p> <ul style="list-style-type: none"> • Coordinate Rail Safety week and other educational and outreach initiatives <p><u>Local Agencies</u></p> <ul style="list-style-type: none"> • Provide information on RGGCF and other funding opportunities <p><u>MPOs and RPOs</u></p> <ul style="list-style-type: none"> • Communicate rail safety projects for them to be incorporated into planning efforts
<p>Indiana Operation Lifesaver</p>	<p><u>Local Law Enforcement</u></p> <ul style="list-style-type: none"> • Coordinate enforcement blitzes • Training modules for enforcement at grade crossings • Coordinate Rail Safety Week and other educational and outreach initiatives

Table 19: Stakeholder Action Coordination Key Implementation Roles





Opportunities to Build Upon

- Strengthen existing relationships through program coordination and regular communication
- Build new communications amongst stakeholders, for example, between local agencies and the railroads



Known Challenges

- Coordination, especially external coordination can be inherently challenging due to divergent agency missions, bureaucratic processes, and lack of decision makers involved.



Section 4. Summary

INDOT and its safety and rail partners are committed to continuing the trend of safer highway-rail grade crossings throughout Indiana. This plan builds on the successes and accomplishments established in the 2012 Safety Action Plan. The 2022 Plan will continue this momentum and implement the strategies outlined in this document to make progress in both the near future and for years to come. It should be emphasized that the strategies outlined in this plan are intended to provide clear direction for INDOT and its partners but remain flexible enough to adapt to new data, technologies, and circumstances.



Photo 7: Typical Section 130 Project



Section 5. Appendices

Appendix A: Meeting Summaries

Steering Committee Meeting #1 Summary

February 8th, 2022 via MS TEAMS

Attendees

Name	Organization
Bob Wilcox	Indiana Law Enforcement Academy
Robert D. Crawford	Federal Railroad Administration (FRA)
Rick Drumm	Federal Highway Administration (FHWA)
Robert Duckworth	Indiana Criminal Justice Institute (ICJI)
Laura Slusher	Indiana LTAP
Jessica Feder	Indiana Operation Lifesaver (INOL)
Brandon Burgoa	INDOT Technical Planning & Programming
Jason Holder	INDOT LPA and Grants Administrative Office
Michael Holowaty	INDOT Office of Traffic Safety
Kevin Knoke	INDOT Office of Traffic Safety
Thomas Rueschhoff	INDOT Rail Programs Office
Nicole Waldheim	Burgess & Niple
Tristan Jackson	Burgess & Niple
Ryan Klitzsch	Cambridge Systematics
Rebecca Wingate	Cambridge Systematics

Meeting Purpose

The purpose of the meeting was to provide background and context on the Indiana Highway-Rail Grade Safety Action Plan (SAP), discuss what has been completed in the previous ten years to address safety at rail crossings in Indiana, and gain feedback on strategies to include in the 2022 Plan update.

Key Takeaways

- Obtained valuable insights on on-going behavioral and engineering activities occurring to address the SAP strategies, which could be incorporated in the 2022 update.
 - Railroads should be highlighted as a key stakeholder
 - INOL driver’s education training
 - Railroad Investigation Safety Course
 - Education on funding opportunities for SAP-related projects (i.e. signal interconnectivity, road crossing surface repairs, etc.)
 - Enforcement opportunity associated with “going around gates” definition of trespassing
- Obtained consensus on the 2022 SAP mission, goals, and objectives, barring a minor change to the mission statement.
- Clarified that we should use the word “crashes” in place of “accidents” in the 2022 SAP.
- Obtained valuable insights on how to arrange the strategies in the 2022 SAP.





- Retain rail crossing closures, grade separations, train activated enhancements, passive warning enhancements, communications outreach, enforcement, accurate data, and statewide coordination as strategies
- Add strategy for Advanced Signal Pre-Emption
- Revise Innovative Countermeasures strategy to Unconventional/Technology Countermeasures
- Consider if/how to address crossing surface condition and blocked crossings as strategies

Detailed Summary of Discussion

Success/Challenges/Strategy Review

- Through TRAX, 9 crossing separations and 2 closures have occurred at a cost of \$125 million in state funding and \$57million from local agencies and the railroad companies.
- The local 10% match for Section 130 funds created a barrier for locals- if it was not for the railroads stepping up with matching funds, many projects would not have been realized. Close to 95% of all projects have the 10% match covered by the railroads
- INOL partners very closely with the Indiana Drivers Ed Association, all educators get training from INOL.
- The RISC program used to be GCCI and is now a four-hour course for all new recruits and current law enforcement officers to get continuing education. INOL is currently preparing a module for fire departments and emergency medical service providers.
- The Four-Quadrant Gate installations were relatively expensive, so locations were picked very deliberately. Median barriers are relatively less expensive and serve a similar purpose where site conditions allow their use.

Data Review

- The “moving over crossing” data section includes vehicles that hit trains at crossings as well as trains hitting vehicles moving through crossings.
- Whenever traffic signals are located near a crossing, pre-emption signals should be updated as well.
 - There is a proactive statewide effort to promote traffic signal pre-emption and there is state and federal funding available for implementation, including INDOT transportation project funds, HSIP funds (eligible for 100% of project cost), and Section 130 funds for local agencies
 - 200 ft is the minimum distance from a crossing that triggers a pre-emption requirement, but that distance can be greater, depending on several factors.
 - Near terminus policy if you’re designing a road project and you come within a specified distance of a crossing. In the past, the crossing wasn’t included, now project engineers are responsible for upgrading the crossings. As a result, recent crossing upgrades have been installed using roadway project funds.
- Flashing lights are included in “active crossings” for the purposes of the data sets.
- Pedestrian crash data includes near-misses.
- For the purposes of the FRA data set, the FRA defines trespassing as going around a gate- this is not the same as the other accepted definition of trespassing, which is people on the railroad right-of-way not at a crossing.
- It was suggested that it could be helpful if the ARIES dataset could differentiate whether a moving train hit a vehicle or whether a moving vehicle hit a train at a crossing.





However, this information is normally covered by the officer's narrative and the expense of adding a check box on the report software would need to be considered.

- There is no data on crossing conditions specifically- only whether a crossing is paved or unpaved. Unpaved crossings tend to deteriorate more rapidly but 99% of the crossings in Indiana are paved.
 - Crossing conditions can be defined in several ways - condition of the material in the crossing, condition of the material in the crossing apron, or even the vertical geometry of the crossing. This could be cast as advice to FRA to consider a uniform rating system for crossing condition. A process like this would standardize the subjective nature of crossing condition reports and give the railroads a standard for each type of crossing and surface material.
 - The only possible data to attain for crossing conditions are crossing geometry and visibility.
 - When you ask the public, people always say the crossings are in bad condition. Section 130 funds are eligible to improve surface conditions, but warning upgrades have been prioritized higher. Other funds are also eligible to upgrade surface conditions.
 - In Indiana, it is the railroads' responsibility to maintain crossings. Many railroads are primarily concerned with the crossing conditions for trains, not cars. The Class I railroads tend to do a better job of maintaining crossings than the smaller railroads.
 - LTAP teaches locals how to rate roads all over the State. They have the capacity to teach locals how to consistently rate railroad crossings as well. Locals rate their roads every two years and rating crossings could likely be folded into that process- possible partnership between INDOT and LTAP on this effort.

Mission, Goals, and Objectives

- "All modes of transportation" should be placed in the mission statement in lieu of calling out motor vehicles specially to not suggest implicit prioritization.
- Replace language throughout section with "crashes" in lieu of "accidents" but keep any mention of "incidents."

Preliminary Strategy Discussion

- Carry crossing closures, grade separation, train activated warning enhancements and passive warning enhancements into the new plan.
- "Crossings with Multiple Crashes" will be removed.
- "Indiana Driver's Manual" will be removed.
- Several sub strategies can be added to "Communications Outreach" and "Statewide Coordination."
 - 1-page safety brochures based off the content in the driver's manual could be a sub-strategy.
- "Accurate Crash and Rail Data" will remain to account for emerging technologies and data collection practices.
- Project team will discuss strategies further, steering committee are encouraged to email their feedback and input to the project team.

Steering Committee Action Item(s)

- Review first draft of 2022 SAP strategies once prepared and provide written feedback.
- Participate in the March 10th Steering Committee meeting.





Railroad Stakeholder Meeting Summary

March 1st, 2022 via MS TEAMS

Attendees

Name	Organization
Jessica Feder	Indiana Operation Lifesaver (IOL)
Jason Bishop	CSX
Derrick Wright	NICTD
David A. Hall	CSX
Jeremy Kramer	Louisville-Indiana Railroad
Kelly Wenger	NICTD
Kristen Coslet	NICTD
Mark Flashman	NICTD
Nathan Schmidt	NICTD
William R. Miller	Norfolk Southern
Peter Ray	Indiana Railroad Company, Indianapolis
Derek Sublette	Norfolk Southern
Troy Strane	Indiana Northeastern Railroad
Michael Holowaty	INDOT
Kevin Knoke	INDOT
Thomas Rueschhoff	INDOT
Nicole Waldheim	Burgess & Niple
Tristan Jackson	Burgess & Niple

Meeting Purpose

The purpose of this meeting was to inform Indiana’s railroad stakeholders about the 2022 Safety Action Plan (SAP), gather feedback as to what strategies should be included, and review the mission, goals, and objectives of the plan.

Key Takeaways

- Strong interest in the continuation of the TRAX program.
- The railroads value low-cost safety countermeasures to supplement or compliment larger active warning projects. Those proven especially effective include median barriers, edge delineators and solar powered LED lights. With 70 percent of crash incidents occurring because drivers go around gates, these supplemental treatments can curb that issue.
- INDOT could share funding information on how the Infrastructure Investments and Jobs Act (IIJA) impacts highway-rail grade crossing safety.
- Increased education, especially to local law enforcement on how to use ENS signage, could be a sub-strategy in the SAP.





- Crossing surface condition was discussed. While it is an eligible expense under Section 130, equipment upgrades/updates take precedent. The condition of the crossing surface is not causing severe crashes.
- There may be opportunities for data analysis outside of what is prescribed by FRA- such as some statistics surrounding driver behavior at railroad crossings

Detailed Summary of Discussion

Successes and Challenges Agenda Item

- Local TRAX program is a success story, there is great interest to see it continue
 - INDOT will recommend to the state legislature another iteration of the TRAX program due to its previous success but there is no guarantee this will happen, and funding will continue.
- What kind of technical guidance will INDOT be offering to small, rural communities, and others related to IIJA?
 - Still waiting on guidance from NHSTA, FRA, and FHWA. Current guidance relates to the FAST Act, not the IIJA. INDOT can pass the question along to FRA and FHWA.
 - Indiana has candidate locations for some of the new discretionary grant opportunities. Railroads could potentially assist with RAISE grants and other discretionary grant applications.
 - Notice of Funding Opportunity is already out for a few of those grants.
 - Railroads could potentially team with INDOT on creating webinar series for locals to educate them on IIJA. Railroads like Norfolk Southern have a few one-pagers that they can share.
- Grade crossing surface condition is an issue, but it is difficult to obtain funding this type of improvement.
 - A standardized rating of crossing surfaces would be a valuable tool to better understand good versus poor conditions to better prioritize crossing surface needs.
 - There is a huge backlog of crossings that need warning devices upgrades, so fixing crossing surface conditions is a lower priority.
 - It is possible to spend section 130 on surfaces, but current INDOT policy is to focus efforts on warning devices.
 - There is another state grant program for Class II and III railroads with a 50% match to address surface needs.

Mission, Goals and Objectives Agenda Item

- Modify language in goals and objectives to eliminate the wording about prioritizing multiple crash locations to instead focus on all priority locations.

Survey Results and Strategies Discussion Agenda Item

- According to Norfolk Southern, 70% of incidents at crossings are due to people driving around warning gates and suggest utilizing effective mitigation measures such as median barriers.
 - Challenges include turning the maintenance of median barriers over to local agencies and snow removal.





- Further data analysis techniques could be explored to better illustrate the problem.
- Another major issue is drivers getting stuck within crossing limits.
 - Adding solar powered signage and/or side-of-the-road delineators have made a difference in other states
- FRA has mandated ENS signs but are local law enforcement informed on how to read and use them?
 - ENS signs are currently part of IOL coursework for law enforcement officials
 - INDOT could possibly put together a one-page informational flyer on ENS signs
 - Truck driver education regarding ENS signs could also be a worthwhile effort
 - IOL just added a member of the Indiana Truck Drivers Association to their board
- Electrified rail line crossing warning devices have neither predictors nor CWT. Warning devices when mixed with non-electrified railroads at a single crossing can cause issues and possibly excessive wait time for motorists.

Stakeholder Committee Action Item(s)

- Fill out survey link that was shared during discussion if you have not already done so. Link is: <https://arcg.is/100OyK>
- Email project team with any additional input on strategies
- Review draft SAP and provide comments





Steering Committee Meeting #2 Summary

March 10th, 2022 via MS TEAMS

Attendees

Name	Organization
Rick Drumm	Federal Highway Administration (FHWA)
Robert Duckworth	Indiana Criminal Justice Institute (ICJI)
Laura Slusher	Indiana LTAP
Jason Holder	INDOT LPA and Grants Administrative Office
Michael Holowaty	INDOT Office of Traffic Safety
Brandon Burgoa	INDOT Technical Planning & Programming
Kevin Knoke	INDOT Office of Traffic Safety
Thomas Rueschhoff	INDOT Rail Programs Office
Nicole Waldheim	Burgess & Niple
Tristan Jackson	Burgess & Niple
Ryan Klitzsch	Cambridge Systematics

Other steering committee members were invited but could not attend, including:

- Jessica Feder, Indiana Operation Lifesaver
- Robert D. Crawford, FRA
- Bob Wilcox, Indiana Law Enforcement Academy

Meeting Purpose

The purpose of the meeting was to provide updates and progress of the SAP development, including the revised mission, goals, and objectives; results of the MPO and rail meetings; the proposed strategies; the SAP outline; and the best practices table. The primary objective of this meeting was to obtain stakeholder feedback, input, and buy-in on these topics.

Key Takeaways

- A future TRAX program with federal funding as well as a possible TRAX 2.0 utilizing state funding is gaining momentum and conversations with the state legislature have been advanced. Pedestrians and non-motorized road users should be explicitly addressed across several strategies, including activated warning enhancements and grade separations, communications, and outreach, etc.
- Encouraging local agencies to upgrade and maintain their passive warning equipment before providing grant or formula funds for other activities could be a new policy requirement.
- Collaborating with local agencies on pre-emption is a good sub-strategy and something that can be developed during 2022.
- Section 130 projects programmed for FY2023 will not require a local match.

Detailed Summary of Discussion

MPO and Rail Meeting Feedback





- In the railroad stakeholder meeting, truck drivers were also identified as a target group for education on ENS signage.
- The solar powered LED lights refer to all of the signage at a railroad crossing- a sign that flashes is more likely to be adhered to than one that isn't.
 - There was some discussion of advanced warning signs and powered edge delineators using LEDs.
- Green Rd at Norfolk Southern railroad in Goshen, Elkhart County is an example of a project where supplemental low-cost solutions were implemented.
 - One of the main challenges with low-cost countermeasures is local maintenance once they're implemented.
- There is a strong interest at INDOT to create a sustained TRAX program utilizing federal funding, even if it needs to be scaled down to be enduring.
 - There have been extensive conversations at the legislative level about creating TRAX 2.0.
- Section 130 funds are now eligible for 100% of project funding, no local matching funds will be required for FY2023 projects and on.
 - Agreements could be revised now in theory, but it would be prohibitively burdensome. Once funding has been obligated, the match cannot be changed.

Revised Mission, Goals, and Objectives

- No further comments or revisions

Strategies

- The strategies are directed towards both the railroad and the roadway owners.
 - The railroads do more communications and outreach than INDOT, but it will be difficult to get them to take responsibility for traffic control devices.
 - It's the railroads responsibility to maintain control devices but they have no decision-making authority over where they go, what goes in, etc.
 - Warning device improvements are initiated by INDOT utilizing Section 130 monies, but locals must be encouraged to act on their own roads when it comes to pre-emption and like topics. Local agencies can apply to INDOT to use HSIP systemic funding for traffic signal preemption projects.
- Helping locals with advanced pre-emption will likely have to involve consulting engineers and some outreach and information diffusion could possibly be done through the MPOs.
 - There can be a conversation between Office of Traffic Safety, LTAP, and the Rail Office to strategize how to best reach the local agencies.
 - Could include this in the LPA monthly newsletter as a start.
- Leave the door open for future technologies in the Passive Warning Enhancement strategy.
- Local agencies need to get more involved in keeping their passive warning enhancements updated, especially as it pertains to pavement markings.
 - There is a follow-up process as part of the Rail Office inspections of crossings where letters are sent to local agencies, showing them updates that need to be completed.
 - INDOT does not force local agencies to make upgrades, but they do provide RRGCF to pay for a lot of that work
 - Could there possibly be restrictions on additional funding requests if crossings aren't brought up to standard?





