# State Highway-Rail Grade Crossing Action Plan

Alabama Department of Transportation
Bureau of Multimodal Transportation

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# State Highway-Rail Grade Crossing Action Plan

## Introduction

Section 202 of the Rail Safety Improvement Act of 2008 (RSIA08), Public Law 110-432 (H.R.2095 / S.1889), that was signed into law on 16 October 2008 required the U.S. Secretary of Transportation to identify the ten States with the most highway-rail grade crossing collisions, on average, over the past three years, and to require those States to develop State highway-rail grade crossing action plans. Section 202 further provided that these plans must identify specific solutions for improving safety at crossings, including highway-rail grade crossing closures or grade separations, and must focus on crossings that have experienced multiple collisions, or are at high risk for such collisions.

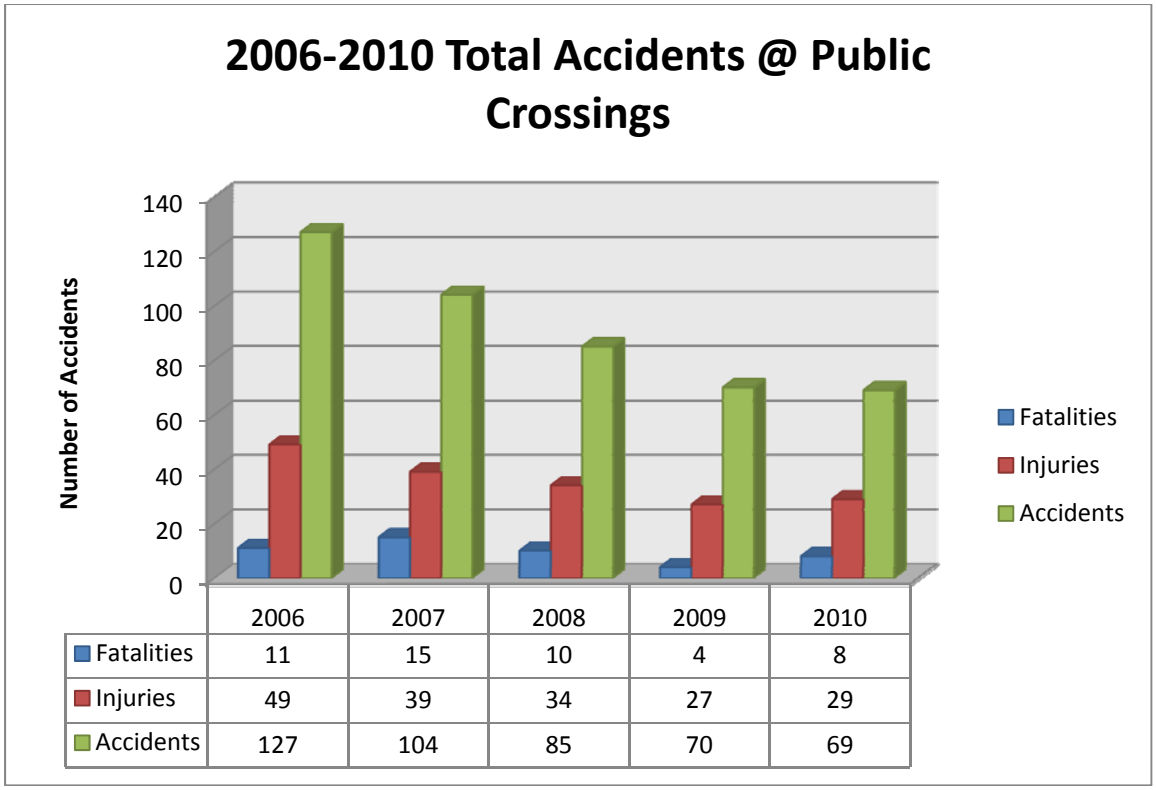
The Federal Railroad Administration (FRA) (http://www.fra.dot.gov/) published a Final Rule in the 28 June 2010 *Federal Register* (Volume 75, No. 123) addressing the development, review, and approval of the State highway-rail grade crossing action plans required by the Rail Safety Improvement Act. The Rule requires that State highway-rail crossing action plans cover a five year time period.

Alabama, California, Florida, Georgia, Illinois, Indiana, Iowa, Louisiana, Ohio, and Texas were identified as the ten states with the most highway-rail grade crossing collisions in the 2006-2008 three calendar year period.

