IOWADOT

IOWA HIGHWAY-RAIL GRADE CROSSING
SAFETY ACTION PLAN

PROGRAM FOR IMPLEMENTATION IN CALENDAR YEARS 2022 -2026

February 14, 2022

IOWA DOT

CONTENTS

Executive Summary

The Rail Safety Improvement Act of 2008 ranked Iowa in the top ten states for the years 2006 through 2008 for number of highway-rail grade crossing collisions. Iowa was required by 49 CFR Part 234, "State Highway-Rail Grade Crossing Action Plans," to submit an action plan to the Federal Railroad Administration, (FRA) promoting safety at highway-rail grade crossings. The task was undertaken by the Iowa Department of Transportation's (DOT) Rail Transportation Office in cooperation with Iowa Operation Lifesaver, and the railroads operating within the state. It was planned for implementation in the calendar years 2012 through 2016. This original State Highway-Rail Grade Crossing Action Plan, (SAP) was approved by the FRA on August 31, 2012.

On December 14, 2020, the FRA issued the Final Rule for 49 CFR Part 234 requiring 40 States and the District of Columbia to develop and implement highway-rail grade crossing action plans. This final rule also required the ten States that had previously developed highway-rail grade crossing action plans as required by the Rail Safety Improvement Act of 2008 and FRA's implementing regulation to update their plans and submit reports to FRA describing actions they have taken to implement the plan.

In Iowa, 3,837 miles of rail freight track are operative and served by 18 railroad companies and two non-operating railroad owners. Five of these rail carriers are major national companies operating nearly 85 percent of Iowa's total route miles. Rail serves 90 of Iowa's 99 counties with 4,094 public and 2,441 private at-grade highway-rail grade crossings intersecting Iowa's 114,782 miles of public roadways. Iowa has an extensive network of roadways with many areas having a 1-mile roadway spacing grid.

The process of revising the original SAP included an analysis of the success of each action item identified in the original SAP and the creation of new action items. This process involved numerous stakeholders including the Traffic and Safety, Local Systems, and Research Bureaus of the Iowa DOT in addition to Iowa Operation Lifesaver and the railroads operating within the state. In addition, input was solicited from the Iowa DOT District Offices, County Engineers, and local Metropolitan Planning Organization's (MPO) and Regional Planning Affiliation's (RPA). This updated SAP document complies with the FRA's regulations which can be found in section 234.11 of title 49 of the Code of Federal Regulations (49 CFR § 234.11). This document describes the practices and programs outlined in the originally mandated SAP related to crossing safety and describes how those initiatives benefited safety, or if the initiatives were discontinued and why. New initiatives have been identified and developed into new action items with goals and objectives for implementation.

The Iowa DOT has leveraged the 23 U.S.C. § 130 (Section 130 Railroad Crossing Safety) funds to improve railroad crossing safety beyond the traditional active warning device installation-type projects. Roadway geometry changes are being incorporated into railroad crossing active warning device installation projects where deemed necessary through the diagnostic review process. Additionally, the accident prediction component of the benefit-cost analysis is currently being updated to incorporate the formula outlined in the FRA document: A New Model for Highway-Rail Grade Crossing Accident Prediction and Severity, (published in October of 2020).

Additional railroad crossing safety efforts are achieved through allocation of state funds to accomplish railroad crossing surface repairs on local roadways. Separate programs exist to repair railroad crossing surfaces on local roadways and the state highway system. Funds are allocated to fund railroad maintenance of existing active warning devices at railroad crossings with existing active warning devices funded through the Section 130 Railroad Crossing Safety program.

For compliance with the original 2012 plan submission, an analysis was conducted for highway-rail grade crossing collisions for the calendar years 2005 through 2009. Due to the relatively low number of incidents, Iowa DOT has elected to evaluate data for the period of 2010-2020 for this updated Safety Action Plan. To comply with the requirement for updating the SAP, an analysis was conducted for highway-rail grade crossing collisions for the calendar years 2016 through 2020 and included in Appendix 2. Although many analytical queries and cross tabulations were performed, this report only illustrated those that either represent areas with significant findings or those that have been assumed to be significant but have little variation from what would be expected when compared to other data.

As with the original submission, subsequent analysis found that the primary target for safety considerations was males under the age of 25, but males in general constitute 78% of all drivers in collisions. When compared with the percentage of traffic on the road, the time period between 10 p.m. and 3 a.m. is over-represented. The type of vehicle being driven was proportionate to the vehicles in the traffic stream. However, crossings on local municipal streets and secondary roads experienced 95% of all collisions. Many of these had vehicle speeds below 25 mph and train speeds below 15 mph.

The Iowa DOT 2012 Safety Action Plan identified twelve action items to serve as safety initiatives for implementation in calendar years 2012-2016. Six of the original action items will be continued through this revision. In addition, ten new action items have been identified for inclusion in this revised Safety Action Plan. A total of sixteen action items will be implemented through calendar years 2022-2026. The action items that are considered initiatives for this revision include:

EDUCATION

1. College and High School education campaign
2. Family education partnerships
3. Advocate with federal agencies like FRA and FHWA to devise a national ad campaign about distracted driving dangers at railroad crossings.

ENGINEERING

4. Rumble strips on paved secondary roads before crossings (reevaluate feasibility)
5. Document Best Practices for highway projects which interact with railroad crossings
6. Include roadway geometry changes into Section 130 projects where applicable
7. Oversight for railroad crossing signals / traffic signals preemption annual inspection requirements to coincide with the anticipated MUTCD revision.

FUNDING PROGRAMS & ACTIVITIES

8. Railroad crossing closure option as part of the Grade Crossing Surface Repair Program
9. Railroad crossing closure incentives for Section 130 Program
10. Identify priority grade separation locations and seek funding
11. Pedestrian Safety / Trespasser Prevention
    - Identify locations for a pedestrian / trespasser prevention discretionary grant request to construct pedestrian bridges (CRISI or other program)
    - Utilize Section 130 funds for fencing to channelize pedestrians near Amtrak stations and prevent the transition of sidewalk pedestrians to train platforms.
    - Address pedestrian issues and Americans with Disabilities Act (ADA) during funded projects and / or coordinate with affected entities to address concerns
12. Passive railroad crossings crossbuck / yield sign renewal project with Section 130 funds
13. Advocate continuation of 23 U.S.C Section 130 and increased railroad safety funding

ENHANCED DATA COLLECTION & ANALYSIS

14. Create a trespasser reporting webpage where the public and railroad employees can report trespasser activity
15. Develop GIS railroad crossing accidents map for Iowa
16. Identify all railroad crossings with humped and dipped attributes; improve signing or construct improvements

Implementation goals, objectives and timelines have been identified. Additionally, the Iowa DOT Rail Team will meet regularly with stakeholders and seek input regarding the current action items. The Safety Action will be reviewed at least annually and modified as necessary.

Introduction

MISSION STATEMENT

The purpose of this action plan is to lay a framework for continued reductions of collisions at Iowa's highway-rail grade crossings through analysis, discussion, and partnerships.

SCOPE

The Rail Safety Improvement Act of 2008 ranked Iowa in the top ten states for the years 2006 through 2008 for number of highway-rail grade crossing collisions. Iowa was one of the original ten states required to develop a Safety Action Plan (SAP) as mandated by 49 CFR Part 234. Twelve action items were developed, guided by the three E's of highway safety: engineering, education, enforcement. The Iowa DOT has implemented many of the action items outlined in the original safety action plan since approved by the FRA. Some of the action items were tested but found to be infeasible or difficult to implement and those action item efforts have been discontinued.

Since the adoption of the original safety action plan, new industry trends and studies as well as statistical analysis of accidents that have occurred in the state have led the Iowa DOT to devise new action items and pursue new efforts related to railroad crossing safety. Over subsequent years, and through collaboration with the Iowa DOT's Traffic and Safety, Local Systems, and Research Bureaus, Iowa Operation Lifesaver, and the railroads which operate in the state, the Iowa DOT as developed new practical actions to tackle the challenges associated with reducing the number of collisions at Iowa's railroad crossings.

The Iowa DOT has leveraged the 23 U.S.C § 130 (Section 130 Railroad Crossing Safety) funds to improve railroad crossing safety beyond the traditional active warning device installation-type projects. Roadway geometry changes are being incorporated into railroad crossing active warning device installation projects where deemed necessary through the diagnostic review process. Additionally, the accident prediction component of the benefit-cost analysis has been updated to incorporate the formula outlined in the FRA document: A New Model for Highway-Rail Grade Crossing Accident Prediction and Severity, (published in October of 2020).

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Highway-Rail grade crossings continue to be a major national issue concerning public safety, capital and maintenance costs, and liability for both railroads and public jurisdictions. Due to increasing highway and rail traffic, increasing train speeds and lengths made possible by industry improvements, the highway-rail grade crossing safety issue will continue to be a focal point for the Iowa DOT.

Per Iowa Code, final decisions concerning crossing protection on roads not owned by the state are made by the local highway jurisdiction or owner. The Iowa Department of Transportation has no authority to "require" installation of any active protection on these roads. Also, the agricultural nature of the state necessitates many private crossings for field accesses and the movement of livestock and produce.

Many programs have been initiated to encourage and help finance crossing closures and improved protection at public crossings. The track record of these programs can be seen in the facts listed in this SAP.

New analysis efforts have determined that the accident demographics, time, and location information has changed only marginally when compared to the analysis undertaken for the original SAP effort.

The overall scope of the SAP re-write consists of the following requirements:

1. A 2012-2016 Safety Action Plan implementation report.
2. How the Iowa DOT will continue to reduce grade crossing risks.
3. Update the current plan to comply with the new requirements.
4. Identify crossings with recent or multiple incidents and crossings that are high-risk.
5. Identify strategies (including closure and grade separation) to mitigate risk
6. Examine pathways crossing railroads for safety issues/improvements.
7. Develop strategies to address trespassing near crossings and trespasser hotspots.
8. Identify crossings with high numbers of suicides and address the problem.

Iowa designated official for SAP implementation

The following Iowa DOT staff is responsible for managing implementation of the 2022-2026 State of Iowa Highway-Rail Grade Crossing Safety Action Plan.

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Statewide Highway-Railway Grade Crossing Safety Efforts

HIGHWAY-RAILWAY GRADE CROSSING PLANNING

Iowa Department of Transportation Commission:

The seven-member Iowa Transportation Commission develops a comprehensive transportation policy and plan for the state of Iowa, identifies transportation needs, and develops programs to meet those needs. With regard to railroad crossing safety, the Transportation Commission approves funding requests for both the Section 130 Safety and Highway-Railroad Crossing Surface Repair programs each October as well as approves the Iowa Transportation Improvement Program (TIP) annually. Project selection parameters for the Section 130 program are outlined in the planning section of this SAP.

Iowa State Rail Plan (SRP):

The SRP is a long-range planning document intended to formulate a state vision for freight and passenger railroad transportation in Iowa. Since the plan is so accessible by the public and provides comprehensive information, it is a great resource for providing specific information about Iowa's highway-rail safety programs and efforts. Chapter 2 of the SRP covers the history of Iowa's Operation Lifesaver program, the 2012 Highway-Rail Grade Crossing Action Safety Plan and many other rail safety efforts, programs and studies that Iowa has completed or is participating in. The SRP was also developed with extensive public participation and involvement by the state's railroads and rail users so there was an opportunity to discuss Iowa's highway-rail crossing safety initiatives and statistics with many stakeholders and the public during those outreach events. When future updates are completed of the plan, there will continue to be opportunities for outreach and collaboration on highway-rail crossing safety.

Iowa Transportation Improvement Program (TIP):

The Iowa Transportation Commission (Commission) and Iowa DOT staff develop Iowa's Transportation Improvement Program (Five-Year Program) to inform Iowans of planned investments in our state's multi-modal transportation system. The TIP is typically updated by the Program Management Team and approved by the Commission each June. The TIP encompasses investments in aviation, transit, railroads, trails, and highways.

Statewide Transportation Improvement Program (STIP):

The STIP is a federally required systematic listing of projects for which federal-aid funding is proposed. This document grows out of the TIP and outlines Iowa DOT's funding objectives to maintain a globally competitive and attractive climate for businesses and people, and to ensure that the transportation system contributes to a productive and efficient economy. Iowa's rail network is a key asset in attaining these objectives. The STIP identifies projects funded by the Federal Highway Administration (FHWA), including highway-railroad grade crossing safety Section 130 projects. These projects may have a potential intersection with the Iowa railroad network. Rail projects in the state have also been added to the STIP in the past for illustrative purposes to support applications for federal grant funding.

Strategic Highway Safety Plan

A key planning component of federally required Highway Safety Improvement Program (HSIP) reporting is the required Strategic Highway Safety Plan (SHSP). According to the U.S. Department of Transportation, an SHSP is a "statewide coordinated safety plan that provides a comprehensive framework for reducing fatalities and serious injuries on all public roads." The purpose of the SHSP is to identify effective safety strategies to address areas of greatest need to make roadways safer.

As stated in Section 3: Safety Emphasis Areas, "Due to the large number of rail and highway intersections, rail crossing safety is critical". The SHSP goes on to outline the existing federal and state funded programs available to reduce train versus vehicle collisions.

HIGHWAY-RAILWAY GRADE CROSSING PROGRAMS ADMINISTRATION

23 U.S.C Section 130 Funds – Highway-Railroad Grade Crossing Safety Funds

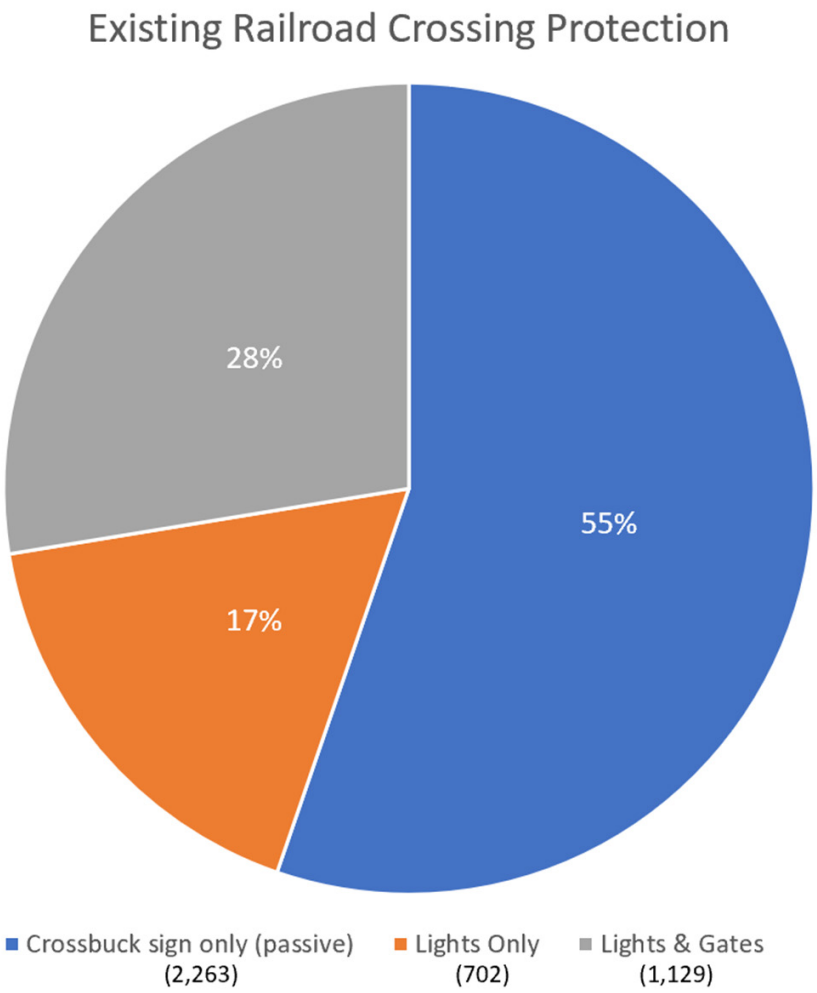
Current Transportation Authorization includes funding for highway-railroad grade crossing safety and is subject to future federal appropriations. Annually for 2022-2026, the Iowa DOT anticipates approximately $5.7M in federal funding for eliminating hazards at highway-railroad crossings. The table below shows the current programmed 5 years of expenditures.

State FY	Number of projects	Federal Funds	Local Match	Total Cost
2019	36	$7,960,950	$854,550	$8,815,500
2020	18	$4,278,733	$475,415	$4,754,148
2021	19	$4,752,000	$528,000	$5,280,000
2022	18	$4,176,000	$464,000	$4,640,000
2023	16	$4,550,000	$505,556	$5,055,556
	107	**$25,717,683**	**$2,827,521**	**$28,545,204**

As evidenced in figure 1 on the next page, over half of the railroad crossings in Iowa are passively protected with crossbuck signs. Forty-five percent of Iowa railroad crossings are protected with active warning devices, (flashing lights / flashing lights & gates).

Iowa Administrative Rules section 761-812 addresses classifications and standards for highway-rail grade crossings. This statute classifies grade crossings based upon their characteristics, conditions, and hazards, and provides standards for warning devices for each classification. Crossings are classified using the FRA predicted accident methodology. Highway authorities have the responsibility of jointly reviewing with the railroad those crossings with a predicted accident rate of .075 or above (list furnished by the Iowa DOT each year) and recommending crossing safety improvements outlined in Iowa Administrative Rule 761-812.

Figure 1



The Iowa DOT employs several methods to target federal and state safety funding to increase safety at crossings, including:

- Conducting on-site reviews of crossings with crash history, higher vehicle or train traffic, passenger traffic, any other physical condition that indicate potential safety problems.
- Coordination with railroads and highway authorities to support crossing closures and crossing closure incentive payments where appropriate.
- Send annual listings to all highway authorities and railroads, identifying their specific crossings with crash history and traffic information, to encourage review of safety issues at crossings under their jurisdiction.
- Review accident narratives and law enforcement accident reports from railroad crossing incidents to determine whether additional safety features may have prevented an accident.
- Facilitate on-site safety evaluations of crossings requested by highway authorities and / or railroads.

The Iowa DOT maintains an application-based Section 130 program. A project application must be submitted jointly by the railroad and highway authority with jurisdiction of the railroad crossing. Applications remain valid for five years or until the crossing benefit-cost ranking justifies funding.

Assessing state highway projects for railroad impacts

Once a non-railroad related state highway project begins the design process it is entered into the Iowa DOT Master Works project scheduling system. The Iowa DOT reviews the projects entered into Master Works to determine whether each location requires railroad involvement and ensures that American Railway Engineering and Maintenance-of-Way (AREMA) standards are included. Iowa DOT coordinates with the affected operating railroad and makes every effort to include the railroad's specific standards and ensures the standards at least meet AREMA guidelines.

If federal funds are included staff review the project to see if there are concerns or deficiencies at railroad crossings within and near the project limits per the 646.214 Design standards to include surface and signal adequacy.

Where appropriate reviews include the consideration of railroad crossing closures and / or grade separation projects as appropriate.

Addressing Trespasser Issues

There is no formal program or federal / state funding available for addressing trespasser issues.

Trespasser mitigation efforts are not eligible for Section 130 funds and therefore a specific program has not been adopted for the reduction of trespasser activity.

Iowa law does not require that railroads report witnessed trespasser activity and therefore railroads do not report trespasser activity to the Iowa DOT. Most reports of trespasser activity to the Iowa DOT come in the form of fatality reports by railroads or trespasser activity is observed by Iowa DOT staff while on site for diagnostic review or construction projects. Each report of trespassing is reviewed on a local level to determine the cause. Most trespassing instances are within towns and cities and appear to entail persons crossing the tracks to get from one side of a town to another as a shortcut rather than walking to the nearest railroad crossing. When the Iowa DOT is made aware of specific trespasser issues or incidents near railroad crossings, the department meets on site with the local municipality and railroad to determine what mitigation strategies may be deployed. In some cases, fencing can be constructed to channelize pedestrians, keeping them on the sidewalk and out of the railroad right-of-way and roadway.