- There is a LTAP training module on the MUTCD and railroad crossing signs. This can be shared again/more broadly across the state.
- Pedestrians will be considered under the train-activated warning enhancements strategy.
 - Pedestrians should be considered separate from “non-motorized.”
 - There is a possibility of future federal funding for pedestrian improvements at grade crossings.
 - Should consider the new sidewalks program, ask questions such as, is the sidewalk ending at the crossing? Are the pedestrian facilities across the crossings ADA compliant?
 - Any rail crossing within an INDOT sidewalk project on a state route will be checked for ADA compliance on the crossing. The intent is to add guidance language to local projects or LPAs to do the same.
 - There is \$25 million in the Office of Traffic Safety dedicated to pedestrian projects and railroad crossings are eligible, starting in 2027.
 - There should be separate sub bullets under several strategies for pedestrians.
- Non-motorized one-pagers regarding railroad safety can go through existing communications channels that already speak to kids and biking communities
 - There will be a program (BikeIN Safe) that includes website that will be launched this summer have a major bicycle helmet giveaway (100,000+ helmets for kids)

SAP/Strategy Outline and Best Practices Table

- No comments on the SAP outline or the strategy outline
- No comments on the best practices table

Steering Committee Action Item(s)

- Steering Committee is encouraged to submit comments to the project team throughout the month of March
- Project team will give steering committee review before the final document is sent to FRA on/around April 15th





Indiana Highway-Rail Grade Crossing Safety Action Plan

Appendix B: Plan Coordination Memorandum

Task 3: Plan Coordination Memorandum

Prepared for



Prepared by



BURGESS & NIPLE

January 2022



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Introduction

The Highway-Rail Grade Crossing State Action Plan (SAP) is Indiana's umbrella document, outlining the primary challenges and effective solutions to address highway-rail grade crossing safety in the state. Since 2010, other state and regional plans have addressed this topic. Relevant goals, objectives, strategies, countermeasures, and location priorities from other plans will be documented and if relevant, included in the final SAP, so all information on highway-rail grade crossing safety can be found in the SAP.

Documents Reviewed

Twenty-two transportation and safety plans were reviewed:

2012 Indiana Highway-Rail Grade Crossing State Action Plan: This is Indiana's original SAP and identifies safety concerns as highway-rail grade crossings and strategies to address those issues. This document will provide a significant foundation for the 2022 IN SAP.

2020 Indiana Highway Safety Improvement Program: This is Indiana's annual program of safety investments to reduce transportation-related fatalities and serious injuries

FY 2022 Highway Safety Plan: This is the highway safety plan that is created by the Traffic Safety Division within the Indiana Criminal Justice Institute. The document reviews crash data and response programming to identify projects and policies that are having the greatest impact on improving highway safety in Indiana

FY 2020 Annual Report: This is the Indiana Criminal Justice Institutes annual report of the fiscal year's activities and the accomplishments made in pursuit of the targets set forth by the Highway Safety Plan

2021 Indiana State Rail Plan DRAFT: Indiana's comprehensive state rail plan, which includes railroad safety and specifically, safety at highway-rail at-grade crossings

2018 State Freight Plan: Indiana's comprehensive statewide freight transportation plan, covering all modes of freight transportation

2021 Indiana Active Transportation Plan DRAFT: Indiana's comprehensive statewide active transportation plan, mostly addressing the bicycle and pedestrian travel modes.

2018 INDOT LRTP: Indiana's statewide, long range transportation plan which outlines a vision for transportation in Indiana for the next 25 years

Indiana MPO MTPs: The Metropolitan Transportation Plans (MTPs) for Indiana's 14 Metropolitan Planning Organizations (MPOs) direct the long-term vision of transportation in their respective areas. The MPO MTPs that were reviewed are listed below. Those with *italicized text* did not include mention of highway-rail at-grade crossings and are not included in the Reference Table:

Northwestern Indiana Regional Planning Commission (NIRPC)

Michiana Area Council of Governments (MACOG)

Northeastern Indiana Regional Coordinating Council (NIRCC)

Area Plan Commission of Tippecanoe County (APCTC)

Kokomo-Howard County Governmental Coordinating Council (KHCGCC)

Terre Haute Area Metropolitan Planning Organization (THAMPO)

Indianapolis Metropolitan Planning Organization (IMPO)

Madison County Council of Governments (MCCOG)





Delaware-Muncie Metropolitan Plan Commission (DMMPC)
Bloomington/Monroe County Metropolitan Planning Organization (BMCMPPO)
Columbus Area Metropolitan Planning Organization (CAMPO)
Evansville Metropolitan Planning Organization (EMPO)
Kentuckiana Regional Planning & Development Agency (KIPDA)
Ohio-Kentucky-Indiana Regional Council of Governments (OKI)

Key Findings

Highlights from the reviewed plans are listed below:

Several of the strategies identified in the 2012 Indiana SAP are still being implemented successfully and could be carried through to the 2021 SAP based on the results of data analysis and stakeholder input.

Several of Indiana's statewide safety plans (HSIP, HSP, and the Annual report) do not reference highway-rail grade crossing safety. However, the upcoming 2022 SHSP update will include SAP strategies.

Indiana's statewide transportation plans (Rail plan, Freight plan, Active Transportation plan, and Long-Range Transportation plan (LRTP)) do reference highway-rail grade crossing safety. Notably, the Freight plan and LRTP recommend rail grade crossing closures and removals as priority strategies.

Ten of the fourteen MPOs reference highway-rail grade crossing safety in their LRTPs. The issue is referenced in their goals, objectives, projects or strategies. The most commonly cited needs are eliminating or separating at-grade crossings; and reducing issues associated with prolonged blocked crossings, such as exacerbated emergency response times and pollution from idling vehicles.

The MPO plans include several countermeasure strategies employed by local agencies, which are consistent with the strategies from the 2012 SAP.





Reference Table

The following table summarizes relevant highway-rail grade crossing information for each document reviewed:

Table 1: Plan Coordination Reference Table

Title	Year	Agency	Goals	Strategies	Data	Application to the 2022 SAP
Highway-Rail Grade Crossing Safety Action Plan	2012	INDOT	To identify the major problems associated with crashes at at-grade rail crossings and suggest countermeasure strategies	Strategies included engineering, education, enforcement, data administration, and interagency coordination initiatives	Crash Performance, Crash Performance by Warning Device, Crashes by Major Contributor and Warning Device	This document was the previous version of the current planning effort- it will act as a go-by and benchmark during the current plan development
SHSP	2016	INDOT	Section 5.4 is dedicated to Highway-Rail Grade Crossing Crashes as part of the overall safety goals of the plan	Close redundant crossings, grade separation where cost-effective, grade crossing warning device improvements, define and identify rail corridor improvement priorities	¾ of crashes occur where train activated warning devices are in operation, ½ of all crashes take place at gated crossings	Good reference point, but focus will be on integrating the goals, objectives, and strategies from the 2022 SAP into the 2022 SHSP update
LRTP	2018	INDOT	Safe and Secure Travel goal includes reference to highway-rail grade crossing safety. Multimodal Needs goal references highway-rail grade crossing safety.	Eliminating and separating at-grade crossings.	Identifies at-grade crossing fatalities are concentrated in Northwest Indiana.	Closer review of data in Northwest Indiana Retain strategies related to eliminating or separating at-grade crossings





<p>State Freight Plan</p>	<p>2018</p>	<p>INDOT</p>	<p>Freight plan recognizes that the railway network must be accessible, in good repair, and safe to be a contributing part of the freight network</p>	<p>Removal of rail/highway grade crossings to improve the safety of the traveling public</p>	<p>5,393 public at-grade highway crossings, 5th most in the U.S. As of 2016, Indiana ranks 3rd in the U.S. for incidents at highway-rail crossings</p>	<p>Retain strategies related to eliminating or separating at-grade crossings</p>
<p>State Rail Plan DRAFT</p>	<p>2021</p>	<p>INDOT</p>	<p>Outlines the safety of rail compared to other freight modes</p>	<p>Outlines criteria for selecting which crossings to upgrade annually</p>	<p>Crashes at crossings vs total crossings and crossings with gates, thoroughly outlined all funding streams and programs</p>	<p>Incorporate information related to funding streams and current project selection criteria</p>
<p>State Active Transportation Plan DRAFT</p>	<p>2021</p>	<p>INDOT</p>	<p>Pedestrian safety at railroad crossings was noted as an area of concern from feedback from elected officials</p>	<p>N/A</p>	<p>N/A</p>	<p>Discuss pedestrian safety at railroad crossings with Steering Committee and at MPO meeting Address pedestrian and bicycle safety as a strategy</p>





<p>NWI 2050</p>	<p>2019</p>	<p>NIRPC</p>	<p>Recognized trains blocking crossings can hamper emergency response efforts</p>	<p>Focus on highway/rail grade separation and model traffic enforcement at rail/highway crossings</p>	<p>Rail Crossing Task Force (RCTF) has investigated which crossings have the most/longest blockages-findings not included</p>	<p>Continue to address grade separations as a SAP strategy</p> <p>Review available blockages data</p> <p>Consider strategy related to blockages and their impacts</p>
<p>Michiana on the Move 2045</p>	<p>2019</p>	<p>MACOG</p>	<p>Removing at-grade rail crossings is listed as one of the aspects of the Transportation Systems Management strategies</p>	<p>Includes a grade separation project in the infrastructure plan (CR 1300 N, Norfolk Southern New Crossing)</p>	<p>Includes a grade separation project in the infrastructure plan (CR 1300 N, Norfolk Southern New Crossing)</p>	<p>Continue to address grade separations as a SAP strategy</p>
<p>2040 Transportation Plan</p>	<p>2018</p>	<p>NIRCC</p>	<p>Objective 4: Eliminate at-grade rail crossings along primary corridors and at other locations where conflicts exist</p>	<p>Safety Management System monitors rail-highway grade crossings and maintains pertinent data</p>	<p>Crossing upgrade projects are included in the TIP</p> <p>Emphasis Area 10 in data section: Reduce crashes at highway railroad crossings</p>	<p>Continue to address grade separations and elimination as SAP strategies</p>





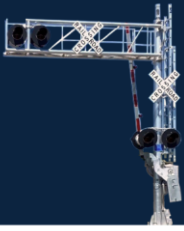
<p>2040 Metropolitan Plan – Completing our Streets</p>	<p>2012</p>	<p>APCTC</p>	<p>Reduction and elimination of at-grade rail crossings is mentioned in Goal 7: Promote Efficient System Management and Operation</p>	<p>Recently developed quiet crossings in Lafayette and eliminated at grade crossings as part of the Lafayette Railroad Relocation Project and on US 52</p>	<p>Tippecanoe County averages 2.5 railroad crashes a year Includes Table 5 which outlines warning equipment per crossing</p>	<p>Continue to address grade separations and elimination as SAP strategies</p>
<p>2045 Metropolitan Transportation Plan</p>	<p>2018</p>	<p>THAMPO</p>	<p>The high volume of train traffic through the MPA and the large number of at-grade public crossings contribute to traffic congestion, raise concerns about public safety and security, and limit opportunities for growth and development in some sections of the urbanized area.</p>	<p>Indicated the Local TRAX program is a good strategy for closing and/or upgrading crossings Noted that the Terre Haute Urbanized Railroad Corridor Study led to the development of an ITS application that tracked train traffic in the region, including blocked crossings</p>	<p>N/A</p>	<p>Review the ITS application that tracks delayed crossings and relays information to emergency responders as a potential statewide strategy Continue to address grade separations and elimination as SAP strategies</p>
<p>2045 inMotion</p>	<p>2020</p>	<p>MCCOG</p>	<p>Interactions with railroads is listed under the Vulnerable Road Users and the Safety & Emergency Management focus group meetings</p>	<p>Combination of static and dynamic signage to alert when a crossing is being blocked to redirect traffic</p>	<p>N/A</p>	<p>Review the ITS system and signage as a possible countermeasure to blocked railroad crossings</p>





<p>2018-2045 Delaware-Muncie Long Range Plan Update</p>	<p>2018</p>	<p>DMMPC</p>	<p>All crossing upgrade projects are added to the TIP when funds become available</p> <p>Brush along fences sometimes compromise rail crossing approach sight distances- a local effort will be implemented to keep sight distances clear</p>	<p>Reviews rail crossings not at grade and the benefits, as well as mentioning the Muncie Bypass which does have a crossing. The plan mentions adding an overpass when it can fit in the INSTIP</p>	<p>City of Muncie has studied rail crossings in Downtown. Hotels claim to have lost business due to the noise and a quiet zone was established after safety upgrades were implemented</p>	<p>Review upgrades to downtown rail crossings and the local policies for keeping rail crossing approach sight distances clear</p>
<p>2045 MTP</p>	<p>2020</p>	<p>BMCMPO</p>	<p>N/A</p>	<p>Mentions HSIP monies relating to the Railway-Highway Crossings Program as an available source of funding</p>	<p>N/A</p>	<p>N/A</p>
<p>2045 MTP</p>	<p>2019</p>	<p>EMPO</p>	<p>Removal/separation of at-grade crossings is mentioned as an approach under several objectives, as well as a freight recommendation</p>	<p>Includes the proposed elimination of at-grade rail crossing at Mill Rd, west of Kratzville Rd</p>	<p>N/A</p>	<p>Continue to address grade separations and elimination as SAP strategies</p>
<p>Connecting Kentuckiana 2040</p>	<p>2020</p>	<p>KIPDA</p>	<p>Railroad crossing safety is mentioned as a freight impediment</p>	<p>Several projects listed include at-grade rail crossing upgrades as well as projects designed to divert traffic from crossings</p>	<p>Has over 10 projects that include changes to at-grade rail projects, even if it is just one aspect of the given project</p>	<p>Continue to address grade separations and elimination as SAP strategies</p> <p>Consider strategy related to blockages and their impacts</p>





Indiana Highway-Rail Grade Crossing Safety Action Plan

Appendix C: Data Memorandum

Data Analysis

Prepared for



Prepared by

BURGESS & NIPLE



March 2022



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Indiana's grade crossing inventory is presented in this section. Crash/incident history was also examined for patterns and dominant characteristics to inform the risk analysis and crossing prioritization.

1 Data Sources

This report used the following data sources:

- Highway-Rail Grade Crossing Inventory Data – Current (Form FRA F 6180.71) The Grade Crossing Inventory System (GCIS) is an FRA database based on data provided by railroads, transit agencies, and states. The form collects key inventory information such as the physical characteristics, safety devices, traffic, status, and location of all the grade crossings in the nation.
- Highway-Rail Grade Crossing Accident/Incident Data (Form FRA F 6180.57) This FRA form reports on any collision between on-track railroad equipment and highway user at a grade crossing. "Highway user" includes automobiles, buses, trucks, motorcycles, bicycles, farm vehicles, pedestrians, and all other modes of surface transportation motorized and unmotorized. The form collects key collision information such as the type of crossing, type of accident, type of vehicle, type of highway user, and highway user action for collisions between railroad equipment and highway users at grade crossings.
- Injury/Illness Summary – Casualty Data (Form FRA F 6180.55A) Deaths, injuries, or occupational illnesses that occur on railroad property are collected using this FRA form.
- Indiana 2011-2020 Crash Data (ARIES) The Indiana State Police maintains the central repository of all crash reports for the State of Indiana in the Automated Reporting Information Exchange System (ARIES). The crashes reported in this database include crashes that are not reportable to the FRA.

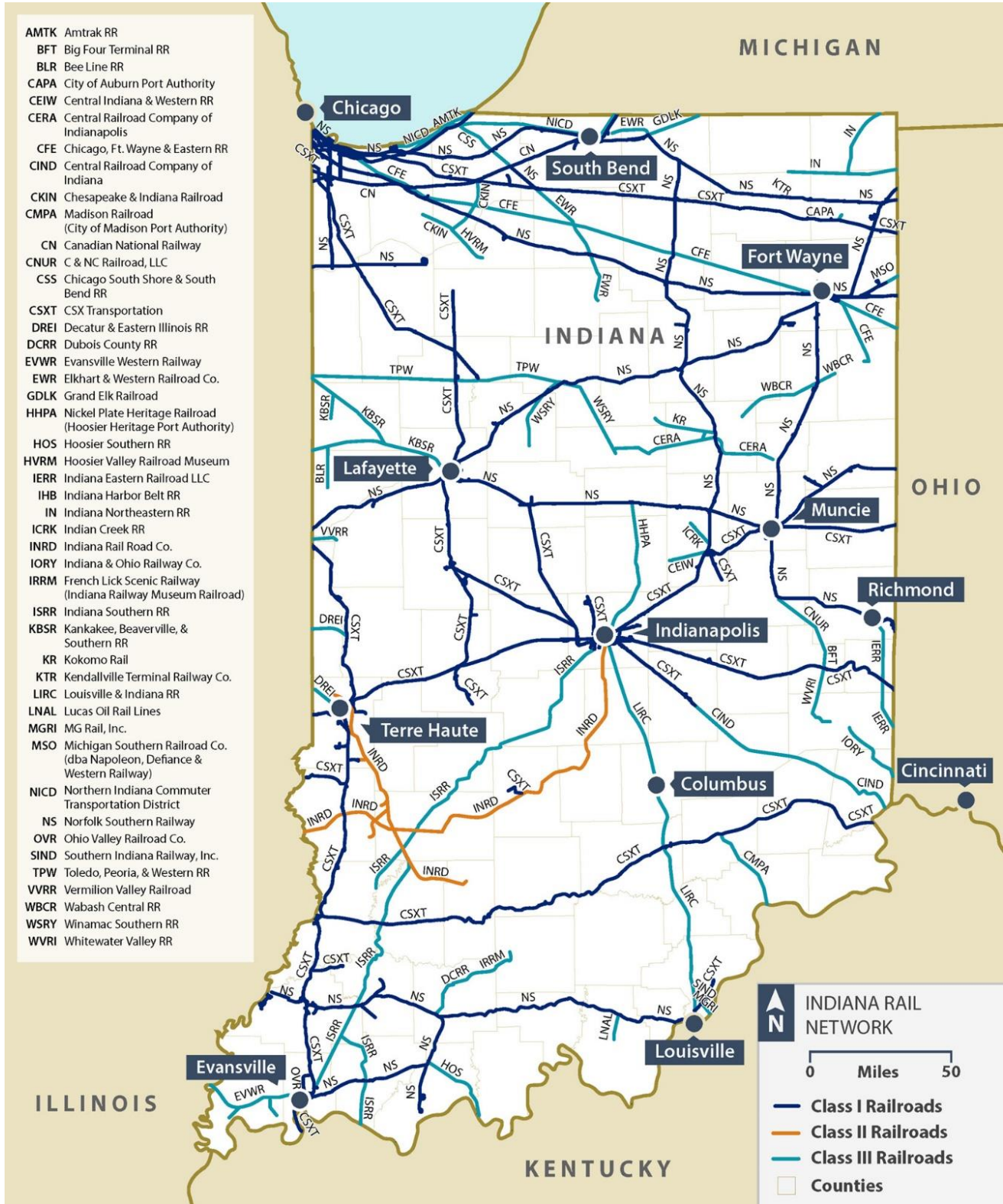
2 Crossing Inventory

Both freight and passenger trains operate in Indiana. **Figure 2** shows the active freight rail lines in Indiana and **Figure 3** highlights the passenger rail lines and stations in Indiana. The passenger rail lines in Indiana include Amtrak intercity trains as well as commuter trains. Indiana's rail network encompasses approximately 4,400 miles of track and there are over 96,000 miles of highways and streets in Indiana. As a result of this convergence of railroads and highways in Indiana, there are large number of highway rail crossings. Indiana has 8,601 crossings overall and 7,566 grade crossings. Indiana ranks sixth for the number of crossings of all types and fifth for the number of at-grade crossings.¹

¹ https://explore.dot.gov/t/FRA/views/CrossingInventoryDashboard-V4/CrossingInventorybyStateandID?:embed=y&:display_count=n&:showVizHome=n&:origin=viz_share_link



Indiana Highway-Rail Grade Crossing Safety Action Plan



(Indiana State Rail Plan 2021, Figure 2-3)

Figure 2: Indiana Rail Network



Indiana Highway-Rail Grade Crossing Safety Action Plan



(Indiana State Rail Plan 2021, Figure 2-19)

Figure 3: Intercity Passenger Rail Routes in Indiana





The 8,601 crossings in Indiana are summarized in **Error! Reference source not found.** There are 5,488 public highway-railroad grade crossings and 24 public pedestrian grade crossings. In addition to the public grade crossings, there are 962 public grade separations and 70 private grade separated crossings.