The Alabama Department (ALDOT) of Transportation, Bureau of Multi Modal, Railroad Safety Program, has developed this Plan to conform with the requirements of 49 CFR Part 234, Grade Crossing Signal System Safety and State Action Plans; Subpart B, Reports and Plans; § 234.11 State highway-rail grade crossing action plans.

## Scope and Objective

The regulatory requirement to develop a State Highway-Rail Grade Crossing Safety Action Plan, hereinafter Plan, requires an analysis of collision data from 2008-2010. The use of three year collision history of data is used to evaluate safety improvement needs. This Plan will be effective for a five (5) year period through 2016 when approved.




| | 2006 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|
| Fatalities | 11 | 15 | 10 | 4 | 8 |
| Injuries | 49 | 39 | 34 | 27 | 29 |
| Accidents | 127 | 104 | 85 | 70 | 69 |

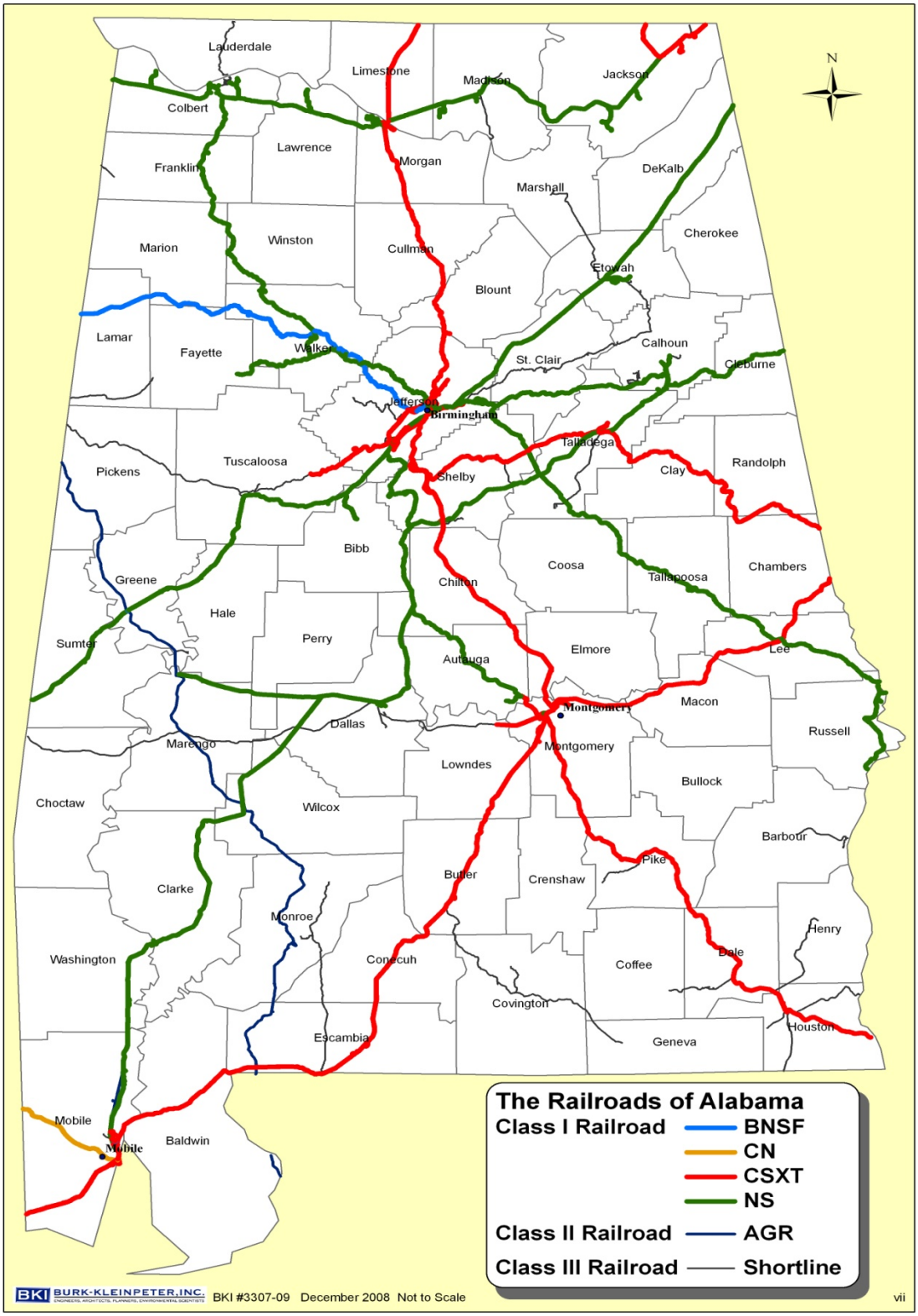
As you can see from the table above, there has been a steady decline in accidents in Alabama. This Plan emphasizes road user safety at public highway-rail grade crossings. Private rail grade crossings are not included in this Plan. Public highway grade crossings located within the restricted areas of US military installations, are not included. References to a “crossing” or “crossings” refer only to public highway-rail grade crossings as described above, unless otherwise indicated.

