Chapter 9: Rail Safety and Security

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Introduction

Safety continues to be one of the Wisconsin Department of Transportation's (WisDOT's) fundamental missions. The department emphasizes safety in all of its efforts, from education and enforcement to engineering and emergency response. WisDOT remains committed to a multidisciplinary philosophy that safety "is everybody's business." *Connections 2030,* adopted in 2009, identified the following objectives to help the department achieve its multimodal transportation safety vision:

- Reduce crashes, injuries and fatalities
- Educate users on safety strategies
- Design and construct safe transportation facilities
- Identify and build partnerships between governmental units to achieve safety improvements

Like safety, security considerations have also been a part of WisDOT's policies for many years. In *Connections 2030*, WisDOT defined its transportation security vision for all modes – to be able to prevent, prepare for or coordinate response to any incident, whether caused by natural or human events. The following objectives, first defined in *Connections 2030*, further the department's efforts to achieve this vision:

- Support a comprehensive vision of homeland security and defense mobilization
- Improve emergency response
- Improve data/decision support systems
- Maintain the transportation system to maximize the use of existing facilities
- Use technology and other methods to operate existing facilities and services more efficiently

Building on the vision, policies and actions identified in *Connections 2030*, *Wisconsin Rail Plan 2030* adopts and further refines the safety and security policies specific to rail transportation statewide. Specifically, this chapter reviews:

- Stakeholder roles and responsibilities for rail safety and security
- Rail safety
- Rail security

Stakeholder Roles and Responsibilities for Rail Safety and Security

As a steward of the state's transportation system, WisDOT is responsible for addressing safety and security for all transportation modes and systems. Unlike the state trunk highway system, in which WisDOT has primary authority, the department must coordinate with other agencies and private rail

companies regarding rail safety and security. The following is a summary of key stakeholders with direct involvement in rail safety or security issues.

Federal Railroad Administration (FRA) is responsible for promoting the safety of the nation's passenger and freight railroads. The FRA fulfills this responsibility by developing programs that identify, monitor and address railroad safety issues; and by promulgating and enforcing regulations that prescribe minimum rail safety standards. Each year, federal safety inspectors make nearly 90,000 inspections of track, rail tank cars, operating practices and shipping facilities nationwide. The FRA also coordinates numerous grade crossing and trespass-prevention initiatives, collects and analyzes rail incident data, and creates statistical reports.

Federal Highway Administration (FHWA) has a major role in safety at roadway-railway grade crossings. It sets standards for traffic control at roadway-railway grade crossings and establishes reporting requirements for crossings. The FHWA also manages the Railway-Highway Crossing Program, a subset of the Highway Safety Improvement Program. Funds from this program provide for the elimination of hazards and the installation of protective devices at public roadway-railway crossings. To be eligible for these funds, states must publish an annual report on the effectiveness of safety projects in reducing roadway-related crashes, injuries and fatalities. The FHWA also tests proposed new warning devices to ensure they meet the criteria for motorist survival if the device were to be struck by a motorist when installed.

Federal Transit Administration (FTA) oversees the safety and security of the nation's transit systems which include commuter rail operations. The goal of the FTA Safety and Security Program is to "achieve the highest practical level of safety and security for all modes of transit." In addition to oversight, the FTA also provides technical assistance to programs that help transit agencies prevent injuries, fatalities, property damage and system interruption, and to ensure transit agencies are able to quickly and effectively respond to any incidents.

Wisconsin Office of the Commissioner of Railroads (OCR) is the state agency with primary jurisdiction for the safety of public roadway-railway crossings, regardless of whether the crossing is at-grade or separated. In carrying out its responsibilities, this office works closely with WisDOT on rail safety issues. The OCR's duties include:

- Authorizing installation, alteration, repair and consolidation of roadway-railway crossings
- Making determinations on petitions for closures and establishment of new crossings, and on the adequacy of warning devices at railroad crossings
- Making determinations on railroad fencing and railroad track clearance laws

> WisDOT serves as the state sponsor of **Wisconsin's Operation Lifesaver, Inc.**, an international, non-profit, public education program established in 1972. Its goal is to end collisions, deaths, and injuries at places where roadways cross train tracks and on railroad rights of way. Operation Lifesaver, Inc. supports public education, engineering and enforcement efforts. Its programs are sponsored cooperatively by federal, state and local government agencies; highway safety organizations; and the nation's railroads. Trained and certified volunteers make safety presentations to a wide variety of groups throughout the state.