Table 20: Indiana Crossing Summary

Crossing Type	Public	Private	Unknown	Total	Percent of Total
At-Grade Highway	5,488	2,014	0	7,502	87%
At-Grade Pedestrian Pathway	23	31	7	61	1%
At-Grade Pedestrian Station	1	2	0	3	0%
Grade Separated	962	70	3	1,035	12%
Total	6,475	2,117	10	8,601	100%

(Form FRA F 6180.71, retrieved January 18, 2022)

Note: Excludes closed crossings.

Grade-separated crossings have been classified in **Error! Reference source not found.** as highway or pedestrian and railroad over/under. Most of the grade-separated crossings in Indiana are for highway vehicles and the crossings are nearly evenly split between railroad under and railroad over grade separations. Grade-separated crossings are excluded from the remainder of the analysis in this report.

Table 21: Indiana Grade Separated Crossing Summary

Crossing Type	Railroad Under	Railroad Over	Total	Percent of Total
Public Highway	466	472	938	91%
Public Pedestrian-Pathway	11	12	23	2%
Public Pedestrian-Station	0	1	1	0%
Private or Unclassified	18	55	73	7%
Total	495	540	1,035	100%
% of Total	48%	52%	100%	

(Form FRA F 6180.71, retrieved January 18, 2022)

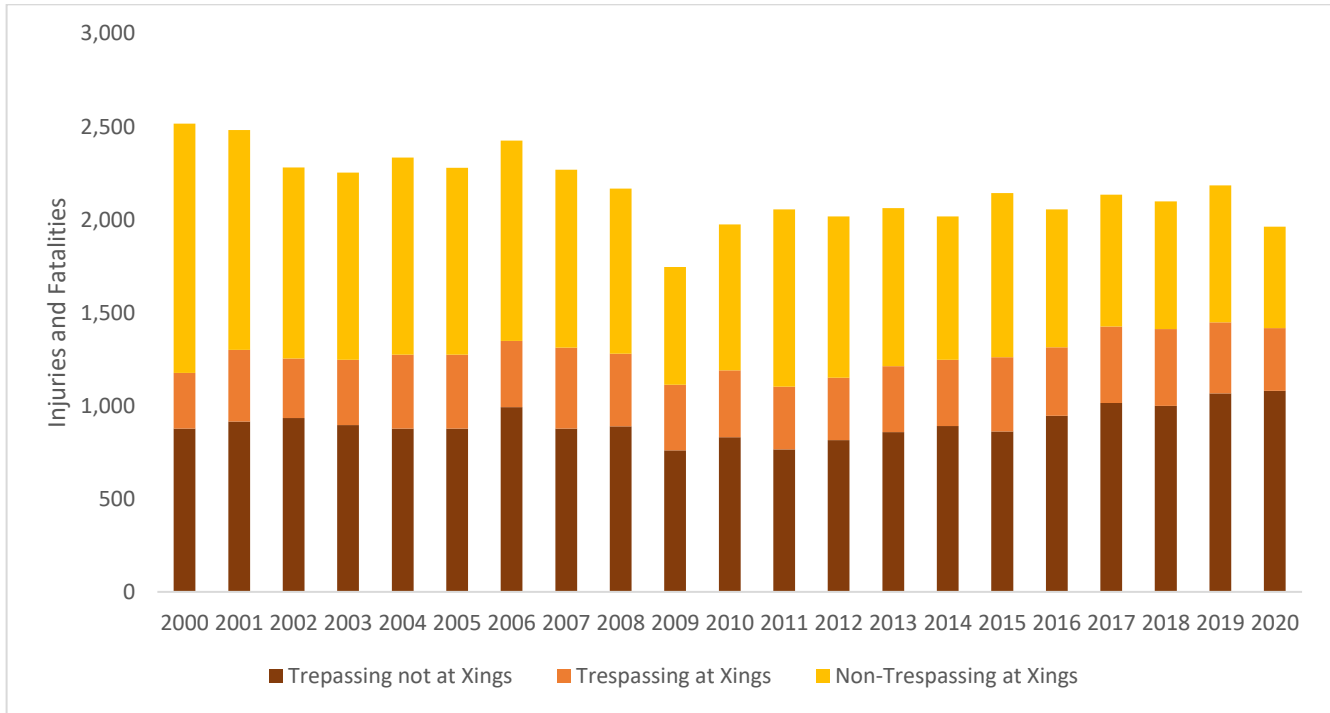
The casualties at grade crossings in Indiana are proportionally less than the state's share of the nation's grade crossings. Figure 5 and **Error! Reference source not found.** show the overall number of injuries and fatalities between 2000 and 2020 across the nation and in Indiana, respectively. Indiana has 3.7 percent of the grade crossings in the nation.² In 2020, the injuries and fatalities at grade crossings in Indiana were 2.9 percent of the national injuries and fatalities at grade crossings. Overall casualties have declined 22 percent in the nation and 40 percent in Indiana between 2000 and 2020. The decreases in casualties, across the nation and in Indiana, are a result of the decrease in non-trespassing casualties at grade crossings (59 percent decrease across the nation and 57 percent decrease in Indiana). Across the nation, trespassing casualties at grade crossings and trespassing

² The nation has 204,715 grade crossings as of February 12, 2022. <https://railroads.dot.gov/safety-data/crossing-and-inventory-data/crossing-inventory-state-and-id>



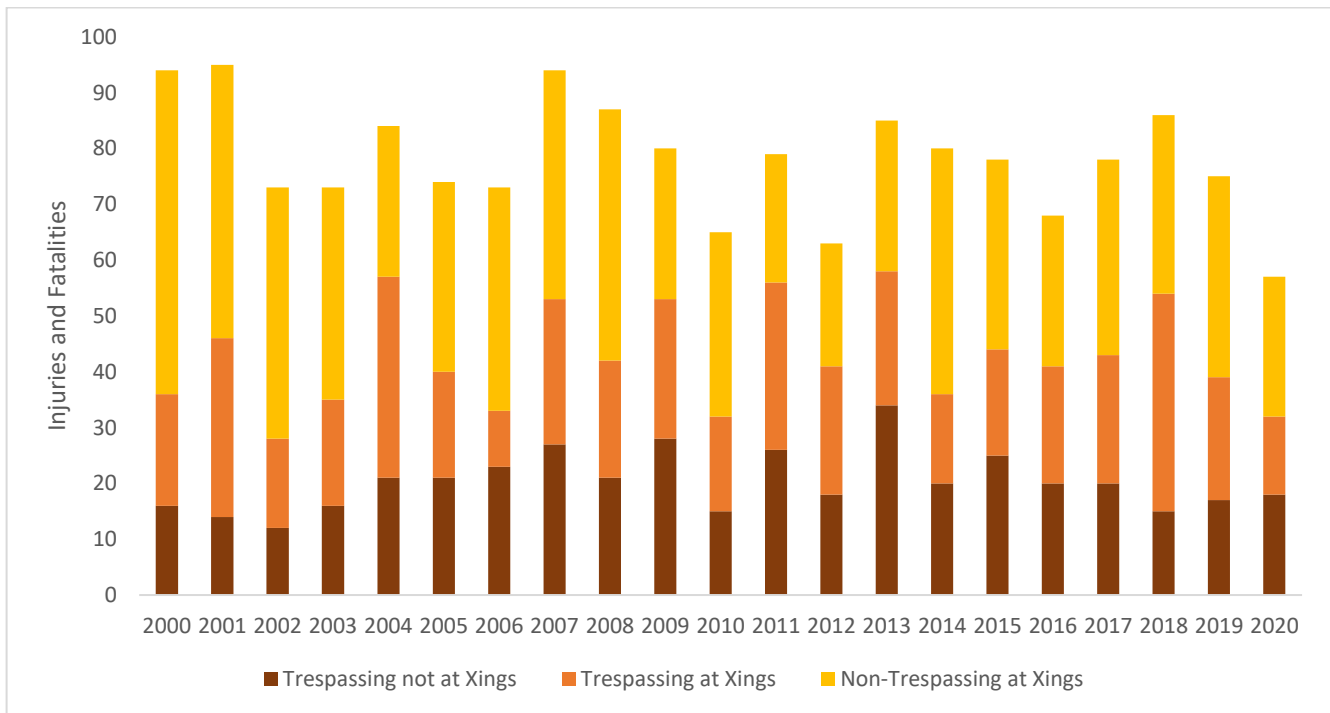


casualties not at grade crossings have increased 20 percent between 2000 and 2020 (13 percent at grade crossings and 23 percent not at grade crossings).



(Form FRA F 6180.55A, retrieved January 6, 2022)

Figure 4: National Trespassing and Grade Crossing Casualties





(Form FRA F 6180.55A, retrieved January 6, 2022)

Figure 5: Indiana Trespassing and Grade Crossing Casualties

3 Public Highway At-Grade Crossings

The State of Indiana may only utilize state funds on public roadway grade crossings.³ Of the 7,566 grade crossings in Indiana, 5,488 are grade crossings for public highways and of those, 5,353 are registered as currently with train traffic. The grade crossing analysis is limited to these public highway grade crossings with train traffic.⁴ Although the state cannot fund improvement at private and pedestrian crossings, the incident history at private and pedestrian grade crossings is summarized in Section 4 for reference.

The remainder of this section uses the general term “grade crossings” to refer to the subset of public highway grade crossings with train traffic in Indiana. Table 22 summarizes the grade crossings by protection type and rural/urban geography. Urban/rural are defined in the FRA database by FHWA functional class and the categorizations do not reflect the most recent census data.⁵

Table 22: Indiana Grade Crossing Summary

Geography	Active	Passive	Total
With Train Traffic	3,216	2,137	5,353
Rural	1,580	1,535	3,115
Urban	1,634	595	2,229
Unknown	2	7	9
No Train Traffic	31	104	135
Total	3,247	2,241	5,488

(Form FRA F 6180.71, retrieved January 18, 2022)

Figure 6 Error! Reference source not found. demonstrates the balance between grade crossings in Indiana’s rural and urban areas. Fifty-eight percent of grade crossings are in rural areas and 42 percent are in urban areas. Most grade crossings are on local roads, as shown in Figure 7.

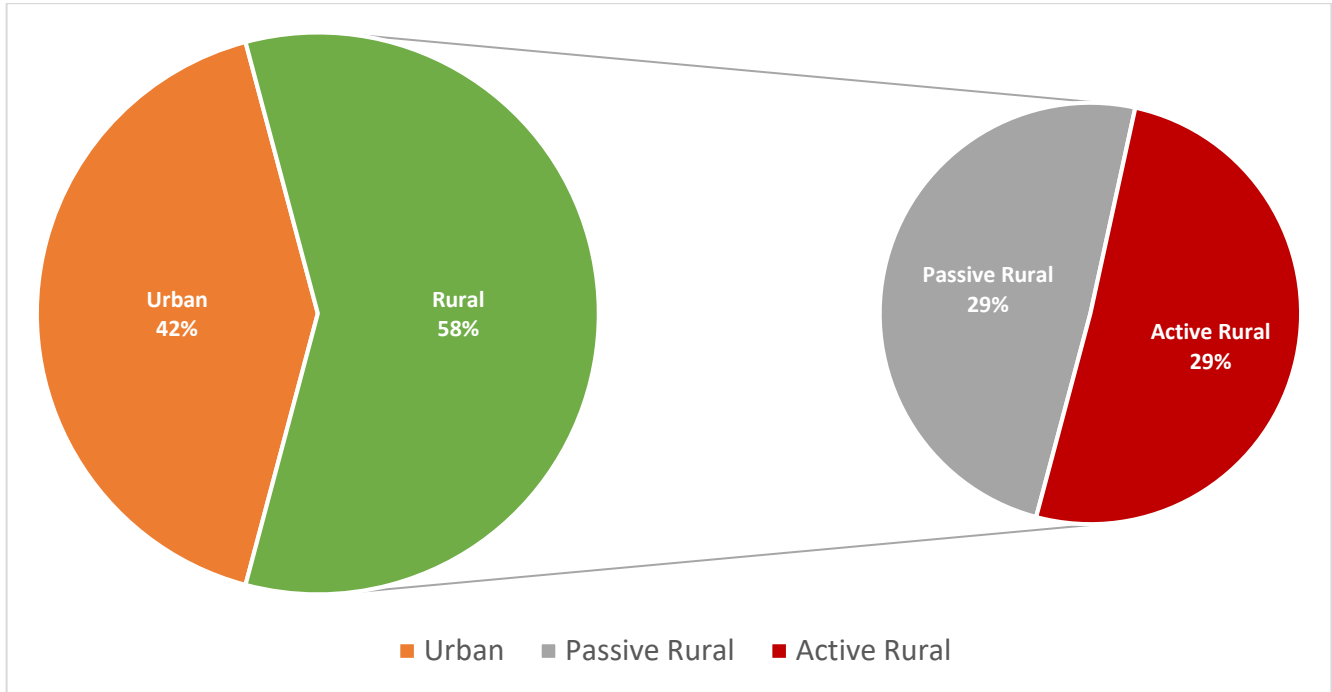
³ Per state law, the term "grade crossing" means a crossing of any railroad and any public highway, street, or roadway, at grade. IC § 8-6-7.7-1 (2020)

⁴ Closed crossings are altogether excluded from this report.