Highway rail crossing warning devices are classified as passive or active warning devices. Passive warning devices typically consist of cross bucks, warning signs, regulatory signs, and pavement markings. Passive crossings refer to crossings without active warning devices. Active warning devices typically consist of automatic gates, and/or flashing lights and bells. Hereinafter references to “gates” or “gated crossing” refer to crossings equipped with automatic gates, flashing lights and bells, and “flashers” or “flasher crossings” understood to refer to crossings equipped with automatic flashing lights and bells only.

The objective of this Plan is to identify specific solutions to mitigate collisions between trains or on-track equipment, and pedestrians or vehicles at crossings. Crash is a widely used term within the traffic engineering field that refers to collisions, accidents or wrecks. The term crash hereinafter should be understood to refer to such incidents.

Highway grade crossing closures and grade separations are two (2) critical elements that could reduce crashes. The Plan will focus on existing crossings with a history of multiple crashes or otherwise have risk factors that could cause multiple crash crossings. The Rail Safety Improvement Act recognized that these type crossings account for a disproportionately high number of total crashes, and offer the greatest opportunity for crash reduction. Multiple crash crossings are defined as any crossings that have experienced more than one crash for the timeframe between 2006-2010.

# Alabama Rail System



# SUMMARY of Alabama Rail System

Railroad operations in Alabama have historically been oriented to the movement of goods between major population centers and the Gulf Coast port cities. Through the years, those routes radiating out from the ports have been integrated into a comprehensive rail network. This has worked to Alabama's advantage, as new industries seeking transportation efficiency, particularly intermodal efficiency, have found what they were looking for in Alabama, especially in terms of rail and waterborne shipping.

The map above depicts the statewide rail network in the year 2008. As can be seen on the map, the state is criss-crossed by rail lines. According to the most recent report by the AAR, total rail miles of road operated in the State of Alabama is 3,759 miles. As defined by the AAR, "miles of road" is the aggregate length of roadway, excluding yard tracks and sidings, and does not reflect the fact that a mile of road may include two, three, or more parallel tracks. Miles of road operated, less trackage rights, which eliminates double-counting caused by more than one railroad operating the same track, is the measure of the rail network. As published by the AAR, the amount of railroad mileage operated in Alabama, by classification, is shown below.

**Miles of Railroad in Alabama**

| Class of Railroad | Miles |
|---|---:|
| Class I | 2,684 miles |
| Class II/Regional | 344 miles |
| Class II/Local Linehaul | 572 miles |
| Class III/Local Switching and Terminal | 159 miles |
| Total | 3,759 miles |

*Source: Association of American Railroads, 2007.*

# 1.0 Crossing Closures

Section 37-2-84, Code of Alabama 1975, (Act No. 94582) was amended and signed by the Governor of Alabama on April 22, 1994, giving the Alabama Department of Transportation (ALDOT) the authority to close a crossing on a Municipal or County Highway, Street or Right- Of-Way crossing the tracks or right-of-way of any railroad within the state whenever in the judgment of the Department the grade crossing is dangerous or redundant or the enhancement of public safety resulting from the closing outweighs any inconvenience caused by rerouting the vehicular traffic.

While ALDOT does not pursue crossing closures on its own, ALDOT will work with the railroad to close any crossing approved to be closed by a local municipality. ALDOT will also make an incentive payment to the local government for the permanent closure of a crossing. ALDOT will match the incentive payment for the grade crossing closure paid by the railroad up to a maximum of $7,500 per crossing. The local government receiving an incentive payment from the State shall use the money for transportation safety improvements.

