Impact of Blocked Highway/Rail Grade Crossings On Emergency Response Services

Federal Railroad Administration

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Report on the Impact of Blocked Highway-Railroad Grade Crossings on Emergency Response Services

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I. Executive Summary

As directed by Congress in the Safe, Accountable, Flexible, Efficient Transportation Equity Act; a Legacy for Users of 2005 (SAFETEA-LU), the Federal Railroad Administration (FRA) has prepared a report regarding the impacts of blocked highway-railroad grade crossings on emergency response providers.[1] In this report, FRA has identified the principal causes of blocked grade crossings.

While every minute can be precious in an emergency, crossings blocked for extended periods of time are a much greater problem than simply having to wait while a train passes through a crossing. A variety of railroad operational issues, described in this report, can lead to trains stopping in a position that blocks a crossing. Given the growth in both rail and highway traffic, it is likely that the problem of blocked crossings will increase in the future.

Railroads and communities around the country, working together, have crafted a number of solutions to the problem. These remedies range from grade separations, which solve the problem completely, to cooperative agreements with the railroads to notify emergency response personnel when a crossing is or may be blocked. Grade separations are expensive and generally are undertaken to address traffic problems caused by blocked crossings, although the advantages for emergency response are a factor in justifying such investments. Monitoring railroad operations, either with radars and cameras at crossings or through contact with the railroad, is much cheaper. When dispatchers are aware that a crossing is or will be blocked by a train, they can route emergency responders to alternative routes. Additionally, railroads have altered their operations in ways that reduce blockages, although often these changes increase railroad costs.

Communities are the best judges of the severity of the problem of blocked crossings. Working with the railroads, they can identify the most cost-effective solution. The existence of relatively inexpensive remedies should allow most communities to take the necessary steps to mitigate the problem.

Railroads must play a key role. They should actively work with communities to identify problems and propose possible remedies. Although railroads have only limited staffs available to work on community issues, this report found numerous examples of active railroad and community cooperation that resulted in projects or procedures to reduce the impact of blocked crossings.

II. Introduction

Section 9004 of SAFETEA-LU, "Report Regarding Impact on Public Safety of Train Travel in Communities without Grade Separation," requires the Secretary of the U.S.

[1] For the purpose of this report, highway-railroad grade crossing refers to any vehicular crossing of railroad tracks, including state and federal highways, county roads and city streets as well as private grade crossings.

Department of Transportation (DOT) to conduct a study of the impacts of blocked highway-railroad grade crossings on emergency response providers - ambulance, fire, and police services. The Federal Railroad Administration (FRA) has conducted this study for the Secretary, gathering information from State and local government officials, emergency responders, and the railroads.

This report describes the sources of the blocked highway-railroad grade crossing problem and reports on possible solutions. The report presents a number of case studies of communities that have experienced blocked grade crossings and solutions that have either been implemented or are in the process of being developed.

In the preparation of this report, FRA has received assistance from a number of entities, including our DOT partners, the National Highway Traffic Safety Administration (NHTSA) and the Federal Highway Administration (FHWA): a variety of state and local governments and several railroads. We thank them all for their assistance.

III. Methodology

There is no uniform national data collected on blocked crossings or on emergency responder delays. While some individual communities collect information on these subjects, there is no way to extrapolate these experiences into a national picture of delays. Therefore, the approach chosen was to contact those who had knowledge or experience in the area and build on that to create a report that explored the issue on the basis of those who actually dealt with it.

First, FRA sought to better understand the problem as seen by the emergency response community. Working with NHTSA, FRA sent a joint letter to state emergency response directors, soliciting input on their perception of the problem. This led to additional contacts in the emergency medical services (EMS) community, including mention of the study on various EMS-related websites. As a result, FRA received a large number of responses from police, fire, and rescue personnel throughout the country. Their experiences and concerns led to a better appreciation of what they faced and where those problems were most severe.

Additionally, the FRA's regional grade crossing managers, who deal daily with grade crossing safety concerns, were asked to provide any experiences and contacts they might have with regard to emergency response issues.[2] They provided valuable information on specific crossing concerns in a number of areas as well as identifying locations we might use for case studies.

State DOTs were contacted both to learn of problems and solutions as well as to get their views. They provided valuable contacts and information on the issue, including how state rail programs were working to eliminate or avoid such problems.

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[2] FRA has regional grade crossing managers in each of its 8 regions. See Appendix II for their names and contact information.

Finally, FRA contacted the Class I railroads to learn of their view of the issue, and, in particular, how they were addressing blocked crossings. They provided much valuable information on their operations and on solutions they had identified.

Using the contacts developed, FRA followed up to learn more about what was the cause of blocked crossings and what solutions might be appropriate. The results of these efforts are summarized in the case studies in Appendix I.

The FRA then identified solutions proposed or implemented in various communities. Each community is best situated to evaluate how severely it views the situation and what efforts it is prepared to make, in cooperation with the railroads, to mitigate the problem. This report gives an idea of the wide range of solutions to be considered.

IV. Scope of the Problem

There are over 241,000 highway-railroad grade crossings in the U.S., 146,000 public and the rest private.[3] Highway-railroad crossings are blocked when trains travel over or stop on track crossed by a highway. Trains may block crossings for only a limited time for a short passenger train traveling at a fairly high speed, or for hours after a grade crossing accident or a mechanical problem with a train. Blocked crossings are a problem for all highway users, but they can be a particularly serious problem for emergency responders. Emergency responders (emergency medical services, fire and police) need to reach their destinations as quickly as possible. An ambulance racing to a heart attack victim or an automobile accident may be delayed only a few minutes by a passing train, but even a few minutes is a very long time in an emergency. A fire engine forced to take another route because of a stopped train may arrive at a fire too late to prevent significant damage or even deaths or injuries. Delayed police response can lessen the chance to apprehend a criminal or prevent a more serious crime.

The problem is not simply trains moving through a grade crossing. Many areas reported problems with trains that stopped while blocking a crossing, sometimes for hours. There are a number of reasons for trains to block crossings and these factors also determine the length of time the crossing is blocked.

While there are no aggregate statistics on delays at crossings, blocked crossings have become a more contentious issue in recent years. This may be partly due to the expectation that emergency response will be quicker and therefore delays are less acceptable. But there are several national trends that may be leading to greater problems with blocked crossings.

[3] These numbers are approximate, based on reports by state DOTs to FRA and other sources. In some cases, a railroad line may be abandoned, but the crossing is still counted. In other cases, a highway crossing may be closed, but still counted. New crossings, both public and private, are added all the time, making it difficult to have an exact number.

A. Community Growth

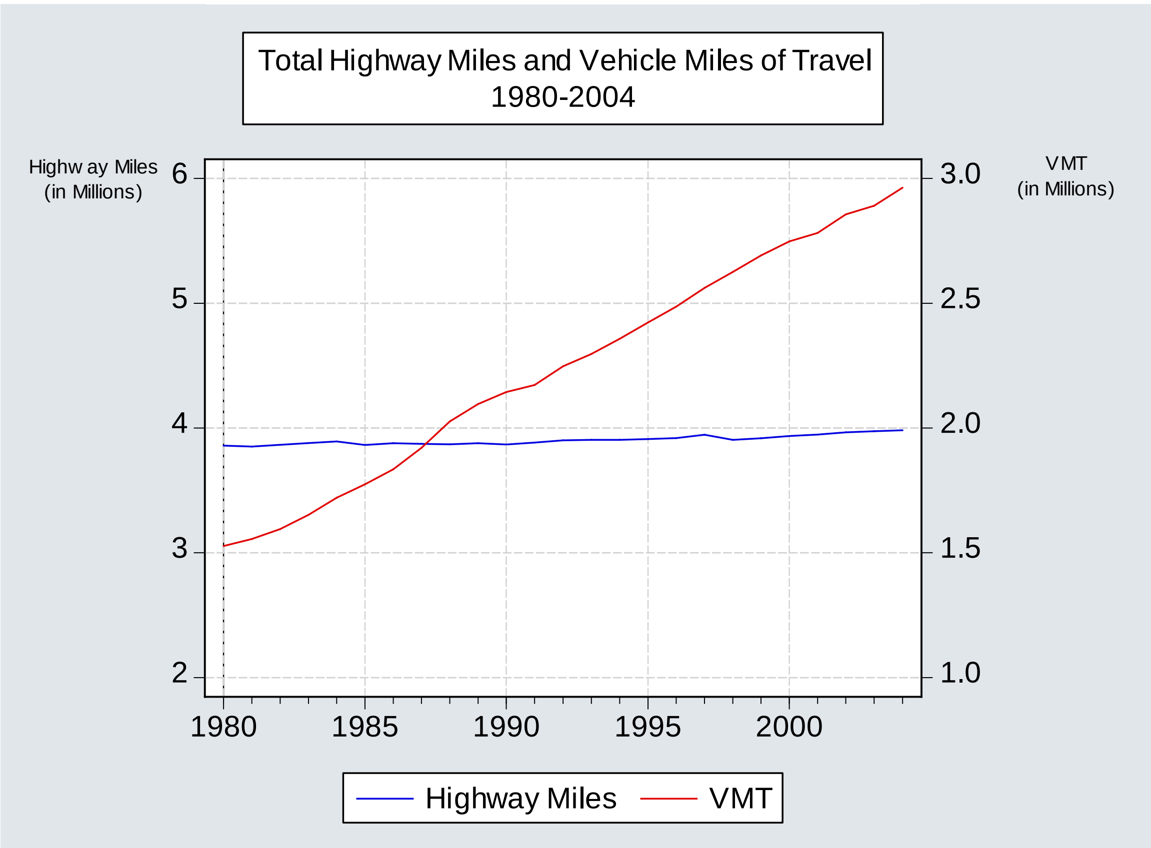
In many parts of the country, communities grew up around the railroad, which means the railroad often runs right through the middle of town. Grade separations in these towns are often resisted because of the density of development and the need to build ramps to any road bridge over the tracks. If these towns have emergency facilities only on one side of the railroad, the potential for blocked crossings will grow as the community grows, particularly if rail traffic is also growing.