⁵ The GCIS is consistent with the FHWA definitions. See Appendix D here:

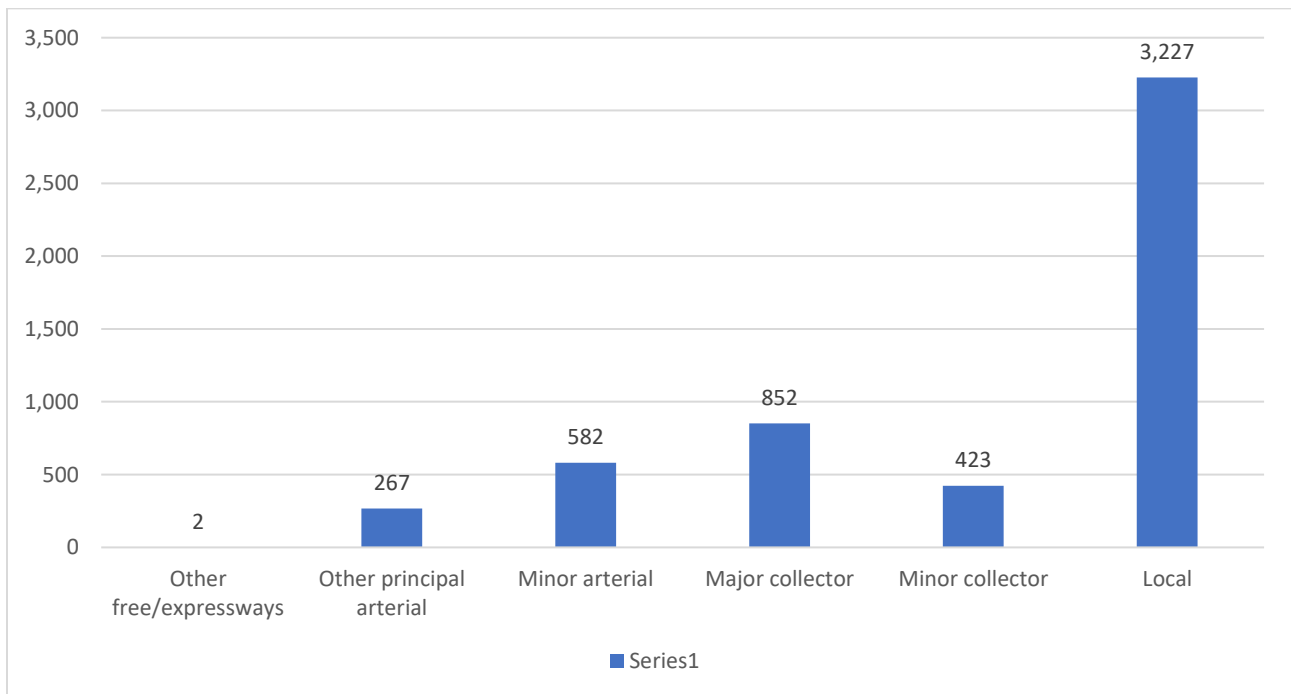
https://safetydata.fra.dot.gov/GCIS/Help//ReferenceDocuments/GCIS_Data_Migration_Strategy_v3.0.0_Rel_0_1-27-2021.pdf





(Form FRA F 6180.71, retrieved January 18, 2022)

Figure 6: Urban, Rural, Active, and Passive Grade Crossings



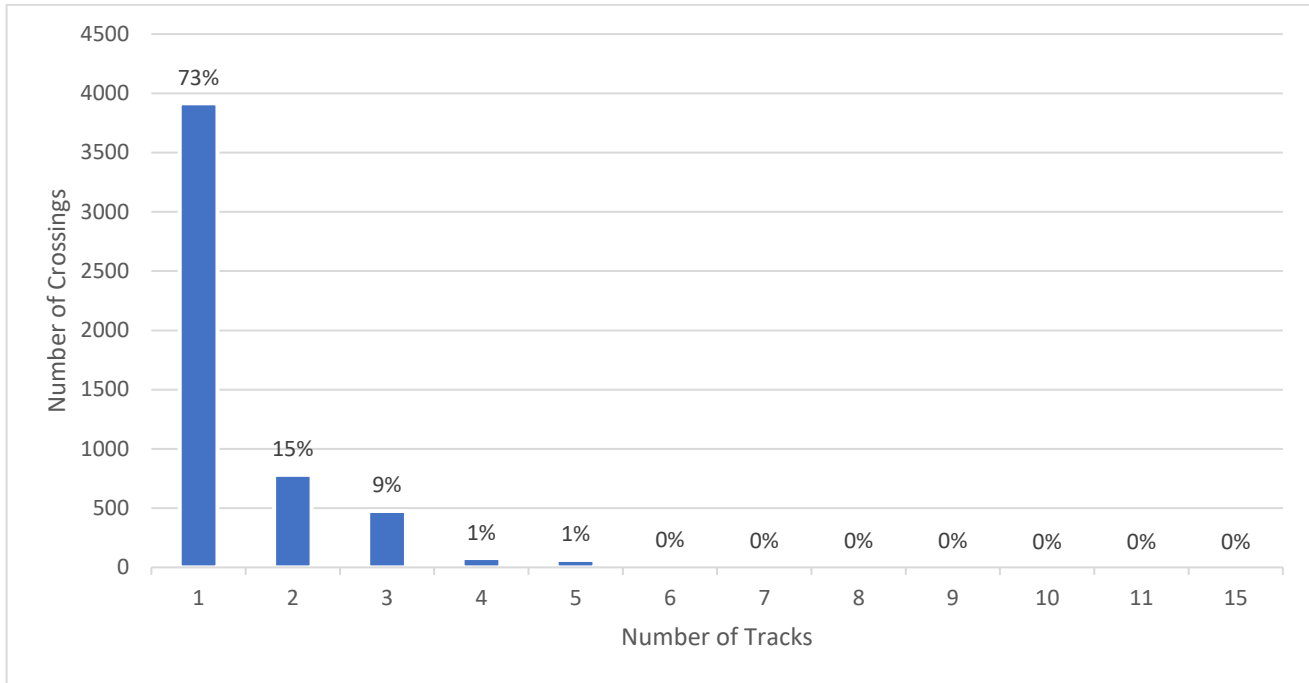
(Form FRA F 6180.71, retrieved January 18, 2022)

Figure 7: Functional Class by Grade Crossings





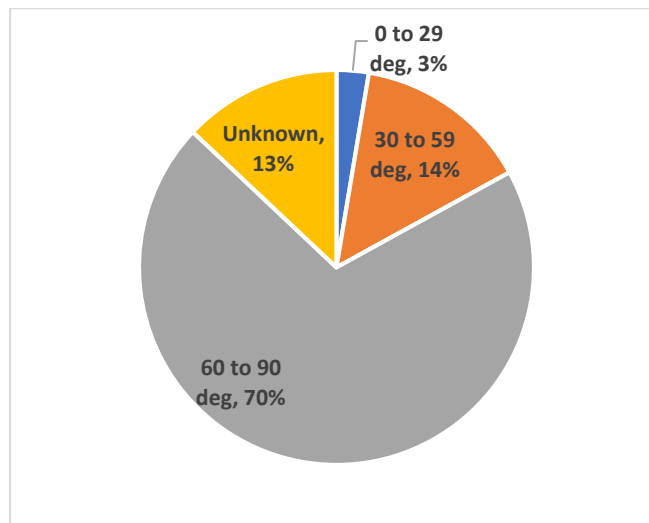
Most grade crossings in Indiana are at single railroad tracks (73 percent). Fifteen percent of grade crossings are at double railroad tracks and only 9 percent are at triple railroad tracks. **Figure 8** displays the number of tracks at grade crossings.



Form FRA F 6180.71, retrieved January 18, 2022)

Figure 8: Number of Tracks at Grade Crossings

The skew between the roadway and the railroad tracks is measured by the smallest angle. Figure 9 demonstrates the smallest angle at grade crossings. Most of the grade crossings (70 percent) have a normal skew—60 to 90 degrees. A moderate skew of 30 to 59 degrees is found at 14 percent of the crossings and a severe skew of 0 to 29 degrees is found at 3 percent of crossings. Thirteen percent of crossings did not have entries in the smallest angle field of the Grade Crossings Inventory System.

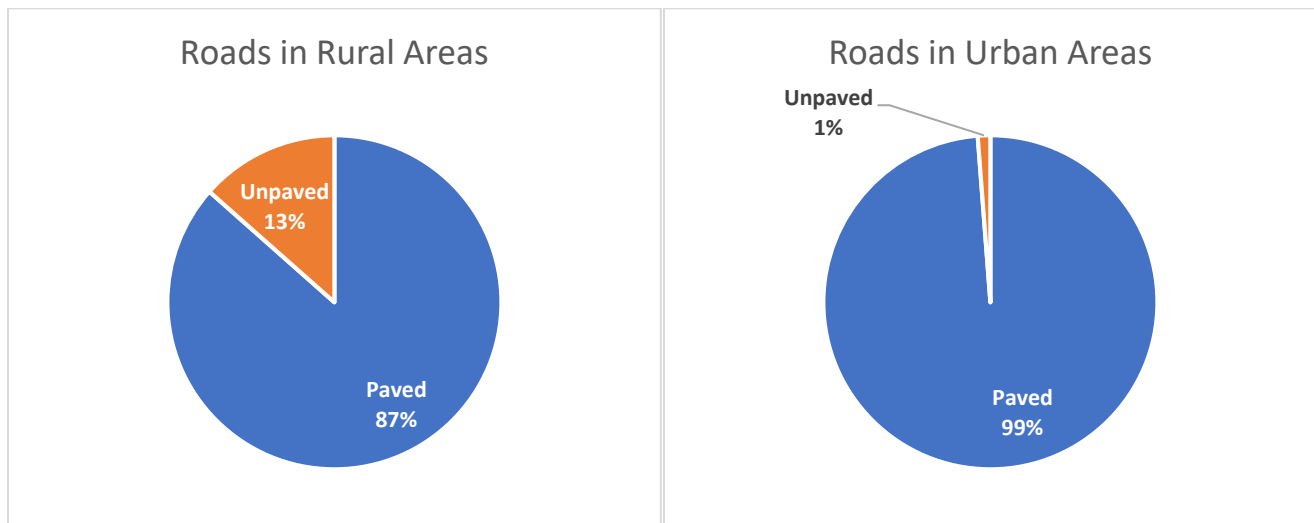




(Form FRA F 6180.71, retrieved January 18, 2022)

Figure 9: Smallest Crossing Angle at Grade Crossings

The aprons leading up to grade crossings of unpaved roadways generally experience more erosion than paved crossings. Most rural and urban grade crossings are paved. Only 13 percent of grade crossings in rural areas and 1 percent in urban areas have unpaved roadways as demonstrated in **Figure 10**. Together eight percent of grade crossings are unpaved.



(Form FRA F 6180.71, retrieved January 18, 2022)

Figure 10: Paving at Grade Crossings in Rural and Urban Areas

Grade crossings with nearby intersections present logistical challenges to traffic flow. The FHWA Manual on Uniform Traffic Control Devices (MUTCD) specifies grade crossings with active warning devices within 200 feet of a highway traffic signal should be interconnected with the highway traffic control system. The interconnection allows the railroad devices to send a preemption call to the highway traffic signals upon detection of an approaching train. Depending on the highway traffic volumes, highway vehicle mix, highway vehicle and train approach speeds, frequency of trains, and queue lengths—interconnection or other alternatives should be considered for highway traffic signals located further than 200 feet.⁶

Interconnected warning signs are specified in the MUTCD as useful at intersections near grade crossings. For crossings where traffic has the potential to back up from a stop sign-controlled intersection, an active warning sign activated by time-of-day or queue detection could be provided to remind road users of the risk of stopping on the crossing. Examples of warning signs include a dynamic "Do Not Stop On Tracks" sign or a passive sign with a warning beacon including the phrase "When Flashing".⁷

⁶ FHWA-SA-18-040/FRA-RRS-18-001. *Highway-Rail Crossing Handbook, 3rd Edition*. July 2019. https://safety.fhwa.dot.gov/hsip/xings/com_roaduser/fhwasa18040/chp2g.cfm

⁷ Ibid





Of the grade crossings with signals at nearby intersections, 32 percent have interconnected traffic signals or warning signs. Most interconnected signals or warning signs are for highway traffic signals within 200 feet of a grade crossing.

Table 23 demonstrates the number of crossings with signals at nearby intersections and the signal interconnections.

Table 23: Grade Crossings with Signals at Nearby Crossings

Interconnection	Crossings with Signals at Nearby Intersection
Not Interconnected	203
Interconnected Warning Signs	3
Interconnected traffic signals	117
Unknown	57
Total	380

(Form FRA F 6180.71, retrieved January 18, 2022)

The number of incidents at grade crossings found in the FRA database are shown in **Table 24**. Incidents without any injuries or fatalities are considered property damage only (PDO) incidents. Incidents involving injuries but no fatalities are considered injury only incidents. Incidents involving fatalities and any number of injuries are considered fatal incidents. All incidents involving rail equipment and on railroad property are required to be reported to the FRA. From 2011 to 2020, there were 1,110 incidents, 406 injuries, and 137 fatalities reported in the FRA database. The number of injuries and fatalities at grade crossings are shown in tally for every 10 incidents.

. Overall, 9 percent of incidents were fatal and 26 percent of incidents were injury only. On average there were 4 injuries and 1 fatality for every 10 incidents.

Table 24: Grade Crossing Incidents, 2011 to 2020, FRA Database

Incident Type	Number of Incidents (FRA)	Percent of Total
Property Damage Only	724	65%
Injury Only	291	26%
Fatal	105	9%
Total Incidents	1,110	100%

(Form FRA F 6180.71 retrieved January 14, 2022, and Form FRA F 6180.57 retrieved January 18, 2022)

Table 25: Grade Crossing Injuries and Fatalities, 2011 to 2020, FRA Database

Incident Type	Number of Persons Injured	Number of Persons Killed	Average Persons Injured per Incident	Average Persons Killed per Incident
PDO	0	0	0	0
Injury Only	385	0	1.3	0
Fatal	21	137	0.2	1.1
Total	406	137	0.4	0.1

(Form FRA F 6180.71 retrieved January 14, 2022, and Form FRA F 6180.57 retrieved January 18, 2022)

The number of incidents at grade crossings found in the State Police Database are shown in **Table 26** by the crash type. While most of the incidents found in the FRA database are found in the State Police





database, more incidents are reported in the FRA database than crashes in the State Police database. Many PDO crashes are not reported and an officer's report sometimes is not prepared. The State Police database also does not record the crossing identification number, so the State Police database cannot be filtered to show only the crashes occurring at public highway grade crossings. From 2011 to 2020, there were 936 crashes, 376 injuries, and 76 fatalities reported in the State Police database. The number of injuries and fatalities at grade crossings are shown in **Table 27**. Overall, 7 percent of crashes are fatal and 30 percent of crashes were injury only. On average there were 4 injuries and 1 fatality for every 10 crashes.

Table 26: Grade Crossing Crashes, 2011 to 2020, State Police Database

Crash Type	Number of Crashes (ARIES)	Percent of Total
PDO	587	63%
Injury Only	285	30%
Fatal	64	7%
Total Crashes	936	100%

(ARIES)

Table 27: Grade Crossing Injuries and Fatalities, 2011 to 2020, State Police Database

Crash Type	Number of Persons Injured	Number of Persons Killed	Average Persons Injured per Crash	Average Persons Killed per Crash
PDO	0	0	0	0
Injury Only	358	0	1.3	0
Fatal	18	76	0.3	1.3
Total	376	76	0.4	0.1

(ARIES)

Examining the grade crossing and incidents by county, a majority of the incidents between 2016 to 2020 occurred in 10 counties. These 10 counties are listed in **Table 28** and represent 30 percent of the State's incidents but 58 percent of the incidents.

Table 28: Grade Crossings and Incidents (2016-2020), Top 10 Counties

County	Incidents (2016-2020)	Number of Crossings	Incidents (2016-2020), Percent of Total	Number of Crossings, Percent of Total
Lake	80	300	14.7%	5.5%
Marion	48	228	8.8%	4.2%
St Joseph	35	127	6.4%	2.3%
La Porte	35	252	6.4%	4.6%
Elkhart	26	92	4.8%	1.7%
Madison	22	187	4.0%	3.4%
Vigo	19	153	3.5%	2.8%
Porter	18	114	3.3%	2.1%
Knox	18	86	3.3%	1.6%
Clark	17	96	3.1%	1.7%
Top 10 Subtotal	318	1,635	58.2%	29.8%



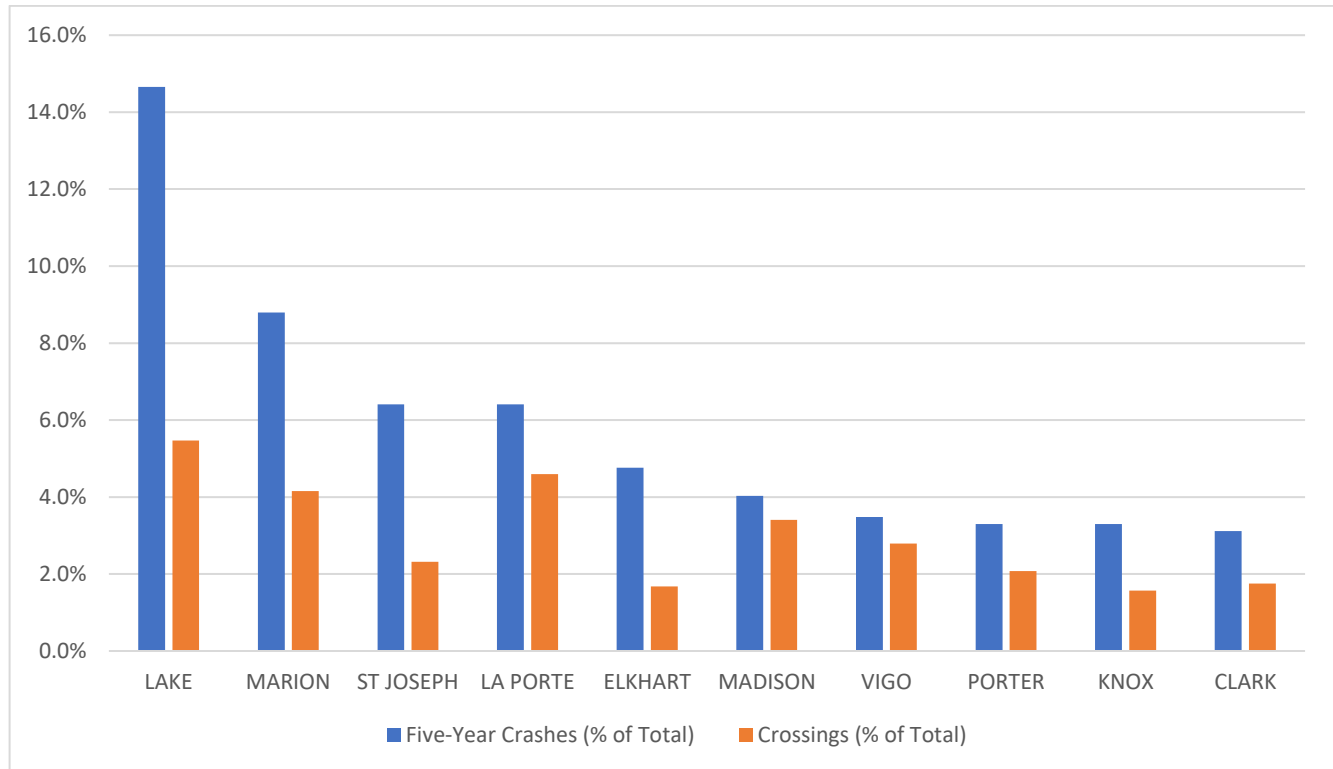


State Total	546	5,488	100.0%	100.0%
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(Form FRA F 6180.71 retrieved January 14, 2022, and Form FRA F 6180.57 retrieved January 18, 2022)