As the state agency with statutory responsibility and legal jurisdiction to investigate the safety of roadway-railway crossings, any order by the OCR is final and has the force of law following any appeal.

Wisconsin Department of Transportation (WisDOT**)** is the primary state agency responsible for roadway-railway crossing improvements statewide. WisDOT regularly improves crossings as part of highway projects. These improvements typically address crossing surfaces and active warning devices. Several WisDOT efforts address the security of roads, bridges, buildings and other transportation assets including rail corridors and stations. Because railroads are typically owned and operated by private interests, WisDOT's enforcement efforts are focused on road traffic at grade crossings. WisDOT also promotes rail safety and security through its Internet site and educational programs such as Operation Lifesaver. At the planning level, WisDOT coordinates with local jurisdictions, metropolitan planning organizations, regional planning commissions, railroads and rail transit commissions in considering rail safety improvements.

Office of Wisconsin Emergency Management (WEM), located in the Department of Military Affairs, is responsible for coordinating all state security matters. When rail emergencies arise, WEM coordinates the local response effort, including state and local law enforcement, emergency responders and the railroad companies.

Railroad companies are private entities that typically own the rail lines on which they operate. They are subject to safety and security regulations, primarily at the federal government level. At the state level, they are subject to the regulations of the Office of the Commissioner of Railroads. The responsibilities of railroads, in terms of safety and security, include:

- Maintaining all public roadway-railway crossing surfaces in good repair and in safe condition for public travel (Section 86.12 and Section 86.13, Wis. Stats.)
- Providing advance railroad crossing warning signs for town and county rail crossings (the local authority installs the signs)
- Maintaining all installed warning devices, both active and passive, at public at-grade roadway-railway crossings, including interconnecting signals to traffic signals
- Providing safety and security preparedness and emergency response efforts on their rail lines

Amtrak is responsible for ensuring the safety and security of its passenger operations. Examples of the measures it uses include Amtrak police officers and security teams, onboard security checks and canine (K-9) units.

Metra is responsible for ensuring the safety and security of its commuter rail operations. Like Amtrak and private railroad companies, it has its own police department, which provides security for all its lines and stations. Metra also provides training and education on emergency preparedness to its staff and to emergency responders serving communities in which it provides service.

Due to the number of groups having a role in rail safety and security, coordination and communication is very important in ensuring that safety and security issues are addressed quickly and efficiently.

Rail Safety

Most rail safety rules and regulations fall under the jurisdiction of the Federal Railroad Administration (FRA). The 2008 Rail Safety Improvement Act requires stronger rail safety measures affecting grade crossings, train operations, crews, hours of service, and calls for the improvement of automatic train stop technologies. Railroads operating in Wisconsin are subject to these federal rules and regulations. As a result of federal preemption, Wisconsin has limited autonomy with regard to rail safety issues. While WisDOT can make the FRA aware of particular issues, the department cannot force a railroad to act.

In 2009, there were 57 crashes involving trains in Wisconsin. These crashes resulted in four fatalities and 24 injuries. Nationwide, commuter rail and intercity passenger rail remain one of the safest ways to travel.

There are three key safety concerns with rail transportation:

- Crossings
- Quiet zones
- Collisions and derailments

In addition, there are two concerns that impact both safety and security:

- Trespassing
- Shipment of hazardous materials

Crossings

Over 7,200 rail crossings are located in Wisconsin (Table 9-1). Rail crossings can be either at-grade or grade-separated. At-grade crossings are the most common type of crossing in Wisconsin, accounting for over 89 percent of all crossings in the state. At-grade crossings occur wherever a railway and highway physically intersect. Grade-separated crossings occur when the railway and roadway are physically separated by an overpass or underpass.

Since 1990, crashes at highway-railway grade crossings have declined by more than 50 percent nationally. Even with this decline, railway-roadway crossing safety remains a concern.