In several instances Iowa DOT staff have installed temporary traffic cameras to record activity at and adjacent to railroad crossings where trespasser issues have been reported. (This has especially been the case at Amtrak railroad stations where passengers embark and disembark on platforms between city streets that are not separated from city pedestrians). In some cases, city pedestrians are utilizing the Amtrak passenger platforms as sidewalks between city streets. The collected video footage is reviewed to identify causal circumstances and actions of trespassers. This information is studied to determine how to best prevent trespassing at the location and shared with the affected railroad and roadway authority. In most situations it has been determined that fencing is the best option to prevent trespassing. Unfortunately, most cities are unable to install fencing due to budget constraints.

Due to lack of reporting of trespasser activity on the part of the railroads the Iowa DOT frequently utilizes the FRA trespasser dashboard webpage: and fatality map web page in order to help assess trespasser hotspots and direct trespasser prevention efforts.

Additionally, the Iowa DOT sends an annual Community Events Letter to all cities and counties each February explaining the need to contact railroads when large events or celebrations are planned so the railroad is aware and can advise locomotive engineers. The letter warns of trespassing dangers and that local law enforcement should assist event organizers with keeping stationary people and vehicles off railroad tracks and railroad right-of-way during the event.

The Iowa DOT is currently devising a webpage that can be utilized by the public and railroad employees to report trespasser activity. This is one of the recently identified action items. An initial and subsequent annual letter

will be sent to cities, counties, and Iowa DOT District Offices advising of the dangers of railroad trespassing and reminding those groups to utilize the webpage to report trespasser activity.

All of the Class I Railroads represented in Iowa have their own law enforcement staff. After having conversations with representatives from three different Class I railroads it has been determined there are some additional efforts that can be researched and potentially focused on related to trespassing and safety in Iowa at highway-rail grade crossings. The Iowa DOT envisions having future discussions with Operation Lifesaver, MPOs, RPAs, counties, cities and other interested stakeholders about how the railroad safety community can work with the railroad law enforcement to implement some of the following initiatives with their help:

- Focused social media campaigns
- Geo-fencing via social media or internet advertising
- Looking at the detailed FRA data sets and providing that information to the so they can incorporate trespassing data into any of their planning efforts local partners
- Working with communities who have festivals and similar events near or around the railroad infrastructure to provide additional education and awareness to event planners, visitors and attendees
- Scheduling future rail incidence safety training with the railroad law enforcement staff
- Provide rail safety handouts to truckers at rest areas and/or weigh stations
- Talk to the Iowa DOT Freight Advisory Council (FAC) about rail crossing safety at future meetings

Highway-Railroad Crossing Signal Maintenance program, (State funded)

The Iowa DOT allocates $700,000 annually for the reimbursement of signal maintenance costs to the railroads. The reimbursement calculation is based on Association of American Railroads (AAR) standard signal unit counts and the railroad crossing must have had the active warning devices installed through the Section 130 program. Each year, the Iowa DOT computes an average annual maintenance cost per AAR signal unit. This unit cost is used by all railroads for billing purposes. The percentage of participation cannot exceed 75 percent.

If, in any year, the balance of the highway grade crossing safety fund is inadequate to fully reimburse all railroads, the department shall reimburse each railroad on a pro-rata basis.

Highway-Railroad Crossing Surface Repair program, (State funded)

The grade crossing surface repair program participates in the cost to rebuild highway-railroad grade crossings. This program assists in maintaining safe and smooth crossing surfaces at highway-railroad crossings. Smooth crossings are ideal for safety because:

1. Vehicles will not become “stuck” on a deteriorated railroad crossing.
2. Motorists slowing down to negotiate a rough crossing could be struck by a train either due to their low speed at passive crossings, or due their low speed causing the motorist be become trapped inside the gates. Gate timing is predicated on roadway and train speeds. If the motorist is traveling significantly slower than the posted roadway speed to negotiate the rough crossing, the gates could lower and trap the vehicle, potentially causing an accident.

Only public crossings are eligible for assistance through this program. Eligible applicants include cities, counties, railroads and spur track owners. Either a railroad owner or a roadway jurisdiction may initiate discussions regarding surface repair funding, however, the application must be initiated by both the

roadway jurisdiction and the railroad. Spur track owners act as the railroad for the purposes of applications and agreements of their infrastructure.

Nine hundred thousand dollars in an annual appropriation from Iowa's Road Use Tax Fund assists cities, counties and railroads with surface repairs. Projects selected for funding receive 60% of the cost of repairs from the Grade Crossing Surface Repair Fund. The highway authority and railroad must each agree to pay 20% of the total project cost. When a rail spur at a public crossing is owned by a private industry or agricultural cooperative, that entity assumes the costs normally paid by the railroad as owner of the track.

The available funding allows a limited number of surface improvements each year. Currently, there is a multi-year wait for funding. Roadway jurisdictions are encouraged to consider applying for funding before a crossing condition deteriorates significantly.

Projects are selected from applications received for eligible projects.

A portion of the repair fund, not to exceed 50 percent annually, is set aside to meet critical or atypical needs. The criteria used to identify priorities for this portion of the funding include, but are not limited to:

- Condition of the crossing
- Safety concerns
- Utilization of the rail line
- Train and motor vehicle traffic density at the site - special consideration may be given to heavy truck traffic
- Recent or planned development or construction in the vicinity of the crossing

Remaining funds are allocated to eligible projects in the order completed applications are received by the department. Projects will be advanced if funding becomes available. Recommendations are made annually to the Commission for funding approval.

Primary Surface Repair Program

The State of Iowa is the responsible highway authority for primary highway system railroad crossings. The 159 public grade crossings on state primary roads are not eligible for Highway-Railroad Crossing Surface Repair program grants. The Iowa DOT also allocates funds directly from the Primary Road Fund to rebuild and repair highway-railroad grade crossing surfaces on state primary roads, (state highway system). This allows the grade crossing surface repair fund to focus on city and county projects, reducing the existing backlog of projects. This program is a maintenance-type program whereas standard agreements can be quickly drafted, paying the railroad a specified amount per linear foot for the crossing structure replacement. The Iowa DOT acts as the roadway authority and replaces roadway approaches, hauls materials in and out for both the railroad and the Iowa DOT and removes debris for both entities. Projects completed in this program are designed with the placement of asphalt underlayment beneath the railroad crossing structure to eliminate moisture from fouling the ballast which ultimately doubles or triples the lifespan of the railroad crossing.

Annual reporting of the Railway-Highway Crossings Program (RHCP) as a component of the Highway Safety Improvement Program (HSIP) to FHWA

Iowa, like all states is required to complete annual reports for the HSIP. A component of the HSIP is the Railway-Highway Crossings Program (RHCP). States must submit these reports to the respective FHWA Division Office no later than August 31st of each year. The reports are then submitted to the FHWA Office of Safety by September 30th.

The HSIP is the reporting mechanism to ensure that states are complying with the Fixing America's Surface Transportation (FAST) Act (Pub. L. No. 114-94). The FAST Act is a Federal-aid program with the purpose of reducing fatalities and serious injuries on all public roads. HSIP is authorized under section 148 of title 23, United States Code, with implementing regulations at 23 CFR part 924.

An annual report on HSIP implementation and effectiveness is required under 23 U.S.C. 148(h) and 23 CFR 924.15 is required for tracking HSIP implementation efforts. Given the purpose of the HSIP and the performance management requirements established in the Moving Ahead for Progress in the 21st Century Act (MAP-21) under 23 U.S.C. 150, States should select and implement projects that will contribute to a reduction in fatalities and serious injuries, consistent with their Strategic Highway Safety Plan (SHSP) goals and safety performance targets. The HSIP annual report serves as the mechanism to report on safety performance targets pursuant to 23 CFR Part 490. States should use the HSIP reports to demonstrate the success of their safety programs and to communicate to others within their States about the importance of a continued focus on improving highway safety.

The RHCP component of the HSIP is completed annually by the Iowa DOT in order to comply with title 23, United States Code (U.S.C.) Section 130 funds. This guidance reflects the railway-highway crossings program reporting requirements under Moving Ahead for Progress in the 21st Century Act (MAP-21) and Part 924 of title 23 of the Code of Federal Regulations (23 CFR Part 924). Information regarding current Section 130 projects are contained within the annual report which occur during the reporting period, for each project includes the following information:

- Project location
- USDOT crossing numbers
- FHWA roadway functional classification
- Specific project type and description
- Crossing protection (active, passive)
- Crossing type (vehicle, pedestrian, etc.)
- Project cost including Federal share
- Funding types (Section 130 or other)

To best assess the effectiveness of the program, past projects are listed along with the following information pertaining to each past project:

- Location of project
- USDOT crossing number
- FHWA roadway functional classification
- Specific project type and description
- Crossing protection (active, passive)
- Crossing type (vehicle, pedestrian, etc.)
- Cost of project including Federal share
- Funding types (Section 130 or other)
- Crash data (minimum of 3 years before and up to 3 years after project completion)
- Effectiveness of prior projects in terms of listing any additional accidents that have occurred at the railroad crossing after the Section 130 project.

Stakeholder Engagement

PROCESS FOR STAKEHOLDER INVOLVEMENT IN SAP DEVELOPMENT

The Iowa DOT identified the stakeholder groups that benefit from safety enhancements and could contribute to the promotion of safety at railroad crossings to help develop the SAP. The following groups were identified:

- Railroads
- Local Roadway Authorities and Emergency Services
- Operation Lifesaver
- MPO's and RPA's
- General Public

The Iowa DOT engaged the various entities through meetings and informational sessions where feedback and comments were solicited. The following information is provided about the engagement process with each type of entity.

Railroads

The Iowa DOT holds a semi-annual meeting with the Rail Advisory Committee (RAC). The RAC is made up of representatives from all of the railroads in the state, personnel from the Iowa DOT, and other ad hoc Iowa DOT office representatives such as the Traffic and Safety, Local Systems, and other bureaus. Outside participants are also included for presentations or workshops on topics of concern.

Safety is always one of the topics on the agenda for these meetings and the Crossing Safety Action Plans (both the original plan in 2012 and the updated plan to be submitted in 2022) include essential input from the group. The recommended Action Items in the plan have resulted, in large part, directly from this type of input.

During the September 2021 RAC meeting the overall scope of the action plan was discussed. Also discussed was the desire for the Iowa DOT to complete an entire re-write of the plan to comply with the new federal mandate.

The group then conducted a "prioritization dot exercise" with the current action items and suggested new action items. Each item was discussed in length and then participants were asked to vote for their top three preferred action items as well as provide comments on any of the items.

A summary of the prioritization dot exercise results is on the following page.

RAIL ADVISORY COMMITTEE INPUT – SEPT. 2021

● = ONE VOTE

EDUCATION

College and high school education campaign

No comments ● ●

Family education partnerships

No comments / no votes

Enforcement/Judicial/Awareness

No comments ● ● ●

ENGINEERING

Rumble strips on paved secondary roads

Several comments

According to the 2012 SAP, the Iowa DOT Traffic and Safety Bureau recommendation was against rumble strips because they are used to indicate a stop sign, where as many railroad crossings have yield signs.

However, the DOT uses rumble strips in many places on the shoulders and down the center lines of highways. Rumble strips would get the attention of distracted drivers.

● ● ● ● ● ●

Verify engineering for preemption signal timing

No comments / no votes

Develop railroad crossing closure rating criteria

No comments ●

Crossing signal light LED conversion

No comments / no votes

DOT staff explained that this is already happening routinely as lights reach the end of service life or when crossings are updated.

FUNDING PROGRAMS

Closure as part of the grade crossing surface repair program

Comments:

- *Railroads suggested the Iowa DOT should get testimonials from communities that had crossing closures and that it was actually a good thing.*
- *When a crossing is closed, that's one less time the train sounds its horn in town.*

We explained that this is problematic for the Iowa DOT due to a of lack of funding.

●

Section 130 railroad crossing closure incentive match increase

Comments:

- *Support and encourage closures*

● ●

Passenger rail

No comments / no votes

This effort included upgrading safety measures at crossings and closing selected crossings along a planned new passenger rail service route. The planned service is on hold now

Decrease reallocation of Section 130 funds for railroad crossing surface repair projects

Note: this is no longer occurring.
The backlog of surface projects was caught up in 2017.

Advocate for continued Section 130 and increased rail safety funding

No comments ● ● ● ●

Topics and comments that were provided during the meeting were based upon discussion and are not in the original SAP.

Operation Lifesaver

No comments / no votes

Modification to the Education topic:

Comments:

- *We should target specific groups – especially Farm & Ag, hunters, drivers, realtors/homebuilders/developers.*
- *Education should start earlier: elementary and middle school.*
- *Railroad 101*
- *Educate localities on the actual costs associated with establishing Quiet zones.*

● ● ● ● ●

Pathways and Bike paths

No votes

Comments:

- *Need to do more safety education specific to pedestrian and bike paths.*
- *Need to encourage strongly that paths should not be placed parallel and near railroads because it leads to unsafe behavior.*
- *Education is needed.*

Legal statutes better to enforce no trespassing on railroad right-of-way.

No comments ● ● ● ● ● ● ●

Discourage new crossings

No comments ● ● ● ●

Local Roadway Authorities and Emergency Services

The Local Systems Bureau of the Iowa DOT shared the existing action items from the 2012 SAP and proposed SAP action items for this updated SAP with Iowa's county engineers through established communications efforts. The county engineers were asked to comment on the existing action items and provide suggestions for additional action items.

In addition, Iowa DOT maintains consistent communication with the county and city engineers that have rail lines in their jurisdictions to discuss projects and railroad crossing safety because highway project design around railroad crossings requires education and coordination. For highway projects that include railroad crossings, it is important for the engineers involved to consider the details necessary to make the railroad crossing as safe as possible, including familiarity with MUTCD guidance. This includes such things as level approach pavements with a smooth transition to the crossing surface, appropriate sight distances and extra signage as deemed necessary.

Ongoing participation in county and city engineer meetings provides the Iowa DOT the opportunity to educate local engineers about the importance of careful design of roadway infrastructure to maximize safety of railroad crossings within or near their roadway projects.

The input received from the County Engineers can be grouped into several themes.

- **Rumble Strips:** Several concerns were received about putting in rumble strips on paved roads in advance of railroad crossings. Concerns include: driver expectations with rumble strips are normally associated with a stop condition that is present every time a person drives that road and putting them in advance of a railroad crossing would be inconsistent, the additional cost of the rumble strips, wariness that this would be an unfunded mandate, and uncertainty of the design requirements of the rumble strips.
- **Funding and railroad coordination:** Several comments were received expressing the need for railroads to cost share for safety improvements and that the railroads be willing partners in improvements to reduce highway-railroad grade crossing accidents. Improved coordination with railroads on projects is desired. One county expressed that Section 130 funding is already limited and funding should not be used to repair the surface of crossings or additional items such as fencing and sign renewal.
- **Crossing surfaces:** The counties desire the railroads have a larger role in maintaining and improving crossing surfaces, including increasing the maintenance of the ties and fasteners through crossings to reduce hazards to road traffic. Support was notes for increasing the funding for crossing surface repairs and for improvements to humped and dipped crossings.
- **Education activities are supported.**
- **Crossing closures and prioritization of improvements:** As crossings are evaluated for improvements/repairs, other crossings in the area should be evaluated for needs and ability to close. Any crossing closure guidance should not be viewed as absolute given the unique nature of each crossing. Closure incentives for the Section 130 program would be helpful for some communities but should never be used to force closures.
- **Cross buck/yield sign replacement:** There are questions about including stop sign replacement with a program to replace cross bucks and yield signs.

Operation Lifesaver Inc., (OLI)

Operation Lifesaver is the primary catalyst for railroad crossing safety and trespasser awareness. The Iowa DOT supports OLI both financially and with in-kind support. One of the key aspects of railroad crossing safety is instilling risk awareness in inexperienced, young, and learning drivers in addition to children younger than driving age. The Iowa DOT has benefited from OLI input into the safety action plan. OLI outreach efforts will be instrumental in helping the Iowa DOT accomplish several of the goals within this action plan. The Iowa DOT does post information on social media periodically with regard to trespasser prevention and railroad crossing safety, but OLI interacts with the public in-person through attending public events and training opportunities.

The Iowa Operation Lifesaver Board meets five times per year; but the group has been meeting less frequently in 2020 and 2021 due to the COVID-19 pandemic. Iowa DOT staff met with the Iowa OLI board members during the November 2021 meeting to discuss the SAP goals & progress, and to obtain input from the group. The existing and proposed action items were presented; and a request was made to the group to provide input about the action items and to provide any ideas for additional action items for consideration. The following recommendations were made by the group:

- Increase state funding for Operation Lifesaver.
- Increase signage at bike paths and trails where they cross railroad lines.
- Increase state funds to pay more toward railroad crossing projects.
- Paint dynamic envelope on pavement for urban and pathway crossings.
- Incorporate pedestrian gate skirts into projects involving pedestrian crossings.
- Enforce Judicial Awareness: Section 321 Code of Iowa
- Continue to pursue the use of rumble strips in advance of railroad crossings
- Add crossings to popular navigation products and apps such as Wayze, Google Maps, etc.
- Utilize preemption signal timing
- OLI and state should coordinate to increase education of photographers and sportsmen about trespassing dangers.

MPO's / RPA's

The has participated in quarterly MPO and RPA meetings facilitated by the Systems Planning Bureau of the Iowa DOT. Information has been provided about rail safety issues to the members of these organizations requesting input be provided to the Iowa DOT regarding the rail safety plan action items. Some agencies shared the information with their member governments and some information was provided concerning hotspots for trespassers and/or just general trespassing issues in their communities. The Iowa DOT has already started following up with at least one of the communities and working with other agencies on some remedies.

A second quarterly meeting occurred during the development of the rail safety plan, and the Iowa DOT provided additional information concerning the draft action items. There was also a discussion about future efforts to keep the MPOs and RPAs engaged in rail safety efforts as the Rail Team implements the SAP.

General public

The general public can report railroad crossing surface and general safety issues via the Iowa DOT website. The public can request a review of railroad crossings by Iowa DOT Rail Team staff. The Iowa DOT also responds to complaints and inquiries by maintaining complaint logs and coordinates with railroads to perform remedial solutions until projects can be coordinated, leveraging state or federal funds for more permanent solutions.

STAKEHOLDER INVOLVEMENT IN SAP IMPLEMENTATION

Railroads

The Iowa DOT will coordinate with railroad law enforcement to develop strategies for outreach and educational opportunities. Once the strategies have been developed the Iowa DOT will participate in the outreach and efforts.

The Iowa DOT will continue to encourage railroad participation in the Section 130 and Highway-Railroad Crossing Surface Repair programs.

The Iowa DOT currently facilitates three to four RAC meetings annually, attended by government affairs and public policy railroad representatives. The Iowa DOT will add the Safety Action Plan to the agenda for each meeting to discuss action item efforts, provide status reports, and obtain feedback. Additionally, the Iowa DOT facilitates Winter Meetings, (attended by public project managers, signal maintainers, roadmasters, and other in-field staff) with all of the Class I railroads individually and all of the shortline railroads together in a separate meeting. The Iowa DOT intends to add an agenda item for these meetings to discuss the SAP action items and implementation efforts.

Once the trespasser reporting portal webpage is operational the Iowa DOT will heavily promote and encourage reporting of trespasser activity on the part of railroad employees.

Local Roadway Authorities and Emergency Services

The Iowa DOT will continue to send annual letters to all cities, counties, and Iowa DOT District offices referencing the establishment of new railroad crossings, planning community events, motor grader operations at railroad crossings, and snow removal best practices at railroad crossings. Iowa DOT will coordinate with local communities and emergency services to promote education and defensive driving near railroad crossings.

The Iowa DOT will participate in County Engineer annual meetings and incorporate an agenda item pertaining to the SAP implementation to educate and seek feedback on a regular basis.

Once the trespasser reporting portal webpage is operational, the Iowa DOT will heavily promote and encourage reporting of trespasser activity on the part of counties and request county employees encourage citizens to utilize the webpage to report trespasser activity as well.

Operation Lifesaver Inc., (OLI)

The Iowa DOT supports OLI through financial and in-kind resources. Between 2015 and 2021 the Iowa DOT has secured $ 169,500 in funding through the TSIP and in-kind dollars to support the OLI mission. Iowa DOT has provided printing resources as well as facilitated meetings and provided conference rooms and conference phone bridge access. The Iowa DOT has worked with OLI to ensure the action items concerning education and outreach were being conducted.