(Form FRA F 6180.71 retrieved January 14, 2022, and Form FRA F 6180.57 retrieved January 18, 2022)

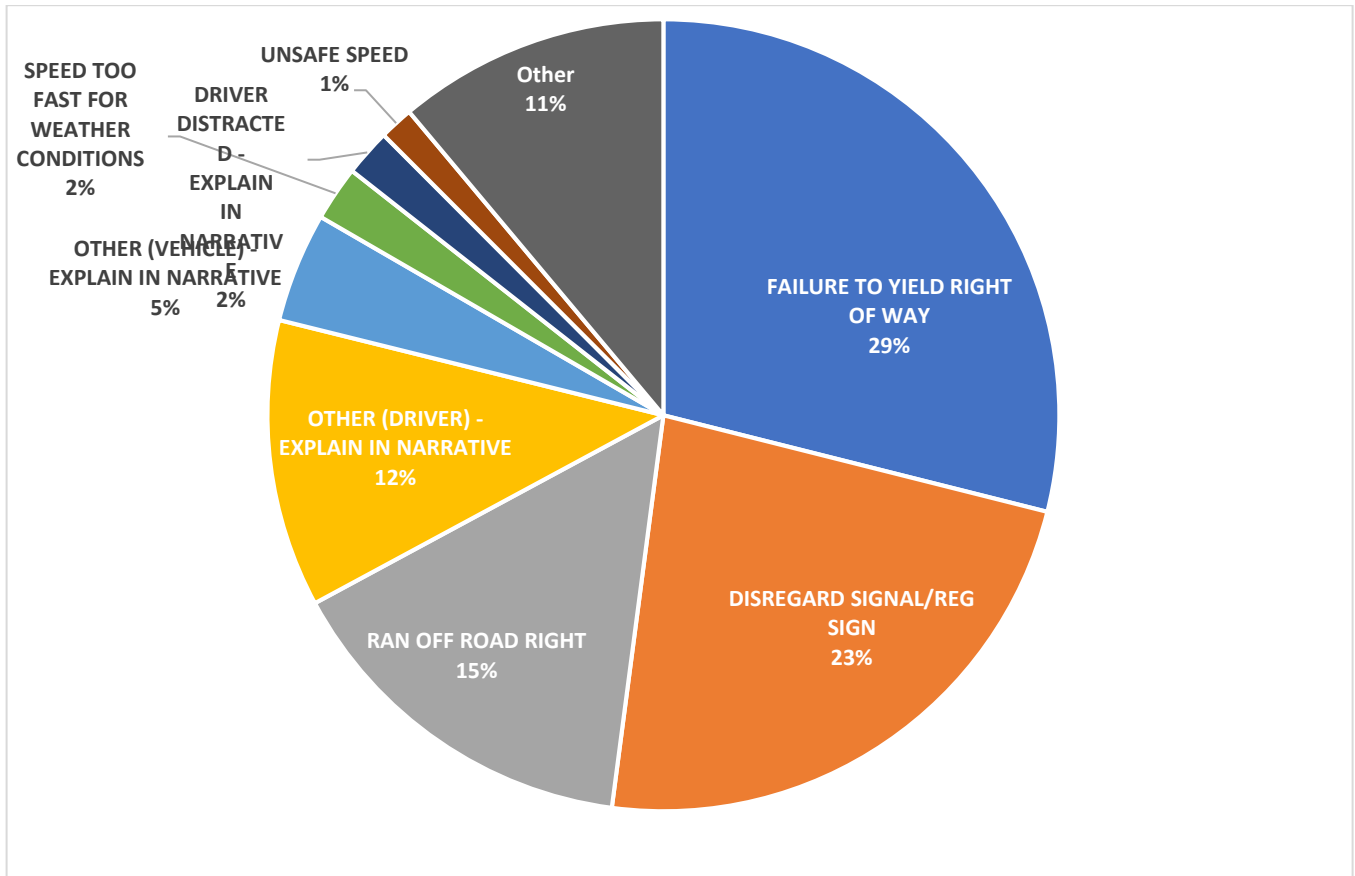
Figure 11 further demonstrates that these 10 counties each have a percent of total incidents which outnumber their respective percent of total crossings.



(Form FRA F 6180.71 retrieved January 14, 2022, and Form FRA F 6180.57 retrieved January 18, 2022)

Figure 11: Grade Crossings and Incidents (2016-2020), Top 10 Counties

The State Police database provides different details behind the cause of crashes than the FRA database. Most crashes at grade crossings occur due to driver decisions, from failure to yield right of way, disregarding a signal or sign, unsafe speeds, or driver distractions. These causes of grade crossing crashes identified by the State Police are demonstrated in **Figure 12**.



(ARIES)

Figure 12: Causes of Grade Crossing Crashes (all grade crossings), 2011-2021—State Police

Incidents history at grade crossings within the last 5 years in the FRA database are shown in Table 29. The FRA defines recent incidents as one incident within the past three years and multiple incidents as more than one incident within the past five years. The crossings with incidents in the past 5 years are also listed, this is the total number of crossings with any number of incidents in the past five years. Most grade crossings with incidents are in urban areas. Incidents occur more frequently at urban grade crossings even though there are fewer urban grade crossings than rural grade crossings.

Table 29: Grade Crossings with Incidents Summary, 2016-2020

Geography	Crossings with Multiple incidents	Crossings with a Recent incident	Crossings with Incidents with Past 5-Years	Percent of Crossings w/ Incidents	Percent of Total Crossings
Rural	20	95	165	38%	58%
Urban	58	128	264	61%	42%
Unknown	0	1	1	0%	0%
Total	78	224	430	100%	100%

(Form FRA F 6180.71 retrieved January 14, 2022, and Form FRA F 6180.57 retrieved January 18, 2022)





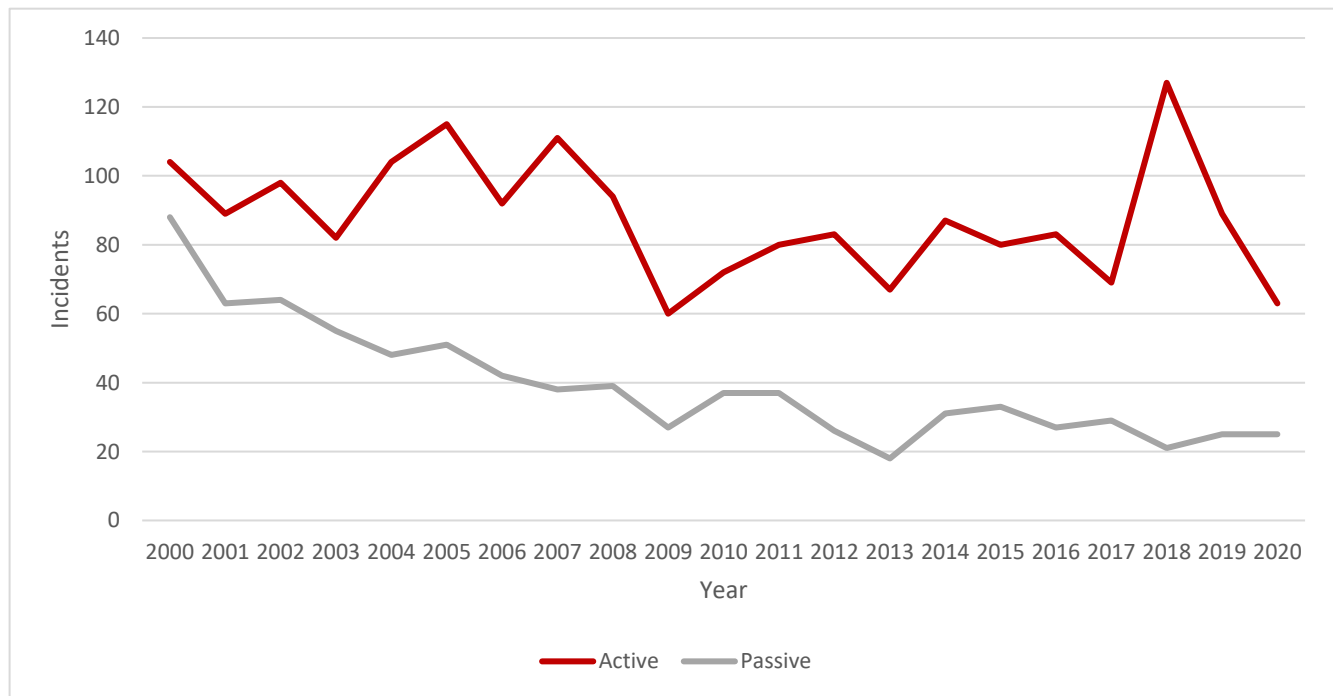
Most incidents from 2016 to 2020 occurred at active crossings Table 30. Seventy-seven percent of incidents occurred at active crossings even though only 59 percent of crossings are active.

Table 30: Summary of Incidents at Grade Crossings, 2016-2020

Incidents Past 5-years	Rural	Urban	Unknown	Grand Total	Percent of Incidents	Percent of Crossings
Active Crossings	110	321	0	431	77%	59%
Passive Crossings	77	49	1	127	23%	41%
Grand Total	187	370	1	558	100%	100%

(Form FRA F 6180.71 retrieved January 14, 2022, and Form FRA F 6180.57, retrieved January 18, 2022)

Figure 13 demonstrates how the number of incidents at passive crossings versus active crossings have changed from 2000 to 2020. Incidents at passive crossings declined at a greater rate than active crossings. In 2000, there were 105 incidents at active crossings and 94 incidents at passive crossings. In 2020, there were 63 incidents at active crossings and 30 incidents at passive crossings—incidents decreased 40 percent at active crossings and 69 percent at passive crossings. In 2019, there was a sudden peak in incidents at crossings, however, the average number of incidents at active crossings decreased from 96 average incidents per year from 2000 to 2009 and 90 average incidents per year from 2010 to 2020.



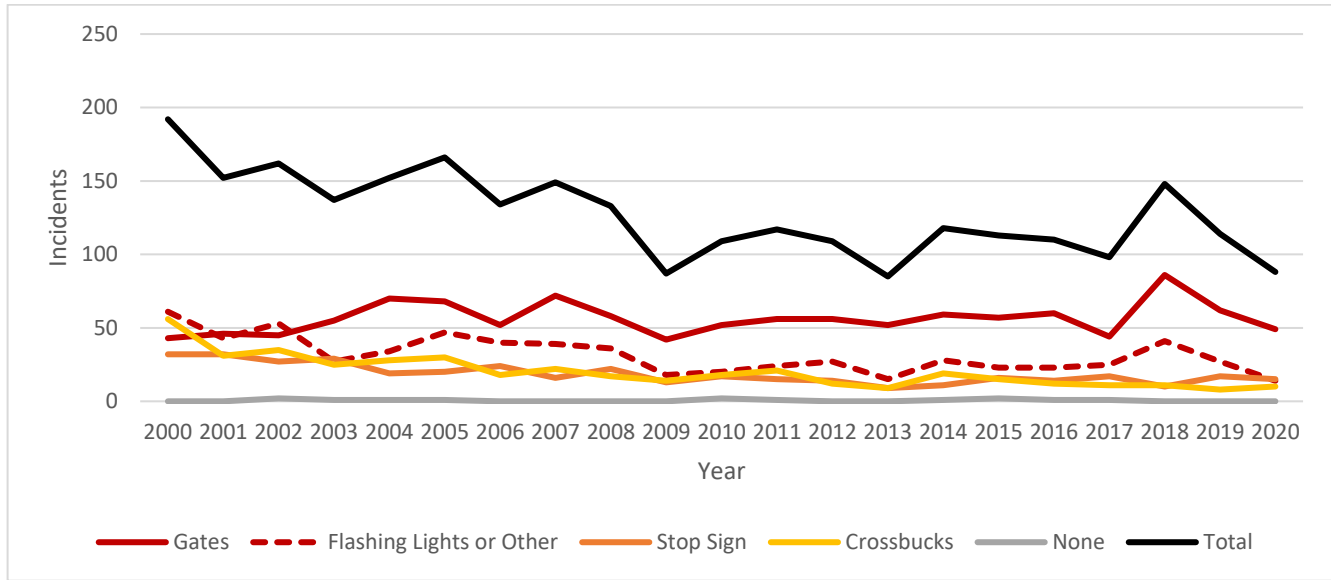
(Form FRA F 6180.71 retrieved January 14, 2022, and Form FRA F 6180.57, retrieved January 18, 2022)

Figure 13: Incidents at Crossings by Active or Passive





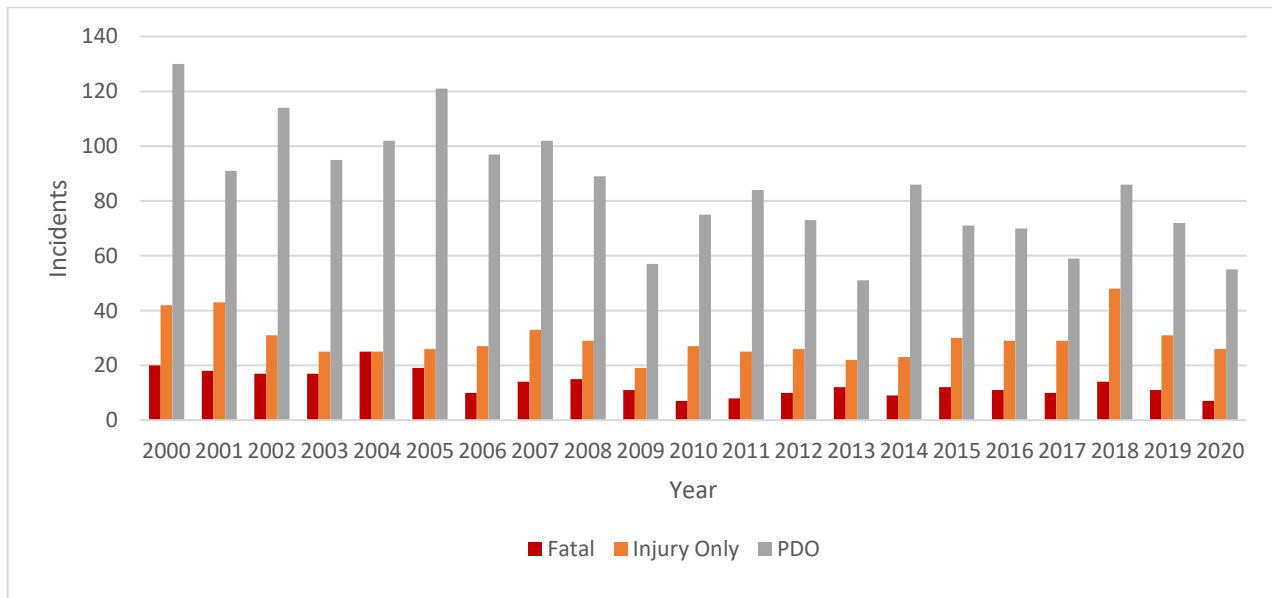
Figure 14 demonstrates how incidents at crossings has varied by protection type between 2000 and 2020. While incidents overall have declined 53 percent between 2000 and 2020, incidents at crossings with gates have increased.



(Form FRA F 6180.71 retrieved January 14, 2022, and Form FRA F 6180.57, retrieved January 18, 2022)

Figure 14: Incidents at Crossings by Warning Device

Figure 15 demonstrates how the severity of incidents at grade crossings have changed between 2000 and 2020. Fatalities have decreased 65 percent and injuries have decreased casualties and incidents have decreased 38 percent.



(Form FRA F 6180.71 retrieved January 14, 2022, and Form FRA F 6180.57, retrieved January 18, 2022)

Figure 15: Incidents at Crossings by Severity





Table 31 demonstrates that most incidents at both active and passive grade crossings occur while the vehicle is moving over the grade crossing.

Table 31: Position of vehicles for incidents, 2016-2020

Vehicle Position	Active	Passive	Grand Total
Stalled/Stuck on Crossing	101	5	106
Stopped on Crossing	75	22	97
Moving over Crossing	249	100	349
Trapped on Crossing by Traffic	3	0	3
Blocked on Crossing by Gates	3	0	3
Grand Total	431	127	558

(Form FRA F 6180.71 retrieved January 14, 2022, and Form FRA F 6180.57, retrieved January 18, 2022)

demonstrates that most incidents at active crossings are related to driver decisions such as willfully going around crossing gates or not stopping when flashing lights are present. Most incidents at passive crossings occur because the driver did not stop before proceeding across the crossing.

Table 32: Driver contributing action for incidents 2016-2020

Action of Motorist	Active	Passive	Grand Total
Went around the gates	114	0	114
Stopped and then proceeded	19	18	37
Did not stop	93	79	172
Stopped on Crossing	128	27	155
Other	48	2	50
Went around/thru temporary barricade	4	0	4
Went thru the gate	19	0	19
Suicide/Attempted	6	1	7
Grand Total	431	127	558

(Form FRA F 6180.71 retrieved January 14, 2022, and Form FRA F 6180.57, retrieved January 18, 2022)





Table **33** demonstrates incidents at crossings by interconnection status. Incidents at crossings with interconnected traffic signals occur at a higher rate than the percent of total crossings with interconnected traffic signals. There were no incidents at crossings with interconnected warning signs in the past five years.