As these towns spread out into suburbs, development leads to new roads and demands for additional grade crossings if there is no nearby grade-separated highway. This can result in new residential areas without direct grade separated access to emergency facilities.

B. Growth in Highway Traffic

Highway traffic has grown steadily. As Chart 1 indicates, the number of lane miles has grown much more slowly. This has led to increased traffic density on many of our roads and highways. With more highway traffic, blocked crossings inevitably lead to more delays for motorists. The ensuing congestion can further hamper emergency responders who are delayed by a train in a crossing. They must then make their way through the traffic resulting from blocked crossing.

Chart 1



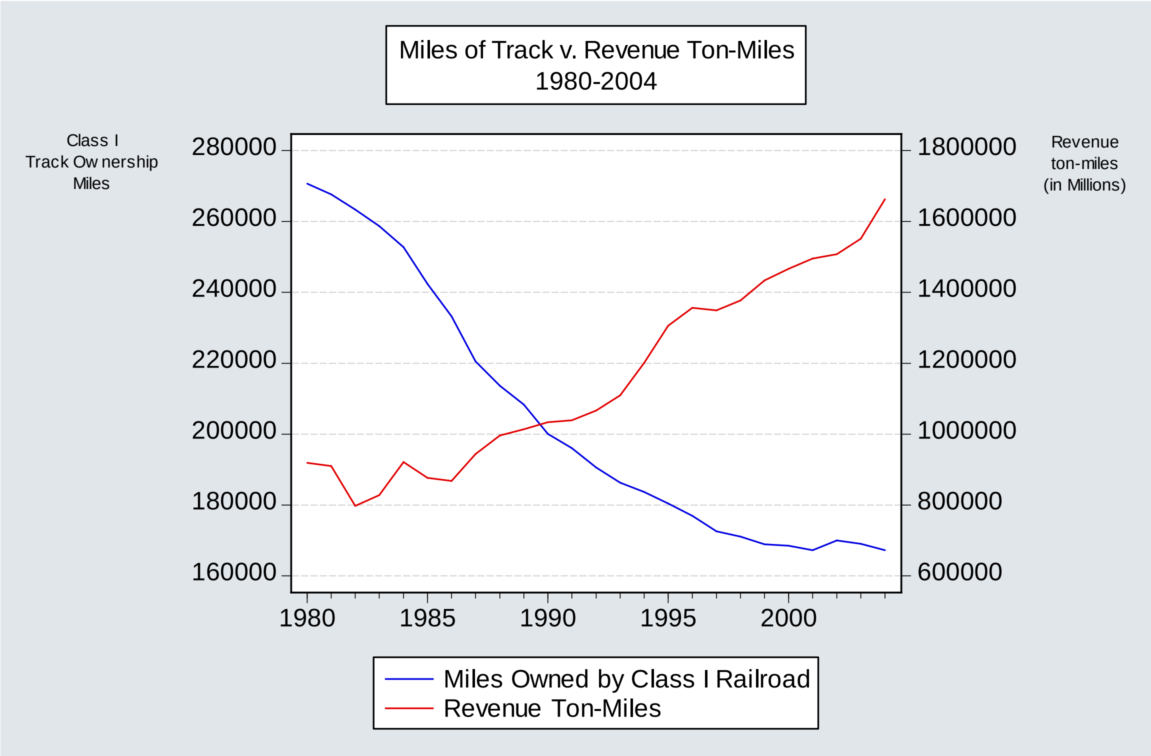
Source: Federal Highway Administration, Highway Statistics, 2004

C. Growth in Rail Traffic

Like highway traffic, rail traffic has continued to grow. In 1980, railroads in the United States originated 1.492 billion tons of freight traffic. By 2004, that figure grew to 1.844 billion tons.[4] The growth in rail traffic reflects changes in rail regulation and the growth of demand for rail transportation. After years of decline, the rail industry was partially deregulated by the Staggers Act in 1980. The railroad industry then entered a period of consolidation and restructuring that led to a decrease in track miles, increased railroad merger activity, and significant productivity improvements

Between 1980 and 2004, despite traffic growth, railroad track miles decreased considerably (see Chart 2). The result is that density – cars or trains per day for each mile of highway or track - has steadily grown. Grade separations have alleviated conflicts in some areas, but more trains and more vehicles at most crossings inevitably lead to highway delays – delays that can also delay emergency response times.

Chart 2



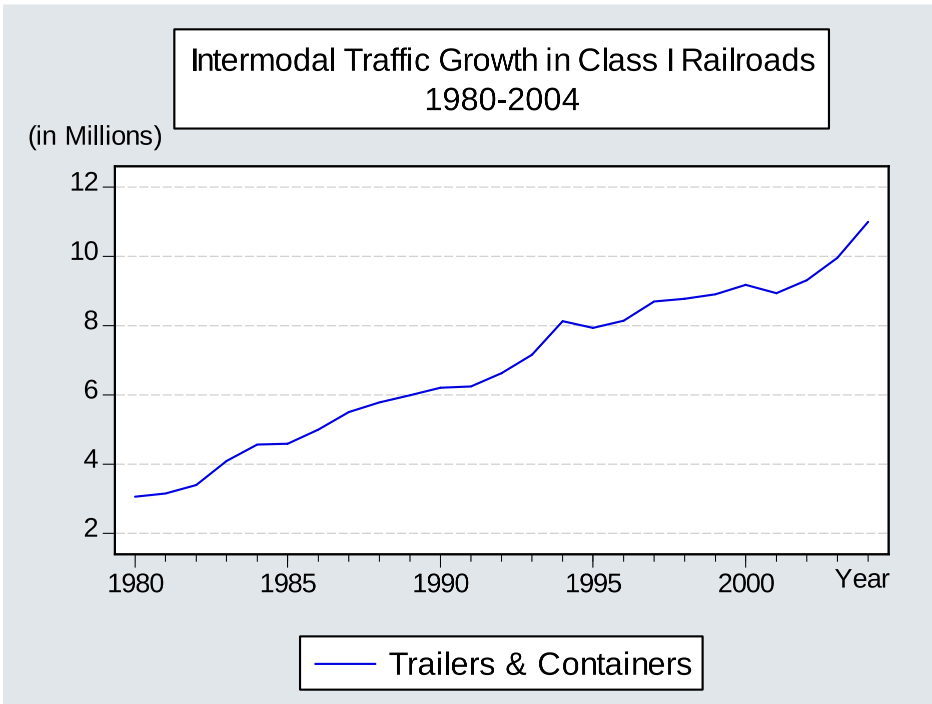
Source: Association of American Railroads, Railroad Facts, 2005 Edition, page 27, 45

The demand for rail services has meant more trains on those remaining miles. The increase in the number of trains on a line inevitably means more delays for highway users and emergency responders. Rail traffic growth has come primarily from two sources: intermodal freight and coal. The growth in intermodal freight traffic, particularly in

[4] Association of American Railroads, Railroad Facts, 2005 Edition, page 28.

trains to and from the Ports of Los Angeles and Long Beach, has been phenomenal (see Chart 3). Coal traffic, the historic mainstay of the rail industry, has also been increasing rapidly. The relatively low price of coal for generating electricity, compared to natural gas and oil, has led many utilities to increase the use of coal where possible. Responding to legislation to reduce emissions, many utilities have switched to low-sulfur coal from the Powder River Basin in northeastern Wyoming and nearby areas. This coal is now being hauled to utilities in the south and east. These long hauls have increased traffic on a number of Midwestern rail lines.