## Class 1 RR Crossing Closures:

| YEAR | CSX | NS | BNSF | Total |
|---|---|---|---|---|
| **2006** | 8 | 13 | 3 | 24 |
| **2007** | 3 | 19 | 1 | 23 |
| **2008** | 6 | 12 | 3 | 21 |
| **2009** | 1 | 7 | 1 | 9 |
| **2010** | 5 | 4 | 0 | 9 |
| **Total** | 23 | 55 | 8 | 86 |

# 2.0 Grade Crossing Separations

Grade crossing separations can be a feasible alternative to resolve a high frequency crash problem at grade crossings.

Separations are normally considered during planning and preliminary engineering phases. Grade separations are included in the construction phase of major contracts when there is a positive cost benefit ratio. These structures will cost $3-$5 million and require environmental analysis acquisition of right of way and other Federal requirements above those used for the Section 130 Program.

Separations will always be considered as an alternative to initiate a problem, but be seldom used.

## 3.0 Multiple Incidents at a Crossing

Multiple incidents at rail/highway grade crossings occur in the State of Alabama for various reasons. A large proportion of these collisions are caused by drivers deliberately circumventing warning equipment. Driver behavior issues include ignoring flashing lights or other active warning devices, passing through barrier gates or even driving around stopped traffic and already lowered gates. When a rail/highway grade crossing has multiple incidents, efforts will be made to determine the causes for such incidents. An assessment of the rail/highway grade crossing by reviewing the crash report records and a site review in most cases will explain why the rail/highway grade crossing has experienced a number of incidents. Once the prevalent characteristics are determined a plan will be prepared to identify appropriate countermeasures to reduce the amount of incidents.

There are several strategies already in place to reduce the amount of collisions. These are listed as follows:

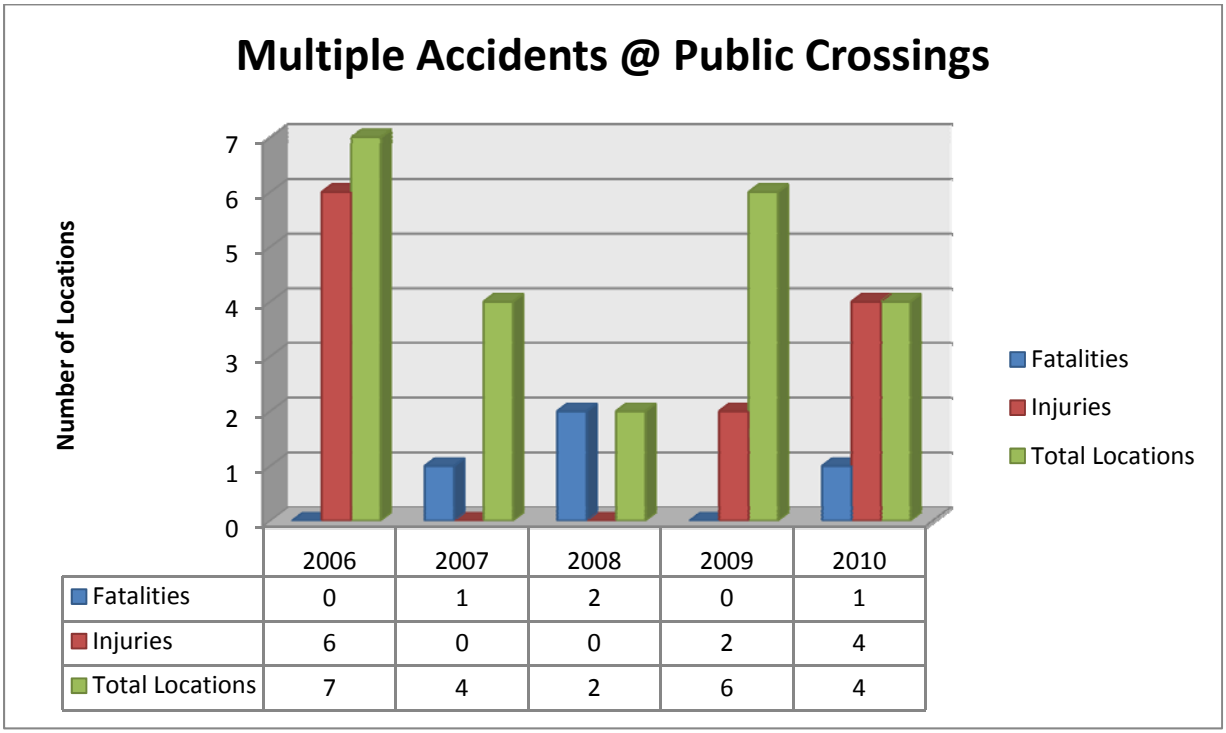
1. Compile a list of accidents that have occurred at the rail/highway grade crossing.
2. Contact the local governing agency to encourage implementation of educational and enforcement policies.
3. Install flexible traffic channelization devices and other cost effective physical barriers at grade crossings that are already equipped with active warning devices.
4. Improve the signs and permanent markings at the approaches to aid in reducing the amount of incidents.
5. Encourage railroads to reduce the amount of vegetation to improve visibility for the rail/highway along the right-of-way.