Table 33: Grade Crossing Incident History by Interconnection Status, 2016-2020

Signal Pre-emption	Crossings with Multiple incidents	Crossings with a Recent incident	Crossings with Incidents Past 5-Years	Percent of Crossings w/ Incidents	Percent of Total Crossings
Not Interconnected	66	208	396	92%	95%
Interconnected Traffic Signals	8	8	20	5%	2%
Unknown	4	8	14	3%	3%
Grand Total	78	224	430	100%	5,353

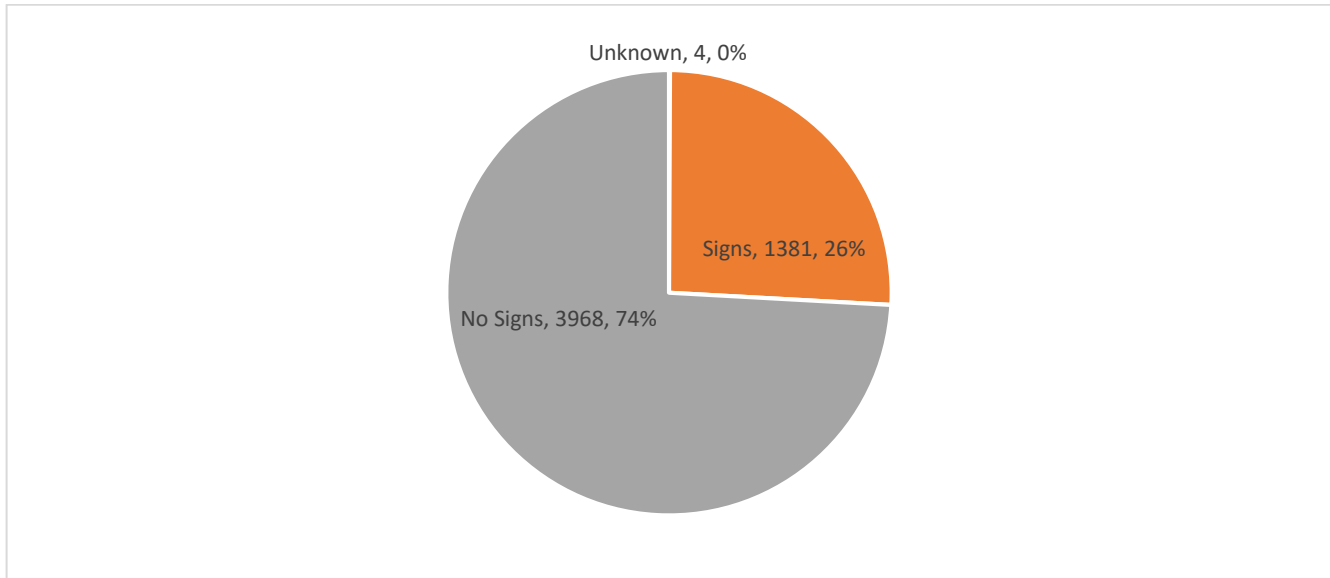
(Form FRA F 6180.71 retrieved January 14, 2022, and Form FRA F 6180.57, retrieved January 18, 2022)

The grade Crossings Inventory System records whether a crossing has a sign indicating possible low ground clearance. As shown in **Figure 16**, 26 percent of grade crossings have signs indicating low ground clearance.





Table 34 demonstrates that crossings with low ground clearance signs have proportionately less incidents and most incidents at grade crossings with low ground clearance signs occur while the highway user is moving across the grade crossing.



(Form FRA F 6180.71 retrieved January 14, 2022)

Figure 16: Highway-Rail Grade Crossings with Low Ground Clearance Signs



Table 34: Highway-Rail Grade Incidents at Crossings with Low Ground Clearance Signs by User Position, 2016-2020

Low Ground Clearance	Stalled or stuck on crossing	Stopped on crossing	Moving over crossing	Trapped on crossing by traffic	Blocked on crossing by gates	Grand Total
Unknown	2	0	3	0	0	5
Signs	8	15	63	0	0	86
No Signs	96	82	283	3	3	467
Grand Total	106	97	349	3	3	558

(Form FRA F 6180.71 retrieved January 14, 2022, and Form FRA F 6180.57, retrieved January 18, 2022)

The breakdown of injuries, fatalities and incidents are shown in cars, pick-up trucks, and vans.

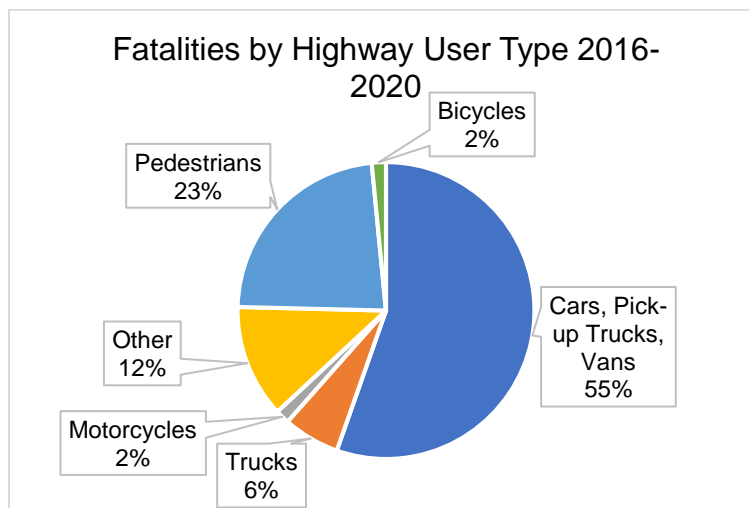


Figure 1: Injuries and Fatalities by Highway User Type, 2016-2020

by the type of highway vehicle or user. Most injuries, fatalities, and incidents at grade crossings involve passenger vehicles such as cars, pick-up trucks, and vans.

Table 35: Injuries and Fatalities by Highway User Type, 2016-2020

Years 2016-2020 Highway User	Fatalities	Injuries	Number of Incidents
Cars, Pick-up Trucks, Vans	36	133	366
Trucks	4	23	84
Buses	0	0	0
Motorcycles	1	1	2
Other	8	29	66
Pedestrians	15	20	36
Bicycles	1	2	4
Grand Total	65	208	558

(Form FRA F 6180.57, retrieved January 18, 2022)





As shown in Table 36, between 2016 and 2020, the incidents involving pedestrians and bicyclists occurred at crossings with active protection devices, and most of these incidents were at grade crossings with gates.

Table 36: Pedestrian and Bicycle Incidents by Crossing Protection, 2016-2020

Crossing Protection	Number of Incidents
Flashing Lights or Other	4
Gates	36
Grand Total	40

(Form FRA F 6180.71 retrieved January 14, 2022, and Form FRA F 6180.57, retrieved January 18, 2022)

The actions of the bicyclist and pedestrian involved in incidents are shown in





Table 37. More than half of the incidents were a result of trespassing at a grade crossing as the pedestrian or bicyclist went around the gates.





Table 37: Pedestrian and Bicycle Incidents by User Action, 2016-2020

User Action	Number of Incidents
Went around the gates	23
Did not stop	3
Stopped on crossing	7
Other	3
Suicide/attempted suicide	4
Grand Total	40

(Form FRA F 6180.71 retrieved January 14, 2022 and Form FRA F 6180.57, retrieved January 18, 2022)

4 Private and Pedestrian Crossings

The crossing inventory and incident history at private and pedestrian crossings was examined separately for two reasons: The State of Indiana may only utilize state funds public roadway grade crossings and private and pedestrian crossings have different data requirements in the grade Crossings Inventory System and have less traffic data.⁸

The number of incidents at pedestrian highway grade crossings are shown in **Table 38** by the incident type. From 2011 to 2020, there were 43 incidents and 9 injuries at private and pedestrian grade crossings. The number of injuries and fatalities are shown in **Table 39**. Overall, 79 percent of incidents were property damage only and 21 percent of incidents were injury only. On average there were 3 injuries for every 10 incidents. All of these incidents in the past 10 years occurred at private highway grade crossings, none of the incidents occurred at pedestrian grade crossings.

Table 38: Private Highway Grade Crossing Incidents, 2011 to 2020, FRA Database

Incident Type	Number of Incidents (FRA)	Percent of Total
Property Damage Only	34	79%
Injury Only	9	21%
Fatal	0	0%
Total Incidents	43	100%

(Form FRA F 6180.71 retrieved January 14, 2022, and Form FRA F 6180.57 retrieved January 18, 2022)

Table 39: Private Highway Grade Crossing Injuries and Fatalities, 2011 to 2020, FRA Database

Incident Type	Number of Persons Injured	Number of Persons Killed	Average Persons Injured per Incident	Average Persons Killed per Incident
PDO	0	0	0	0
Injury Only	12	0	1.3	0
Fatal	0	0	0	0
Total	12	0	0.3	0

(Form FRA F 6180.71 retrieved January 14, 2022, and Form FRA F 6180.57 retrieved January 18, 2022)

⁸ Per state law, the term "grade crossing" means a crossing of any railroad and any public highway, street, or roadway, at grade. IN Code § 8-6-7.7-1 (2020)





There are 2,078 private or pedestrian grade crossings, of which 97 percent are private highway grade crossings. As shown in Table 40, only private highway grade crossings had incidents.

Table 40: Private or Pedestrian Grade Crossing Incident History, 2016-2020

Grade Crossing	Crossings with Multiple incidents	Crossings with a Recent incident	Crossings with Incidents Past 5-Years	Percent of Crossings w/ Incidents	Percent of Total Crossings
Private Highway	1	9	20	100%	97%
Pedestrian	0	0	0	0%	3%
Private Unclassified	0	0	0	0%	0%
Grand Total	1	9	20	100%	100%

(Form FRA F 6180.71 retrieved January 14, 2022, and Form FRA F 6180.57, retrieved January 18, 2022)

None of the incidents at private highway grade crossings from 2016 to 2020 resulted in fatalities, but the incidents did result in six injuries. Table 41 shows that most of the incidents occurred at passive crossings and most of the users were moving over the crossing at the time of the incident.

Table 41: Incidents at Private Highway Grade Crossings by Crossing Protection, 2016-2020

User Position	Incidents with Injury	Total Incidents	Percent of Incidents	Percent of Crossings
Active Warning Devices	2	2	3%	2%
Passive Warning Devices	4	62	97%	98%
Grand Total	6	64	100%	100%

(Form FRA F 6180.71 retrieved January 14, 2022 and Form FRA F 6180.57, retrieved January 18, 2022)

Table 42 demonstrates that at the time of the incident, most highway users at private highway grade crossings were moving over the crossing.

Table 42: Incidents at Private Highway Grade Crossings by Crossing Protection and User Position, 2016-2020

User Position	Incidents with Injury	Total Incidents	Percent of Incidents
Stalled or stuck on crossing	1	3	4%
Stopped on crossing	2	4	6%
Moving over crossing	3	57	90%
Grand Total	6	64	100%

(Form FRA F 6180.71 retrieved January 14, 2022, and Form FRA F 6180.57, retrieved January 18, 2022)





Table 43 demonstrates that most users either did not stop before crossing the grade crossing or stopped and then proceeded.

Table 43: Incidents at Private Highway Grade Crossings by Crossing Protection and User Position, 2016-2020

User Action	Incidents with Injury	Total Incidents	Percent of Incidents
Went around the gates	1	1	2%
Stopped and then proceeded	0	22	34%
Did not stop	2	28	44%
Stopped on crossing	3	6	9%
Other	0	7	11%
Grand Total	6	64	100%

(Form FRA F 6180.71 retrieved January 14, 2022, and Form FRA F 6180.57, retrieved January 18, 2022)





Appendices

Appendix A: Public Highway Grade Crossing with Recent or Multiple Incidents (2016-2020)

GXID	RR	Xing Type	Passive Protection	Active Protection	County	Incidents (2016-2020)	Injury Only Incident (2016-2020)	Fatality Only Incident (2016-2020)	Injury and Fatal Incident (2016-2020)	Incident History
522646H	NS	A-U	Crossbuck/Yield	Gates	Lake	8	2	0	0	Multiple incidents
155637W	CSX	A-U		Gates	Lake	7	1	3	0	Multiple incidents
260800C	GRW				Lake	6	0	0	0	Multiple incidents
510018T	NS	A-U	Crossbuck/Yield	Gates	Elkhart	5	0	0	0	Multiple incidents
535343L	LIRC	A-U		Gates	Clark	5	1	0	1	Multiple incidents
535616D	CSX	A-U		Flashing Lights or Other	Marion	5	3	0	0	Multiple incidents
156098N	NS	A-U	Crossbuck/Yield	Gates	Lake	4	3	0	0	Multiple incidents
483276X	CSS	A-U	Crossbuck/Yield	Gates	La Porte	4	1	0	0	Multiple incidents
510034C	NS	A-U	Crossbuck/Yield	Gates	Elkhart	4	1	1	0	Multiple incidents
155481A	CSX	A-R		Gates	St Joseph	3	0	1	0	Multiple incidents
478314U	NS	A-U	Stop Sign	Gates	Wabash	3	0	0	0	Multiple incidents
522538L	NS	A-U	Crossbuck/Yield	Gates	St Joseph	3	0	0	0	Multiple incidents
522564B	NS	A-U	Crossbuck/Yield	Gates	St Joseph	3	0	0	0	Multiple incidents
522593L	NS	A-U	Crossbuck/Yield	Gates	La Porte	3	1	0	0	Multiple incidents
522628K	NS	A-U	Crossbuck/Yield	Gates	Porter	3	2	1	0	Multiple incidents
535509N	LIRC	A-R		Gates	Bartholomew	3	0	1	0	Multiple incidents
535587V	LIRC	A-U	Stop Sign	Gates	Johnson	3	1	1	0	Multiple incidents
539239F	CSX	A-U		Gates	Marion	3	0	0	0	Multiple incidents
539242N	CSX	A-U	Crossbuck/Yield	Gates	Marion	3	1	0	0	Multiple incidents
539243V	CSX	A-U		Gates	Marion	3	2	0	0	Multiple incidents
870879M	NICD	A-U		Gates	Lake	3	0	0	0	Multiple incidents
154278E	CSX	A-U		Gates	Marion	2	1	0	0	Multiple incidents
155615W	CSX	A-R		Gates	Porter	2	0	0	0	Multiple incidents
155633U	CSX	A-U		Gates	Lake	2	0	0	0	Multiple incidents
156099V	NS	A-U	Crossbuck/Yield	Gates	Lake	2	0	0	0	Multiple incidents
163619U	CSX	A-U		Gates	Lake	2	0	0	0	Multiple incidents
163627L	CSX	A-U		Gates	Lake	2	0	0	0	Multiple incidents
163633P	CSX	A-U		Gates	Lake	2	0	0	0	Multiple incidents
260657U	WC	A-U	Crossbuck/Yield	Gates	Lake	2	1	0	0	Multiple incidents
326947P	IHB			Flashing Lights or Other	Lake	2	0	0	0	Multiple incidents



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GXID	RR	Xing Type	Passive Protection	Active Protection	County	Incidents (2016-2020)	Injury Only Incident (2016-2020)	Fatality Only Incident (2016-2020)	Injury and Fatal Incident (2016-2020)	Incident History
341194Y	CSX	P-R	Stop Sign		Newton	2	2	0	0	Multiple incidents
341232F	CSX	A-R		Gates	Jasper	2	2	0	0	Multiple incidents
342280Y	CSX	A-U		Flashing Lights or Other	Vigo	2	0	0	0	Multiple incidents
342357J	CSX	A-R		Gates	Sullivan	2	0	0	0	Multiple incidents
342383Y	CSX	A-R		Flashing Lights or Other	Knox	2	0	0	0	Multiple incidents
342396A	CSX	A-U		Gates	Knox	2	2	0	0	Multiple incidents
342417R	CSX	P-U	Stop Sign		Knox	2	0	0	0	Multiple incidents
342424B	CSX	A-U		Flashing Lights or Other	Knox	2	1	0	0	Multiple incidents
342817J	CSX	A-U		Flashing Lights or Other	Vanderburgh	2	0	0	0	Multiple incidents
478013Y	NS	A-U	Crossbuck/Yield	Gates	Allen	2	0	0	0	Multiple incidents
478223N	NS	A-U	Crossbuck/Yield	Gates	Allen	2	2	0	0	Multiple incidents
478442C	NS	A-R	Crossbuck/Yield	Gates	Whitley	2	0	0	0	Multiple incidents
478677M	NS	A-U	Crossbuck/Yield	Gates	Lake	2	0	0	0	Multiple incidents
478703A	NS	A-U	Crossbuck/Yield	Gates	Lake	2	1	0	0	Multiple incidents
484327J	NS	P-R	Crossbuck/Yield		Tippecanoe	2	2	0	0	Multiple incidents
510039L	NS	A-U		Flashing Lights or Other	Elkhart	2	0	0	0	Multiple incidents
522506F	NS	A-U	Crossbuck/Yield	Gates	Elkhart	2	2	0	0	Multiple incidents
522530G	NS	A-U	Crossbuck/Yield	Gates	St Joseph	2	0	0	0	Multiple incidents
522533C	NS	A-U	Crossbuck/Yield	Gates	St Joseph	2	2	0	0	Multiple incidents
522563U	NS	A-U		Gates	St Joseph	2	0	0	0	Multiple incidents
522594T	NS	A-U	Crossbuck/Yield	Gates	La Porte	2	0	2	0	Multiple incidents
522620F	NS	A-R	Crossbuck/Yield	Gates	Porter	2	0	0	0	Multiple incidents
522639X	NS	A-U	Crossbuck/Yield	Gates	Lake	2	0	1	0	Multiple incidents
522929F	NS	A-U		Gates	Lake	2	0	0	0	Multiple incidents
524612V	NS	A-U		Gates	Wayne	2	1	0	0	Multiple incidents
532962H	CFE	P-R	Crossbuck/Yield		Starke	2	1	0	0	Multiple incidents
533504X	TPW	A-R		Flashing Lights or Other	Newton	2	0	0	0	Multiple incidents
533573F	NS	A-U		Gates	Kosciusko	2	1	1	0	Multiple incidents
533995Y	NS	P-R	Stop Sign		Grant	2	0	0	0	Multiple incidents
535349C	LIRC	A-U		Gates	Clark	2	1	0	1	Multiple incidents
535372W	LIRC	A-R		Gates	Clark	2	0	0	1	Multiple incidents