Chart 3



Source: Association of American Railroads, Railroad Facts, 2005 Edition, page 26

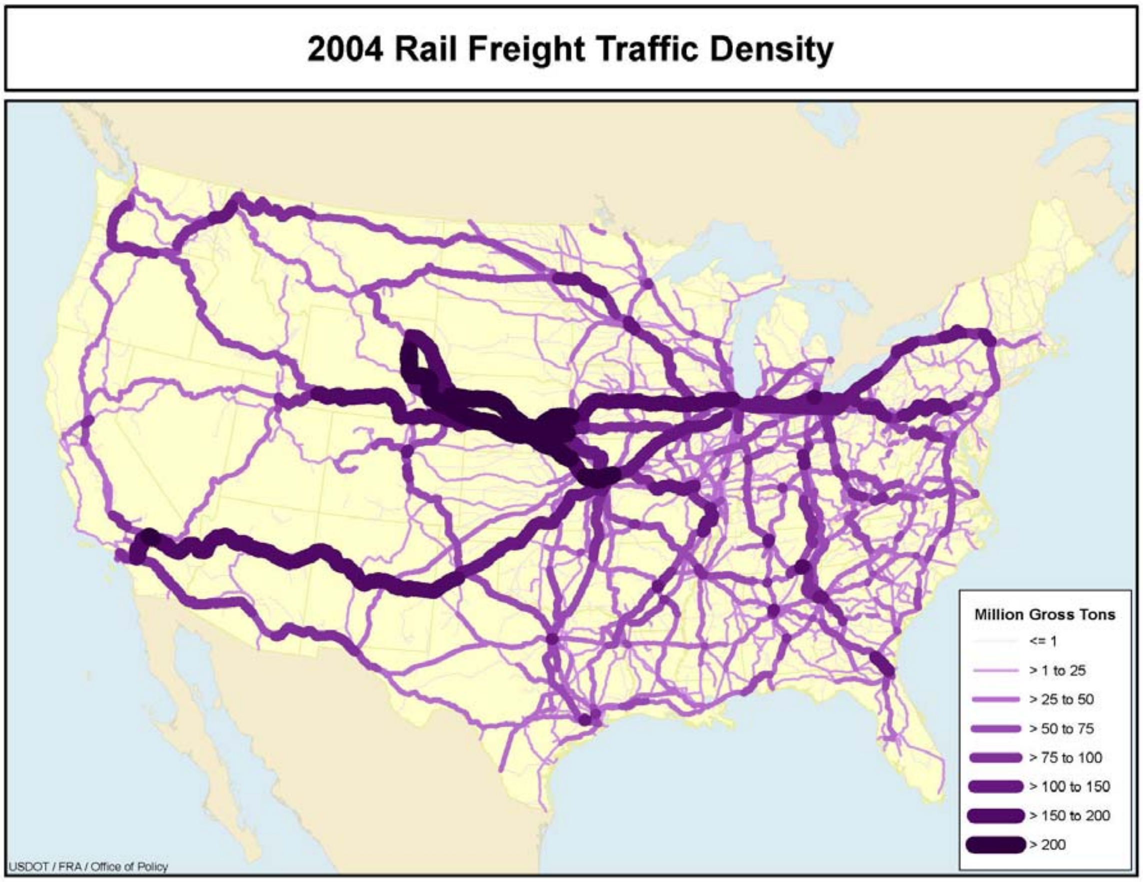
V. Causes of Blocked Crossings

A. Moving Trains

Many freight trains today are over one mile long. At twenty miles an hour, such a train would take 3 minutes to clear a crossing. If the crossing has gates, those gates would go down before the train arrived and would not rise until the train had passed, perhaps adding another minute or two. With growing rail traffic handled over fewer rail lines, blockages due to passing trains are becoming more frequent in certain areas. There are a number of rail corridors with over 100 trains a day, and some with over 150. If, as a rough estimate, a given crossing has four trains an hour, it is inevitable that at some point the gates lowered for a passing train will remain down as another train approaches from the opposite direction, so crossings of busy lines might see delays of 10 or more minutes per occurrence, depending on train speed.

Rail freight traffic density is shown in Map 1. Forecasts by the U.S. DOT and DRI-WEFA (see AASHTO Bottom Line Report, Table 6, Page 56) indicate that freight traffic overall is likely to increase 57% between 2000 and 2020 while rail traffic is forecast to grow by 44% in the same period, leading to even greater density.

Map 1



As of July, 2006, oil had reached a price of $78 a barrel, an increase of about 300% from the $25 a barrel it sold for in 2000. If oil prices remain at current (or higher) levels, coal traffic from the Powder River Basin and other areas will grow rapidly. Additionally, continued economic growth will likely generate rapid growth in intermodal traffic from the ports.

Increases in train traffic coupled with increases in highway traffic will lead to more congestion related to highway-railroad grade crossings. It may also lead to problems in providing emergency services unless steps are taken to mitigate these problems.

B. Stopped Trains

The problem of blocked crossings due to passing trains, and sometimes multiple trains, is a serious problem in some limited areas. In many communities, however, the problem is due to stopped, rather than moving trains. Stopped trains might block a crossing for 15 minutes to several hours. The impact of a stopped train on emergency response can, of course, be very serious in cases of true emergency, particularly if no grade separated alternative is available nearby. The number of instances of blocked crossings due to stopped trains is probably increasing due to growth in rail traffic. There are a number of reasons, discussed below, that the growth in rail traffic and related congestion on the railroads may be causing more crossings to be blocked for extended periods.

1. Trains Held in Sidings

Railroad main lines are generally either double or single track. On single-track rail lines, passing sidings are used to allow two trains proceeding in opposite directions to pass (known as a "meet") or to allow a faster train to overtake a slower train. On a single-track rail line, one train must always pull into a siding and then wait to allow an oncoming train to proceed or to allow a faster train to pass. Trains operating over a double-track rail line generally do not have to stop to allow oncoming trains to pass. Depending on the capability of the signaling system and the availability of crossover tracks between the two rail lines, on a double track rail line, faster trains can even overtake slower trains going in the same direction, if there is no oncoming train in the area.

As the Map 2 shows, most railroad mainlines in the U.S. are single track. As traffic grows, a single-track railroad can quickly become congested, resulting in trains stopped in sidings for sometimes hours.

Map 2

Source: Trains Magazine

Colored lines indicate double (or more) tracked rail lines

Consider a fairly common situation: a single track main line and passing sidings every few miles. In such cases, one train must pull into the passing siding and await an oncoming train. Depending on the spacing of sidings, the speed of the trains, and whether or not they are on schedule, the train pulling into the siding (typically a lower priority train) may have to wait for a considerable time before it is free to continue its journey. Trains, and consequently sidings, have been getting longer. Sidings are now almost always a mile or more in length. In many parts of the country, it is difficult to locate a siding more than a mile long in a place where it will not cross a road. Trying to locate a series of such sidings along a rail corridor without blocking a crossing is nearly impossible. At least one railroad interviewed for this study has stated that it has had difficulty locating sidings where they are needed in terms of railroad operations due to community opposition to extending a siding across a highway. Any vehicle using a grade crossing that crosses a rail line at a siding is probably going to face serious delays occasionally.

For example, on CSX's busy corridor between Chicago and Florida, sidings are being lengthened to 10,000 feet. The distance between sidings is being reduced from 30 to 15 miles. Entrance and exits speeds are being doubled to 30 mph. Improved signaling will allow meets and passes to take place more efficiently.[5] These improvements, in addition to benefiting CSX's productivity, should have a positive impact on blocked crossings in the corridor, by reducing the time a train is stopped in a siding blocking a crossing.

To illustrate how long trains must sometimes remain in sidings in the course of normal operations, consider the situation just described, before improvements: sidings spaced 30 miles apart. A train arrives at the siding where a meet is to take place and pulls in. If the oncoming train is late, but has just passed the last siding between the trains, the stopped train would have to wait while the oncoming train covered the 30 miles between the sidings. That could easily mean the stopped train would stay on the siding for an hour or more, depending on the speed of the oncoming train. If that siding had a crossing, it would mean substantial delays for routine highway users but potentially critical delays for emergency response vehicles.

It also takes a considerable time for a stopped train to clear the siding and resume its journey after the oncoming train has passed. Among the factors that can determine the delays are powered or manual turnouts (switches) and the type of turnouts (higher or lower speed limits apply to different types of turnouts);[6] the railroad signaling system; the grade, if any, that the train must ascend; and visibility. If a grade crossing has been located beyond the end of the crossing to avoid parked trains blocking the crossing, there could still be a blockage of 15 to 20 minutes while the train pulls out of the siding. If the turnouts are manual, the train crewmember must throw the switch to allow the parked train to pull out of the siding onto the mainline, wait while the train pulls through the turnout (manual switches typically have a 15 mph or less speed limit), then throw the switch to the through position. The train, after it clears the turnout must stop and wait while the crewmember walks the length of the train (maybe a mile or more) to climb into the locomotive. At this point, the train can resume its journey.

The problem is even worse in cases where a lower priority train pulls into a siding to allow an overtaking train going in the same direction to pass. In this case, depending on the signaling system, the train must wait until the overtaking train has proceeded through the next signal block so that the passed train has a clear signal to proceed.[7]

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[5] Railway Age, September 2005, page 16

[6] These speed limits are determined by the angle that the turnout deviates from the tangent rail line. The sharper the angle, or the more quickly a train would be put in a new direction, the slower the speed limit

[7] Signaled railroad lines are divided into blocks. Each block has a signal at the beginning of the block that tells the engineer to stop, proceed slowly such as to be able to stop at the next signal, or to proceed normally. Two trains are generally not permitted to occupy the same block, since there would be no signal to warn an overtaking train that there is another train in the block. Two trains may occupy the same block under certain conditions if there is no risk of collision. For example, a train may be allowed to proceed at a very low speed until it approaches a stopped train in the same block when congestion delays several trains at the same time. Block spacing depends on railroad policies, but in general a block cannot be smaller than the distance that would be required for a train to stop.

Visibility can also be an issue, requiring the train to enter a siding at a slow enough speed to stop if there is a problem. This is a factor if the signaling system is not able to indicate whether the siding (as opposed to the mainline) is clear.

2. Yard and Switching Activities

Railroads yards are used to sort cars from arriving trains into departing trains bound for the car's ultimate destination. Yards function in a manner somewhat similar to airline terminal "hubs." Yards also form "local" trains that pickup and deliver cars to area customers. These switching activities -- pulling a block of cars from one track, then pushing the cars onto another track -- can lead to blocked crossings. Increases in rail traffic and the growing length of individual trains have strained the capacity of rail yards to assemble and disassemble trains. Few rail yards have highway crossings, but since many yards are a mile or more long, they often have highway crossings just beyond the "throat" of the yard. (The throat is the beginning of the yard, where turnouts begin to provide access to the many sorting and storage tracks.) As trains are assembled from blocks of cars on individual tracks, the switching locomotives must pull strings of cars out of the yard to clear a turnout, then push the string onto a different track to connect with the next block of cars scheduled to be part of the train. Highway crossings just beyond the throats of rail yards can be blocked by the assembling of trains and the associated pulling into and out of the yard.

Arriving trains are usually routed into a "receiving yard." The road locomotives are uncoupled and switching locomotives disassemble the blocks of cars in the train and put them on tracks where they will await their next move, either directly to a customer in a local train or assembly into new trains. If more trains arrive in a given period than there is room in the receiving yard, the arriving trains may wait in sidings along the mainline before the yard or on the mainline itself. These waiting trains may block crossings if they must wait on segments of track with crossings. Often, delays resulting from yard congestion have caused trains to block these crossings for far more time than would result from a passing train.

Railroad switching -- where a train stops, backs up and drops off or picks up cars and pulls forward again -- can produce longer blockages than a passing train would cause. Usually, these moves are involved in serving customers directly, picking up or delivering cars. Such switching can also result if the track configuration requires partial disassembling of a train to accommodate limited track structure. (See Case Study C. i., Greenville, NC.)