Table 9-1: Roadway-railway crossings in Wisconsin, 2008

Crossing Type	Public	Private	Pedestrian	Total
At-grade	4,110	2,288	87	**6,485**
Separated	683	53	31	**767**
Total	**4,793**	**2,341**	**118**	**7,285**

Source: US DOT National Highway-Rail Crossing Inventory, December, 2008

At-grade crossings are equipped with warning devices to alert vehicles and pedestrians of the presence of a rail crossing. These warning devices may be either passive or active. Passive devices do not change when a train is approaching. Examples of passive devices include:

- Circular advance warning signs
- Stop signs
- Crossbucks (the familiar X-shaped signs)
- Pavement markings
- Median barriers

In comparison, active devices become active as a train approaches. For example, lights may flash and gates may be lowered. Examples of active devices include:

- Two quad gates
- Four quad (full barrier) gates
- Flashing lights (cantilevered or mast-mounted)
- Bells
- Yield signs
- Highway traffic signals
- Special warning devices such as flagmen

WisDOT and local governments use both active and passive devices.

Crossing safety may also be increased through changes to the roadway or to the area near the crossing. For example, the design of the roadway may be changed to improve sight distances. Likewise, clearing brush or trees can also improve sight distances.

WisDOT and local governments regularly improve roadway-railway crossings as part of roadway projects. Any project that crosses a rail line or ends near a rail line must include a review of whether any crossing improvements are needed. WisDOT and local governments cannot ignore any railway crossing related improvements when completing a roadway improvement project. In some instances, WisDOT or a local government may improve a roadway-railway crossing even though a project is not planned. In all instances, crossing improvements are coordinated with the railroad company.

With over 6,500 at-grade crossings in the state, rail crossing safety remains a challenge and a priority. Actions that can be taken to improve rail crossing safety include minimizing the installation of new crossings of rail lines, increased education about the dangers of rail crossings, constructing grade-separated crossings or closing existing crossings.

Educational efforts can increase public awareness of the dangers at roadway-railway crossings, and emphasize the need for motorists, pedestrians and bicyclists to respond properly to crossing warning devices. *Connections 2030* stated that WisDOT will continue to support the Operation Lifesaver program that teaches safe behavior while crossing railroad tracks.

As noted earlier, grade-separated crossings are safer than at-grade crossings because they physically separate vehicles, pedestrians and bicyclists from trains. Grade-separated crossings also:

- Eliminate the need for signs, barriers or other safety devices and technologies to warn roadway users of oncoming trains
- Reduce traffic congestion caused by vehicles waiting at a crossing for a train to pass, and as a result may also improve air quality and reduce energy consumption

However, grade-separated crossings are expensive to build and maintain. Typically, these crossings are built in locations with higher volumes of vehicle and train traffic. Construction may be hindered by physical limitations such as existing land uses and topography.

The most effective way to improve crossing safety is to close crossings. While closing a crossing can positively impact crossing safety, it can result in hardships to those directly affected by the crossing. For example, eliminating a crossing may result in greater travel times for drivers, bicyclists and pedestrians. It can also result in increased emergency response time for emergency vehicles. Closed crossings may also function as barriers, preventing easy or convenient movement within a community and between neighborhoods. As a result, WisDOT and the Office of the Commissioner of Railroads (OCR) consider many factors when deciding whether to close a crossing. They include:

- Amount of vehicle and pedestrian traffic
- Response time for emergency vehicles
- Physical conditions and visibility
- Feasibility of rerouting traffic to adjacent crossings
- Crash history and predicted crash frequency rate
- Improvement in livability in the area near the proposed closure

Rail line abandonment can result in the closure of large numbers of crossings. However, rail line abandonments typically occur on low volume railway corridors. As a result, the derived safety benefit may be minimal. In addition, the bulk of rail line abandonments occurred during the 1980s. While railroads still abandon low volume corridors, these abandonments occur less often than in the past. Of the 49 crossings closed in the state from 2000 to 2009, none were due to rail line abandonment.

Where possible, WisDOT and OCR target crossing closures in areas with multiple adjacent crossings, concentrating safety improvements at the remaining crossings. By focusing on these areas, many of the negative impacts associated with closures can be minimized.