It is the intent of the Iowa DOT to continue providing these resources to OLI to ensure the SAP action items concerned with public outreach are realized. Although OLI volunteers have conducted fewer educational and outreach efforts during the COVID-19 pandemic due to the restriction of unnecessary personnel in schools and institutions. The intent is to continue greater and more sustained efforts as soon as practical. The Iowa DOT will search for practices that other state OLI groups are conducting with successful outcomes and encourage OLI Iowa develop similar programs.

Once the trespasser reporting portal webpage is operational, the Iowa DOT will request that OLI volunteers heavily promote and encourage reporting of trespasser activity during their educational and outreach efforts.

MPO's / RPA's

The Iowa DOT will participate in regularly with scheduled statewide MPO and RPA meetings and incorporate an agenda item pertaining to the SAP implementation to educate and seek feedback on a regular basis.

Once the trespasser reporting portal webpage is operational the Iowa DOT will heavily promote and encourage reporting of trespasser activity on the part of the citizens and municipal jurisdictions within the geographical area concerned within each MPO and RPA via the webpage.

General public

The Iowa DOT will post the approved SAP to the Iowa DOT website and post an online public meeting to share the SAP action item recommendations.

Once the trespasser reporting portal webpage is operational the Iowa DOT will heavily promote and encourage reporting of trespasser activity on the part of the citizens webpage via social media and other channels.

The Iowa DOT will continue the ongoing social media posts concerning railroad crossing safety and trespasser issues such as not taking senior and wedding photos on train tracks and the like.

Data Analysis

The Iowa DOT collects crash data through various means. This includes mandatory accident reporting by railroads, investigations of individual accidents, and generating reports from FRA websites. In addition, the Iowa DOT Traffic & Safety Bureau collects additional data regarding railroad crossing accidents for inclusion in the Iowa Crash Analysis Tool (ICAT) which tracks accidents on all Iowa roadways. In addition, all highway-railroad crossing attributes are merged from the railroad crossing inventory into the Iowa DOT Roadway Asset Management System (RAMS) and pathway railroad crossing data is contained to the railroad crossing inventory system as these types of railroad crossings are not part of the Iowa roadway system.

Identification of "high risk" highway-railroad crossings and pathway-railroad crossings can be found in Appendix 2 of this SAP.

DATA DISCUSSION

Railroad Crossing Inventory

The Iowa DOT collects railroad crossing inventory data each summer on a four-year cycle. The state has been divided into quadrants and each summer the Iowa DOT utilizes interns to travel the assigned quadrant and collect the data assigned to the roadway authority and take photos of each railroad crossing. At the conclusion of the data collection a quality control process occurs where the data is verified before being uploaded into the FRA and Iowa DOT railroad crossing inventory databases.

Accident Reporting Data Collection

Iowa Code 327C.37 requires railroads to report accidents and incidents to the state of Iowa.

Administrative Code 761—802. 2, supporting the Iowa Code section above outlines the following criteria for accidents or incidents requiring notification by railroads to the state. The reporting criteria requirement indicates any accident/incident involving train movement which results in any of the following shall be reported within four hours of the accident/incident to the department:

1. Fatality.
2. Personal injury requiring hospitalization.
3. Derailment of ten or more rail cars and locomotives.
4. Derailment of any number of cars or locomotives when one or more are not upright.
5. Derailment or other incident involving a railroad passenger train.
6. Release or potential release of hazardous materials that presents a risk or potential risk to public safety including injury, fatality, evacuation or shelter -in-place of persons.

7. Damage to public or private transportation infrastructure not owned by the involved railroad.
   802.2 (2) Content of notice. The notice of an accident/incident shall provide, at a minimum, the following information:

   a. Name of the railroad involved.
   b. Name and contact information of the individual calling to file the notice.
   c. Date and time the accident/incident occurred.
   d. Location of the accident/incident, described as accurately as possible, including the nearest city and the U.S. DOT crossing identification number or railroad milepost.
   e. Description of the accident/incident.
   f. Impact on motor vehicle travel, if known.
   g. Number of injuries and fatalities.
   h. Hazardous materials involved in the incident and actions taken in the event of a release.
   i. Number of rail cars derailed

The current procedure for reporting railroad incidents involves the railroad dispatch departments contacting the Iowa DOT Traffic Management Center (TMC). The TMC collects pertinent information including the railroad name, railroad crossing (or nearest railroad crossing) DOT number, the county, nearest town, and a narrative of the accident / incident. The TMC then emails a report to select personnel at the Iowa DOT including the Rail Team staff. For accidents / incidents involving railroad crossings and trespasser incidents, as warranted; Rail Team staff contact local agencies, and in some cases local law enforcement to ascertain causal information about the incident. This information is used to collaborate with the railroad and roadway authority with jurisdiction of the railroad crossing to take remedial action if possible and/ or submit a project application for the Section 130 program to utilize funds.

The Iowa DOT is aware that it is possible not all railroad accidents / incidents are being reported by the railroads to the TMC. Therefore, the Iowa DOT studies and scrutinizes all sources of data for trends. However, programming funds and project decision making data is obtained from the FRA and used for official reporting purposes. The FRA GX-Dash website is utilized for accident analysis and trends while the railroad crossing inventory and accident website is utilized for project decision making and funding. Due to the fact that railroads are federally mandated to report railroad crossing accidents to the FRA, the Iowa DOT considers the FRA data to be the most comprehensive source of data.

Upon notification to the Iowa DOT TMC of a railroad derailment/accident involving fifteen train cars or more, involving a release of hazardous material, personal injury, or deemed serious enough in nature to warrant an investigation, the Iowa DOT track inspector expeditiously travels to the accident site. The Track Inspector conducts an investigation either individually or assists in FRA/NTSB investigations into cause. The Track Inspector either individually completes or assists in the completion of the required FRA 39i investigation report. The track inspector prepares reports of defective conditions or violations if necessary, collects sufficient backup evidence to support findings, and prepares an internal Iowa DOT report on findings, and make the report available to proper authorities.

Each month the Iowa DOT downloads accident data from the FRA website and incorporates the data into the Program Control System (PCS) for use in identifying high risk railroad crossings and to be used in the accident prediction and benefit cost formulas utilized for selecting Section 130 safety projects. The number of accidents at a particular crossing is one of many factors the formulas utilize for project selection.

Three reports are downloaded monthly from the FRA website.

1. Highway Rail Accidents
2. Rail Equipment Accidents
3. Railroad Casualties

The downloaded information is then uploaded into an Access database and several fields are verified for accuracy. Once the information is verified, it is saved into a text file so it can be uploaded into the PCS database where it is used to calculate the benefit cost ratio for all the crossing in the state of Iowa. The benefit cost ratio is used to determine which safety projects are selected for funding through the Section 130 program for the fiscal year two years in advance.

Pedestrian and Pathway incidents

There are forty-six (46) pathway-railroad crossings in the state of Iowa. There have been no incidents or accidents at any of these railroad crossings in the previous five years. A full list of pathway-railroad crossings can be found in Appendix 2 of this SAP.

Iowa Crash Analysis Tool (ICAT)

This crash data is collected by law enforcement agencies across the state. All reportable accidents on the Iowa public roadway system are documented and electronically sent to the Iowa DOT Motor Vehicle Bureau by law enforcement and compiled into this dataset. The reported accident information for all incidents on Iowa roadways, including at railroad crossings are input into the ICAT system. The software then allows users to generate reports and analyze data. Sorting data pertaining to railroad crossing accidents is accomplished through a reporting tool. The Iowa DOT relies on FRA data for statistical information because railroads are federally required to report all accidents. If law enforcement does not become involved when an accident occurs, then those accidents are not reported to the Iowa DOT for inclusion in the ICAT system. However, specific information can be gleaned from the ICAT reporting tool, which is not available, and not part of the mandatory accident reporting form required by the FRA. The ICAT system provides a deeper look at causal information and specific insight into the accidents. Appendix 2 contains the ICAT report for the reporting period 2011-2020. Appendix 2 contains a summary report of ICAT for rail related incidents from 2011-2020.

Federal Railroad Administration (FRA) Websites

Railroads are federally mandated to report railroad crossing accidents to the FRA through the submission of the DOT Accident/ Incident Report form FRA F 6180.57. These forms are available for the public to download through the FRA's Office of Safety Analysis website https://safetydata.fra.dot.gov/OfficeofSafety/PublicSite/Crossing/Crossing.aspx along with the railroad crossing inventory forms. Users type in the railroad crossing DOT number and select whether the accident or inventory forms are generated in pdf format.

Information from accident forms submitted to the FRA is aggregated into statistical reporting available through the FRA GX-Dash website (https://explore.dot.gov/t/FRA/views/Highway-RailCrossingCollisions2011-2021/National?:showAppBanner=false&:display_count=n&:showVizHome=n&:origin=viz_share_link&:isGuestRedirectFromVizportal=y&:embed=y)

This dashboard allows users to select accidents by geographic locations such as particular states or counties. MP0s and RPAs and the Iowa DOT have expressed interest in being able to manually select geographic locations and regions not currently available in the county-specific search options.

The Iowa DOT utilizes the GX-Dash website to determine the true number of accidents in the state overall as well as determine localized areas of concern and look for railroad crossing accident hot spots.

The Iowa DOT chooses to utilize the FRA accident reporting data for official use with Section 130 project selection and reporting because the FRA data comes from the federal government and is available to the public. The reported statistics in this SAP are derived from the FRA data as well.

BROAD OVERVIEW OF HIGHWAY-RAILWAY GRADE CROSSING ENVIRONMENT

- There are 3,837 miles of track in Iowa, serving 90 of Iowa's 99 counties
- There are 4,094 public and 2,441 private at-grade highway-rail grade crossings in Iowa
- There are 772 grade-separated highway-rail crossings in Iowa
- There are 104 pedestrian railroad crossings in Iowa
- The Vehicle Miles of Travel (VMT) has risen from 18.3 billion in 1980 to almost 34 billion in 2019
- Railroads in Iowa shipped 59.8 million tons of freight and received 33.3 million tons of freight for a total of 93.1 million tons of freight moved by rail in 2019.
- In 2019, an average of nearly 6.7 million vehicles traversed public at-grade railroad crossings daily in Iowa
- In Iowa, there were 47 vehicle-train collisions in 2019, which calculates to one collision for every 863,402 vehicles traversing an at-grade public railroad crossing
- From 1980 through 2020, the exponential trendline demonstrates an 80.3% reduction in collisions at highway-rail grade crossings.

Internal-facing railroad crossing GIS interactive map

Iowa DOT developed an interactive railroad crossings map. This map is only available to Iowa DOT staff with a required sign-in. A user can type in a crossing number, city, or county and the map will zoom to that particular location. Each railroad crossing is a point on the map and by clicking on the point a window opens containing select forty-three fields from the railroad crossing inventory. In addition, a link to Google Earth Street View is also available within the window. Figures 2 and 3 show the interactive railroad crossings map.

Figure 2 Interactive Railroad Crossing Map

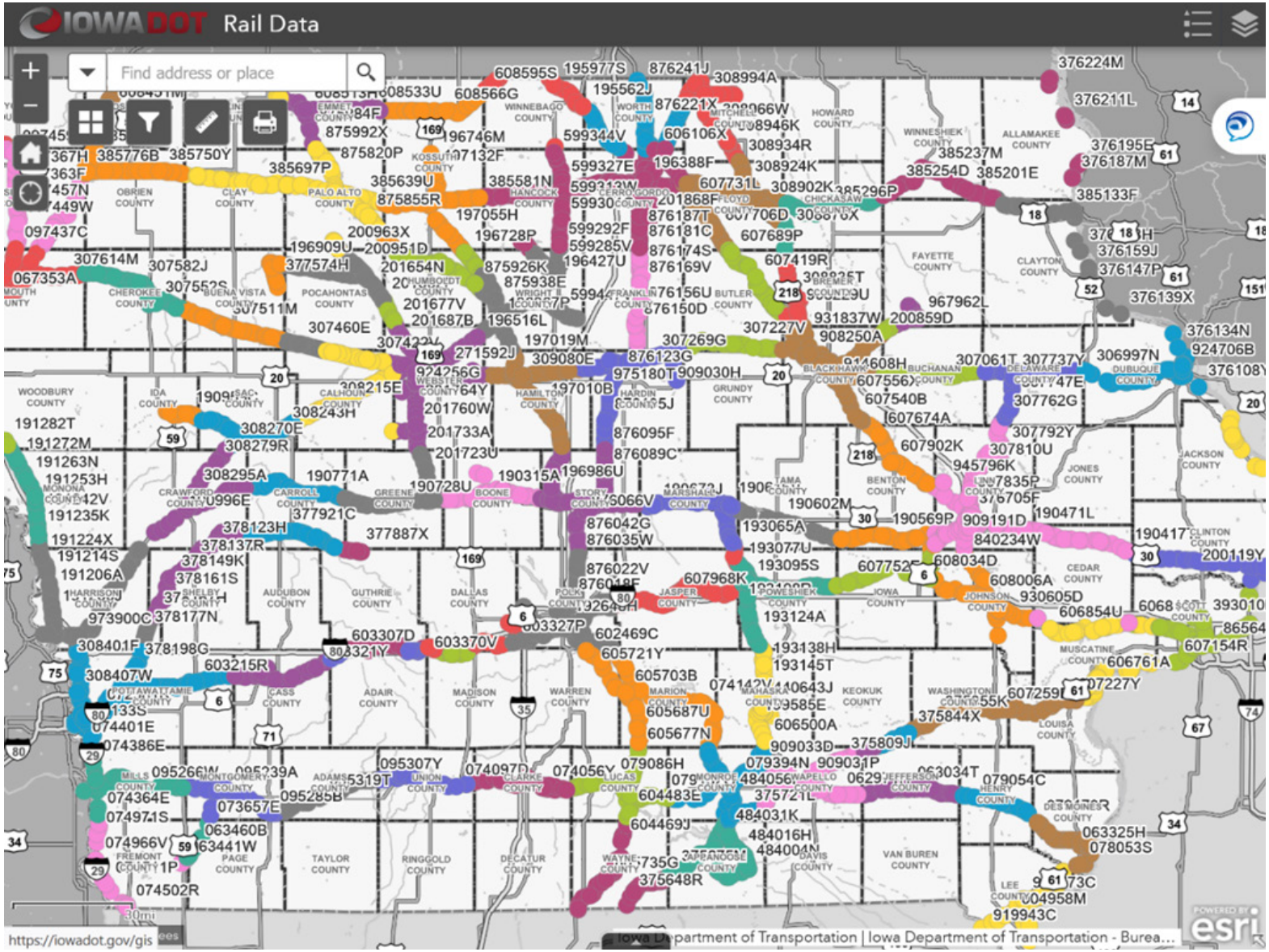
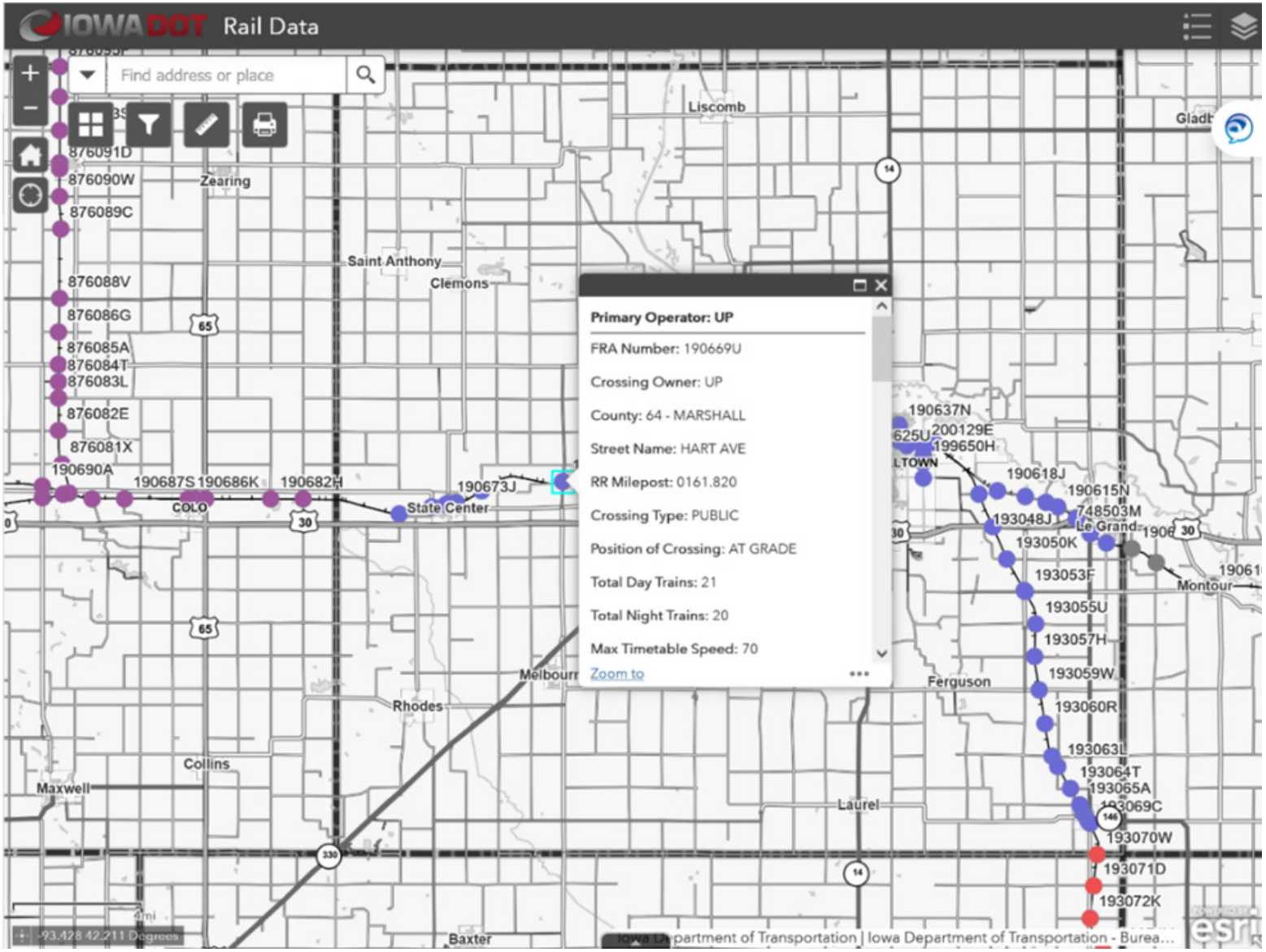


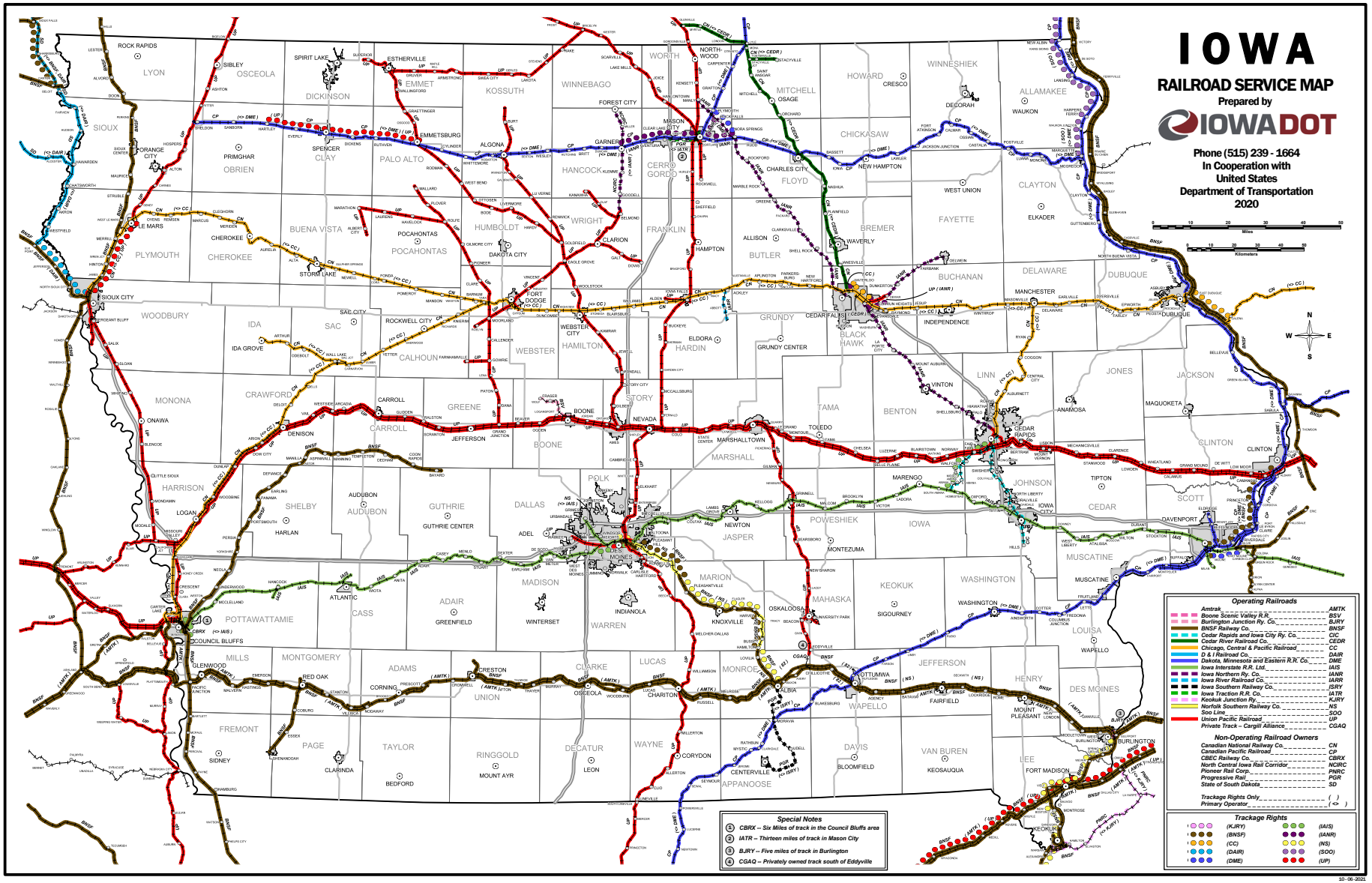
Figure 3 Interactive Railroad Crossing Map (Closeup)



State rail lines map

Rail service in Iowa is privately owned and/or operated by 18 railroad companies. Six of these railroads are national companies and account for roughly 83 percent of Iowa's total rail miles. The remaining 12 smaller railroads consist of regional line haul carriers and local switching companies. Of the 12 smaller railroads serving Iowa, eight operate only within the state of Iowa. Figure 4 shows Iowa's railroad service map and Figure 5 shows trackage for each railroad operating in Iowa.