3. Operational Problems

Highway-railroad grade crossings may be blocked by trains forced to stop for operational reasons. These include trains stopping for mechanical reasons, trains stopped because the crew has reached the hours of service limits and trains involved in grade crossing accidents with highway vehicles[8]. In many of these cases, it may be several hours before the train can resume its journey.

Congestion on a railroad line often means delays for individual trains, as they wait in sidings for other trains to pass or are stopped on the mainline until room is found for them in a receiving yard. These delays can cause the train crew to reach its service limit under the hours of service rules. Railroad procedures generally call for the dispatcher to direct such crews to a siding where they can halt the train and await a relief crew. Dispatchers often attempt to place trains where they will not unduly impede highway traffic, but the key consideration is that they not block the railroad's mainline and that they are placed in a location where a relief crew, coming by van, can easily reach them by road. Local officials interviewed in this study noted at least some cases where crews have stopped trains blocking important crossings when they reached their hours of service limit, resulting in extended crossing blockages.

Trains, like highway vehicles, can experience mechanical problems that require the train to halt. For example, there are "hot box" detectors along many lines that sense when a rail car's wheel bearings have become too hot. Rather than continue on and experience a potentially catastrophic accident, it becomes necessary to stop the train and "set out" the car with an overheated bearing. This requires the train to stop at a point where there is a siding or other track, and leave the car there. Because of the need to find a satisfactory point to drop off the car, the train may stop and switch at a point where it blocks a crossing for a considerably longer time than would be the case if the train were just passing through.

Finally, train accidents, including grade crossing accidents, can lead to unplanned delays that can be extensive, if the train involved in the accident blocks crossings.

Railroads are aware that an emergency train stop can block crossings. Some railroads have a standing policy of notifying local police and emergency responders when a train blocks crossings in certain communities. Others have a policy of "breaking" a train when it would otherwise block a crossing for an extended period. "Breaking" a train refers to uncoupling a train and pulling the front part of the train forward until an interval is opened at the grade crossing between the front and back parts of the train.

C. Summary

It was impossible to quantify the various delays and types of problems nationally. Therefore, FRA identified communities that have reported problems and examined their experiences. Based on these discussions and discussions with the railroads, FRA found that crossings are blocked for a number of reasons. Trains passing through a grade crossing do cause delays and interfere with emergency response. Trains that stop while blocking a crossing are a more significant problem. FRA identified a number of causes

[8] Federal Hours of Service rules govern the time train crews can remain on duty. If a train is delayed and the crew reaches its hours of service limits, the crew is required to halt the train.

for trains to stop in crossings, sometimes causing lengthy delays. Stopped trains appear to cause more concern to the emergency response community than passing trains. While crossings blocked by passing trains cause stressful delays, they are neither as dangerous nor as frustrating as being totally unable to reach the scene of an emergency due to a stopped train.

VI. Impacts on Emergency Response

Delays in emergency situations can have tragic consequences. Emergency responders can be delayed by many things: availability of units, highway traffic, dispatching delays or errors and weather. Delays due to highway-railroad crossings are no different in effect than delays due to other causes. In evaluating the impact of delays, we must consider the cost in terms of deterioration in expected outcome for ambulance patients, worsening of fire damage from delayed fire truck response, and reduced likelihood for apprehension of suspects from delayed police response. Additionally, delays prove very stressful to emergency responders and victims, which also is a cost to be considered. Unfortunately, it is very difficult to convert a delay in response into a quantifiable impact.

The FRA has reviewed anecdotal reports of problems resulting from delays in emergency response due to blocked highway-railroad crossings. However, it is not possible to estimate the costs or impacts of such delays nationally or locally without much more detailed information from communities than is available. The impacts on communities from delayed response due to blocked crossings, while sometimes severe, are less than the impacts of traffic delays and congestion caused by blocked crossings. Another way to look at it would be to say that in places where blocked crossings are seen as a problem – to traffic, to safety and to emergency response – emergency response delays may help to justify a grade separation or other major expenditure, but such delays are unlikely, by themselves, to justify major remediation measures except in special cases.

VII. Possible Remediation Activities

Finding solutions to blocked crossings requires first identifying the reasons for blockage. As described in this section, there are a large number of actions which might be taken to eliminate or ameliorate problems from blocked crossings. A community concerned with blocked crossings may want to consider several of these possible solutions. In addressing a blocked crossing issue, a community should always strive to work closely with the railroad, since in many cases a solution based on changes by the railroad may be the most cost-effective.

A. Community Responses

Although there are no Federal regulations regarding blocked crossings in general, FRA safety regulations do address standing (idling) trains that unnecessarily activate grade-crossing warning systems. These rules prohibit standing trains, locomotives, or other rail equipment from activating the warning systems at grade crossings unless the operations are part of normal train or switching movements. Some states and communities have attempted to address blocked crossings through legal action.   The issue of a State's authority to legislate or regulate blocked crossings is highly contentious and still being defined in the courts.

The railroads have on occasion mounted "preemption" defenses, citing FRA regulations and other Federal requirements (e.g., the former Federal Railroad Safety Act of 1970 (49 U.S.C. 20106) and the Interstate Commerce Commission Termination Act) that they feel take precedence over State laws. For example, to clear a crossing in compliance with a State provision, a railroad might have to adjust either the speed or the length of its train, both of which are governed by Federal regulations. Likewise, a railroad might not be able to complete required air-brake testing at certain locations where doing so would block a crossing in violation of a State provision. Where there is a conflict between the State law and Federal safety requirements, the courts will find the State law to be preempted and, thus, unenforceable.

A better approach, both for the community and freight transportation, is to establish a cooperative relationship between the parties If the railroad and emergency responders (or the community) establish a good relationship, some relatively simple operational changes in railroad activities can do much to resolve blocked crossing problems. If both sides understand the position of the other, it is likely that a solution that at least partially resolves the problem can be reached. If the only answer is a major, long-term project (such as the Alameda Corridor East, see case studies), railroad-community cooperation is also essential. Working together, understanding each other's position and constraints, is the mechanism by which a solution that is mutually acceptable can best be achieved.

While many blocked crossings are the result of "legacy" infrastructure and development, some problems are the result of poor planning. State and local governments should consider the possible impact on emergency services from new highway-railroad crossings and new housing or commercial developments. For example, a major yard on the NS north-south line between Atlanta and Washington, DC/Harrisburg, PA is located in Linwood, NC. As traffic has grown, arriving trains often must wait on the mainline before there is room to proceed into the receiving yard. There is a road that crosses just beyond the beginning of the yard that provides access to a peninsula on a lake. The peninsula is undeveloped and is currently lightly used for recreational purposes (mostly hunting and fishing). The access road is frequently blocked for extended periods of time by stopped trains. There is no other access to the peninsula. A developer is proposing to build several hundred houses on the lakefront of the peninsula. North Carolina Department of Transportation (NCDOT) raised the issue of access to the county authorities, pointing out the safety issues. The developer and the governments have attempted to work out a solution to improve access but at this point it appears the issue of what, if any, access improvements will be built and who will pay for them will be settled in court. The ultimate outcome is unclear at this point, but thanks to the cooperation of the highway planning and rail sections of NCDOT, this issue was raised and will be resolved before the houses are constructed and hundreds of families are put at risk from being cut off from emergency services.

If grade crossing blockages cannot be reduced or ameliorated by any of the approaches that follow, communities can take steps to reduce impacts on their own. For example, communities may construct additional emergency response facilities or station emergency units on opposite sides of a railroad line, so the line need not block responders. In many larger cities, numerous response facilities greatly reduce the problem of blocked crossings because of the wide range of responder locations that can be accessed. However, in smaller communities, with few facilities, the cost of opening another fire or police station may be prohibitive. The locations that indicated to us that they had emergency response problems we found them to be mostly smaller towns and rural areas.

B. Communication

Improving communication between railroads and emergency responders can be an effective and relatively inexpensive solution. Communication systems, some of which do not require railroad participation, can alert EMS personnel to possible crossing closures from approaching trains and allow them to choose alternative routes, if necessary. This approach can be particularly effective if dispatchers are able to route emergency vehicles to open crossings or grade separated crossings before the vehicles have committed to a route that is blocked by a train.

Communication can include connecting the emergency response dispatchers by phone or radio to railroad dispatchers, as has been done is some cases. One approach that has been used is to have the railroad dispatcher inform the local EMS dispatcher or personnel when they will be blocking a crossing.

If the blockage may be lengthy or opening the crossing is critical because of some emergency, arrangements can be made to have the railroad establish a protocol to "break" a train so that it will not block a crossing. Federal Railroad Administration regulations require an air brake test before the train can be moved after it is recoupled, which means that the conductor must walk around the train to check the connections. With trains often more than a mile long, this can take significant time during which the crossing must be blocked. Breaking a train adds to railroad costs by delaying the train and must result in the crossing being blocked for up to an hour while the train is reassembled, but in certain areas it is an approach to be considered. At least one major railroad interviewed for this study has a policy of breaking trains when a blockage of more than 45 minutes is expected over most of the territory in which it operates.

A more sophisticated approach is the use of sensors near the highway-railroad grade crossing that detect an approaching train. The information on speed and location is then used by a central computer to estimate train speed and predict when a train will block a crossing. Different types of sensors are in use, including Doppler radar and magnetometers. Some systems also notify motorists of expected blockages through active signs. Examples of systems that predict train blockages of crossings include

Pomona, CA and Sugarland, TX. See Appendix I for more details. Pomona is described in A. 2 Alameda Corridor East and Sugarland is covered in D. 1. Houston.

C. Training

An important part of establishing cooperation and communication is an understanding of the requirements of both railroad and emergency response operations. One way to facilitate this understanding is through training courses such as those presented by Operation Lifesaver.[9] These courses help acquaint emergency response personnel with railroad operations and clarify procedures for contacting railroad personnel in case of emergencies.