Connections 2030 notes WisDOT will continue to work with OCR and private railroad companies to identify potential rail crossing safety improvement such as signals, gates, grade separations, or closing crossings. In addition, for rail corridors with intercity passenger rail service, WisDOT will continue to work with OCR to discourage new at-grade crossings of the corridors. WisDOT will work to equip federally-designated high-speed rail corridor crossings with appropriate warning devices.

Quiet zones

Train engineers are required by the FRA to sound the locomotive horn as a warning at public roadway-railway crossings. However, the FRA also provides an opportunity for communities to mitigate the effects of train horn noise by establishing quiet zones. Wisconsin's local governments have exercised their authority to create quiet zones within their jurisdictions to improve community quality of life.

Implementing quiet zones can present funding challenges for communities. Because locomotive horns are a basic warning device, eliminating this safety measure requires the installation of other safety measures at public crossings within the quiet zone. While WisDOT neither supports nor opposes quiet zones, department policy prohibits federal or state funds from being used for safety upgrades solely to establish a quiet zone in a community. Instead, federal or state funds may be used only if there is an overarching need for safety improvements at the crossing and those improvements happen to meet the standards for creating a quiet zone. In these instances a community has the option of establishing a quiet zone. For all other instances, a community must fund the necessary safety improvements on its own.

Even when quiet zones are established, train engineers retain the authority and responsibility to use the horn if they feel conditions warrant its use.

Collisions and derailments

While derailments may occur when a train collides with a vehicle, the chances for a derailment increase significantly if a train collides with another train. This section focuses on train-to-train collisions. These collisions may result from natural events, such as severe weather, from human error, or from a range of other potential causes.

Examples of technologies used to minimize or avoid collisions and derailments include:

- Positive train control
- Electronically controlled pneumatic braking system
- Distributive power
- GPS-based interactive car location system
- LED signal system
- Wayside detection system
- Automatic train stop system

Table 9-2 provides a brief description of each of these technologies.

Table 9-2: Examples of technologies that may reduce train collisions and derailments

Technology	Description
Positive train control	• Enables computers to override human workers in emergency situations • Helps prevents train-to-train collisions, over speed derailments, and casualties or injuries to railway workers • Required for all Class I railroads and Amtrak by December 2015
Electronically controlled pneumatic brakes	• Results in shorter stopping distances, fewer derailments and collisions, and reduced severity of collisions that do occur • Allows each car to be braked simultaneously — in comparison to current braking systems which apply power car-to-car from the front of the train to the rear • Allows engineers to "back off" braking efforts to match track grade and curvature without completely releasing the brakes
Distributed power	• Results in improved handling, demonstrated by an average 22 percent reduction in stopping time and a 30 percent reduction in braking distance • Occurs when multiple locomotives, controlled by the lead locomotive, are spaced throughout long trains • Uses radio-signal remote technology to serve as communication link between the locomotives

Trespassing

Trespassing presents both safety and security concerns. Even as roadway-railway crossing-related fatalities have declined, the number of trespassing-related fatalities has risen. Since 1997, trespassing fatalities have become the leading cause of rail-related fatalities in the United States. In Wisconsin, there were 16 trespassing-related fatalities between 2007 and 2009.

Trespassing also presents rail security concerns. Since the events of September 11, 2001, trespassers are now considered a potential security threat.

The public as a whole is generally indifferent to trespassing, with some even finding it socially acceptable. Since rail facilities are private property, trespassing is illegal and subject to local and state laws. (Note: There is an exception to the trespassing laws for private crossings, whereby a person who owns the property on each side of a railroad is allowed to drive across the railroad on that property.)

Railroads, local jurisdictions, and state and federal agencies rely on a variety of measures to prevent and restrict trespassing. Education is one measure. The FRA sponsors and carries out public education related to the dangers of trespassing on rail facilities. Railroad police departments play a crucial role in monitoring trespassing. These departments work closely with public enforcement agencies. Fencing, lighting, gates and barricades are other measures that can be installed to discourage trespassing.

Connections 2030 notes that WisDOT will continue to work with the OCR and private railroad companies to discourage trespassing by installing fencing.