Identify the frequency and locations of multiple incidents are the first line of defense to reducing collisions. While no measure is fool proof, implementing a plan to reduce the number of incidents is a first step to resolving the problem. The methodology for identifying deficient crossings with multiple incidents requires information for a number of variables associated with the specific location. Variables such as train volumes, traffic volumes, type of roadway user, crossing geometrics and approach characteristics are critical in helping to determine a strategy to reduce multiple incidents at rail/highway crossings.

If the proposed countermeasures fail to reduce the number of multiple incidents at a rail/highway grade crossing other alternatives will be considered. Follow up action may require installation of active warning devices at the rail/highway grade crossing. This

process involves the analysis and ranking using the U.S. DOT/Accident Prediction formula to determine prior by ranking the rail/highway crossing locations that have greatest occurrence of collisions.

## 2006-2010 Multiple Crossing Incidents




| | 2006 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|
| Fatalities | 0 | 1 | 2 | 0 | 1 |
| Injuries | 6 | 0 | 0 | 2 | 4 |
| Total Locations | 7 | 4 | 2 | 6 | 4 |

## 4.0 High Risk Crossings

The ALDOT Rail Safety Section is responsible for identifying high risk rail/highway grade crossing locations in Alabama. There are approximately 3,279 public-at-grade crossings in the State of Alabama. 1,277 of those crossings contain active devices. The remaining rail/highway grade crossings contain passive devices.

High risk rail/highway locations are identified on an annual basis for investigation using the US DOT/ Accident Prediction Formula Index.

The ALDOT Section 23 USC 130 (Section 130) Program is a 100% federally funded program. This program is designed to provide signalization at between 28 - 32 rail/highway grade crossings across the State of Alabama annually. Alabama is allocated $4.4 million dollars each year for these rail/highway grade crossing improvements. The ALDOT Rail Safety Section will prepare a Program Document showing the top thirty (30) high risk crossing locations. Once the list is developed a Diagnostic Team is assembled to conduct Diagnostic Reviews and investigate each high risk crossing. The Diagnostic Team will be comprised of ALDOT personnel, local governing officials and the railroad. ALDOT personnel will make the final determination for the high risk crossing location.

Once the scope of work is determined individual railroad crossing projects are initiated and steps are taken to process and complete the projects.

Total number of crossings in Alabama that have had a safety upgrade from 2006 through 2010 is 101 just through the Class I Railroads. It is evident that in order to adequately protect the citizens of Alabama all measures must be taken to ensure their safety. The only problem is that you cannot predict human behavior you can only attempt to divert situations that may arise from a person’s inability to drive safely.

## 2006-2010 Crossings with Multiple Accidents

| Year | Crossing | Multiple Year | Current Status | Type of Safety Features |
|---|---|---|---|---|
| **2006** | 351959Y | | | CB |
| | 352090X | | | CB |
| | 352325F | | 1 | NA |
| | 352545B | | Closed | |
| | 637913E | | 2 | CFL |
| | 727811K | | 3 | FLG |
| | 843916R | | | NA |
| | | | | |
| **2007** | 304232G | | 1 | CFL |
| | 351461C | x | 3 | FLG |
| | 727633B | | 1 | FLG |
| | 727682X | | 2 | CB |
| | | | | |
| **2008** | 351290D | 3 incidents | 1 | FL |
| | 728306U | x | 1 | FL |
| | | | | |
| **2009** | 351430D | | 3 | FLG |
| | 637883P | | 1 | CB |
| | 726756J | | 3 | CFLG |
| | 727829V | | 1 | CB |
| | 728277L | | 2 | CB |
| | 728306U | x | 1 | FL |
| | | | | |
| **2010** | 351461C | x | 3 | FLG |
| | 352327U | | 2 | CB |
| | 636710W | | | FL |
| | 639314R | | 3 | CFLG |