Most public grade crossings with flashing lights or gates have a number posted that emergency responders can use to contact the railroad in case there are problems with the crossing. While the primary function of these numbers is to alert railroad personnel of malfunctions in the crossing protective device or to warn of stalled vehicles on the crossing, contact with the railroad can allow the emergency responders to request that a stopped train be "broken" to allow passage of the emergency vehicles. Although it usually takes some time to "break" the train, this may be the best alternative in cases where there are no alternative access routes to the site of the emergency.

D. Railroad Operational Changes

Routine railroad operations may leave crossings blocked and create problems for emergency responders. Generally, railroads establish their operations so as to minimize their costs and provide service to their customers. Nonetheless, railroads and their dispatchers are often aware of crossings that are routinely blocked in the course of railroad operations. In some cases, railroads can alter their operations to minimize these impacts.

In some cases, long trains can regularly block crossings during the change of rail crews. Crew change points are places on the railroad where a crew that has completed its work assignment turns the train over to a replacement crew. This process takes some time during which the train remains stopped. In some cases, there is little alternative in terms of selecting points for crew change where there is less likelihood of blocking a crossing. However, if crew change points are a problem for emergency response and general traffic, communities should consult with the railroad about possible options. At least one railroad interviewed for this study indicated that it had moved crew change points to avoid blocking crossings.

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[9] Operation Lifesaver (OLI) is a non-profit public education program established to end collisions, deaths and injuries at places where roadways cross train tracks, and on railroad rights-of-way. Sponsored cooperatively by federal, state, and local government agencies, highway safety organizations, and the nation's railroads, OLI provides free safety presentations to increase public safety around railroad tracks. State Coordinators can be found at http://www.oli.org/contact/contact_state.

Serving rail customers requires a number of rail moves to pick up and deliver cars at the customer's siding. This process can lead to regularly blocked crossings. If this is a problem, it is possible the process can be altered to minimize the length of blockages. For example, the railroad can avoid placing cars on a crossing, perhaps leaving them further up the track. Several railroads have reported that they have altered switching patterns at customer locations in an effort to reduce the time a crossing is blocked.

Longer trains may block crossings that were established when trains were generally shorter. Railroads have been increasing train length because longer trains have a lower operating cost per car than shorter trains. However, in cases where these longer trains regularly block crossings when stopped in sidings, it may be possible to negotiate with the railroad on limiting train length. At least one railroad has reduced train length in one area to minimize blocked crossings, although it raises the railroad's cost. On the other hand, shorter trains also mean more frequent trains, which can also cause community problems.

E. Public Investments

1. Grade Separations

The "gold standard" for eliminating possible delays in emergency response due to blocked crossings is grade separation. Building a highway overpass or underpass eliminates any delays from blocked crossings. Unfortunately, grade separations are expensive, typically costing several million dollars. Moreover, in many cases they are inappropriate, since the ramps can block homes and businesses located adjacent to the tracks. In some cases, the geography of the crossing can also make construction very difficult.

In many cases a proposal to provide a grade separation also involves closing some nearby crossings. The FRA advocates a "corridor approach" to grade crossing issues, looking at the risks of an entire corridor and often resulting in recommendations to provide a grade separation or two, closing some crossings and improving crossing protection at others. A corridor approach is also required for the implementation of a "quiet zone" within which train horns do not sound at crossings.[10] Closing crossings is often contentious and may

[10] "Quiet Zones" are permitted under FRA's Final Train Horn Rule, which became effective on June 24, 2005. The rule implemented a 1994 law mandating the use of the locomotive horn (or "whistle") at all public highway-rail grade crossings with certain exceptions. The rule pre-empted applicable state laws and related railroad operating rules requiring locomotive horns be sounded, and it also superseded the previously issued Interim Final Rule. Under the rule, communities have the choice to consider silencing train horns at highway-rail grade crossings based on meeting safety needs. The Final Rule provides for six types of quiet zones, ensures the involvement of state agencies and railroads in the quiet zone development process, gives communities credit for pre-existing safety warning devices at grade crossings and addresses other issues including pedestrian crossings within a quiet zone.

The Final Rule on the Use of Locomotive Horns at Highway-Rail Grade Crossings is available at the U.S. Department of Transportation Docket Management System web site at http://dms.dot.gov/

engender political opposition to a proposal that involves a grade separation and the closing of crossings many residents may see as more convenient.

Grade separations are generally funded by the States' DOT and local communities. Railroads are generally not legally required to contribute. Railroads maintain the crossings and so enjoy a reduction in costs when crossings are eliminated. They also perceive a reduction in liability and risk from crossing accidents. However, these gains are minor in terms of the cost of a grade separation, so railroads are usually only a limited partner in separation projects.

SAFETEA-LU reauthorized the Federal highway program in 2005. While it made several changes, it did continue to provide funding for highway-railway crossing safety. This program, section 1401 of SAFETEA-LU (also known as "the section 130 program") provides $220 million a year for crossing safety. These funds are divided among the States to address problems at thousands of crossings. Because there so many projects competing for limited funding, States have difficultly supporting multi-million dollar grade separations.

Federal Highway Trust funds can generally be used to provide partial funding of grade separations. Depending on the status of the road or highway, grade separations can be funded from accounts such as the National Highway System and the Surface Transportation Program, although the demand for these funds for "regular" highway construction tends to leave little available for grade separations.

2. Rail Relocations

Where grade crossing issues affect an entire corridor rather than a single crossing, relocating the rail line is often proposed as a solution. Railroad lines may be relocated either vertically or horizontally - that is to say a rail line may be moved up or down to separate it vertically from surface streets, or the line may be moved horizontally to a new right-of-way. Relocation is usually extremely expensive. However, it can produce significant benefits in terms of reducing negative community impacts and improving safety. There have been very few rail relocation projects in recent years. Among the projects that have been completed are the Lafayette Railroad Relocation project in Lafayette, IN, which eliminated 41 grade crossings by relocating the rail line out of downtown and the Union Pacific's construction of a 5.4 mile double-track bypass around Hastings, NE in 1994. Brownsville, TX recently completed a project begun in 1973 to relocate in-city rail yards and deactivate 79 of the city's 93 grade crossings. The project, which cost $52 million, provided smoother rail operations and took the majority of traffic from the Port of Brownsville out of the downtown business district. Another recent rail relocation project is the "vertical relocation" (the construction of a railroad trench) of the Union Pacific Railroad in Reno, NV. (See Appendix I, A. 1..)

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docket number FRA-1999-6439-3923. Additional information is located at the FRA web site at www.fra.dot.gov.

Rail relocations generally require the construction of new rail lines, which must be approved by Surface Transportation Board (STB). Approval by STB also involves completing the necessary environmental review, which can mean a full Environmental Impact Analysis if the relocation will entail extensive new construction. Usually, the right-of-way for the new line must be acquired by eminent domain from existing landowners, which can be a contentious and expensive process. If the rail line is to be removed from a downtown area, for example, the line might have to be relocated far enough from town to be in an undeveloped area, requiring the acquisition and construction of many miles of new railroad.

Another approach to rail relocations involves the agreement of two railroads that operate parallel lines to improve and use one line while abandoning the other (or limiting it to local traffic) have the advantage of reducing the amount of new right-of-way that must be acquired and constructed. The original Alameda Corridor project (Appendix I, A. 2) is an example as is the proposed "Bridging the Valley Project" in the Spokane, WA area. (See Appendix I., E. 2.)

F. Private Investments

Railroad infrastructure investments to enhance capacity may have the additional benefit of resolving crossing problems. For example, if a crossing is frequently blocked by trains parked on a siding, converting the line to double track may greatly reduce the problem. As BNSF and UP continue to convert their major transcontinental routes between Los Angeles and the Midwest from single to double track, delays due to trains awaiting oncoming trains should decline, benefiting communities such as Eloy, AZ (see Appendix). The case study on Hammond, IN (Appendix) describes how a railroad's investment in remote controlled turnouts ameliorated a serious crossing blockage problem.

Communities may be interested in working with railroads to expedite infrastructure improvements that provide public benefits as well as benefits to the railroads. The Kansas City Flyovers are an example of such a public investment in railroad infrastructure. "Flyovers" refer to separating two railroad lines by over- or under- passes, instead of having the lines cross each other at grade. The Sheffield Flyover, a 3-mile $74 million project opened in 2000, and the Argentine Connection, a 2-mile $60 million flyover opened in 2004 improve the flow of rail traffic through the city and provide significant public benefits. The Sheffield Project helped reduce delays of as many as 250 trains a day by eliminating at-grade intersections of several railroads. Similarly, the Argentine Project reduced delays for 80 trains through the Kansas City Terminal area. Each project was financed through special bonding authority, to be paid off through railroad user fees. The railroads supported these projects because they made major improvements in rail flows, while the public benefited from the elimination of significant congestion on area roads and highways that resulted when trains backed up at the rail-rail crossings.

Another successful public-private project to provide improved rail infrastructure is the Norfolk Southern Corporation's Shellpot Bridge rebuilding in Wilmington, DE. The bridge's poor condition caused the previous owner, Conrail, to take the bridge, and consequently the line serving the east side of Wilmington, out of service. Freight then had to move on other lines through the city and rail service to industries on Wilmington's east side was degraded. The parties realized that rebuilding the bridge and reopening the line would improve efficiency and capacity for north/south freight traffic, lessening freight on a passenger route, and providing economic benefits to Wilmington and Delaware. Norfolk Southern had limited capital to finance the $13 million project; however, the state used a combination of grants and loans to rehabilitate the bridge, with the loans to be repaid through a per-car user fee.

G. Technology

The railroad industry is currently exploring a number of technological advances that may serve to mitigate blocked crossing problems. Two examples are some form of positive train control and electronically controlled pneumatic brakes.