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GXID	RR	Xing Type	Passive Protection	Active Protection	County	Incidents (2016-2020)	Injury Only Incident (2016-2020)	Fatality Only Incident (2016-2020)	Injury and Fatal Incident (2016-2020)	Incident History
535498D	LIRC	A-U		Flashing Lights or Other	Bartholomew	2	0	0	0	Multiple incidents
535516Y	LIRC	P-R	Stop Sign		Bartholomew	2	1	0	0	Multiple incidents
535525X	LIRC	A-U		Flashing Lights or Other	Johnson	2	0	2	0	Multiple incidents
535596U	LIRC	A-U		Gates	Marion	2	1	0	0	Multiple incidents
535693D	CSX	P-R	Crossbuck/Yield		Boone	2	1	1	0	Multiple incidents
538288Y	CSX	A-U		Flashing Lights or Other	Marion	2	0	0	0	Multiple incidents
538896T	CSX	A-U		Gates	Delaware	2	1	0	0	Multiple incidents
538902U	CSX	A-U		Gates	Delaware	2	1	1	0	Multiple incidents
538922F	CSX	A-U		Gates	Madison	2	2	0	0	Multiple incidents
538945M	CSX	A-U		Flashing Lights or Other	Madison	2	1	0	0	Multiple incidents
538971C	CSX	A-R		Gates	Madison	2	0	0	0	Multiple incidents
539176D	CSX	A-U		Gates	Marion	2	1	0	0	Multiple incidents
539247X	CSX	A-U		Gates	Marion	2	1	0	0	Multiple incidents
539265V	CSX	A-U		Gates	Marion	2	0	0	0	Multiple incidents
543008E	CSX	A-U		Gates	Hendricks	2	1	0	0	Multiple incidents
543067G	CSX	A-R		Gates	Montgomery	2	0	0	0	Multiple incidents
724930J	NS	A-R		Flashing Lights or Other	Dubois	2	1	1	0	Multiple incidents
725037U	NS	P-R	Stop Sign		Crawford	2	0	0	0	Multiple incidents
870458B	NICD	P-U	Crossbuck/Yield		La Porte	2	2	0	0	Multiple incidents
152495X	CSX	A-U		Flashing Lights or Other	Dearborn	1	1	0	0	Recent incidents
152507P	CSX	P-R	Crossbuck/Yield		Dearborn	1	1	0	0	Recent incidents
152594V	CSX	P-R	Stop Sign		Jennings	1	1	0	0	Recent incidents
153182L	CSX	A-R		Flashing Lights or Other	Clark	1	0	0	0	Recent incidents
154150J	CSX	A-U		Gates	Fayette	1	1	0	0	Recent incidents
154240H	CSX	P-R	Stop Sign		Shelby	1	0	0	0	Recent incidents
155290P	CSX	A-R		Gates	Dekalb	1	0	0	0	Recent incidents
155322T	CSX	A-U		Gates	Dekalb	1	0	0	0	Recent incidents
155329R	CSX	A-R		Gates	Dekalb	1	0	1	0	Recent incidents
155395D	CSX	A-R		Gates	Kosciusko	1	0	0	0	Recent incidents
155419P	CSX	A-R		Gates	Elkhart	1	1	0	0	Recent incidents
155454D	CSX	A-R		Gates	Marshall	1	0	0	0	Recent incidents



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GXID	RR	Xing Type	Passive Protection	Active Protection	County	Incidents (2016-2020)	Injury Only Incident (2016-2020)	Fatality Only Incident (2016-2020)	Injury and Fatal Incident (2016-2020)	Incident History
155465R	CSX	A-R		Gates	Marshall	1	0	0	0	Recent incidents
155485C	CSX	A-R		Gates	St Joseph	1	0	0	0	Recent incidents
163635D	CSX	A-U		Gates	Lake	1	0	0	0	Recent incidents
163638Y	CSX	A-U		Gates	Lake	1	0	0	0	Recent incidents
163639F	CSX	A-U		Gates	Lake	1	1	0	0	Recent incidents
230082T	WC	A-U		Gates	Lake	1	1	0	0	Recent incidents
232070F	CSX	A-U		Gates	La Porte	1	0	1	0	Recent incidents
232087J	CSX	A-U		Flashing Lights or Other	La Porte	1	1	0	0	Recent incidents
232112P	CSX	A-U		Gates	Porter	1	0	0	0	Recent incidents
260663X	WC	A-U	Crossbuck/Yield	Gates	Lake	1	1	0	0	Recent incidents
260671P	WC	A-U	Crossbuck/Yield	Gates	Lake	1	0	0	0	Recent incidents
260673D	WC	A-U	Crossbuck/Yield	Gates	Lake	1	0	0	0	Recent incidents
260726A	WC	A-U		Gates	Lake	1	0	1	0	Recent incidents
260900G	WC				Lake	1	0	0	0	Recent incidents
283209B	GTW	A-U		Gates	Lake	1	0	1	0	Recent incidents
283228F	GTW	A-R		Gates	Porter	1	0	0	0	Recent incidents
283250T	GTW	A-U		Gates	Porter	1	0	0	0	Recent incidents
283259E	GTW	A-R		Gates	Porter	1	0	0	0	Recent incidents
283260Y	GTW	A-R	Crossbuck/Yield	Gates	Porter	1	0	0	0	Recent incidents
283294T	GTW	A-R	Crossbuck/Yield	Gates	La Porte	1	1	0	0	Recent incidents
283318E	GTW	A-R		Gates	St Joseph	1	0	0	0	Recent incidents
283370J	GTW	A-U		Gates	St Joseph	1	1	0	0	Recent incidents
292281R	INRD	A-U		Flashing Lights or Other	Marion	1	0	0	0	Recent incidents
292372W	INRD	P-R	Stop Sign		Greene	1	1	0	0	Recent incidents
341141A	CSX	A-U		Gates	Lake	1	1	0	0	Recent incidents
341164G	CSX	A-U		Flashing Lights or Other	Lake	1	0	0	0	Recent incidents
341235B	CSX	P-R	Stop Sign		Jasper	1	0	0	0	Recent incidents
341238W	CSX	P-R	Crossbuck/Yield		White	1	0	0	0	Recent incidents
341294D	CSX	A-R		Gates	Tippecanoe	1	0	0	0	Recent incidents
341347A	CSX	A-U		Flashing Lights or Other	Tippecanoe	1	1	0	0	Recent incidents
341352W	CSX	P-U	Crossbuck/Yield		Tippecanoe	1	0	0	0	Recent incidents
342271A	CSX	A-U		Gates	Vigo	1	1	0	0	Recent incidents
342273N	CSX	A-U		Gates	Vigo	1	0	0	0	Recent incidents



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GXID	RR	Xing Type	Passive Protection	Active Protection	County	Incidents (2016-2020)	Injury Only Incident (2016-2020)	Fatality Only Incident (2016-2020)	Injury and Fatal Incident (2016-2020)	Incident History
342274V	CSX	A-U		Gates	Vigo	1	0	0	0	Recent incidents
342277R	CSX	A-U		Gates	Vigo	1	0	0	0	Recent incidents
342285H	CSX	A-U		Gates	Vigo	1	1	0	0	Recent incidents
342296V	CSX	A-R		Flashing Lights or Other	Vigo	1	1	0	0	Recent incidents
342298J	CSX	A-R		Flashing Lights or Other	Vigo	1	0	1	0	Recent incidents
342339L	CSX	A-R		Gates	Sullivan	1	1	0	0	Recent incidents
342393E	CSX	A-U		Flashing Lights or Other	Knox	1	0	0	0	Recent incidents
342397G	CSX	A-U		Flashing Lights or Other	Knox	1	1	0	0	Recent incidents
342407K	CSX	A-U		Flashing Lights or Other	Knox	1	0	0	0	Recent incidents
342423U	CSX	A-U		Flashing Lights or Other	Knox	1	1	0	0	Recent incidents
342443F	CSX	A-R		Gates	Knox	1	1	0	0	Recent incidents
342449W	CSX	A-R	Stop Sign	Flashing Lights or Other	Gibson	1	0	1	0	Recent incidents
342606M	EVW R	P-U	Crossbuck/Yield		Posey	1	0	0	0	Recent incidents
342729Y	CSX		Crossbuck/Yield		Vanderburgh	1	0	0	0	Recent incidents
342752T	EVW R		Crossbuck/Yield		Vanderburgh	1	0	0	0	Recent incidents
342809S	CSX	P-U	Crossbuck/Yield		Vanderburgh	1	0	0	0	Recent incidents
342843Y	CSX	A-U		Gates	Vanderburgh	1	0	0	0	Recent incidents
373036M	INRD	P-R	Stop Sign		Daviess	1	1	0	0	Recent incidents
373042R	INRD	A-R	Crossbuck/Yield	Flashing Lights or Other	Daviess	1	0	0	0	Recent incidents
474549R	CSX	A-U		Gates	Delaware	1	1	0	0	Recent incidents
474550K	NS	A-U		Gates	Delaware	1	0	0	0	Recent incidents
474584E	NS	P-R	Stop Sign		Delaware	1	0	0	0	Recent incidents
474631K	NS	A-U		Flashing Lights or Other	Madison	1	0	0	0	Recent incidents
474643E	NS	P-U	Crossbuck/Yield		Madison	1	1	0	0	Recent incidents
474673W	NS	A-U		Gates	Tipton	1	0	0	0	Recent incidents
474729N	NS	P-R	Stop Sign		Clinton	1	1	0	0	Recent incidents
475156L	NS	A-R		Flashing Lights or Other	Blackford	1	1	0	0	Recent incidents
477168M	CSX	A-U		Gates	Delaware	1	0	0	0	Recent incidents



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GXID	RR	Xing Type	Passive Protection	Active Protection	County	Incidents (2016-2020)	Injury Only Incident (2016-2020)	Fatality Only Incident (2016-2020)	Injury and Fatal Incident (2016-2020)	Incident History
477174R	CSX		Crossbuck/Yield	Gates	Delaware	1	1	0	0	Recent incidents
477185D	NS	A-R		Gates	Wells	1	0	0	0	Recent incidents
477211R	NS	A-U		Gates	Wells	1	0	0	0	Recent incidents
477840D	NS	P-R	Crossbuck/Yield		Allen	1	1	0	0	Recent incidents
477845M	NS	P-R	Crossbuck/Yield		Allen	1	0	0	0	Recent incidents
477993G	NS	A-U	Crossbuck/Yield	Gates	Allen	1	1	0	0	Recent incidents
478007V	NS	A-U	Crossbuck/Yield	Gates	Allen	1	0	0	0	Recent incidents
478032D	NS	A-U	Crossbuck/Yield	Gates	Allen	1	0	0	0	Recent incidents
478058F	NS	A-U		Gates	Allen	1	0	0	0	Recent incidents
478147X	NS	A-R	Crossbuck/Yield	Gates	Dekalb	1	0	0	0	Recent incidents
478153B	NS	P-R	Stop Sign		Dekalb	1	0	0	0	Recent incidents
478227R	NS	A-U	Crossbuck/Yield	Gates	Allen	1	0	0	0	Recent incidents
478308R	NS	A-U	Crossbuck/Yield	Gates	Wabash	1	0	0	0	Recent incidents
478371H	IN	A-R		Flashing Lights or Other	Dekalb	1	0	0	0	Recent incidents
478510B	NS	A-R	Crossbuck/Yield	Gates	Kosciusko	1	0	1	0	Recent incidents
478551F	NS	A-R	Crossbuck/Yield	Gates	Marshall	1	1	0	0	Recent incidents
478633M	NS	A-U	Crossbuck/Yield	Gates	Porter	1	0	0	0	Recent incidents
478650D	NS	A-R	Crossbuck/Yield	Gates	Porter	1	0	0	0	Recent incidents
478663E	NS		Crossbuck/Yield	Gates	Lake	1	1	0	0	Recent incidents
478680V	NS	A-U	Crossbuck/Yield	Gates	Lake	1	0	0	0	Recent incidents
478681C	NS	A-U	Crossbuck/Yield	Gates	Lake	1	1	0	0	Recent incidents
478688A	NS	A-U	Crossbuck/Yield	Gates	Lake	1	0	1	0	Recent incidents
478700E	NS	A-U	Crossbuck/Yield	Gates	Lake	1	1	0	0	Recent incidents
478704G	NS	A-U	Crossbuck/Yield	Gates	Lake	1	0	0	0	Recent incidents
483275R	CSS	P-U	Crossbuck/Yield		La Porte	1	0	0	0	Recent incidents
483381Y	ELW X	P-R	Stop Sign		Marshall	1	0	0	0	Recent incidents
484216S	NS	A-R	Crossbuck/Yield	Gates	Cass	1	0	0	0	Recent incidents
484342L	NS	P-R	Crossbuck/Yield		Fountain	1	0	0	0	Recent incidents
509330S	NS	A-R	Crossbuck/Yield	Gates	Noble	1	0	1	0	Recent incidents
509356U	IN	P-R	Crossbuck/Yield		Steuben	1	0	0	0	Recent incidents
509583A	NS	A-R	Crossbuck/Yield	Gates	Dekalb	1	0	0	0	Recent incidents
509982L	NS	A-R	Crossbuck/Yield	Gates	Elkhart	1	0	0	0	Recent incidents
510016E	NS	A-U	Crossbuck/Yield	Gates	Elkhart	1	1	0	0	Recent incidents
510020U	NS	A-U	Crossbuck/Yield	Gates	Elkhart	1	0	0	0	Recent incidents



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510031G	NS	A-U	Crossbuck/Yield	Gates	Elkhart	1	1	0	0	Recent incidents
510038E	NS	A-U		Gates	Elkhart	1	1	0	0	Recent incidents
522500P	NS	A-U	Crossbuck/Yield	Gates	Elkhart	1	0	0	0	Recent incidents
522511C	NS				Elkhart	1	0	0	0	Recent incidents
522512J	NS	A-U	Crossbuck/Yield	Flashing Lights or Other	Elkhart	1	1	0	0	Recent incidents
522515E	NS	A-U	Crossbuck/Yield	Gates	St Joseph	1	0	1	0	Recent incidents
522519G	NS	A-U	Crossbuck/Yield	Gates	St Joseph	1	0	0	0	Recent incidents
522527Y	NS	A-U	Crossbuck/Yield	Gates	St Joseph	1	0	0	0	Recent incidents
522531N	NS	A-U	Crossbuck/Yield	Gates	St Joseph	1	0	0	0	Recent incidents
522537E	NS	A-U	Crossbuck/Yield	Gates	St Joseph	1	0	0	0	Recent incidents
522539T	NS	A-U		Gates	St Joseph	1	1	0	0	Recent incidents
522540M	NS	A-U	Crossbuck/Yield	Gates	St Joseph	1	0	0	0	Recent incidents
522546D	NS	A-U	Crossbuck/Yield	Gates	St Joseph	1	0	0	0	Recent incidents
522584M	NS	A-R	Crossbuck/Yield	Gates	La Porte	1	0	0	0	Recent incidents
522602H	NS	A-U	Crossbuck/Yield	Gates	La Porte	1	0	0	0	Recent incidents
522612N	NS	A-R	Crossbuck/Yield	Gates	La Porte	1	0	0	0	Recent incidents
522616R	NS	A-R		Gates	Porter	1	0	0	0	Recent incidents
522622U	NS	A-U	Crossbuck/Yield	Gates	Porter	1	0	0	0	Recent incidents
522680P	ELW X	P-U	Crossbuck/Yield		Elkhart	1	1	0	0	Recent incidents
522689B	ELW X	P-U	Crossbuck/Yield		St Joseph	1	0	0	0	Recent incidents
522798E	CSX	A-U		Gates	Lake	1	0	0	0	Recent incidents
522800D	CSX	A-U		Gates	Lake	1	1	0	0	Recent incidents
524619T	NS	A-U		Gates	Wayne	1	0	0	0	Recent incidents
527860E	NS	A-U		Gates	Henry	1	1	0	0	Recent incidents
527863A	NS	A-U		Gates	Henry	1	0	0	0	Recent incidents
527866V	NS	A-R		Gates	Henry	1	1	0	0	Recent incidents
527889C	NS	A-R		Flashing Lights or Other	Wayne	1	1	0	0	Recent incidents
532306Y	CFE	A-U		Gates	Adams	1	0	0	0	Recent incidents
532344H	NS	A-U	Crossbuck/Yield	Gates	Allen	1	1	0	0	Recent incidents
532809S	CFE	P-R	Crossbuck/Yield		Allen	1	0	0	0	Recent incidents
532883W	CFE	P-R	Stop Sign		Whitley	1	0	0	0	Recent incidents
533430H	TPW	P-R	Crossbuck/Yield		White	1	1	0	0	Recent incidents
533438M	TPW	P-R	Crossbuck/Yield		White	1	1	0	0	Recent incidents