**Status**
*1-currently scheduled for safety upgrade*
*2-scheduled for safety upgrade within the next 5 years*
*3-current safety features*
*Closed*

## 5.0 High Speed Rail Corridors

ALDOT is not currently pursuing high speed rail corridors. However, ALDOT has participated in the past in the Southern Rapid Rail Commission by attending quarterly meetings.

Due to the high cost associated with the project is not economically feasible due to:

- Purchase of right-of-way
- Topography
- Number of at-grade-crossings
- Separated grade crossings, i.e. bridges spanning creeks and rivers
- Environmental impact
- Lack of ridership

## 2006-2010 Corridor Projects

| Year | Corridor(Name) | Number of Crossings | Notes: |
|---|---|---|---|
| 2006 | NS Corridor Line "A" Memphis to Chattanooga. Colbert, Lawrence and Jackson Counties. | 14 | 1 crossing had 1 accident in the past 5 years since signals were installed. |
| 2007 | No Corridor Project | | |
| 2008 | No Corridor Project | | |
| 2009 | No Corridor Project | | |
| 2010 | CSXT Thorsby Corridor, Chilton County | 7 | 4 crossings had a total of 9 accidents - the 5 years before signals were installed. No accidents reported at these locations |

# 6.0 Pedestrians

The following are examples of the safety procedures for pedestrians and disabled pedestrians. An air activated horn will be sounded as trains approach rail passenger stations where pedestrian only crossings are present. FRA suggests that the train bell be sounded as it nears and passes through a passenger station even if is not servicing that station. They also recommend that train alerting lights in a triangular pattern should be illuminated while locomotive enter passenger stations.

To guide pedestrians to the correct crossing points audible and visual aids should be available and easy to find in all passenger railroad stations. The audible messages should have information about trains leaving, departing, and what platform.

The visual signs should be the visual text of the announcement on a changeable sign. Other parts of these aides can tell the pedestrian wishing to cross railroad tracks, the direction of any trains moving in the station and how to get to his or her platform relative to his or her location.

Swing gates serve two main functions an entrance and exit to the track. Swing gates open away from the track and slow pedestrians when they have to stop and open the gate. The gates open so that the pedestrian is looking down the track. Swing gates that have to be opened by a wheelchair are equipped with a smooth surface called a kick plate. The other crossing that deals with gates is the pedestrian gate that comes down across the walkway that leads to the track. Smaller gate than goes across the roadways. When necessary to get to other tracks the crossing surface will be flat and smooth, except for 2 1/2 inch gap on the edge of each rail to allow for wheel flange. When gap reduction is not practicable below-grade or above-grade routes would be provided. A surface of truncated domes at grade crossing are for the visually impaired to notify them of crossings.

The use of convex mirrors are useful helping pedestrians having a clearer view down the track, see a train approaching, and warn of a second train on a different track.

The best safety device for pedestrians and disabled pedestrians at railroad tracks is stop, look, and listen.

## 7.0 Implementation/Experimentation of Innovative Technologies at Grade Crossings

Alabama completed a project where one of the latest technologies was implemented. Monies were earmarked and a project was planned, and completed at a crossing in Troy, Alabama. Below are the specifics related to the project:

Cost: $725,225.63

Project Number: HPP-AL49(900) Pike County, Alabama

An agreement was prepared and executed between ALDOT, Gulf & Ohio Railways, The Board of Trustees of The University of Alabama and University Transportation Center for Alabama and Quixote Transportation Safety.