Railroads are developing positive train control (PTC) systems that can improve the safety of train operations while also providing timely information concerning the position, velocity and direction of movement of trains. The Global Positioning System and radio data link systems will help the railroads plan train movements and potentially avoid undesirable situations such as blocked crossings. Over time, information from these systems may be available for use in Intelligent Transportation Systems (ITS) applications that provide warning of potential blockages and assist in traffic control on the roads. Each of the four largest freight railroads is developing such systems, and major pilot projects are underway or planned. The Burlington Northern Santa Fe Railway (BNSF) has submitted an initial Product Safety Plan for review by FRA and states that it is committed to deploying this technology across its system over the coming years.

Electronically controlled pneumatic brakes (ECP) may potentially reduce the time it takes to break a train and then recouple and resume operations. If this technology safely permits a train to proceed after recoupling without the currently required power break test, the time a train blocks a crossing after being rejoined would be substantially reduced, making breaking a train at a crossing much more feasible. In 2005, FRA, in cooperation with railroads, rail labor, shippers, and car owners undertook an assessment of the benefits of ECP brakes. That study will soon be released. The ECP brakes will reduce stopping distance and derailments, while permitting longer trains. Improved railroad operations would be expected to reduce the time a crossing is blocked.[11]

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[11] FRA may consider waivers or changes in the current Power Brake rule if experience with ECP brakes satisfactorily demonstrates the safety of such an approach.

Conclusion

It is impossible to quantify the delays emergency responders experience at blocked grade crossings. The extent of the problem can be gauged from contacts with emergency responders, states, railroads and FRA safety personnel who work in the grade crossing area. This study has identified the many different situations that can lead to blocked crossings and outlined a number of possible solutions.

All these approaches have advantages and disadvantages and no one solution works in all cases. Communities must consider the alternatives and work with the railroad to determine the most effective solution and to minimize cost. If possible, the best solutions involve addressing all the crossing issues in a corridor at the same time. That way issues such as noise, traffic congestion, economic development and safety can be considered together. While a comprehensive approach must entail more effort and probably more expense than a more piecemeal approach, the opportunities to address the sum of the problems offers the potential to build consensus on a worthwhile solution to all railroad related problems.

In almost all cases, the key to solving the problem is to establish a close working arrangement between the community and the railroad. If both sides understand each other's concerns and limitations, a reasonable solution most likely can be found.

Appendix I. Case Studies

The following cases illustrate some of the problems and/or solutions that have been discussed above. They do not represent a complete list of the communities with blocked highway-railroad crossing problems nor a list of all communities that have developed solutions.

A. Comprehensive Solutions: These cases studies represent efforts to resolve highway-railroad crossing problems (including, but not limited to, emergency response crossings) by initiating comprehensive, corridor wide programs that provide multiple grade separations and/or use a number of the solutions described above.

1. Reno, NV

When the Union Pacific Railroad (UP) acquired the Southern Pacific in 1996, one of the conditions ordered by the Surface Transportation Board was that the UP cooperate with Reno in addressing the grade crossing issues on the rail line that passed through downtown Reno. The rail corridor passing through Reno is a critical freight route from the Port of Oakland to inland destinations. The number of trains traveling through Reno was expected to increase from approximately 15 per day to as many as 34 per day as a result of the merger.

The cost of building a new line around the city was prohibitive, so a "rail trench" was built, completely separating the railroad from streets in downtown Reno. The completed project eliminated 10 highway-railroad crossings along a 2.1-mile route by taking train traffic 33 feet below ground. Without the project, vehicle delays were projected to more than double from 188 hours to 473 hours per day.

The project was partially funded by UP with the City of Reno contributing $50 million provided by a loan through the U.S. Department of Transportation's Transportation Infrastructure Finance and Innovation Act (TIFIA) credit assistance program. The TIFIA helps state and local governments construct transportation projects using flexible and innovative financing approaches. The program allowed the City of Reno to pledge different revenue streams to repay the loan and refinance the project through regular financial markets.

2. Alameda Corridor, CA

Perhaps the best example of a comprehensive solution to grade crossing blockage problems is the Alameda Corridor. Growing container traffic through the Ports of Los Angeles and Long Beach was causing major congestion in the area between the ports and rail yards near downtown Los Angeles. At the time (1981), three railroads: the Union Pacific, the Atchison, Topeka and Santa Fe (now Burlington Northern Santa Fe (BNSF)), and the Southern Pacific, served the port with three different rail lines. Trains from the ports blocked numerous grade crossings, often for long periods, because the trains moved very slowly. Trucks carrying containers from the ports to rail yards and other customers also added to the congestion.

The solution was the development of a 20-mile long grade-separated rail corridor. Linking the ports of Long Beach and Los Angeles to the transcontinental rail network near downtown Los Angeles, the Alameda Corridor is a series of bridges, underpasses, overpasses and street improvements that separate freight trains from street traffic and passenger trains, facilitating a more efficient transportation network. The project's centerpiece is the Mid-Corridor Trench, which carries freight trains from both railroads (now UP and BNSF) that serve the ports in an open trench that is 10 miles long, 33 feet deep and 50 feet wide between State Route 91 in Carson and 25th Street in Los Angeles. The project consolidated four separate low-speed rail lines to the ports, eliminating conflicts at more than 200 at-grade crossings, providing a high-speed freight expressway, and minimizing the impact on communities.

The project produced a wide range of benefits, including:

- More efficient freight rail movements
- Reduced traffic congestion by eliminating at-grade crossings
- Multiple community beautification projects
- Decreased train emissions
- Slashed delays at highway-railroad crossings
- Cut noise pollution from trains
- Reduced emissions from idling automobiles and trucks

The $2.4 billion Alameda Corridor was funded through a unique blend of public and private sources. Revenues from user fees paid by the railroads will be used to retire debts. Railroads initially paid $15.00 for each loaded 20-foot equivalent unit (TEU) container; $4.00 for each empty container, and $8 for other types of loaded rail cars such as tankers and coal carriers. Over a 30-year period, fees will increase between 1.5 percent and 3 percent per year, depending on inflation. Effective January 1, 2006, fees are $16.75, $4.47 and $8.93 respectively.

Planning began in 1981, construction in1997 and operations in 2002. The project extends through or borders the cities of Vernon, Huntington Park, South Gate, Lynwood, Compton, Carson, Los Angeles, and the County of Los Angeles.

For additional details on the project see the Alameda Corridor Transportation Authority website.[12]

The Alameda corridor used rail relocation, new rail infrastructure and grade separations to solve quite a few crossing problems.

[12]The Alameda Corridor Transportation Authority website is at http://www.acta.org/projects_completed_alameda.htm

3. Alameda Corridor East, CA

The growth of imports through the Ports of Los Angeles and Long Beach that led to the Alameda Corridor project (above), as well as increased commuter rail service, have led to sharp increases in train traffic in many areas of the Los Angeles Basin beyond the Alameda Corridor area. In particular, after trains pass through the Alameda Corridor and continue to the east, grade crossing problems occurred to the east of downtown Los Angeles. One result of the increased train traffic was the creation of the Alameda Corridor-East Construction Authority by the San Gabriel Valley Council of Governments – a consortium of the 31 cities of the San Gabriel Valley. Train traffic along the corridor is expected to increase from 69 trains a day in 2003 to 161 in 2025. Meanwhile, vehicular traffic is expected to grow 40% and vehicular delay at crossings will grow by 300%.

The goal of the $950 million ACE project is to mitigate the effects of the increased train traffic along a 35-mile freight rail corridor through the San Gabriel Valley from East Los Angeles to Pomona. It includes transportation safety improvement projects at 39 grade crossings located throughout the San Gabriel Valley. The ACE project includes grade separations at 20 of the most congested crossings, safety improvements at another 42 crossings and the Intelligent Roadway/Rail Interface System (IR/RIS), a communication system to alert motorists and emergency responders to blocked crossings. The project, when completed, is estimated to eliminate 150 accidents a year. Other benefits include reduced congestion, improvements in air quality and enhanced attractiveness to industry.

The grade separations will also improve emergency response, as will the IR/RIS system, which will allow emergency responders to select the best route to an incident. As part of this study, the FRA staff met with officials from the City of San Gabriel to determine how blocked crossings had affected emergency response. In San Gabriel, fire and police stations are located south of the railroad line, which splits the town. Stopped trains have caused serious delays in emergency response in the past, forcing neighboring emergency services to respond to calls in San Gabriel, with unacceptable delays, according to local officials interviewed for this report. The ACE Project, by providing a grade separation in San Gabriel, should reduce the emergency response problem.

B. Grade Separation

1. Belen, NM

Belen, NM is located on the west bank of the Rio Grande in Valencia County. The very busy BNSF east-west lines between Chicago, IL and Los Angeles, CA run through the heart of the city. The Belen rail yard is a stopping point for inspections, repairs, refueling, and crew changes. New Mexico Highway 314 also runs through the middle of Belen parallel to the BNSF rail line and is the city's Main Street. Highway 47 and Interstate 25 cross the east and west sides of the city.

In response to a surge in the demand for freight transportation, the BNSF plans to complete its second mainline track from Los Angeles to Chicago, through Belen. Currently, an average of 110 trains pass through Belen every day (1 train every 15 minutes). When the new mainline track is completed, this will increase train traffic to 160 trains per day. At a public hearing, the FRA Grade Crossing Manager for the region stated that as a result of the additional train traffic, affected grade crossings could be closed for 70 percent of the time.[13]

The New Mexico Department of Transportation (NM DOT) is building a train station in Belen for its new RailRunner Express, a commuter rail service between Belen and Bernalillo, New Mexico. The train station will draw added highway vehicle traffic to the area surrounding the rail line, resulting in an increase highway vehicle-train accident risk and the amount of time it takes for highway traffic to clear the grade crossing after each closure. The RailRunner will run on dedicated track parallel to the BNSF double track. Both projects will add to the number of times per day grade crossings are closed. Belen's emergency response providers would be affected by these projects.