Figure 4 State Railroad Service Map https://iowadot.gov/iowarail/railroads/maps/Rail_ServiceMap.pdf



Railroad Companies			Miles (owned/leased)	Percent of Total	Miles (trackage)[1]
Class I	BNSF	BNSF Railway	659	17.2%	35
	CC	Chicago Central and Pacific Railroad[2]	522	13.6%	41
	CEDR	Cedar River Railroad[2]	76	2.0%	1
	DME	Dakota, Minnesota & Eastern Railroad[3]	650	16.9%	0
	NS	Norfolk Southern Railway	5	0.1%	37
	UP	Union Pacific Railroad	1,288	33.6%	176
	Subtotal		3,200	83.4%	290
Class II	IAIS	Iowa Interstate Railroad	305	8.0%	27
	Subtotal		305	8.0%	27
Class III		Boone & Scenic Valley Railroad	2	0.0%	2
		Burlington Junction Railway	6	0.1%	6
		CBEC Railway	5	0.1%	
		Cedar Rapids & Iowa City Railway	60	1.6%	139
		D & I Railroad	0	0.0%	39
		D & W Railroad	19	0.5%	
		Iowa Northern Railway	145	3.8%	270
		Iowa Southern	35	0.9%	35
		Iowa River Railroad	11	0.3%	0
		Iowa Traction Railroad	10	0.3%	0
		Keokuk Junction Railway	1	0.0%	0
	Subtotal		293	7.6%	490
Other		State of South Dakota[4]	39	1.0%	
	Total		3,837	100.0%	806

1 – Trackage Rights are rights obtained by one carrier to operate over another carrier's tracks.
2 – Subsidiary of the CN Railway
3 – Subsidiary of Canadian Pacific
4 – South Dakota owns the tracks that D & I operate under trackage rights

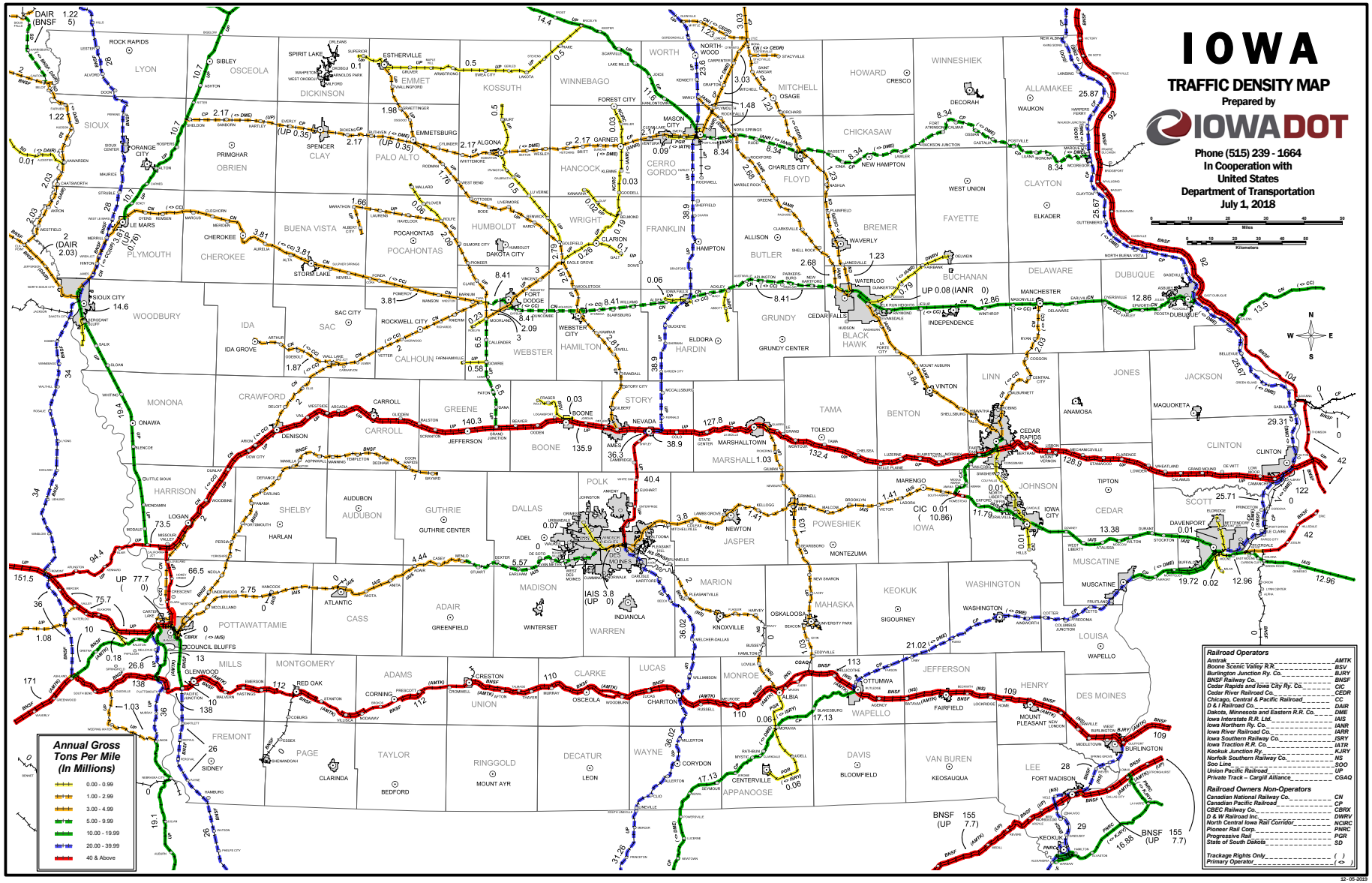
Railroad Traffic Density

The activity on individual rail lines is measured in terms of density or gross ton-miles per mile (gtm/m). Gross ton-miles are defined as the total weight of all freight traveling on the rail line including the weight of freight-train cars, and locomotives. Railroad density is reported in the required Railroad Annual Report for each railroad and is used jointly by the Iowa Department of Revenue and Finance and the Iowa Department of Transportation for separate purposes as prescribed by Iowa statute. The highest density rail corridors are those belonging to the Class I railroads BNSF Railroad, CP Railroad dba DME, and Union Pacific Railroad. As shown in figure 5 and figure 6, about a third of the total track mileage in the state and fully half of the carloads per year in and through the state are associated with two companies: Union Pacific Railroad and BNSF Railroad. This becomes particularly important with considerations about blocked crossings.

RAILROAD FREIGHT DENSITY IN IOWA		
Railroad	**Operating Trackage**	**Freight Density**
Burlington Junction	5.5 miles	unreported
BNSF Railway	1,243 miles	126,468,756
Boone Scenic Valley Railroad	1.66	242,152.50
CBEC Railway, Inc.	4.96	4,998,584
Chicago, Central & Pacific Railroad	671.26	5,444,751,982
Cedar River Railroad Company	92.69	91,430,916
Cedar Rapids & Iowa City Railway Company	138.8	33,322,328
D&I Railroad Company	39	188,770,666
Dakota, Minnesota & Eastern Railroad Corp.	693	92,652,021
Iowa Interstate Railroad	441.84	4,449,846,939
Iowa Northern Railway Company	274.59	258,555,797
Iowa River Railroad, Inc.	11	2,567,994
Iowa Traction Railway	13.4	3,430,217
Iowa Southern Railway	35	4,381,381
Keokuk Junction Railway Company	7.7	1,042,103,992
Norfolk Southern Railroad	45	unreported
Soo Line Corp	830	20,885,218
Union Pacific Railroad	2,026	90,487,118

Freight Density is defined as gross ton-miles carried per mile of route

Figure 5 State Railroad Density Map https://iowadot.gov/iowarail/railroads/maps/Density.pdf



The state of Iowa has a significant density of railroads with 18 railroad companies operating on 3,837 miles of track in a state with dimensions of only about 200 by 300 miles. In addition, Iowa has a farm-to-market secondary road system. That means that the state has a rectangular grid of roads spaced approximately one mile apart in each cardinal direction. This combination results in Iowa having approximately 4,094 at-grade crossings on public roads along with 2,441 private at-grade crossings. There are 876 grade separations and pedestrian crossings.

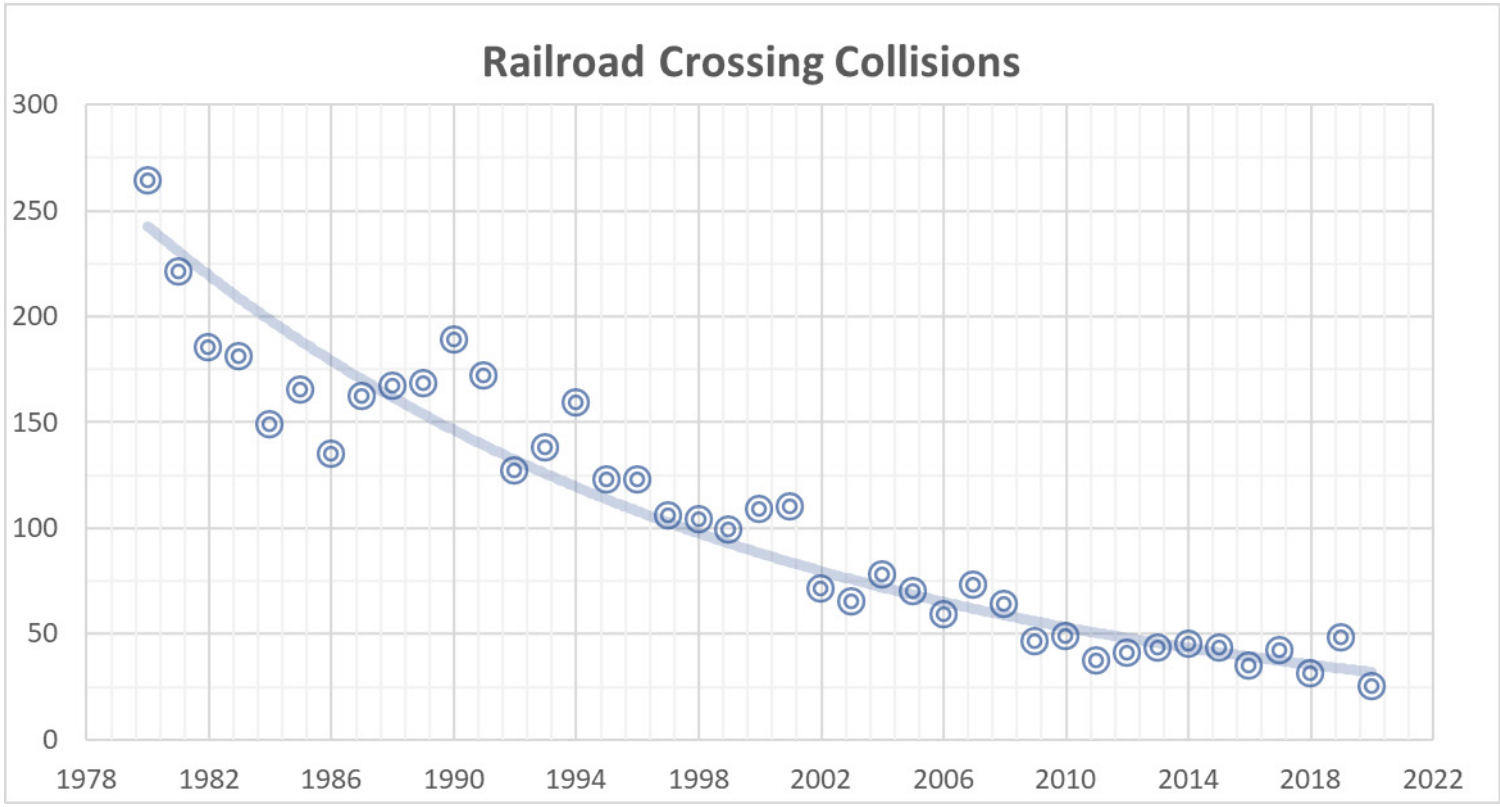
THE TOP FIVE RAILROADS, IN TERMS OF TRACK MILEAGE AND RAILROAD CROSSINGS

Railroad	Railroad Class	Total Miles in Iowa	Percent of Total Iowa Rail Network Owned	Number/Percent of Public Crossings in Iowa	
				at-grade	grade separated
UP	Class I	1,288	33.6%	1,665	31%
BNSF	Class I	659	17.2%	721	18%
CP dba DME	Class I	650	16.9%	787	19%
CN dba CEDR / CC	Class I	598	15.6%	766	19%
IAIS	Class II	305	8%	787	11%

RAILROAD CROSSING CRASH DATA

The railroad crossing crash date shown in following figures utilize aggregate data obtained from FRA websites. This includes mandatory accident reporting by railroads, investigations of individual accidents, and generating reports from FRA websites. Iowa DOT chose to evaluate data for the period of 2010-2020 due to the relatively low number of incidents each year.

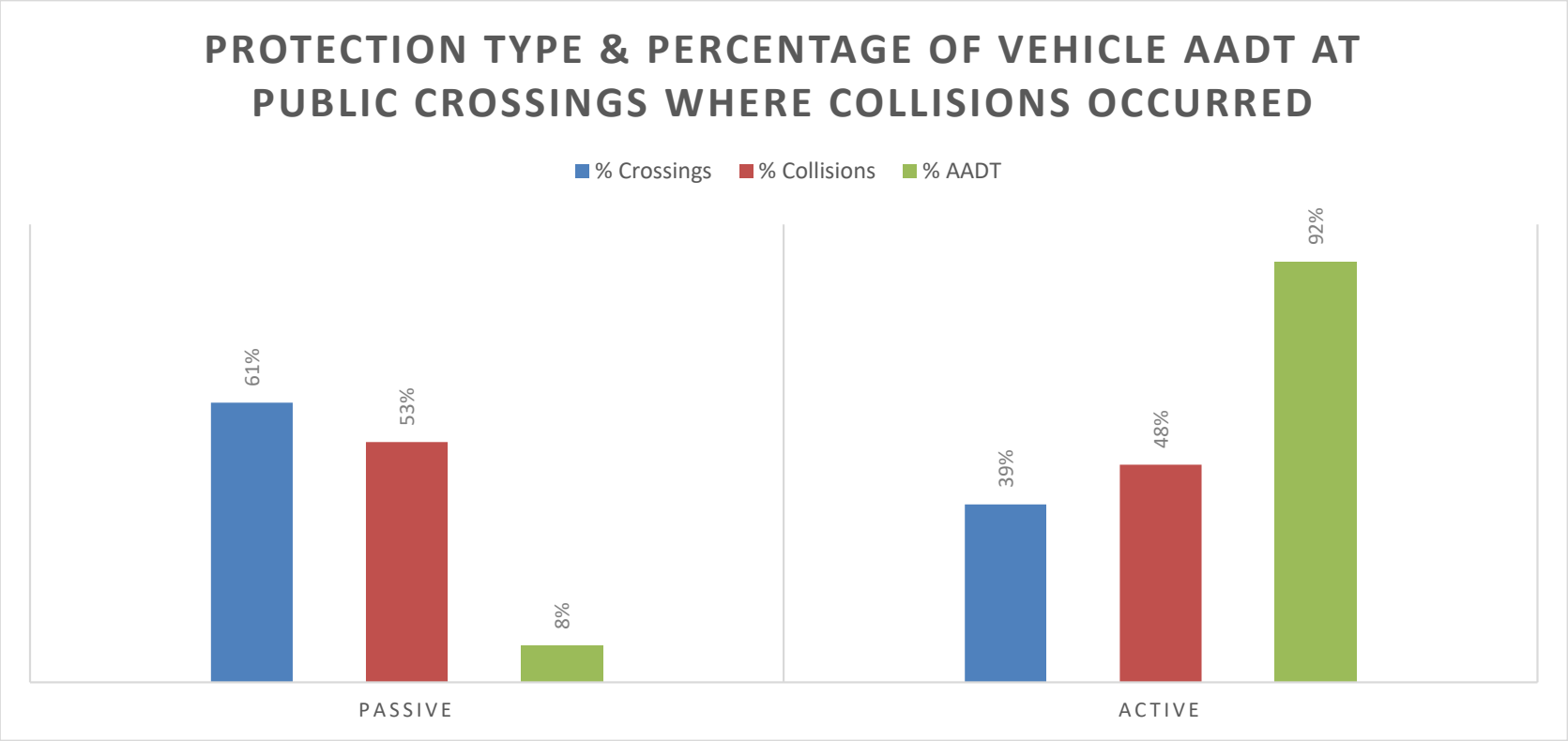
Figure 6: Historical Trend



An analysis of railroad crossing collisions in Iowa from 1980 to 2020 show the downward trend in incidents. As demonstrated, Iowa has a 30+ year history of decreasing trend in crashes and the number of incidents has leveled off over the past decade. Fortunately, Iowa railroad crossing collisions have reached relatively low numbers and our goal is to implement actions to further reduce incidents and reinforce the actions that are contributing to the low number. In recognizing that any collision is one too many, Iowa aggressively seeks to improve safety for highway-rail grade crossings.

Figure 7 shows that the % of collisions at Passive and Active crossings is similar and that the percent of overall vehicular traffic is much higher for Active crossings. This demonstrates that when the exposure of the number of vehicles using the crossing is considered, the use of active protection is strongly supported. This data also highlights that most of the passively protected crossings are on rural, low volume roads in the state.