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533519M	NS	A-R		Gates	Elkhart	1	0	0	0	Recent incidents
533535W	NS	P-R	Stop Sign		Kosciusko	1	0	0	0	Recent incidents
533541A	NS	P-R	Stop Sign		Kosciusko	1	0	1	0	Recent incidents
533554B	NS	A-R		Gates	Kosciusko	1	0	0	0	Recent incidents
533561L	NS	A-U		Gates	Kosciusko	1	1	0	0	Recent incidents
533570K	NS	A-U		Flashing Lights or Other	Kosciusko	1	1	0	0	Recent incidents
533574M	NS	A-U		Gates	Kosciusko	1	0	0	0	Recent incidents
533648C	NS	P-U	Crossbuck/Yield		Wabash	1	0	0	0	Recent incidents
533650D	NS	P-U	Crossbuck/Yield		Wabash	1	0	0	0	Recent incidents
533671W	NS	P-R	Stop Sign		Wabash	1	1	0	0	Recent incidents
533709R	NS	A-U		Gates	Grant	1	0	0	0	Recent incidents
533965G	NS	A-U		Flashing Lights or Other	Grant	1	1	0	0	Recent incidents
535307R	LIRC	P-U	Crossbuck/Yield		Clark	1	0	0	0	Recent incidents
535340R	LIRC	A-U		Gates	Clark	1	0	0	0	Recent incidents
535347N	LIRC	A-R		Gates	Clark	1	1	0	0	Recent incidents
535355F	LIRC	A-R		Gates	Clark	1	0	0	0	Recent incidents
535375S	LIRC	P-R	Stop Sign		Clark	1	1	0	0	Recent incidents
535381V	LIRC		Stop Sign		Clark	1	1	0	0	Recent incidents
535405G	LIRC	P-U	Stop Sign		Scott	1	0	0	0	Recent incidents
535407V	LIRC	A-U		Gates	Scott	1	0	0	0	Recent incidents
535408C	LIRC	P-R	Stop Sign		Scott	1	0	0	1	Recent incidents
535429V	LIRC	A-R		Gates	Jackson	1	1	0	0	Recent incidents
535457Y	LIRC	A-U		Gates	Jackson	1	0	0	0	Recent incidents
535505L	LIRC	A-R		Flashing Lights or Other	Bartholomew	1	0	1	0	Recent incidents
535508G	LIRC	A-R		Gates	Bartholomew	1	0	0	0	Recent incidents
535517F	LIRC	P-R	Stop Sign		Bartholomew	1	0	0	1	Recent incidents
535519U	LIRC	A-R	Stop Sign	Flashing Lights or Other	Johnson	1	1	0	0	Recent incidents
535529A	LIRC	A-R		Gates	Bartholomew	1	1	0	0	Recent incidents
535579D	LIRC	A-R		Gates	Johnson	1	0	0	0	Recent incidents
535581E	LIRC				Johnson	1	0	0	0	Recent incidents
535588C	LIRC	A-U	Stop Sign	Gates	Johnson	1	1	0	0	Recent incidents
535613H	CSX	P-U	Stop Sign		Marion	1	1	0	0	Recent incidents



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535624V	CSX	A-U		Flashing Lights or Other	Marion	1	0	0	0	Recent incidents
535648J	CSX	P-R	Stop Sign	Stop Sign	Hendricks	1	1	0	0	Recent incidents
535649R	CSX	P-R			Hendricks	1	0	1	0	Recent incidents
535703G	CSX	P-R	Crossbuck/Yield		Boone	1	1	0	0	Recent incidents
535712F	CSX	P-R	Stop Sign		Clinton	1	0	0	0	Recent incidents
536347S	GDLK	P-R	Stop Sign		Elkhart	1	0	0	0	Recent incidents
538046D	CIND	P-R	Stop Sign		Dearborn	1	0	0	0	Recent incidents
538061F	CIND	P-R	Stop Sign		Ripley	1	0	0	0	Recent incidents
538271V	CSX	A-U		Flashing Lights or Other	Marion	1	0	0	0	Recent incidents
538272C	CSX	A-U		Flashing Lights or Other	Marion	1	0	0	0	Recent incidents
538295J	CSX	P-U	Stop Sign		Marion	1	1	0	0	Recent incidents
538299L	CSX	A-U		Flashing Lights or Other	Marion	1	0	0	0	Recent incidents
538892R	CSX	A-U		Gates	Delaware	1	0	0	0	Recent incidents
538905P	CSX	A-U		Gates	Delaware	1	0	0	0	Recent incidents
538920S	CSX	A-U		Gates	Madison	1	0	0	0	Recent incidents
538964S	CSX	A-R		Gates	Madison	1	0	0	0	Recent incidents
538980B	CSX	A-R		Gates	Madison	1	0	0	0	Recent incidents
538981H	CSX	A-R		Gates	Madison	1	0	1	0	Recent incidents
538992V	CSX	A-R		Gates	Hancock	1	0	0	0	Recent incidents
538995R	CSX	A-R		Gates	Hancock	1	0	0	0	Recent incidents
539172B	CSX	A-U		Gates	Marion	1	0	0	0	Recent incidents
539183N	CSX	A-U		Gates	Marion	1	0	1	0	Recent incidents
539186J	CSX	A-U		Gates	Marion	1	0	0	0	Recent incidents
539230U	CSX	A-U		Gates	Marion	1	0	0	0	Recent incidents
539251M	CSX	A-U		Gates	Marion	1	0	0	0	Recent incidents
539252U	CSX	A-U		Gates	Marion	1	0	0	0	Recent incidents
539256W	CSX			Gates	Marion	1	0	0	0	Recent incidents
539257D	CSX	A-U		Gates	Marion	1	0	0	0	Recent incidents
539273M	CSX	A-U		Flashing Lights or Other	Marion	1	0	0	0	Recent incidents
539471H	ISRR	P-R	Stop Sign		Greene	1	0	0	0	Recent incidents
539648X	NS	A-R		Flashing Lights or Other	Madison	1	0	1	0	Recent incidents
539654B	NS	P-R	Stop Sign		Madison	1	1	0	0	Recent incidents



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540168H	CSX	A-R		Gates	Putnam	1	0	0	0	Recent incidents
543005J	CSX	A-R		Gates	Hendricks	1	0	1	0	Recent incidents
543016W	CSX	A-U		Gates	Hendricks	1	1	0	0	Recent incidents
724853L	NS	P-R	Crossbuck/Yield		Gibson	1	0	0	0	Recent incidents
724933E	NS	A-R		Gates	Dubois	1	1	0	0	Recent incidents
724940P	NS	A-U	Crossbuck/Yield	Gates	Dubois	1	0	0	0	Recent incidents
724943K	NS	P-R	Stop Sign		Gibson	1	0	0	0	Recent incidents
724973C	NS	P-R	Stop Sign		Cass	1	1	0	0	Recent incidents
725083V	NS	A-R	Crossbuck/Yield	Gates	Dubois	1	0	0	0	Recent incidents
735861J	NS	P-R	Stop Sign		Spencer	1	0	0	0	Recent incidents
858654F	NS	A-R		Flashing Lights or Other	Warrick	1	1	0	0	Recent incidents
870380J	NICD	P-U	Crossbuck/Yield		St Joseph	1	1	0	0	Recent incidents
870381R	NICD	P-U	Crossbuck/Yield		St Joseph	1	0	0	0	Recent incidents
870409E	NICD	A-R		Gates	St Joseph	1	1	0	0	Recent incidents
870449C	NICD	A-U		Gates	La Porte	1	1	0	0	Recent incidents
870675B	NICD	P-U	Crossbuck/Yield		La Porte	1	0	0	0	Recent incidents
870676H	NICD	P-U	Stop Sign		La Porte	1	0	0	0	Recent incidents
870677P	NICD	P-U	Crossbuck/Yield		La Porte	1	0	0	0	Recent incidents
870684A	NICD	P-U	Crossbuck/Yield		La Porte	1	0	0	0	Recent incidents
870699P	NICD	P-U	Crossbuck/Yield		La Porte	1	0	0	0	Recent incidents
870702V	CSS	A-U		Flashing Lights or Other	La Porte	1	1	0	0	Recent incidents
870723N	NICD			Gates	Porter	1	1	0	0	Recent incidents
870876S	NICD	A-U		Gates	Lake	1	0	1	0	Recent incidents
870895W	NICD	A-U		Gates	Lake	1	0	0	0	Recent incidents
870902E	NICD	A-U		Gates	Lake	1	0	0	0	Recent incidents
873121H	NS	A-U	Crossbuck/Yield	Flashing Lights or Other	Tippecanoe	1	0	0	0	Recent incidents
879180F	NS	A-U		Gates	Delaware	1	1	0	0	Recent incidents
879187D	NS	P-U	Crossbuck/Yield		Delaware	1	0	0	0	Recent incidents
879191T	NS	A-U		Gates	Delaware	1	1	0	0	Recent incidents
879197J	NS	A-U		Gates	Delaware	1	0	0	0	Recent incidents
937002E	CSX				Marion	1	1	0	0	Recent incidents
948718N	NS				Porter	1	0	0	0	Recent incidents
948738A	NS				Clinton	1	0	0	0	Recent incidents



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953828J	NS		Crossbuck/Yield	Flashing Lights or Other	Lake	1	0	0	0	Recent incidents





Appendix D: Best Practices Table

Category	Best Practice Strategy	Applicability	Advice
Grade Closures and Separations	Crossing Closure	All locations, when practical. Consider when communities are disproportionately adversely affected by noise, traffic delays, visual quality, and the land use "barrier"	1.) Closing a public highway-rail crossing should consider public safety, necessity, access, and economics.
Grade Closures and Separations	Grade Separations	All locations, when practical. Consider when communities are disproportionately adversely affected by noise, traffic delays, visual quality, and the land use "barrier"	1.) A grade separation of a public highway-rail crossing should consider public safety, necessity, access, and economics.
New Crossings	New Crossings	New crossings (particularly on mainline tracks) should not be permitted unless no other viable alternatives exist.	1.) Opening a new public highway-rail crossing should consider public safety, necessity, access, and economics. Consideration should be given to closing one or more existing crossings.



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Category	Best Practice Strategy	Applicability	Advice
Inactive or Abandoned	Inactive or Abandoned	At locations where tracks were formally abandoned or inactive	1.) Confirm status of tracks. 2.) Remove tracks if applicable.
Site Improvements	Crossing Geometry	All locations, when practical	1.) The ideal crossing geometry is a 90-degree intersection of track and highway with slight-ascending grades on both highway approaches to reduce the flow of surface water toward the crossing. Few crossings have this ideal geometry because of topography or limitations of ROW for both the highway and the railroad. Every effort should be made to construct new crossings in this manner.
Site Improvements	Crossing Surfaces	All locations, when practical	1.) Proper preparation of the track structure and good drainage of the subgrade are essential to good performance from any type of crossing surface. Excessive moisture in the soil can cause track settlement, accompanied by penetration of mud into the ballast section. Moisture can enter the subgrade and ballast section from above, below, and/or adjacent subgrade areas. Surface and subsurface drainage should be intercepted and discharged away from the crossing.
Systemic Passive Warning Enhancements	Arrow Markings	At locations where lane reductions are necessary	Advanced pavement markings should be placed in accordance with the IMUTCD.
Systemic Passive Warning Enhancements	Signs	All locations	The "Crossbuck" Assembly" including the required signage that includes (R15-1, R1-2, ENS sign, etc.) with retroreflectivity strips are required to be used on each highway approach to every crossing, except at Light Rail Transit (LRT) crossings in semi-exclusive or mixed-use alignments. Additional consideration should include: 1.) Adding active treatments and devices with passive signs. 2.) Utilizing clear zones when possible. 3.) Ensuring adequate sight distance.
Train-Activated Warning Enhancements	Back-up Power	At locations where crossing warning devices are present	Active crossing warning devices usually incorporate some "fail-safe" design principles, resulting in crossing warning systems indicating an approaching train whenever the system fails. Crossing signals are normally "dark" unless a train is approaching or occupying the crossing, so there is no indication to the road user when power has failed. 1.) Crossing control



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Category	Best Practice Strategy	Applicability	Advice
			systems should include stand-by battery power. Solar energy may be used to charge storage batteries to power signals at crossings in remote locations.
Train-Activated Warning Enhancements	Constant Warning Time Track Circuit	At locations where crossing warning devices are present	<p>The MUTCD and FRA regulations (49 CFR 234.225) require that the system provide for a minimum of 20 seconds of warning time. 1.) When determining if the minimum 20 seconds of warning time should be increased, some factors that should be considered include but are not limited to the following:</p> <ul style="list-style-type: none"> a.) Track clearance distances due to multiple tracks and/or angled crossings (add 1 second for each 10 feet of added crossing length in excess of 35 feet). b.) The crossing is located within proximity of a highway intersection controlled by STOP signs where vehicles have a tendency of stopping on the crossing. c.) The crossing is regularly used by long tractor-trailer vehicles. d.) The crossing is regularly used by vehicles required to make mandatory stops before proceeding over the crossing (such as school buses and hazardous materials vehicles). e.) The crossing's active traffic control devices are interconnected with other highway traffic signal systems. f.) It is necessary to provide at least 5 seconds between the time the approach lane gates to the crossing are fully lowered and when the train reaches the crossing (49 CFR 234.223). g.) The crossing is regularly used by pedestrians and non-motorized components. h.) The crossing and approaches are not level. i.) Additional warning time is needed to accommodate a four-quadrant gate system. j.) Other factors regarding crossing location as appropriate.
Train-Activated Warning Enhancements	Warning Time	At locations where crossing warning devices are present	1.) Avoid excessive warning times.





Category	Best Practice Strategy	Applicability	Advice
Advanced Pre-Emption	Advanced Pre-Emption	Where a downstream traffic signal may cause traffic to back up toward and/or through a grade crossing OR where traffic queues from a railroad crossing have the potential to interfere with a nearby highway traffic signal	1.) Preemption should be considered
Advanced Pre-Emption	Advanced Pre-Emption	At applicable locations with preempted signals	1.) At a signalized intersection located within 200 feet or less of a crossing, where the intersection traffic control signals are preempted by the approach of a train, all movements from the signalized intersection approaching the crossing should be prohibited during the signal preemption sequences.
Advanced Pre-Emption	Pre-Signal and Queue Cutter Design Considerations	At locations with sufficient queues	<p>The recommended practice for queue management is dependent upon the clearing storage distance (CSD), location of crossing, and severity of queueing:</p> <ol style="list-style-type: none"> 1.) Pre-Signals—Can be used to stop vehicular traffic before the railroad crossing cases where the CSD is 50 feet or less OR as much as 200 to 250 feet depending on vehicle length. 2.) Queue-Cutter Signals—Can be used in cases where the crossing is located farther than 450 to 500 feet. 3.) Combination Pre-Signal/Queue-Cutter Signal—Can be used in cases where the crossing is located between 200 and 450 feet. 4.) Coordinated Traffic Signals—Use as desired, providing more green time can reduce queuing within the Minimum Track Clearance Distance (MTCD).





Category	Best Practice Strategy	Applicability	Advice
Advanced Pre-emption	Management of Queueing at Frontage Roads	At locations with frontage roads	1.) Utilize stop signs
Advanced Pre-emption	Adjacent Rail Crossings	At locations with adjacent rail crossings	<p>The recommended practice is dependent upon the distance between the two crossings:</p> <ol style="list-style-type: none"> 1.) Adjacent crossings within 100 feet—the crossings should be treated as one individual crossing. 2.) Adjacent crossings with 100 to 200 feet of separation—Additional signs or other appropriate traffic control devices should be used to inform approaching road users of the long distance to cross the tracks. “Interior” active devices (such as flashing-light signals with or without crossing gates) may be omitted. 3.) Adjacent crossings over 200 feet apart—Where the distance between tracks exceeds 200feet, the operation of the devices should provide for additional time for vehicles to clear the extended Minimum Track Clearance Distance (MTCD)
Pedestrians	Transit and On-Street Rail	At Light Rail Transit (LRT) crossing locations with pedestrian and bike traffic/volumes	<ol style="list-style-type: none"> 1.) The MUTCD Section 8C.13 requires use of standard traffic control signal pedestrian signal heads compliant with Section 4E.04 where such heads are used at LRT crossings. 2.) Consistent with current practice, the MUTCD indicates flashing-light signals with a Crossbuck sign and audible device should be used where there is inadequate clearing sight distance, or where LRT speeds exceed 35 mph.
Pedestrians	Channelization	At locations with pedestrian traffic/volumes	<ol style="list-style-type: none"> 1.) Pedestrian movements should be channelized to designated engineered crossing locations which provide warnings and controls designed for pedestrian use. 2.) Pedestrian safety is enhanced when pedestrians are able to cross tracks as closely as possible to a right angle (90 degrees).
Pedestrians	Accessibility Standards	At locations with pedestrian traffic/volumes	<ol style="list-style-type: none"> 1.) The following standards pertaining to the following should be met: 1.) Minimum widths and clearances, 2.) Accessible routes and pedestrian pathways, 3.) Curb ramps and ramps, 4.) Detectable warning strips, and 5.) Protruding objects.



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Category	Best Practice Strategy	Applicability	Advice
Pedestrians	Stop Lines and Detectable Warnings	At locations with pedestrian traffic/volumes	1.) Detectable warning surfaces mark boundaries between pedestrian and vehicular ways where there is no raised curb. Detectable warning surfaces contrast visually with adjacent walking surfaces, either light-on-dark, or dark-on-light.
Bicycles	Channelization	At locations with bicycle traffic/volumes	1.) Bicycle movements should be channelized to designated engineered crossing locations which provide warnings and controls designed for bicycle use.
Bicycles	Stop Lines and Detectable Warnings	At locations with bicycle traffic/volumes	1.) Detectable warning surfaces mark boundaries between bicycle and vehicular ways where there is no raised curb. Detectable warning surfaces contrast visually with adjacent walking surfaces, either light-on-dark, or dark-on-light.
Bicycles	Bike Trails	At locations with bicycle traffic/volumes	1.) Crossing surface type needs to easily accommodate bicycle tires to ensure no loss of control when crossing tracks. 2.) The path should allow the bicycle to cross as close to a 90-degree angle as possible.
Enforcement	Raise Awareness	Where practical	1.) Enforcement "blitz"
Communications and Outreach	Collaboration with industry leaders	All locations	1.) Examples include Operation Lifesaver Inc. (OLI) and Federal Railroad Administration (FRA)
Communications and Outreach	Participation in national campaigns	All locations	1.) Examples include Rail Safety Week and See Tracks? Think Train!