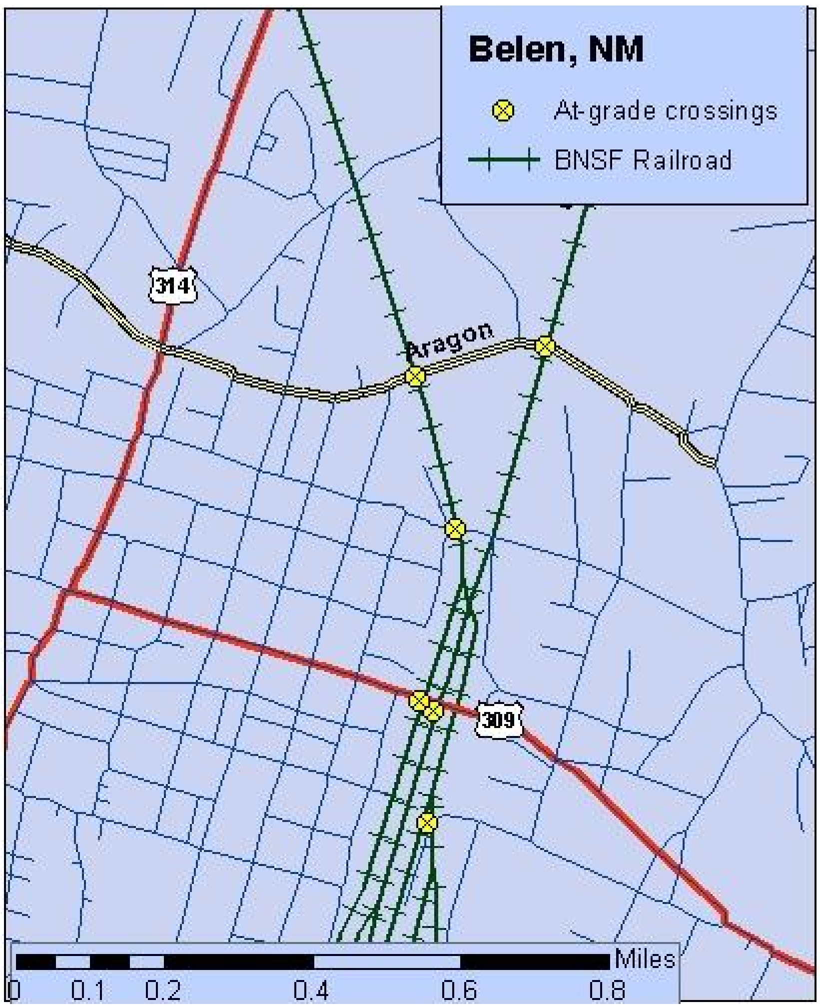
The BNSF and NM DOT have worked together to improve safety and reduce highway delay along this rail line. Initially, NM DOT notified BNSF it would have to upgrade the signal equipment at the affected grade crossings. But BNSF offered to contribute $2 million towards a grade separation at one location in exchange for an agreement with the city to close four adjacent grade crossings. NM DOT agreed and added $3 million in Federal Section 130 (Rail Safety) and Section 152 (Hazardous Elimination) funds, bringing the total grade separation funds available to $5 million. Then, the Belen Planning and Zoning Commission gained public support for the grade crossing separation and closures by hosting a series of public hearings where NM DOT, BNSF, FRA, and the general public presented their views.

Some project details still need to be addressed. If successfully resolved, the city of Belen will have a total of three grade-separated crossings evenly spaced throughout the city and a Quiet Zone by default since no at grade crossings will remain. This will allow all vehicles, including emergency response vehicles, access to all points in the city within a reasonable amount of time. The BNSF will have fewer grade crossing signal systems to maintain, as railroads are required by Federal law to maintain all grade-crossing signaling equipment.

[13] Ms. Carolyn Cook, Federal Railroad Administration Grade Crossing Manager at the Belen Planning and Zoning Commission Meeting, December 12, 2005.

This project is an excellent example of the state, community and railroad working together to address a potentially critical problem as railroad traffic grows to very high levels.

Map 1A



***Source**: FRA Office of Policy and Program Development*

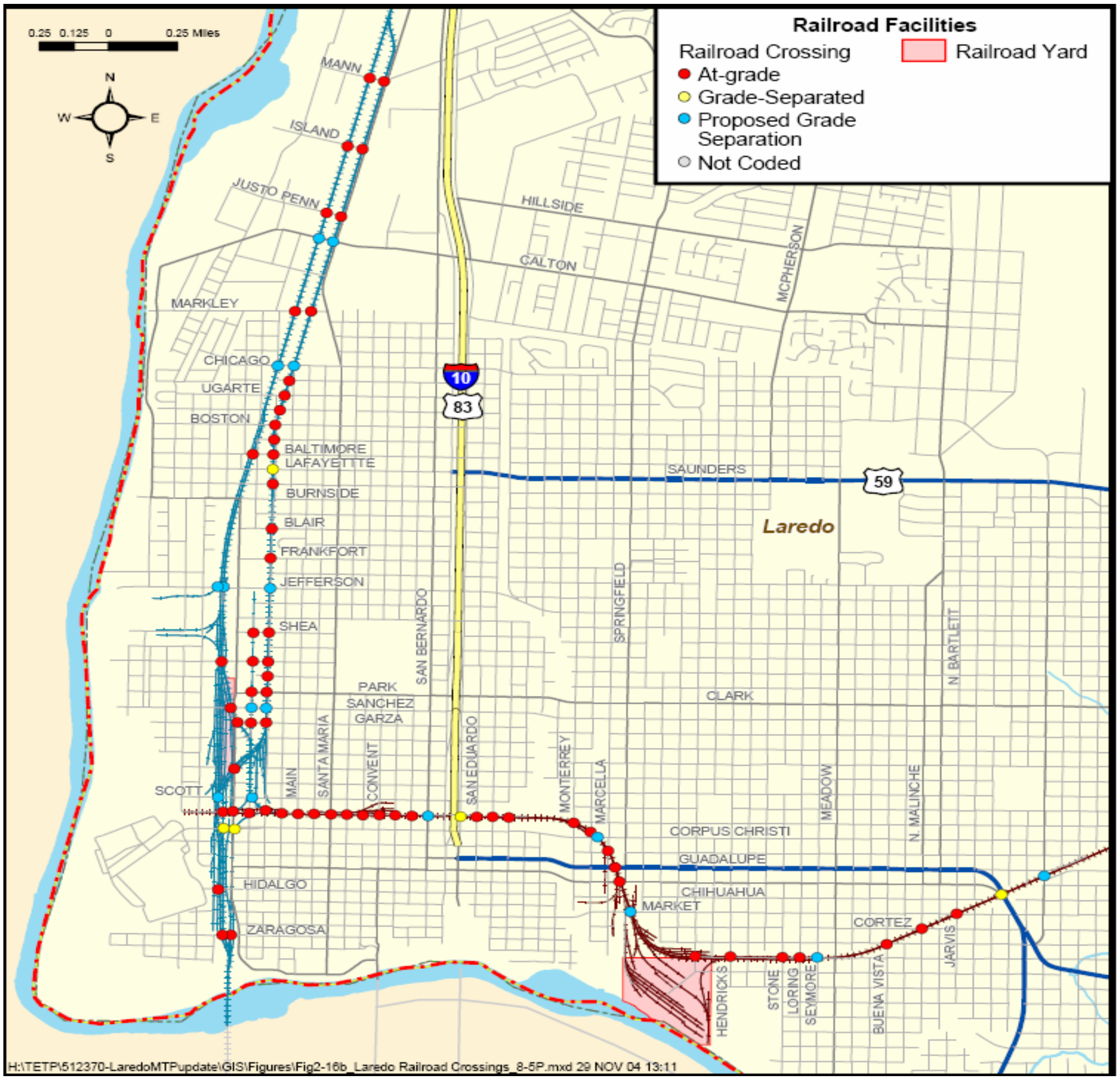
2. Laredo, TX

The city of Laredo, located in the south of Texas, is considered to be the main gateway of trade between the United States and Mexico. It is the busiest highway-railroad crossing on the U.S./Mexico border. Freight reaches Laredo from the south through the Kansas City Southern's (KCS) Transportacion Ferroviaria Mexicana (TFM) railroad subsidiary in Mexico, from the north via the Union Pacific Railroad (UP) and east by the Texas-Mexican Railroad, also owned by KCS. Highway transportation is provided mainly by

I-35, which travels north to San Antonio and handles a large amount of truck traffic. Increased freight movement has led to significant impacts on local transportation infrastructure.

All US/Mexico traffic at Laredo uses the single-track international railroad bridge in downtown Laredo, which connects TFM with Texas-Mexican/KCS and UP. The bridge is owned by KCS but UP operates over the bridge via a usage agreement. The Texas-Mexican Railroad has an east-west direction and travels to Corpus Christi then to Houston and the Midwest. The UP connects north to its mainline in San Antonio. The railroads in downtown Laredo run parallel to the Rio Grande, the border with Mexico, resulting in a long and thin strip of urban land between the railroads and the border. Each company owns a rail yard where it sorts and assembles rail cars. The UP rail yard is located about a half mile north of the international bridge and is used primarily for import and export operations. The Texas-Mexican rail yard is located to the east in central Laredo, and is used to assemble trains going out to east Texas and the Midwest or Mexico. The two railroads combined have 81 grade crossings in Laredo, plus five grade separations. Map 2A (pg. 7) shows the location of the railroads and Laredo street system.