Figure 7: Active vs Passive Crossing Protection



A demographic analysis of the crash data (figures 8 and 9) provides significant insights. In Figure 8 the group "less than 25" is over-represented. This is the only age group that has an accident variance compared to the population of driving age that is greater by more than 5%. Note that drivers who are 55 or older have 37% percent of the population but only 29% of the collisions.

The gender split in Figure 9 shows that 78 percent of all drivers involved in grade crossing accidents are male (the ratio of women to men in Iowa is approximately 50:50 with slightly more women). Figures 8 and 9 indicate that the major target audience for crossing safety education should be males under the age of 25.

Figure 8 Vehicle Driver's Age

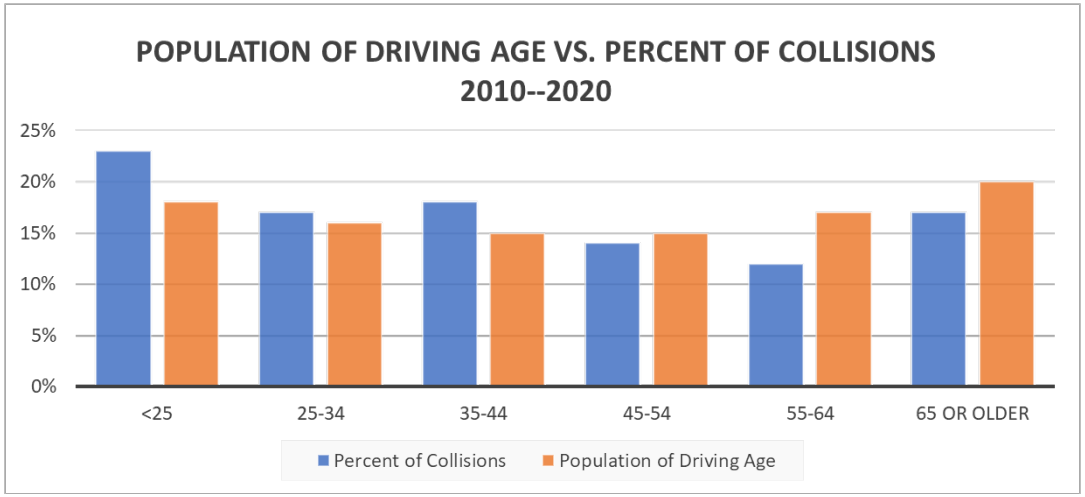


Figure 9 Gender Differences

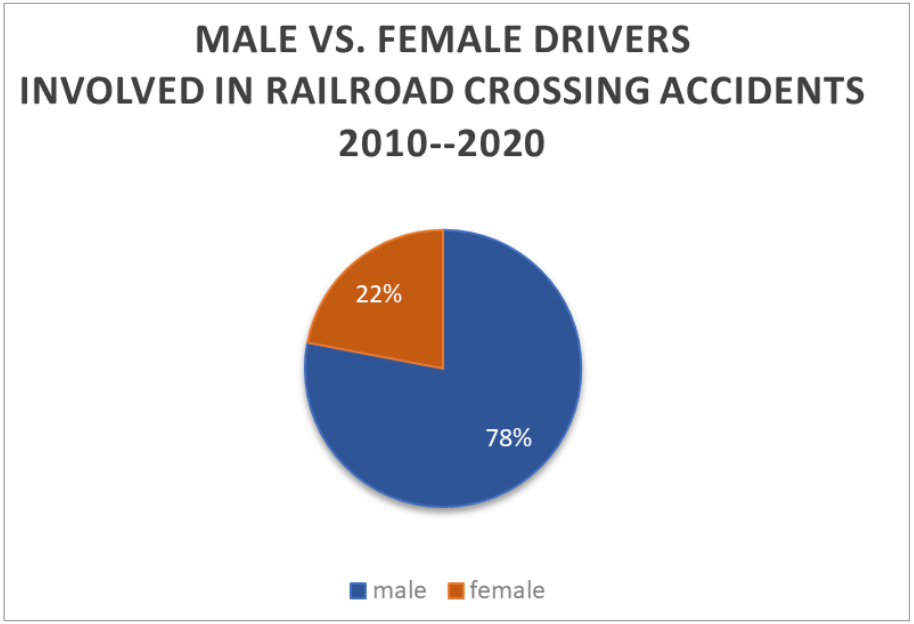
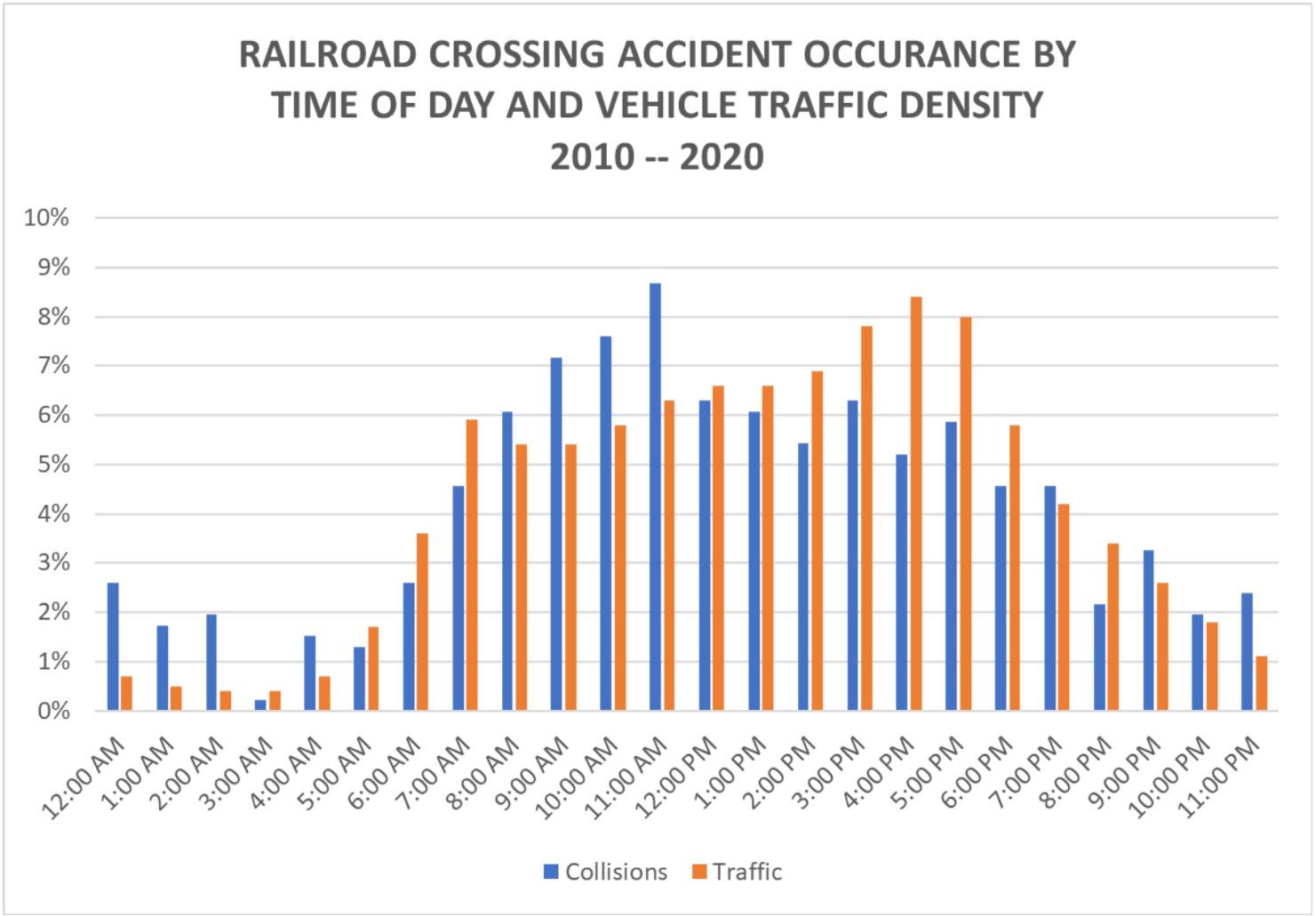


Figure 10 shows the railroad crossing accident occurrence by time of day and vehicle density. Traffic density rises at the start of morning rush and then stays steady through the day until evening rush when it climbs further. After 6:00 p.m. traffic density levels rapidly decline to very low levels. Collisions, however, peak during the morning and then stay steady at slightly lower levels through the rest of the workday. Collisions decline after 7:00 p.m. but stay relatively elevated until after 2:00 a.m. The elevated crossing collisions versus vehicle traffic density between the hours of 11 PM to 2 AM are of particular concern and indicate further efforts to address late night collisions should be pursued.

Figure 10 Collisions by Traffic Density (%) and Time of Day



Figures 11 and 12 provide interesting information regarding the speeds of the vehicles and trains and their relationship to collisions. In the majority of collisions, the vehicle speed is under 25 mph. This speed implies largely urban driving, and may be partly related to distracted driving.

In the first SAP, the data for Crossing Collisions by Train Speed showed the majority of collisions occurred with a train speed of 15 mph or less. The data from the last 10 years show two peaks one at slow speed, <15 mph, and one at 35-45 mph. This may be because of the difficulty people have with judging the speed of a laterally approaching train.

Figure 11 Collisions by Vehicle Speed

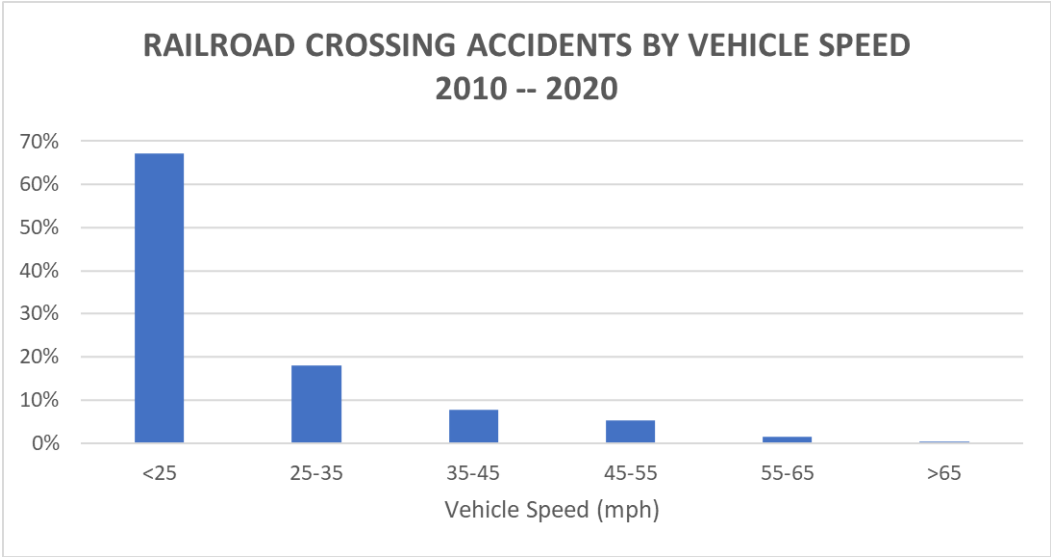
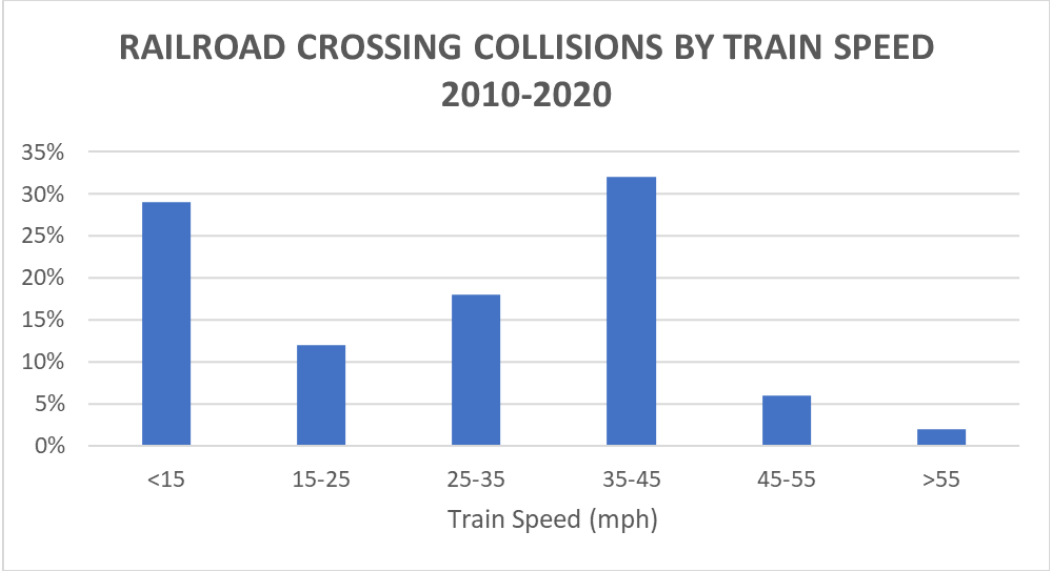


Figure 12 Collisions by Train Speed



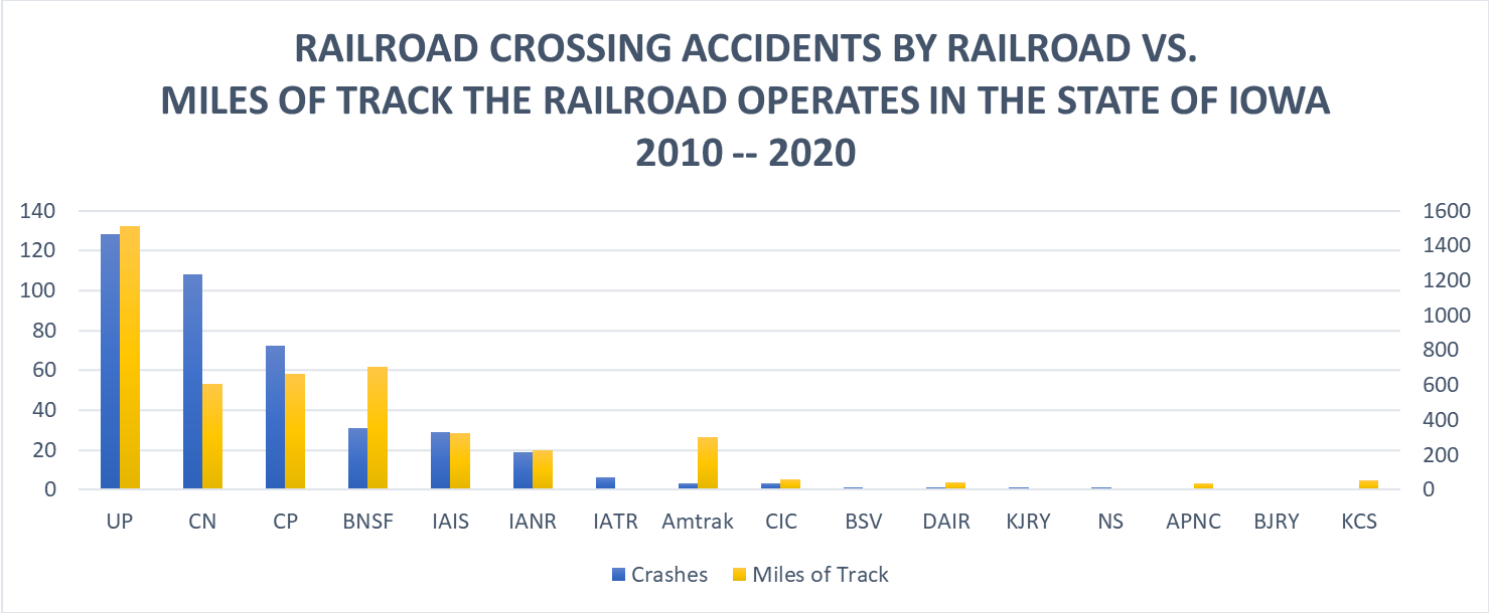
Risk Assessment

INDIVIDUAL CROSSINGS AND CORRIDORS

The examination of the accident data was conducted by joining the datasets in a Geographic Information System (GIS) environment. This data includes information on 352 collisions over the initial five-year period and 439 collisions over the last 10-year period.

The Iowa DOT Section 130 program is application based. Applications are submitted to the program by the railroad and roadway authority with jurisdiction of the railroad crossing. The benefit-cost report is initiated annually, and applications are funded in the order of benefit-cost score from highest to lowest until the annual appropriation is depleted. This process is outlined in Iowa Administrative Rules so identifying specific corridors or railroad specific areas is not advantageous with regard to Section 130 project selection. Identifying corridors and geographically specific batches of railroad crossings for funding is not prudent because unless the railroad and all of the corresponding roadway authorities agree to submit applications for each railroad crossing, and those particular railroad crossings have a high enough benefit cost score, utilizing Section 130 funds to enhance the safety of corridors is not possible. Iowa DOT has identified specific corridors with safety issues in the past, however implementation of improvements requires project applications to the Section 130 program. Except for extenuating circumstances, allocating funding to enhance safety at railroad crossings within specific corridors or rail lines with multiple railroad crossings is rare because all of the railroad crossings in the corridor would need to have the highest benefit-cost scores to be funded. Figure 13 depicts the number of accidents per railroad and compares that number of accidents with the number of miles of track.

Figure 13 Collisions by Train Speed



CORRIDOR EVALUATIONS

Despite inherent challenges with funding corridor or rail line upgrades due to the application-based Section 130 program, the recent Canadian Pacific (CP) / Kansas City Southern (KCS) merger has brought to light the need to review the existing main CP rail line through Iowa. This line extends from the border with Missouri in the south-central portion of the state, toward the east and then north along the Mississippi river to the northeast border with Minnesota. This corridor constitutes a portion of the anticipated main route from Mexico to Canada on the CP-KCS line. It is anticipated that train traffic will increase substantially once the merger is complete and train speeds may increase. Iowa DOT will be working with the railroad to partner with corresponding roadway authorities to have project applications submitted to the Section 130 and Highway-Railroad Crossing Surface Repair programs.