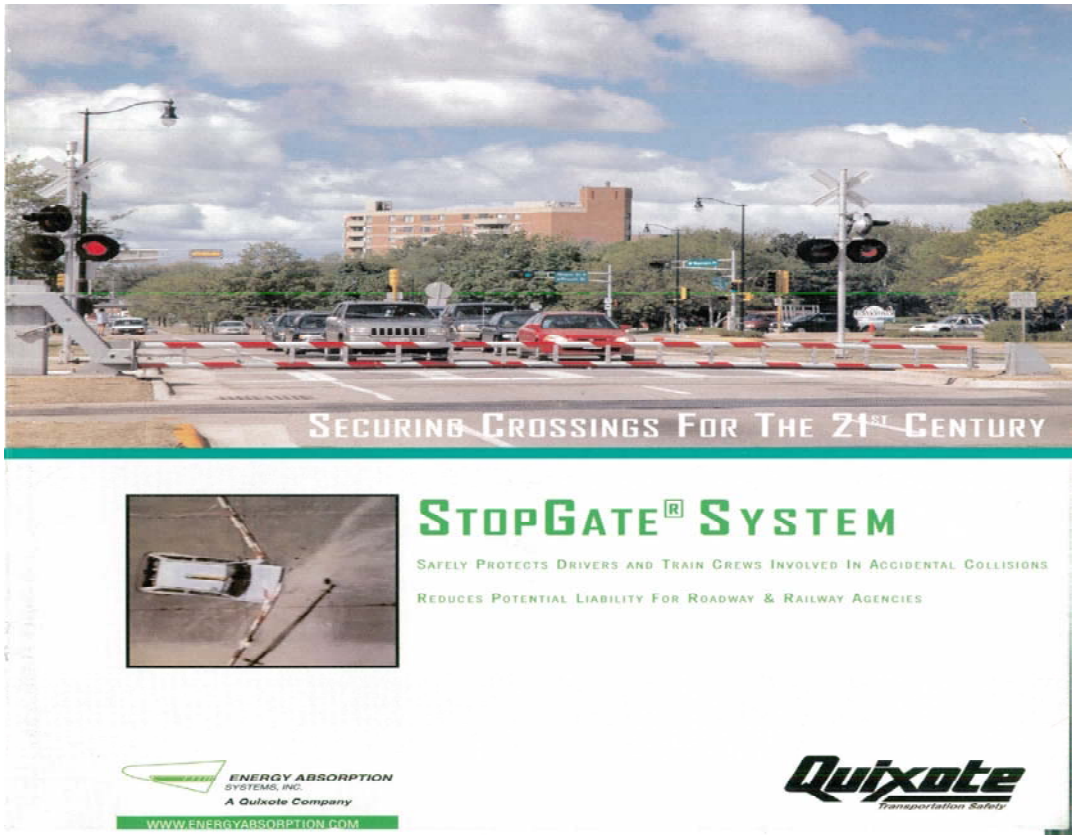
Scope: Install a StopGate Barrier Arm System at a specified railroad crossing in Alabama. The University of Alabama was the evaluator and should be providing a detailed report based upon this project.

Benefits: The StopGate Barrier Arm can help to prevent vehicle intrusion into secured areas by vehicles up to 4410 lb. (2000 kg) traveling at speeds up to 43 mph (70 km/h). Based on initial costs, as well as projected costs of maintenance, the StopGate Barrier Arm can be an extremely cost effective method of protecting infrastructure. The

StopGate Barrier Arm operates like a standard automatic warning gate. Unlike a standard warning device, the StopGate Barrier Arm completely spans across a roadway, and connects to a locking device on both sides of the road, creating a positive, crashworthy barrier that meets National Cooperative Highway Research Program (NCHRP) Report 350 TL-2 criteria.

Upon vehicle impact, the StopGate Barrier Arm acts as an arresting system to bring a vehicle to a complete stop. The StopGate Barrier Arm has successfully passed the NCHRP 350 TL-2 tests as required using vehicles weighing both 1808 lb. (820 kg) and 4410 lb. (2000 kg) for structural adequacy, occupancy risk, and vehicle trajectory evaluation criteria at speeds up to 43 mph (70 km/h). The mass of the StopGate Barrier Arm gives it commanding presence that discourages drivers from challenging it.

The University of Alabama is preparing a report based upon the 3 year evaluation of this crossing. The report is not available at the time of creating the action plan and should be forthcoming.



# 8.0 Engineering Enforcement and Education (3-E's)

Education efforts are very important in the scheme of being able to protect the citizens of Alabama. There are several ways to approach this situation. The first tool in this equation is to inform citizens about a program called Operation Lifesaver. Operation Lifesaver is a safety campaign that was started in 1972 in the state of Idaho. The basic goal of Operation Lifesaver is to promote highway-rail grade crossing safety through educating people about the dangers at rail-highway grade crossings and to prevent collisions, injuries and fatalities on and around railroad tracks and highway-rail grade crossings.