Shipment of hazardous materials

The U.S. Department of Transportation defines hazardous materials, or HAZMAT, as substances or materials capable of posing an unreasonable risk to health, safety, or property when transported in commerce. Hazardous materials shipments present a unique safety and security concern. In the absence of a collision, derailment or security threat, these shipments present little risk. However, if a collision or derailment were to occur, or if a terrorist were to use a hazardous materials shipment as a weapon, the potential consequences would be considerable.

A 2006 FRA audit reported an increase in the number of hazardous materials defects for all Class I railroads from a previous audit done in 2003. The audit focused on railroads' compliance with requirements related to hazardous materials shipments and hazard communication. The 2006 audit emphasized the importance of continued preparedness for potential hazardous materials incidents.

As noted earlier in this chapter, the Office of Wisconsin Emergency Management (WEM) coordinates security concerns in Wisconsin, including coordinating emergency response efforts. WEM contracts with eight regional HAZMAT response teams to provide a high level of response capability to the state's communities. These teams may be activated for an incident involving a HAZMAT spill, leak, explosion, injury, or the potential of immediate threat to life, property, or the environment. County-level response teams respond to lower level hazardous materials incidents that exceed the capabilities of standard fire departments.

As discussed in the next section, WisDOT's role in transportation security is limited. *Connections 2030* identities two key policies related to transportation security:

- Enhancing the security of the transportation system by reducing vulnerability
- Improving emergency response to make the transportation system more resilient

WisDOT will continue to implement these policies. In addition, WisDOT will continue to work with WEM, railroad companies and other agencies to discuss rail-related security issues. WisDOT also expects rail carriers to comply with regulations related to the transportation of any hazardous materials and work with the appropriate agencies if a spill occurs.

Rail Security

Like safety, transportation security is a high priority. However, WisDOT's role in transportation security, including rail security, is limited. The Wisconsin Home Rule statute (Chapters 59 and 163, Wis. Stats.) notes it is the responsibility of the local government to respond to emergency events. WisDOT typically serves in a support role unless the local jurisdiction defers command to WisDOT. As a result, the key players involved in rail security are Wisconsin Emergency Management, local governments and

railroads. Federal agencies may also become involved if there is a threat of an incident or if an incident occurs.

Rail security is often separated into two types: passenger rail, which includes commuter rail and freight rail. Each type has its own security concerns. For example, passenger rail has several characteristics that make it vulnerable to attack:

- Easy accessibility
- Quick service to destinations
- Large number of access points
- High volumes of passengers (particularly for commuter rail operations)

Due to these characteristics, using airport-like security measures is impractical.

No specific threats have been identified regarding the freight rail system. However, security experts note it may be an attractive terrorist target for several reasons:

- Publicly accessible
- Long stretches of open and unattended track
- Difficulty of securing rail assets
- Corridors in densely populated urban areas

To date, freight rail security efforts have focused on securing the shipment of certain hazardous substances, as well as ensuring the security of key infrastructure.

In this section, rail security concerns focus around two key areas:

- Reducing vulnerability
- Improving emergency response

Reducing vulnerability

In 2005, WisDOT conducted a security assessment of the state's critical transportation infrastructure. As part of the assessment, the department identified public and private rail facilities that would compromise Wisconsin's transportation system if damaged or destroyed. WisDOT's vulnerability assessment identified more than 100 transportation facilities – including highways, rail, air, transit and waterways – as having the potential to catastrophically disrupt the state's transportation system. The department also identified possible actions to prevent or mitigate potential security threats. These actions fall into three categories:

- Deterrence – examples include fencing, lighting, barriers, gates, checkpoints, patrols and guards
- Detection – examples include personnel identification, inspection, lighting, alarms, sirens, closed-circuit television, and chemical, biological, radiological, nuclear and explosive detection technology
- Defense – examples include barriers, structural hardening, and blast reinforcement

WisDOT and the railroads use all of these strategies and employ many of these devices and technologies in various combinations on railway locations statewide.

Highway bridges located over rail facilities are particularly vulnerable. Wisconsin has 613 highway bridges over rail facilities (not including pedestrian walkways). Rail cars parked beneath these structures—especially those containing hazardous materials—can pose a security threat to the roadway and to the railway itself if hazardous materials are released. WisDOT coordinates with railroad officials and other private companies to help keep the areas beneath these structures clear.