HIGHER LEVEL SAFETY CONSIDERATIONS

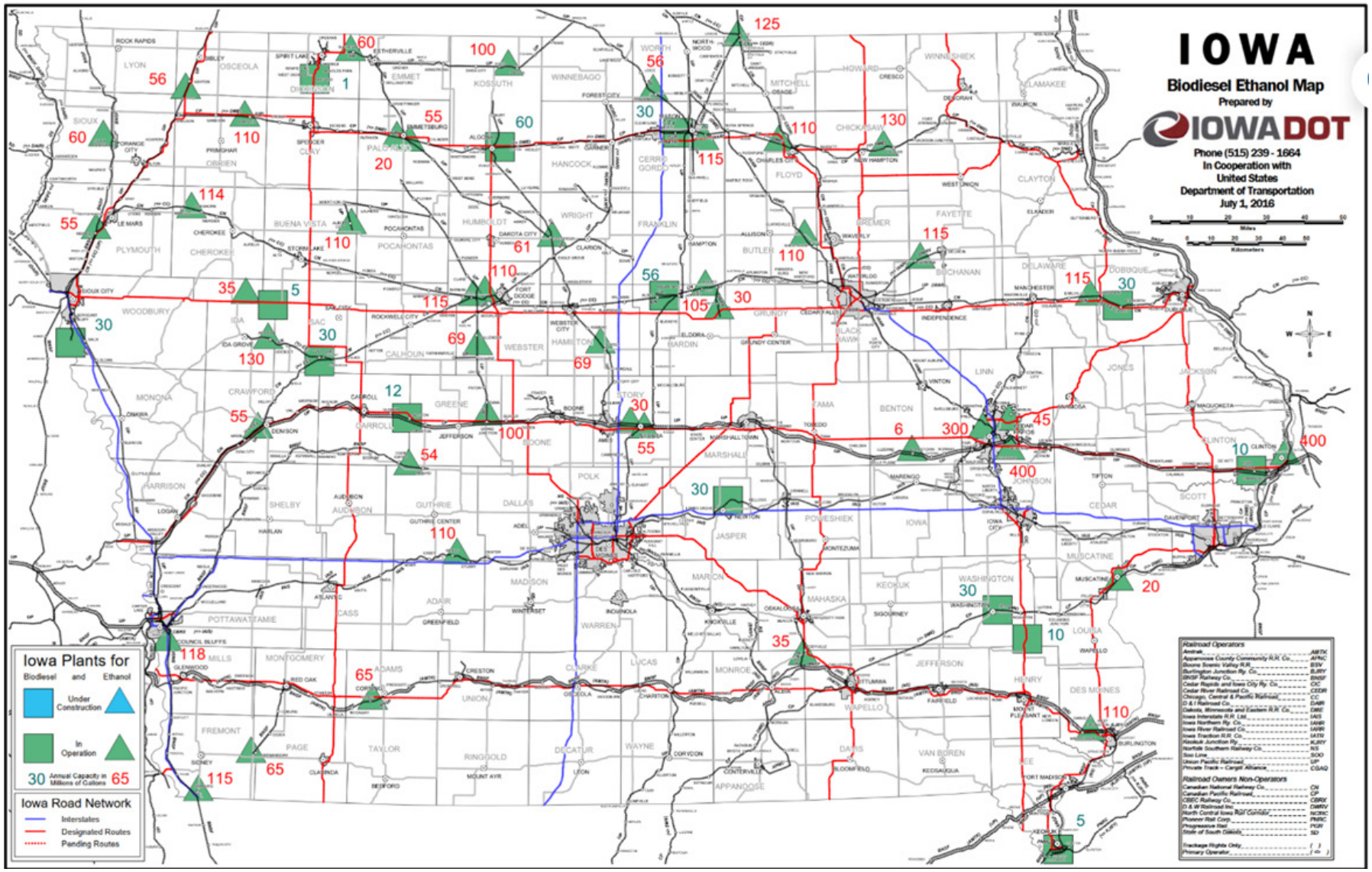
Hazmat Considerations

Iowa has two Class I double-main rail lines traversing the state; UP in the north-central area and BNSF/ Amtrak in the south. Both lines have high train traffic density and high train speeds. These high-speed rail lines accommodate trains that carry hazmat materials such as crude oil, spent nuclear material, and ethanol. Adequately protecting the railroad crossings with active warning devices along these corridors is a high priority with challenges in the more rural roadways where vehicle AADT is low so the benefit cost formula score is low.

Additionally, Iowa's corn production has led to the emergence to a robust ethanol fuel production industry over the past twenty-five years. Figure 17 shows the locations of Iowa's biodiesel and ethanol plants. Ethanol is a renewable fuel source and gained popularity as oil and gasoline prices increased Ethanol is highly flammable and is shipped via rail and truck. Rail and truck traffic converge at railroad crossings near the ethanol plants. Tanker trucks deliver raw materials while finished product is most often shipped via train.

Ethanol plants are typically constructed in rural areas. This increases the vehicular annual average daily traffic, (AADT) on formerly low AADT roadways. The increased AADT consisting of tanker trucks servicing the facility as well as employees, coupled with switching operations with passively protected crossings is an identified cause of railroad crossing accidents.

Protecting Iowa's energy production capabilities, mitigating hazmat incidents, and reducing railroad crossing incidents has led the Iowa DOT initiative to encourage either the ethanol plants or the railroads servicing the ethanol plants to submit project applications for the Section 130 program (in cooperation with the local roadway authority). Several Section 130 projects over the past three years were initiated through these efforts.


IOWA
Biodiesel Ethanol Map
Prepared by
IOWA DOT
Phone (515) 239 - 1664
In Cooperation with
United States
Department of Transportation
July 1, 2016
Iowa Plants for
Biodiesel and Ethanol
Under Construction
In Operation
30 Annual Capacity in Millions of Gallons 65
Iowa Road Network
Interstates
Designated Routes
Pending Routes
Railroad Operators
Railroad Owners Non-Operators

Iowa's Rural Roadway System

The Iowa Section 130 benefit-cost formula frequently identifies railroad crossings along the UP and BNSF/ Amtrak double-main lines as locations where the addition of active warning devices are warranted. In general, Iowa's rural areas have roadway systems which are laid out like a grid with a roadway every mile. Many of these roads are gravel and are utilized almost solely for agricultural purposes. Many of these roads have very minimal vehicle traffic. The dilemma is whether to fund projects to protect these high-speed / density rail lines at low vehicle AADT roadways is warranted over more urban, high vehicle AADT railroad crossings.

Increased Train Lengths

The precision scheduled railroading business model adopted by many railroads has led to an increase in train lengths. This has had a dramatic effect on blocked crossings. Due to Iowa's rural roadway grid system, if a one to two-mile long train stops, one to three crossings could be blocked. Motorists who experience delays with a blocked crossing may be likely to exhibit risky behavior in the future when they encounter railroad crossings. These motorists may try to beat a train through a railroad crossing by going around gates or take other dangerous measures in an attempt to not be delayed by a train blocking a crossing again.

Rough Railroad Crossing Surfaces

Rough railroad crossing surfaces can change driver behavior and influence accidents. Iowa DOT staff have witnessed motorists substantially slow their vehicles to traverse rough railroad crossings. This places the vehicle over the railroad crossing and dynamic safety envelope for longer durations of time. Additionally, the timing for the railroad crossing gates is set to the posted roadway speed and train speed. If vehicles are traveling at speeds lower than the posted roadway speed in order to safely traverse the rough railroad crossing, the vehicle is on the railroad crossing and within the dynamic safety envelope longer than necessary and outside the timing presets for the signals.

Accidents have occurred where railroad crossing panels have become unlagged from the railroad ties and have been flipped on their side by semi-trucks. Motorists have struck these unlagged cement crossing panels and have lost control of their vehicle and crashed or have gone into the adjacent roadway ditch. Additionally, we have received reports of motorists losing control of their vehicles when traversing railroad crossing surfaces that are damaged or uneven when driving at posted roadway speeds.

HIGHEST PRIORITY HIGHWAY-RAILWAY GRADE CROSSING SAFETY CHALLENGES IN IOWA

How the challenges were determined

A study of causal information obtained from the ICAT Reporting tool (Appendix 3), local law enforcement reports and FRA accident reports has indicated that driver behavior is the prominent challenge with regard to railroad crossing safety. Specifically, distracted driving and high rates of speed are the dominant issues within the scope of the driver behavior challenge. Preventative measures such as the installation of active warning devices at railroad crossings are ineffective if drivers fail to heed the warnings and drive into the sides of trains.

Additionally, the rural roadway system layout as a one-mile grid system also poses a challenge to railroad crossing safety. Longer train lengths make it possible for one or more crossings to be blocked if a train stops, thus forcing drivers to drive over two miles to avoid being delayed at a railroad crossing. This adversely affects driver behavior, at times conditioning drivers to take chances beating trains through railroad crossings to avoid being stuck.

Results

Engineering solutions at railroad crossings alone cannot prevent erroneous driver behavior. Therefore, the Iowa DOT actively encourages railroad crossing closures where prudent while still promoting the Section 130 program to have active warning devices installed at passive railroad crossings. Iowa DOT also plans to continue to study the feasibility of incorporating rumble strips in advance of railroad crossings. Rumble strips in advance of railroad crossings may aid with the distracted driving issue.

Additionally, the Iowa DOT plans to continue education and other outreach action efforts in an attempt to reinforce the messages of the dangers distracted driving and excessive speeds.

Action Plan

2012-2016 ACTION ITEMS

The original 2012 Safety Action Plan identified eleven action items, (A through K) below. In addition, through stakeholder collaboration fourteen new action items have been identified for this SAP revision.

The specific 2012 safety action plan items were:

Education

Action A: College and High School Education Campaign.

Action B: Family Education Partnerships

Enforcement

Action C: Enforcement/Judicial Awareness Campaign.

Engineering

Action D: Rumble Strips on Paved Secondary Roads Before Crossings.

Action E: Verify Engineering for Preemption Signal Timing

Action F: Crossing Signal Light LED Conversion Study.

Action G: Develop Closure Rating Criteria.

Programming/Funding

Action H: Closure as part of the Grade Crossing Surface Repair Program.

Action I: Closure Incentives for Section 130 Program.

Action J: Decrease reallocation of Section 130 funds.

Action K: Passenger Rail.

Action L: Advocate continuation of 23 U.S.C. Section 130 and increased railroad safety funding

IMPLEMENTATION REPORT: ACTIONS TAKEN TO IMPLEMENT 2012 SAFETY ACTION PLAN		
Action Item	**Implementation Actions Taken**	**Continue or Discontinue with the 2022 revision**
Action A: College and High School Education Campaign	• Iowa DOT leveraged Operation Lifesaver Inc., (OLI) to conduct railroad safety training and education in colleges and high schools. Between 2014 and 2019, OLI conducted 997 training events at colleges and high schools. • Iowa DOT coordinated with various railroad law enforcement agencies to provide training to the public and county engineers on six occasions between 2012 and 2019. • Railroad Safety training has been developed and made mandatory for all Iowa DOT personnel who may interact with railroad crossings, property, and right-of-way.	Continue
Action B: Family Education Partnerships	Iowa DOT leveraged Operation Lifesaver Inc., (OLI) to conduct 3,554 railroad safety education and training opportunities between 2014 and 2020 in the following family settings: • Outreach at the Iowa State Fair and some county fairs each year. • Presentations to scouting groups. • Outreach associated with RAGBRAI (Register's Annual Great Bicycle Ride Across Iowa, which is a non-competitive, internationally recognized bicycle ride organized by The Des Moines Register) organizers and affected counties, cities, and towns each year on bike ride routes. • Provided information, presentations, and educational resources to participants of driver's education programs. • Provided railroad crossing safety training to first responders. *Above information extrapolated from OLI 2014-2020 Annual Reports.*	Continue
Action C: Enforcement/Judicial Awareness Campaign	During the 2017 Legislative session, the legislature passed bill language that modified current Iowa Code 716.8 to modify the penalties for trespassing. This revision made it easier for local law enforcement to fine railroad trespassers and add scheduled fines based on first violation, second violation and third or subsequent violations.	Discontinue *(Completed)*
Action D: Rumble Strips on Paved Secondary Roads Before Crossings	This action is a priority of the railroads but a concern for local roadway authorities. The feasibility of incorporating rumble strips in advance of railroad crossings was considered by the Iowa DOT Traffic & Safety Bureau and determined to not conform with MUTCD standards. Also, there was concern that rumble strips in a railroad crossing application would confuse motorists because rumble strips are also used in advance of stop signs on rural roadways in some cases.	Continue *(Check with Traffic & Safety Bureau for feasibility again to satisfy the desire of the railroads to do so.)*

Action E: Verify Engineering for Preemption Signal Timing	Iowa DOT determined that local roadway authorities had already undertaken this effort.	Discontinue
Action F: Crossing Signal Light LED Conversion Study	Iowa DOT determined that these conversions are being completed over time by railroads as a part of normal signal maintenance/repair work.	Discontinue
Action G: Develop Closure Rating Criteria.	The railroad crossing closure rating criteria were developed in February 2015 through collaboration with Iowa State University's Center for Transportation Research and Education. A railroad crossing closure formula was devised. When deployed, the formula is effective at identifying whether a railroad crossing should be closed but local politics and emotions regarding closing crossings typically undermine the non-biased formula when it determines a railroad crossing should be closed.	Discontinue *(Completed)*
Action H: Closure as part of the Grade Crossing Surface Repair Program	For each highway-railroad crossing surface repair project on site review Iowa DOT initiated discussions regarding closure as an alternative to surface replacement. In some cases, surface replacement of an adjacent crossing was offered as an incentive for closure.	Continue
Action I: Closure Incentives for Section 130 Program	During diagnostic reviews Iowa DOT initiated discussions regarding closure of the crossing as an alternative to active warning device upgrades. In some cases, signal upgrades to an adjacent crossing were offered as an incentive for closure.	Continue
Action J: Decrease reallocation of Section 130 funds	A portion of the Section 130 annual appropriation had been used to reduce the backlog of highway-railroad crossing surface repair projects from FY 2005 to FY 2013. The backlog of surface projects has significantly decreased. Section 130 funds have not been diverted for surface projects since state fiscal year 2013 and are not expected to be in the future.	Discontinue
Action K: Passenger Rail	At the time of the 2012 Safety Action Plan Iowa was in the process of planning a high-speed passenger rail service from Chicago to Iowa City. Part of the process included upgrading safety measures at railroad crossings and closing selected crossings. That study has been completed, but the project is not currently active.	Discontinue *(Completed)*
Action L: Advocate continuation of 23 U.S.C Section 130 and increased railroad safety funding	The Infrastructure Investment and Jobs Act (IIJA) modifies how Section 130 funds are to be spent on Safety projects but the annual appropriation does not increase through the legislation.	Continue

2012 SAP Action Item Efforts Continuing through 2022 Update

- College and High School education campaign
- Family education partnerships
- Rumble strips on paved secondary roads before crossings (re-evaluate feasibility)
- Closure as part of the Grade Crossing Surface Repair Program
- Closure Incentives for Section 130 Program
- Advocate continuation of 23 U.S.C Section 130 and increased railroad safety funding

RECOMMENDED 2022-2026 ACTION ITEMS:

The recommended 2022-2016 action items are the cumulative original 2012 SAP action items that are being continued with this effort and ten new action items identified from stakeholder input efforts and Iowa DOT Rail Team experience in the field & managing safety projects:

EDUCATION

1. **College and High School education campaign**

   Goal: Continue the college and high school railroad crossing safety and trespasser campaign.

   Objective: Continue to leverage Operation Lifesaver, Inc. (OLI) to conduct training and outreach in educational settings or events hosted by these education entities. This is an ongoing effort supported through annual financial and in-kind contributions to OLI.

   Timeline: Ongoing

2. **Family education partnerships**

   Goal: Continue the college and high school railroad crossing safety and trespasser education partnerships.

   Objective: Continue to leverage OLI to conduct training and outreach in family-oriented settings such as festivals, fairs, and community events. This is an ongoing effort supported through annual financial and in-kind contributions to OLI.

   Timeline: Ongoing

3. **Advocate with federal agencies like FRA and FHWA to devise a national advertisement campaign about distracted driving dangers at railroad crossings.**

   Goal: Partner with federal agencies to create and disseminate a national advertisement campaign educating the public about the dangers of distracted driving at or near railroad crossings.

   Objective: Communicate with the FRA and FHWA about distracted driving data and concerns, then request an opportunity to brainstorm ideas on information to share and the best way to share it.

   Timeline: Initiate Summer 2022

ENGINEERING

4. **Rumble Strips on Paved Secondary Roads Before Crossings (re-evaluate feasibility)**

   Goal: Continue to study the feasibility of constructing rumble strips on paved secondary roads in advance of railroad crossings and verify whether the effort is compatible with MUTCD standards and applicability.

   Objective: Work with the Iowa DOT Traffic and Safety Bureau to determine if the idea is possible and reach a definitive answer.

   Timeline: January 2023.

5. **Document Best Practices for highway projects which interact with railroad crossings**

   Goal: Publish the Best practices for government entities & project sponsors that are planning projects which interact with railroad property and railroad crossings document.

   Objectives: Stakeholder review will be completed by October, 2023.

   The document will be available on the Iowa DOT website by January 2024

   Timeline: January 2024

6. **Include roadway geometry changes into Section 130 projects where applicable**

   Goal: Include roadway geometry changes into Section 130 projects where applicable as determined by the on site diagnostic review.

   Objective: Assess roadway geometry in close proximity to railroad crossings as part of the Section 130 diagnostic review process. This could include narrowing and defining roadway lanes, closing / relocating driveways near railroad crossings, elimination of curbside parking and separating the pedestrians from the roadway. Those modifications will be included in the project scope and eligible for funding (ongoing effort as part of project reviews).

   Timeline: Ongoing

7. **Oversight for railroad crossing signals / traffic signals preemption annual inspection requirements to coincide with the anticipated MUTCD revision.**

   Goal: Oversight for railroad crossing signals / traffic signals preemption annual inspection requirements to coincide with the anticipated MUTCD revision.

   Objectives: Await publication of forthcoming revised MUTCD guidance (TBD).

   Formulate processes and forms associated with MUTCD compliance, (TBD).

   Begin oversight and documentation program, (TBD).

   Timeline: TBD, after MUTCD guidance is updated

FUNDING PROGRAMS AND ACTIVITIES

8. Railroad crossing closure option as part of the Grade Crossing Surface Repair Program

Goal: Consider railroad crossing closures as part of the Highway-Railroad Grade Crossing Surface Repair Program

Objective: Continue to promote railroad crossing closures during on site reviews as an option for improving safety in lieu of railroad crossing surface replacement when applicable. This is an ongoing effort and the option will be presented as part of all on site project reviews.

Timeline: Ongoing

9. Railroad crossing closure incentives for Section 130 Program

Goal: Consider railroad crossing closure incentives for Section 130 program projects

Objective: Continue to promote railroad crossing closures during on site reviews as an option for improving safety in lieu of railroad crossing active warning device upgrades as warranted. The option would include not only the FHWA incentive match payment, but also the upgrade to active warning devices at nearby railroad crossings which would absorb the vehicular traffic from the closed railroad crossing. This is an ongoing effort and the option will be presented as part of all on site project reviews.

Timeline: Ongoing

10. Identify priority grade separation locations and seek funding

Goal: Contribute Section 130 funds toward grade separation projects as part of larger roadway corridor projects.

Objective: Assess the feasibility of contributing funds from the annual Section 130 appropriation to go toward grade separations as part of highway project reviews. This is an effort to contribute funds as a portion of a grade separation project, not fund entirely.

Timeline: Ongoing

11. Pedestrian Safety / Trespasser Prevention

A. Identify locations for a pedestrian / trespasser prevention discretionary grant request to construct pedestrian bridges (CRISI or another program)

Goal: Identify statewide locations for a pedestrian / trespasser prevention CRISI grant request to construct pedestrian bridges at multiple locations.

Objectives: Stakeholder input identifying areas of concern received by August, 2023.

Have list of locations verified and compiled for inclusion in the CRISI grant request by December, 2023

Apply for CRISI grant funding associated with 2024 NOFO.

Timeline: 2023-2024

B. Use Section 130 funds for fencing to channelize pedestrians near Amtrak stations and prevent the transition of sidewalk pedestrians to train platforms.

Goal: Utilize Section 130 funds for fencing to channelize pedestrians near two Amtrak stations, (Osceola & Mount Pleasant) and prevent the transition of sidewalk pedestrians to train platforms.

Objectives: Complete the Osceola project (which has already been initiated) November, 2022

Plan Mount Pleasant pedestrian / trespassing project and secure funding by September, 2023

Complete the Mount Pleasant project, (which has already been initiated) November 2023

Timeline: 2022-2023

C. Address pedestrian issues and Americans with Disabilities Act (ADA) during funded projects and/or coordinate with affected entities to address concerns

Goal: Continue to ensure that state and federally funded projects are not considered to be complete unless the sidewalks associated with the project are confirmed to be ADA complaint.

Goal: The Iowa DOT will follow up with complaints of ADA sidewalk non-compliance at railroad crossing locations.

Objective: Iowa DOT will contact responsible roadway authorities to address ADA complaints concerning railroad crossing sidewalks. If appropriate action is not taken by the responsible roadway authority, Iowa DOT will contact the FHWA ADA Compliance Officer for the State of Iowa to investigate.

Timeline: Ongoing

12. Passive railroad crossings crossbuck / yield sign renewal project with Section 130 funds.

Goal: Utilize Section 130 funds to replace crossbuck and yield signs at passive railroad crossings around the state. This was last accomplished in 2005 for crossbucks and 2008 for yield signs.

Objectives: Each Railroad provides a list of locations and railroad crossing numbers to Iowa DOT by June, 2023.

Secure Section 130 funding by November 30, 2023.

Have crossbuck and yield signs installed by railroads by October, 2026.

Timeline: 2023-2026

13. Advocate continuation of 23 U.S.C Section 130 and increased railroad crossing safety funding

Goal: Continue to advocate for increased rail funding for railroad crossing safety.