Operation Lifesaver encourages the use of the three E's to educate people how to safely travel across rail-highway grade crossings.

The first E is involves the use of Engineering. These consist of traffic control devices at highway-rail grade crossings which include signs, signals, pavement markings, or other active warning devices designed to help manage traffic flow and reduce risk. The familiar crossbuck is a warning to on-coming traffic of a highway-rail grade crossing and of the motorist's responsibility to yield if a train is approaching. Flashing red lights at a gated crossing provide clear warning of an approaching train and require the motorist to stop. Complying with the traffic control devices at highway-rail grade crossings can make the difference between life and death. The Manual of Uniform Traffic Control Devices (MUTCD) identifies both passive and active devices that are used at rail-highway grade crossings.

The second E is Enforcement. These are the actual police officers that encourage citizens to drive safely when crossing rail-highway grade crossings. Seventy percent (70%) of fatalities, injuries and property damage incidents occur because drivers do not exhibit safe driving habits when driving across rail highway grade crossings. Police officers are instructed to ticket any and all drivers that do not adhere to the rules of safe driving.

The third E is Education. This involves educating people about how to stay safe when being round rail-highway grade crossings. Examples these measures are looking both ways when going across a rail-highway grade crossing, not using excessive speed and not going around gates that are already down.

The Federal Railroad Administration (FRA) in conjunction with Operation Lifesaver has developed Public Service Announcements (PSA) through print and broadcast campaigns that are intended to increase the awareness highway-grade crossing safety.

Even though the focus is to protect citizens who travel across public at grade crossings statistics have shown that there have been increases in fatalities, injuries and property damage incidents at private crossings as well. Safety is a primary concern for law enforcement, community leaders and the railroad. The only way to ensure that all

parties are unified in their commitment to these issues is to continuously participate in the dissemination of newer and more advanced technology and it arises.

# Appendix A - 49 CFR Part 234, Subpart B, § 234.11

**49 CFR Part 234, Grade Crossing Signal System Safety and State Action Plans**
**Subpart B, Reports and Plans**
**§ 234.11 State highway-rail grade crossing action plans**

(a) *Purpose.* The purpose of this section is to reduce collisions at highway-rail grade crossings in the ten States that have had the most highway-rail grade crossing collisions, on average, during the calendar years 2006, 2007, and 2008. This section does not restrict any other State, or other entity, from adopting a highway-rail grade crossing action plan. This section also does not restrict any of the States required to develop action plans under this section from adopting a highway-rail grade crossing action plan with additional or more stringent requirements not inconsistent with this section.

(b) *Application.* This section applies to the ten States that have had the most highway-rail grade crossing collisions, on average, during the calendar years 2006, 2007, and 2008.

(c) *Action plans.*

(1) The ten identified States shall each develop a State highway-rail grade crossing action plan and submit such a plan to FRA for review and approval not later than August 27, 2011.

(2) A State highway-rail grade crossing action plan shall:

(i) Identify specific solutions for improving safety at crossings, including highway-rail grade crossing closures or grade separations;

(ii) Focus on crossings that have experienced multiple accidents or are at high risk for such accidents; and

(iii) Cover a five-year time period.

(d) *Review and approval.*

(1) State highway-rail grade crossing action plans required under paragraph (c) of this section shall be submitted for FRA review and approval using at least one of the following methods: Mail to the Associate Administrator for Railroad Safety/Chief Safety Officer, U.S. Department of Transportation, Federal Railroad Administration, 1200 New Jersey Ave., SE., Washington, DC 20590; or e-mail to *rrs.correspondence@fra.dot.gov.*

(2) FRA will review and approve or disapprove a State highway-rail grade crossing action plan submitted pursuant to paragraph (d) of this section within 60 days of receipt.

(3) If the proposed State highway-rail grade crossing action plan is disapproved, FRA will notify the affected State as to the specific areas in which the proposed plan is deficient. A State shall correct all deficiencies within 30 days following receipt of written notice from FRA.

(4) FRA may condition the awarding of any grants under 49 U.S.C. 20158, 20167, or 22501 to an identified State on the development of an FRA approved State highway-rail grade crossing action plan.