While grade-separated crossings can also pose a security threat, the threat is considerably less due to the smaller area of roadway and railway exposure. Wisconsin has 736 grade separated rail crossings (not including pedestrian crossings).

Addressing security needs for passenger and commuter rail is challenging. According to passenger rail experts, certain characteristics of passenger rail systems make them inherently vulnerable to terrorist attacks and difficult to secure. Balancing the potential economic impacts of security enhancements with the benefits of such measures is a difficult challenge.

Securing the nation's passenger rail systems is a shared responsibility. It requires coordination between federal, state and local governments; the private sector; and rail passengers who ride these systems. The Federal Transit Administration and Federal Railroad Administration are responsible for passenger and freight rail safety and security. In addition, passenger rail operators also share responsibility for securing their systems. Although all levels of government are involved in passenger rail security, the primary responsibility for securing passenger rail systems rests with passenger rail operators. As a partner in those efforts, WisDOT will continue to participate in discussions and implement measures to ensure the security of the transportation system statewide.

The Department of Homeland Security issued a series of directives regarding protective measures that apply to all passenger rail operators. These directives include:

- Conducting comprehensive vulnerability assessments of rail and transit networks that operate in high-density urban areas
- Training personnel to prevent and respond to potential terrorist events
- Requiring operators to remove trash receptacles except clear plastic or bomb-resistant trash containers at certain locations
- Asking employees and passengers to report suspicious behavior or unattended property
- Using canine explosive teams to screen passenger baggage, terminals and trains, when needed
- Ensuring that security levels are consistent with Department of Homeland Security threat levels

To assist with passenger rail security, *Connections 2030* noted that WisDOT will:

- Seek federal security funding to install and operate flat-panel displays and remote audio announcement technology at all Amtrak stations in Wisconsin
- Take an active role in the oversight of security for new commuter rail systems in Wisconsin

Improving emergency response

The importance of coordinated, skilled emergency response procedures – in both the initial hours after an incident occurs and in the weeks and months following the incident – has been demonstrated repeatedly. Major incidents typically involve a phase of rescue and recovery followed by a longer period of reconstruction. The demands placed on transportation and emergency response partners evolve throughout an emergency situation.

Whether a critical event is triggered by environmental conditions, equipment or structural failure, human error, or terrorist action, numerous agencies have roles in the response effort. These include federal, state and local agencies, railroads and other private companies. Communication between these groups is important to ensure that appropriate and accurate information is shared in a timely manner. To help facilitate a prompt response, every roadway-railway crossing in Wisconsin has a sign indicating that crossing's unique identification number, as well as emergency contact numbers. This allows emergency responders to quickly identify an incident's location.

As mentioned previously, Wisconsin Emergency Management (WEM) coordinates the local response effort, which includes fire departments, hazardous materials response teams, law enforcement, state transportation officials, and the railroads. In some instances, rail personnel might first contact the National Response Center, which will then contact WEM.

In situations where emergency evacuation of residents might be necessary, commuter rail operators and Amtrak coordinate with the Federal Emergency Management Agency (FEMA).

To improve emergency response, WisDOT has adopted an Emergency Transportation Operations Plan. This plan encompasses all modes. It provides the necessary structure for the department to effectively respond to an emergency incident. The Emergency Transportation Operations Plan documents the procedures, processes, technology, roles and relationships used by the department when responding to incidents.

One key area of emergency response focuses on the nation's defense. Each year, the Department of Defense ships a large number of heavy vehicles and equipment by rail for deployment. The department established the Strategic Rail Corridor Network to ensure that its minimum mobility needs are identified and coordinated with the appropriate transportation authorities. The Strategic Rail Corridor

> The Department of Defense has identified a network of *highways* –The Strategic Highway Network (STRAHNET)—designated as important to the nation's strategic defense policy.

Network consists of over 38,000 miles of track nationwide and serves 190 defense installations. In Wisconsin, the STRACNET line is the same as that used by Amtrak for passenger rail travel (see Map 9-1).

Map 9-1: Wisconsin's designated Strategic Rail Corridor