Timeline: Ongoing

ENHANCED DATA COLLECTION & ANALYSIS

14. Create a trespasser reporting webpage where the public and railroad employees can report trespasser activity.

Goal: Create a trespasser reporting webpage where the public and railroad employees can report trespasser activity.

Objectives: Develop webpage template

Iowa DOT Information Technology staff create the webpage

Timeline: Operational trespasser reporter webpage by end of 2023

15. Develop GIS railroad crossing accidents map for Iowa

Goal: Develop GIS mapping for accidents to identify individual crossing accident locations so analysis of specific railroads, railroad corridors, or regions can be conducted.

Objective: Have a functioning map created by the Iowa DOT by December 30, 2022.

Timeline: December 2022

16. Identify all railroad crossings with humped and dipped attributes; improve signing or construct improvements

Goal: Identify and remedy roadway geometry or ensure signage is in place at all humped and dipped railroad crossings in the state.

Objectives: Have all locations identified as part of the annual railroad crossing inventory data collection after the first four-year cycle (July, 2025)

Verify the data through photo analysis and devise a final list of actionable locations by December, 2026.

Work with local roadway authorities and railroads to consider roadway geometry changes such as longer approaches to mitigate the hump / dip effect. If roadway changes cannot be made, ensure proper MUTCD approved signage is installed, (W10-5 / W10-5P). (July 2028)

Timeline: 2022-2028

PROCESS AND METRICS FOR MEASURING PROGRESS

While reviewing the number of accidents and incidents on the surface appears to be the simplest approach to measuring progress, the reality is that a comprehensive look at causal information is the best indicator of why accidents and incidents are occurring and whether the action items identified in this SAP are proving to be effective.

In order to best assess whether the action items identified in this SAP are effective, the Iowa DOT will review railroad crossing accident and trespassing incidence reports, crash data and inventory information looking for causal information and whether the action items have been effective in decreasing occurrences. New action items will be created as necessary to address emerging problems and existing action items will be modified to best combat the issues found in causal determinations. The SAP is a living document and actions will be modified to best assist with the reduction of railroad crossing accidents and trespasser occurrences as deemed necessary.

Additionally, Iowa DOT will meet regularly with stakeholders and seek input regarding the current action items. The SAP will be reviewed at least annually and modified as necessary.

CHALLENGES TO MEETING GOALS AND OBJECTIVES

Railroad Crossing Accidents

Review of railroad crossing accident causal information has determined that many accidents are now caused by distracted driving. Motorists are crashing through gates and into the side of trains. This is an issue that cannot be solved through engineering safety measures into railroad crossings. It appears that distracted driving has increased with the proliferation of smart phone use, thus threatening the downward trend in railroad crossing accident occurrence.

Lack of participation by some railroads in the Section 130 program is an additional challenge. The Section 130 program is predicated on railroad participation. The equipment is installed, owned, and maintained by the railroad on railroad property. Without railroad participation, the safety improvements cannot be made.

Trespassing

A lack of mandatory reporting of trespasser activity poses a serious challenge to the reduction of trespasser injuries and fatalities. If locations of high activity cannot be identified, solving the issues inherent to those particular locations cannot occur. While public education has a marginal effect on the reduction of trespassing activity; it is the installation of fencing and other physical barriers as well as providing safe crossing options which provide the best preventative measures. Constructing preventative measures and safe crossing options are location specific efforts. Without the identification of trespassing hotspot locations due to a lack of reporting, preventative measures cannot be completed.

DETERMINE NEXT STEPS

Short-term actions

The following action items are those which are anticipated to be completed in the first three years of the Safety Action Plan implementation timeframe:

Action Item	Anticipated Completion Date
Action 3: Advocate for national advertisement campaign about distracted driving dangers at railroad crossings._	Begin 2022
Action 4: Rumble strips on paved secondary roads before crossings (reevaluate feasibility)	January 2023
Action 5: Develop the Best Practices for government entities & project Sponsors that are planning projects which interact with railroad property and railroad crossings document.	January 2024
Action 11: Pedestrian Safety / Trespasser Prevention	2023-2024
Action 14: Create a trespasser reporting webpage where the public and railroad employees can report trespasser activity.	July 2023
Action 15: Develop GIS mapping for accidents to identify individual crossing accident locations so analysis of specific railroads, railroad corridors, or regions can be conducted.	December 2022

Iowa DOT staff will be assigned to implement action items, assess the effectiveness of the action items, and review whether the action items need to be revised or discontinued. Status reports will be drafted and discussed during the annual review of the SAP.

Long-term actions

The following action items are those which are anticipated to be completed in the subsequent three years of the SAP implementation timeframe, or are ongoing initiatives without a specific implementation date:

Action Item	Anticipated Completion Date
Action 1: College and High School Education Campaign	Ongoing
Action 2: Family Education Partnerships	Ongoing
Action 6: Include roadway geometry changes into Section 130 projects where applicable.	Ongoing
Action 7: Oversight for railroad crossing signals / traffic signals preemption annual inspection requirements to coincide with the anticipated MUTCD revision.	To Be Determined
Action 8: Railroad crossing closure as part of the Grade Crossing Surface Repair Program	Ongoing
Action 9: Railroad crossing closure incentives for Section 130 Program	Ongoing
Action 10: Identify priority grade separation locations and seek funding	Ongoing
Action 12: Passive railroad crossings crossbuck / yield sign renewal project with Section 130 funds.	2026
Action 13: Advocate continuation of 23 U.S.C. Section 130 and increased railroad crossing safety funding	Ongoing
Action 16: Identify all railroad crossings with humped and dipped attributes; improve signing or construct improvements.	2022-2028

As is the case with the short-term actions, Iowa DOT staff will be assigned to implement action items, assess the effectiveness of the action items, and review whether the action items need to be revised or discontinued. Status reports will be drafted and discussed during the annual review of the SAP.

Appendices

APPENDIX 1 – IOWA DOT SECTION 130 PROCESSES

The Iowa DOT maintains an application-based Section 130 program. A project application must be submitted jointly by the railroad and highway authority with jurisdiction of the railroad crossing. Applications remain valid for five years or until the crossing benefit-cost ranking justifies funding. If the application is not funded within five years, a request is made of the railroad and highway authority to resubmit an application for the desired project. A copy of the expiring application and the newest version of the application are provided as part of the request. Applications are due on the last day of the state fiscal year, (June 30) to be considered for the funding. Projects are selected two fiscal years in advance. This provides enough time for the preliminary engineering and agreement process as well as the railroad's eventual ordering of materials so that costs are incurred during the proper fiscal year.

Each year during the first week of the state fiscal year, (July1 – June 30) the benefit-cost ratio formula report is calculated for every railroad crossing in the state. This Benefit-Cost (BC) formula, is based primarily on the FRA GradeDec, goes through a seven-step process to index exposure, predict the number of collisions, breakdown the number of predicted collisions by expected severity, estimate the societal cost of those collisions, extract the benefit in dollars for the proposed protection upgrades, total the cost of that upgrade, and divide the extracted benefit by the total cost. The complete formula document can be found at: https://iowadot.gov/iowarail/assistance/130/130SelectionProcess_final.pdf

The Iowa DOT Rail Team is currently in the process of replacing the current accident prediction component of the BC formula with the accident prediction formula contained within the FRA document, A New Model for Highway-Rail Grade Crossing Accident Prediction and Severity, (October of 2020).

All at-grade railroad crossings are ranked from those with the highest benefit-cost ratio to those with the lowest. Projects recommended for funding are those with the highest benefit-cost ratio for which a project application has been submitted to the program. The benefit-cost ratio calculation moves beyond a measure of the predicted accidents at a crossing to a calculation that allows the Iowa DOT to maximize the public benefit in relationship to the public investment. The Iowa DOT's use of the benefit-cost ratio to prioritize projects for selection is projected to result in five fewer fatalities and an increased safety benefit that totals nearly $10 million, over a 10-year period.

Iowa DOT Rail Team staff use a two-tiered process to evaluate applications for crossing safety improvements and recommend projects for funding. Iowa DOT Rail Team staff review both new project applications as well as eligible project applications already in the program queue but not funded in the previous five years and recommends projects in accordance with the following selection criteria:

- Applications for safety improvements are ranked by benefit cost and selection is made from highest to lowest BC. In addition, other projects may be recommended for funding based on specific safety characteristics of the crossing, such as presence of passenger trains, high truck traffic, hazardous material traffic, sight obstructions, and near miss reports.
- Projects may also be recommended for funding for specific reasons, like:
    - Sight distance issues
    - Presence of railroad / highway passenger traffic or hazardous material traffic
    - Near-miss reports from railroads and highway authorities
    - Characteristics of nearby crossings impact on the project crossing
    - Circuitry upgrades
    - Safety diagnostic review team recommendations
    - Anticipated increase of vehicle / train traffic or speed / traffic
    - If a crossing closure nearby causes an increase of vehicle traffic
    - other specific safety concerns or as approved by the Transportation Commission.

- On site diagnostic reviews are conducted with all stakeholders to ensure a proposed project warrants funding. If warranted, the group collaborates to identify what specific safety improvements will be part of the project. A component of all diagnostic reviews is to determine whether closing the railroad crossing is the best course of action. Consideration of roadway geometry changes that could benefit the overall safety of the railroad crossing in addition to the installation of active warning devices are considered and discussed.

Safety projects are funded through a cost share of 90% federal funding and 10% matching funds provided by the highway authority and/ or the railroad.

Applications which include a predicted-accident (PA) calculation equal to or higher than .075 receive priority for funding. The PA calculation, developed by the FRA, computes the expected number of accidents at crossings based on information available in the grade-crossing inventory and accident history.

Once projects are selected based upon the factors discussed above, the list of projects is presented to the Iowa DOT Transportation Commission for funding approval. Once approved by the Transportation Commission, the prospective projects are assigned project numbers based on a prescribed naming convention, and National Environmental Policy Act (NEPA), Cultural and right-of-way (ROW) clearances requests are made to the Iowa DOT Location and Environment & Right-of Way Bureaus respectively.

After the NEPA and Right of way ROW clearances are received, formal project requests are made in the federal Financial Management Information System (FMIS) for funding. Once FHWA project funding approvals have been obtained, preliminary engineering authorization letters are sent to the participating railroads for each project. These letters provide the project number as requested with the FHWA in FMIS so that the railroad can charge their engineering to the project without an agreement. Some railroads will not attend the federally mandated on site diagnostic review to determine the type of safety enhancements necessary at the railroad crossing until a preliminary engineering authorization is secured so their consultant has a project to charge their time to.

On site diagnostic reviews are scheduled with all stakeholders, including the railroad and roadway authority with jurisdiction of the railroad crossing, any local entities such as police, fire. EMS, and the utility company that will provide power to the active warning devices or may need to relocate existing utilities to accommodate the active warning devices. Following the on site diagnostic review an on site diagnostic review form is drafted. This document contains meeting discussion notes, a list of attendees, the existing attributes of the railroad crossing, and a list of safety enhancements deemed necessary at the location by the diagnostic review team. This document is provided to the railroad and roadway authority to assist in any engineering for the project. The railroad's preliminary engineering produces the plans sheet(s) and cost estimate necessary for and included in the project agreement.

In rare instances the diagnostic review team may determine that roadway geometry modifications are necessary to enhance the safety of the railroad crossing. Such changes could include narrowing the roadway to eliminate curbside parking near the railroad crossing. Vehicles parked along the curb in advance of the railroad crossing signals may obscure the signals from motorist's view. The elimination of driveways within the railroad crossing gates may also be necessary to prevent motorists from entering the roadway and the railroad crossing dynamic safety envelope from within the lowered gates. The local roadway agencies such as cities and counties are required to let their roadway modification(s) project according to federal specifications. However, if the railroad crossing is located on the Iowa DOT's primary highway roadway system the Iowa DOT Contracts Bureau will let the project according to federal specifications.

Once the railroad provides the plans sheet(s) and cost estimate to the Iowa DOT Rail Team, an agreement is drafted and sent to the railroad for signature. Once the agreement is returned with railroad signature it is sent to the roadway authority for signature. Upon receipt of the signed agreement from the roadway authority, the Iowa DOT executes the agreement and the fully executed copy of the agreement is sent to both the railroad and roadway authority with a notice to proceed with the project.

It typically takes the railroad six to nine months to order materials and schedule the construction of the active warning devices. If roadway geometry changes were identified as necessary during the diagnostic review, the roadway authority would complete that construction prior to the railroad installing the active warning devices.

Section 130 Funding / Project authorization annual timeline:	
June 30:	Applications must be submitted for consideration in the next fiscal year's funding.
First week of July:	Projects are selected based on scoring formula.
Month of August:	Railroads and Roadway Authorities are requested to confirm participation in funding selected projects.
First week of September:	List of projects presented to Iowa DOT Transportation Commission for funding approval.
First week of October:	Iowa DOT Transportation Commission approves the list of projects. Upon receiving approval NEPA and ROW clearances requested.
Last week of November:	NEPA and ROW clearances have been received.
First week of December:	Projects requested with FHWA through FMIS.
Last week of December:	FHWA approves projects in FMIS. PE Authorization letters sent to railroads for each project.

The railroad is responsible for reporting the project start and completion dates to the Iowa DOT Rail Team. Once the Iowa DOT has been advised by the railroad that the project is completed, an on site final inspection is scheduled. During the final inspection the railroad crossing signals system is tested, and a review is conducted to ensure that the materials listed as having been installed at the railroad crossing are in fact installed and in working order. If the system is working properly and the materials sheet matches the materials and components found on site; and if the railroad crossing is ADA compliant, a certificate of completion is issued by the Iowa DOT.

Once a final invoice has been received from the railroad and the Certificate of Completion has been issued the Iowa DOT Rail Team can request a final audit of the project. After the final audit is issued the railroad has ninety (90) days to rebut the audit findings or pay back the audit exceptions outlined in the final audit certificate. If the railroad elects to dispute the findings of the audit, Iowa DOT External Audits Bureau and Iowa DOT Rail Team staff communicate with railroad to verify documentation supporting the railroad's rationale for disputing the exception findings. If the information provided by the railroad is approved, the External Audits Bureau will issue a revised final audit certificate. Once issued, the railroad must pay any outstanding audit exceptions within 60 days.

In the past five state fiscal program funding cycles, one hundred and seven Section 130 projects have been programmed for a total of $25,717,683. This is an average cost of $240,352 per railroad crossing. (Projects are programmed two fiscal years in advance.)

APPENDIX 2 - IDENTIFICATION OF HIGH-RISK HIGHWAY-RAILROAD CROSSINGS & PATHWAY CROSSINGS

The Iowa DOT utilizes two main sources of data to categorize the highway-rail and grade crossings. These data sets include the FRA website and the internal Roadway Asset Management System (RAMS). The RAMS system includes all railroad crossings in the state of Iowa along with the specific railroad crossing attributes which are input from the railroad crossing inventory database.

The Iowa DOT Benefit-Cost Ratio Formula incorporates an accident prediction formula which identifies highway-rail and pathway grade crossings that are at high-risk for accidents/incidents to include the following factors:

- Average annual daily vehicle traffic;
- Total number of trains per day that travel through each highway-railroad crossing;
- Total number of motor vehicle collisions at each crossing during the previous 5-year period;
- Number of main tracks at each crossing;
- Number of roadway lanes at each crossing;
- Maximum railroad timetable speed;

Roadway geometry (vertical and horizontal) as well as sight distance (stopping, corner and clearing) at each crossing are reviewed through the on site diagnostic review process for each highway-railroad crossing.

The Iowa DOT is in the process of revising the accident prediction formula component of the Benefit-Cost Ration Formula to solely utilize the *A New Model for Highway-Rail Grade Crossing Accident Prediction and Severity* formula, (published in October of 2020).

The following graph depicts those highway-railroad at-grade railroad crossings which have experienced at least one accident / incident within the previous three years. Data for 2018-2020 was used for the 3-year period.

RR Crossing Number	Year of Accident	County
385243R	2018	WINNESHIEK
385773F	2018	O BRIEN
385297W	2018	CHICKASAW
307418F	2018	CALHOUN
067366B	2018	SIOUX
308838N	2018	BREMER
307856H	2018	BLACK HAWK
382041H	2018	WOODBURY
307168V	2018	BLACK HAWK
308971T	2018	MITCHELL
191349X	2018	WOODBURY
608572K	2018	KOSSUTH
606851Y	2018	MUSCATINE
307348T	2018	HAMILTON
603326H	2018	DALLAS
201735N	2018	WEBSTER
190997L	2018	CRAWFORD
603327P	2018	DALLAS
385243R	2018	WINNESHIEK
385773F	2018	O BRIEN
376110A	2018	DUBUQUE
380030N	2018	WORTH
196508U	2018	WRIGHT
307649N	2018	PLYMOUTH
079150E	2018	MONROE

RR Crossing Number	Year of Accident	County
307484T	2018	BUENA VISTA
097457N	2018	SIOUX
193126N	2018	POWESHIEK
375710Y	2018	APPANOOSE
079153A	2018	HENRY
307324E	2018	HAMILTON
063224W	2018	MONROE
385516H	2018	CERRO GORDO
190702S	2018	STORY
309081L	2018	LINN
190580P	2018	BENTON
607869M	2018	LINN
190945U	2019	SAC
308944W	2019	MITCHELL
307397P	2019	WEBSTER
307167N	2019	BLACK HAWK
190437E	2019	CEDAR
308822S	2019	BREMER
307869J	2019	BLACK HAWK
307950W	2019	BLACK HAWK
607982F	2019	JASPER
271474G	2019	BOONE
607882B	2019	POLK
307780E	2019	LINN
376151E	2019	CLAYTON
190461F	2019	LINN
062957M	2019	WAPELLO
603297A	2019	GUTHRIE

RR Crossing Number	Year of Accident	County
191184C	2019	HARRISON
307588A	2019	CHEROKEE
603280W	2019	GUTHRIE
607491G	2019	POWESHIEK
067334V	2019	PLYMOUTH
607983M	2019	JASPER
079092L	2019	LUCAS
307018M	2019	DELAWARE
375792H	2019	WAPELLO
874976K	2019	CERRO GORDO
079176G	2019	DES MOINES
695494R	2019	LOUISA
191287C	2019	WOODBURY
608579H	2019	KOSSUTH
607488Y	2019	POWESHIEK
875886P	2019	HUMBOLDT
931828X	2019	PLYMOUTH
606737Y	2019	MUSCATINE
865600S	2019	SCOTT
186826D	2019	OSCEOLA
190558C	2019	BENTON
197008A	2019	HAMILTON
196392V	2019	CERRO GORDO
307399D	2019	WEBSTER
603317J	2019	CASS
603892T	2019 (2)	SCOTT
190688Y	2019	STORY
307422V	2019	CALHOUN

RR Crossing Number	Year of Accident	County
865544M	2019	CLINTON
376125P	2019	DUBUQUE
067354G	2019	PLYMOUTH
385750Y	2019	O BRIEN
308237E	2019	SAC
079419G	2019	WAPELLO
190501B	2019	LINN
308924K	2019	FLOYD
933932Y	2019	BLACK HAWK
922305U	2019	POLK
608032P	2020	IOWA
309012D	2020	MITCHELL
196919A	2020	POCAHONTAS
922540S	2020	WRIGHT
922540S	2020	WRIGHT
599286C	2020	WRIGHT
911773H	2020	BLACK HAWK
920336L	2020	WOODBURY
607572G	2020	BLACK HAWK
607552V	2020	BLACK HAWK
191073K	2020	HARRISON
603326H	2020	DALLAS
196614C	2020	POCAHONTAS
920334X	2020	WOODBURY
079431N	2020	JEFFERSON
606780E	2020	SCOTT
874088N	2020	CERRO GORDO
865604U	2020	SCOTT

RR Crossing Number	Year of Accident	County
385153S	2020	CLAYTON
307506R	2020	BUENA VISTA
307082L	2020	BUCHANAN
079408U	2020	WAPELLO
307259B	2020	HARDIN
603300F	2020	GUTHRIE
072518F	2020	LEE
607576J	2020	BLACK HAWK
606835P	2020	MUSCATINE
909175U	2020	DALLAS
969106A	2020	POLK
385516H	2020	CERRO GORDO
375664A	2020	WAYNE
307895Y	2020	BLACK HAWK
385619H	2020	KOSSUTH

The following graph depicts those highway-railroad at-grade railroad crossings which have experienced more than one accident / incident within the previous five years. Data for 2016-2020 was used for the 5 year period.

RR Crossing Number	Year of Accident	County
307168V	2016	BLACK HAWK
307168V	2018	BLACK HAWK
307649N	2017	PLYMOUTH
307649N	2018	PLYMOUTH
307950W	2017	BLACK HAWK
307950W	2019	BLACK HAWK
308822S	2017 (2)	BREMER
308822S	2019	BREMER
385516H	2018	CERRO GORDO
385516H	2020	CERRO GORDO
603326H	2018	DALLAS
603326H	2020	DALLAS
603892T	2016	SCOTT
603892T	2019 (2)	SCOTT
606851Y	2017 (2)	MUSCATINE
606851Y	2018	MUSCATINE
607572G	2017	BLACK HAWK
607572G	2020	BLACK HAWK
607982F	2017	JASPER
607982F	2019	JASPER
922540S	2020 (2)	WRIGHT

Pathway Crossings

There are forty-six (46) pathway-railroad crossings in the state of Iowa. There have been no accidents/ incidents at pathway-railroad crossings in the state of Iowa within the previous five years (2016-2020).

The following graph lists the current pathway-railroad crossings and the respective county of location.

Pathway Crossing Number	County
308945D	Mitchell
308946K	Mitchell
308948Y	Mitchell
308949F	Mitchell
308951G	Mitchell
966997J	Benton
968462S	Black Hawk
969205X	Polk
972311J	Linn
972312R	Linn
689568S	Muscatine
689571A	Muscatine
307055P	Buchanan
307087V	Buchanan
375996U	Scott
385147N	Clayton
385183J	Allamakee
840172B	Johnson
385426J	Floyd
376256T	Clayton
307504C	Buena Vista
307511M	Buena Vista
307513B	Buena Vista

Pathway Crossing Number	County
307514H	Buena Vista
865580H	Scott
385711H	Clay
376711J	Linn
865651C	Scott
078022T	Lee
200780E	Black Hawk
200784G	Black Hawk
607205Y	Muscatine
607207M	Muscatine
607407W	Butler
607536L	Black Hawk
607540B	Black Hawk
909027A	Johnson
484070B	Monroe
193090H	Poweshiek
193091P	Poweshiek
193092W	Poweshiek
193093D	Poweshiek
193094K	Poweshiek
193095S	Poweshiek
931825C	Linn
934342F	Black Hawk

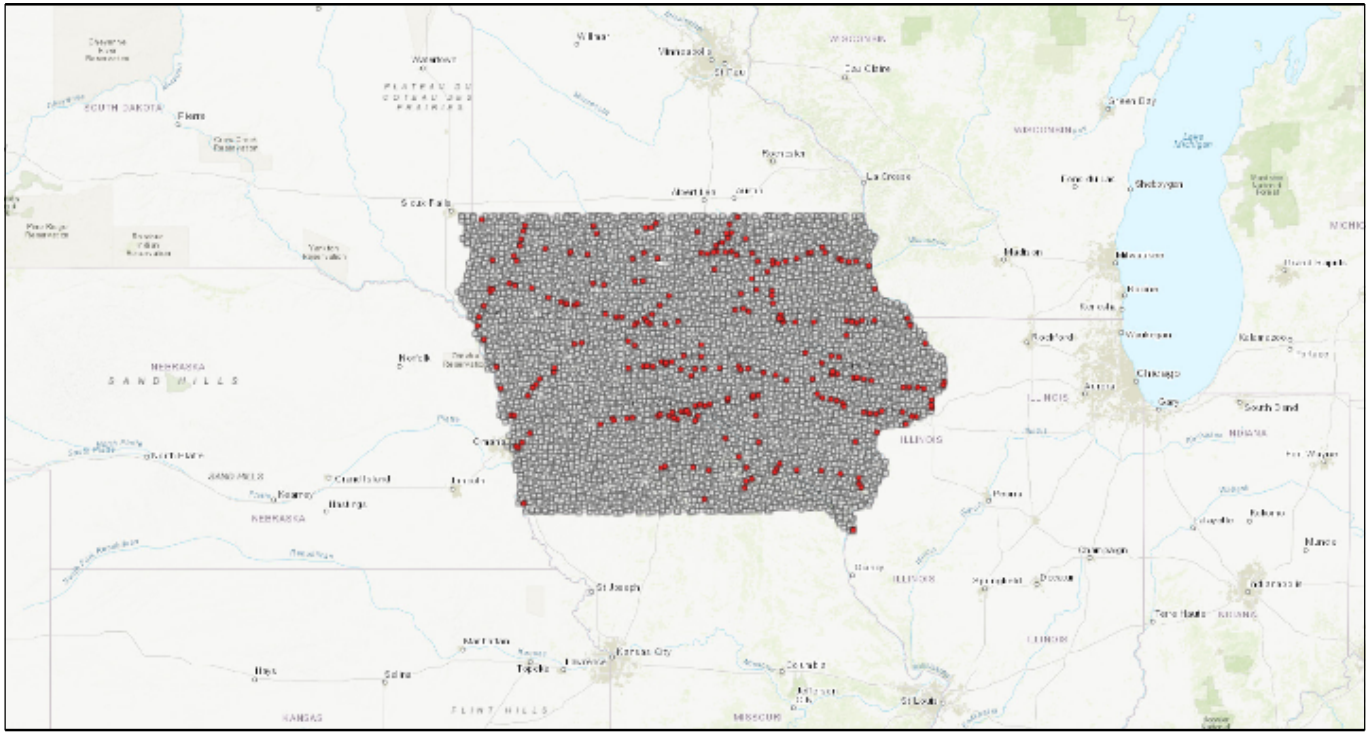
APPENDIX 3 – IOWA CRASH ANALYSIS TOOL QUICK REPORT 2011-2020

Crash Severity	352
Fatal Crash	23
Suspected Serious Injury Crash	38
Suspected Minor Injury Crash	49
Possible/Unknown Injury Crash	43
Property Damage Only	199

Injury Status Summary	193
Fatalities	26
Suspected serious/incapacitating	43
Suspected minor/non-incapacitating	66
Possible (complaint of pain/injury)	53
Unknown	5

Property/Vehicles/Occupants	
Property Damage Total (dollars):	9,274,370.00
Average (per crash dollars):	26,347.64
Total Vehicles:	717.00
Average (per crash):	2.04
Total Occupants:	938.00
Average (per crash):	2.69

Average Severity	
Fatalities/Fatal Crash:	1.13
Fatalities/Crash:	0.07
Injuries/Crash:	0.46
Major Injuries/Crash:	0.12
Minor Injuries/Crash:	0.19
Possible/Unknown Injuries/Crash:	0.15



Major Cause			352
Animal	1	Ran traffic signal	0
Ran stop sign	2	Failed to yield to emergency vehicle	0
FTYROW: At uncontrolled intersection	4	FTYROW: Making right turn on red signal	0
FTYROW: From stop sign	0	FTYROW: From yield sign	1
FTYROW: Making left turn	0	FTYROW: From driveway	0
FTYROW: From parked position	0	FTYROW: To pedestrian	7
FTYROW: Other	101	Drove around RR grade crossing gates	12
Disregarded RR Signal	47	Crossed centerline (undivided)	3
Crossed median (divided)	0	Traveling wrong way or on wrong side of road	1
Aggressive driving/road rage	0	Driving too fast for conditions	8
Exceeded authorized speed	4	Improper or erratic lane changing	0
Operating vehicle in an reckless, erratic, ca...	6	Followed too close	0
Passing: On wrong side	0	Passing: Where prohibited by signs/markings	0
Passing: With insufficient distance/inadequa...	0	Passing: Through/around barrier	0
Passing: Other passing	0	Made improper turn	4
Driver Distraction: Manual operation of an e...	1	Driver Distraction: Talking on a hand-held d...	0
Driver Distraction: Talking on a hands free ...	0	Driver Distraction: Adjusting devices (radio...	0
Driver Distraction: Other electronic device ...	0	Driver Distraction: Passenger	1
Driver Distraction: Unrestrained animal	0	Driver Distraction: Reaching for object(s)/f...	0
Driver Distraction: Inattentive/lost in thou...	7	Driver Distraction: Other interior distracti...	7
Driver Distraction: Exterior distraction	3	Ran off road - right	6
Ran off road - straight	0	Ran off road - left	11
Lost control	5	Swerving/Evasive Action	19
Over correcting/over steering	0	Failed to keep in proper lane	2
Failure to signal intentions	0	Traveling on prohibited traffic way	1
Vehicle stopped on railroad tracks	15	Other: Vision obstructed	7
Other: Improper operation	2	Other: Disregarded warning sign	2
Other: Disregarded signs/road markings	7	Other: Illegal off-road driving	0
Downhill runaway	1	Separation of units	0
Towing improperly	0	Cargo/equipment loss or shift	1
Equipment failure	1	Oversized load/vehicle	0
Other: Getting off/out of vehicle	0	Failure to dim lights/have lights on	0
Improper backing	0	Improper starting	0
Illegally parked/unattended	5	Driving less than the posted speed limit	0
Operator inexperience	0	Other	31
Unknown	11	Not reported	0
Other: No improper action	5		

Time of Day/Day of Week

Day of Week	12 AM to 2 AM	2 AM to 4 AM	4 AM to 6 AM	6 AM to 8 AM	8 AM to 10 AM	10 AM to Noon	Noon to 2 PM	2 PM to 4 PM	4 PM to 6 PM	6 PM to 8 PM	8 PM to 10 PM	10 PM to 12 AM	Not reported	Total
Sunday	6	2	3	2	1	2	5	5	6	2	2	1	0	37
Monday	1	0	4	3	9	10	7	4	4	4	3	1	0	50
Tuesday	2	1	0	3	7	9	5	12	8	4	4	0	0	55
Wednesday	0	2	2	4	6	9	5	5	3	3	4	2	0	45
Thursday	2	1	1	4	11	8	9	5	6	5	5	1	0	58
Friday	0	1	1	5	8	14	4	4	8	6	7	5	0	63
Saturday	4	5	1	1	8	7	4	3	4	3	2	2	0	44
Total	15	12	12	22	50	59	39	38	39	27	27	12	0	352

Manner of Crash Collision	**352**
Non-collision (single vehicle)	47
Head-on (front to front)	5
Rear-end (front to rear)	9
Angle, oncoming left turn	1
Broadside (front to side)	227
Sideswipe, same direction	9
Sideswipe, opposite direction	3
Rear to rear	0
Rear to side	1
Not reported	1
Other	37
Unknown	12

Surface Conditions	**352**
Dry	233
Wet	30
Ice/frost	17
Snow	28
Slush	4
Mud, dirt	15
Water (standing or moving)	0
Sand	0
Oil	0
Gravel	21
Not reported	1
Other	3
Unknown	0

Fixed Object Struck			**717**
Bridge overhead structure	1	Bridge pier or support	0
Bridge/bridge rail parapet	0	Curb/island/raised median	0
Ditch	17	Embankment	2
Ground	0	Culvert/pipe opening	0
Guardrail - face	7	Guardrail - end	0
Concrete traffic barrier (median or right sid...	0	Other traffic barrier	0
Cable barrier	0	Impact attenuator/crash cushion	0
Utility pole/light support	1	Traffic sign support	3
Traffic signal support	1	Other post/pole/support	2
Fire hydrant	0	Mailbox	0
Tree	0	Landscape/shrubbery	0
Snow bank	1	Fence	0
Wall	0	Building	0
Other fixed object	4	None (no fixed object struck)	678

Driver Age/Driver Gender					
Driver Age - 5 year Bins	Female	Male	Not reported	Unknown	**Total**
< 14	0	0	0	0	0
= 14	0	1	0	0	1
= 15	2	4	0	0	6
= 16	2	4	0	0	6
= 17	6	6	0	0	12
= 18	4	4	0	0	8
= 19	2	4	0	0	6
= 20	1	6	0	0	7
>= 21 and <= 24	7	21	0	0	28
>= 25 and <= 29	5	18	0	0	23
>= 30 and <= 34	6	25	2	0	33
>= 35 and <= 39	2	19	0	0	21
>= 40 and <= 44	7	25	0	0	32
>= 45 and <= 49	5	14	0	0	19
>= 50 and <= 54	6	28	1	0	35
>= 55 and <= 59	5	21	0	0	26
>= 60 and <= 64	4	13	0	0	17
>= 65 and <= 69	4	14	0	0	18
>= 70 and <= 74	3	15	0	0	18
>= 75 and <= 79	2	10	0	0	12
>= 80 and <= 84	1	7	0	0	8
>= 85 and <= 89	2	3	0	0	5
>= 90 and <= 94	0	1	0	0	1
>= 95	0	0	0	0	0
Not reported	0	0	0	0	0
Unknown	0	0	164	0	164
Total	76	263	167	0	506

Drug/Alcohol Related	**352**
Drug	4
Alcohol (< Statutory)	3
Alcohol (Statutory)	18
Drug and Alcohol (< Statutory)	0
Drug and Alcohol (Statutory)	0
Refused	0
Under Influence of Alcohol/Drugs/Medications	4
None Indicated	323

Alcohol Test Given	**717**
None	298
Blood	20
Urine	1
Breath	19
Vitreous	0
Refused	0
Not reported	379

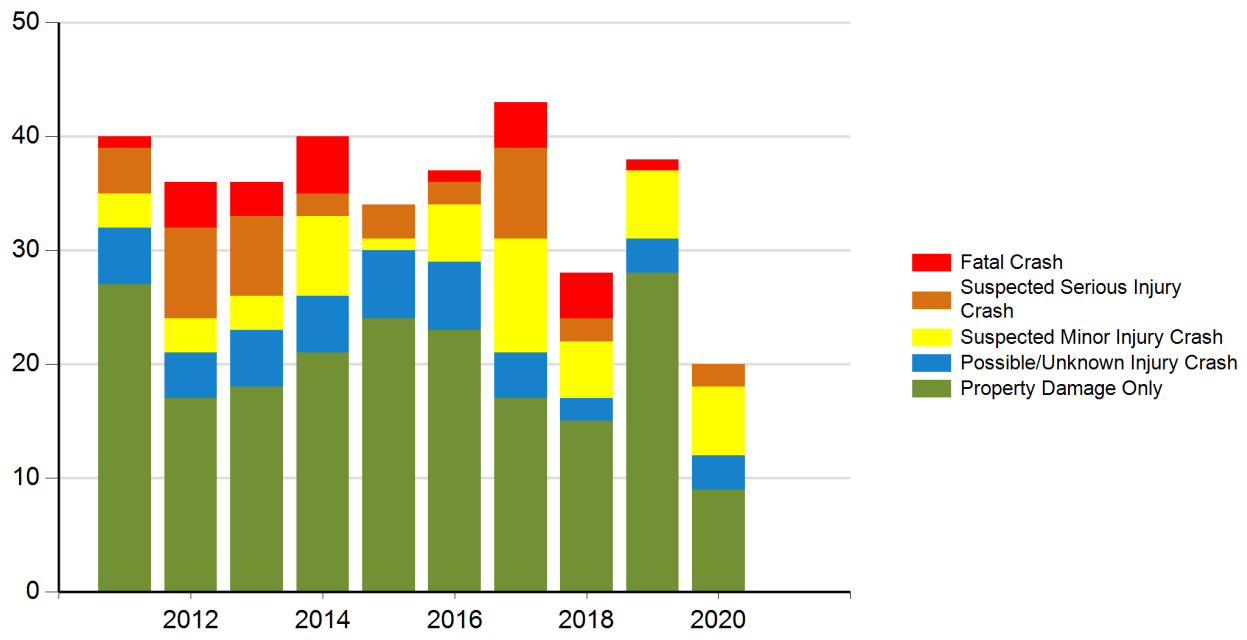
Drug Test Given	**717**
None	319
Blood	9
Urine	6
Breath	0
Vitreous	0
Refused	0
Not reported	383

Drug Test Result	**382**
Negative	3
Cannabis	0
Central Nervous System depressants	0
Central Nervous System stimulants	0
Hallucinogens	0
Inhalants	0
Narcotic Analgesics	0
Dissociative Anesthetic (PCP)	0
Prescription Drug	0
Not reported	378
Other	1

Crash Severity - Annual

Crash Year	Fatal Crash	Suspected Serious Injury Crash	Suspected Minor Injury Crash	Possible/Unknown Injury Crash	Property Damage Only	**Total**
2011	1	4	3	5	27	40
2012	4	8	3	4	17	36
2013	3	7	3	5	18	36
2014	5	2	7	5	21	40
2015	0	3	1	6	24	34
2016	1	2	5	6	23	37
2017	4	8	10	4	17	43
2018	4	2	5	2	15	28
2019	1	0	6	3	28	38
2020	0	2	6	3	9	20
2021	0	0	0	0	0	0
Total	23	38	49	43	199	352

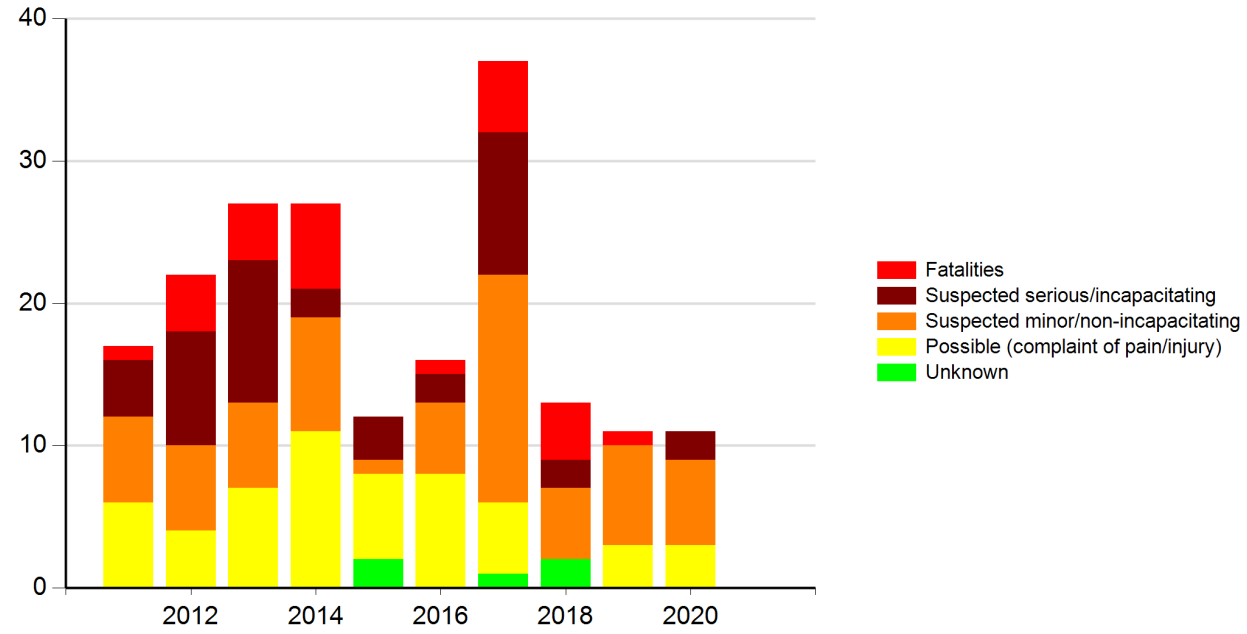
Severity/Year



Injury Status - Annual

Crash Year	Fatalities	Suspected serious/incapacitating	Suspected minor/non-incapacitating	Possible (complaint of pain/injury)	Unknown	**Total**
2011	1	4	6	6	0	17
2012	4	8	6	4	0	22
2013	4	10	6	7	0	27
2014	6	2	8	11	0	27
2015	0	3	1	6	2	12
2016	1	2	5	8	0	16
2017	5	10	16	5	1	37
2018	4	2	5	0	2	13
2019	1	0	7	3	0	11
2020	0	2	6	3	0	11
2021	0	0	0	0	0	0
Total	26	43	66	53	5	193

Injury Status/Year



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