Map 2A



Source: *Wilbur Smith Associates, 2005*

The city of Laredo has a number of major activity centers, those that attract or generate large numbers of vehicle trips, within the land strip between the border and the railroads (the area in the map to the left of the railroads). The only way to access these centers are at-grade highway-railroad crossings. This presents a problem because the large number of people going into and out of the area between the border and the railroads means a higher likelihood of emergency response calls. There are two hospitals in the downtown area, located north and east of the railroads, on the other side of the strip between the railroads and the border. In case of an emergency, the ambulance must cross the tracks to reach a hospital after a call in the strip. Due to crossing blockage, emergency response may be delayed. Fire stations are well distributed throughout the city and there are stations on every side of the rail lines. However, the police department has its main offices south of the railroads in central Laredo. This means that a police car must detour to use one of the three overpasses available if trains block highway-railroad grade crossings.

The proposed solution to this problem is the construction of 16 overpasses that would provide access to all areas at any time. This tactic is expensive and complex and will take a long time to complete. For this reason, an alternative, short-term approach is being considered that makes use of technology developed at the Texas Transportation Institute (TTI). Doppler radars, video cameras and wireless technology will be used to inform first responders about blocked crossings and the best alternative routes (see Houston in the Communications section of the Appendix).

3. Chattanooga, TN

Chattanooga (population 156,000) is located in southeastern Tennessee in Hamilton County. It is on a bend in the Tennessee River between Lookout and Signal Mountains and at the junction of Interstates 75, 24 and 59. Four railroads move traffic through Chattanooga. The Norfolk Southern Railroad (NS) runs two lines through the city; from north to south and from east to west, the CSX railroad enters the city from the west and departs to the south, with a branch to the east. The Chattanooga Belt Railroad runs from east to west through the city, while the Chattanooga and Chickamauga Railroad runs south out of the city.

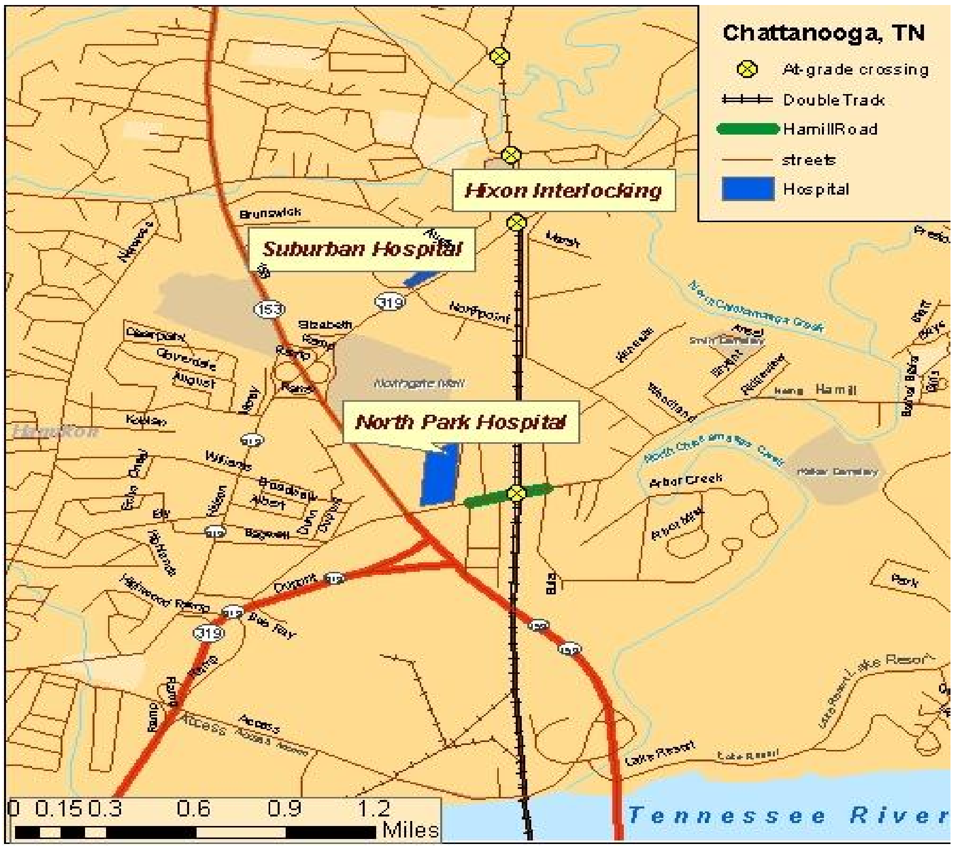
The Hamill Road Crossing is near the northern edge of Chattanooga on NS track. Between 36 and 44 trains and over 19,000 highway vehicles pass over the highway-railroad crossing each day. Auto traffic at this crossing will most likely increase due to considerable commercial and real estate development in the area.

The Hamill Road crossing is on a double tracked rail line. One mile north, the double tracks converge to single track at the Hixon Interlocking. Northbound trains sometimes have to slow down at the Hamill Road crossing to allow oncoming southbound trains to pass through the interlocking. Some southbound trains have to slow down at the crossing to drop off crews or for switching activity at Norfolk Southern DeButts Rail Yard, which is 1.4 miles to the south and just over the Tennessee River Bridge. Slow north- and south-bound trains can occupy the crossing one right after another. As a result, the Hamill Road crossing is frequently blocked from 30-55 minutes at a time. This can cause auto traffic to back up until it blocks Highway 153, one-quarter mile away, which is a designated evacuation route for a Tennessee Valley Authority nuclear plant and serves as a major traffic artery for school buses, fire trucks, and ambulances. When Highway 153 is blocked by traffic, the alternative route to cross the Tennessee River to the south can take an additional 10-15 minutes in travel time.

The city police and fire departments report the Hamill Road crossing has caused serious delays for emergency vehicles. The hospital and fire station are on the west side of the railroad tracks and about 5,000 people live to the east. The entrance to the North Park Hospital, an acute care facility, is on Hamill Road, one-quarter of a mile southwest of the crossing. Emergency vehicles and patients are delayed when the crossing is blocked.

Approaching from the east, emergency vehicles can detour about a mile to the north where there is a grade separated crossing, but that results in a delay of several minutes and then contending with the backup on the other side crossing to reach the Hospital. City officials and the Norfolk Southern Railroad have received numerous complaints from the public concerning this crossing and are working together to develop a solution. Right now, the city of Chattanooga is widening Hamill Road from two to four lanes up to the crossing so that traffic does not back up onto Highway 153. The Hamilton County Rail Authority plans to conduct a feasibility study to evaluate a highway rail grade separation.

Map 3A



Source: *FRA Office of Policy and Program Development*

C. Public/Private Investments

1. Greenville, NC

The city of Greenville is located in eastern North Carolina; the city and surrounding metropolitan area have a total population of around 142,500. Greenville is intersected by the railroad lines of Norfolk Southern (NS) running east-west and CSX Corporation going north-south (see Map 4A, pg. 15). Railroad operations block local roads, causing delays in the vehicle flow between southeast residential neighborhoods and destinations in the northwest of the city. Local streets are blocked during the movement of freight trains coming southbound on the CSX line onto the NS eastern route. The problem arises because there is no track directly connecting the southbound track to the eastbound track at the intersection. Trains must proceed beyond the intersection into the nearby switching yard (see Map 5A, pg. 16). At the yard, the locomotives must "run around" the train so they will be at the other end of the train, which will be the front as the train now heads east. The train will now be pulled northbound onto the eastbound NS line, since there is a direct track connection in that direction an seen on Map 5A. In order to "turn" the train, that is, prepare it to be operated in the opposite direction, it must be broken into shorter segments at the yard, because the yard is not long enough to hold the entire train and thus allow the locomotives to "run around" the train on one of the yard tracks. After the locomotives are on the north side of the train segments, they recouple the segments and proceed north and east to the customer. This switching back and forth blocks the roads at either end of the yard for substantial periods of time. The North Carolina Department of Transportation (NCDOT) reports that blockages can last up to 3 hours two times a day, often at peak travel times on roads with volumes ranging from 16,000 to 30,000 vehicles per day. This means commuters, school busses, and emergency vehicles cannot pass through the rail corridors.

Figure 1. - CSX–NS railroad intersection

Source: *Federal Railroad Administration, Office of Policy*

In Figure 1, the CSX track runs from the bottom left (south) and the NS line runs across the figure horizontally. Currently, CSX trains proceed past this crossing to a yard, where the locomotives are moved to the opposite end of the train, the new front of the train, and the train then uses the connecting track shown in Figure 4 to proceed eastward (left in this picture). A direct connecting track running to the left in Figure 1 between the CSX line and the NS line would eliminate blocked crossings caused by the need to move locomotives to the opposite end of the train.

Figure 2. – CSX rail yard and Howell Street

Source: *Federal Railroad Administration, Office of Policy*

Figure 2 illustrates the proximity of Howell Street to the north end of the CSX rail yard and how trains will likely block the crossing.

Figure 3.- At Grade Crossing of Arlington Boulevard & CSX railroad

Source: *Federal Railroad Administration, Office of Policy*

Figure 3 above shows the at-grade crossing of Arlington Boulevard and the CSX Transportation rail line. Arlington Boulevard is at the southern limit of the yard. This artery serves as access road for a high school, located next to the yard. To the left of the picture is a residential area and people travel to the right to get to school, work and, if needed, medical services.

Figure 4. - Northeast connecting track branching to the left

Source: *Federal Railroad Administration, Office of Policy*

Figure 4 faces north and shows the CSX line and the track heading off to the right that connects directly with the NS line to the east. The intersection of the two lines can be seen in the center of the picture. (Figure 1 was taken on the other side of the crossing in the center, looking south.)

A 2006 study prepared for NCDOT by Ralph Whitehead Associates concludes that these negative railroad impacts can be mitigated by two projects. One is the construction of a south-to-east connecting track at the intersection of NS-CSX lines and the other is relocating CSX rail yard from downtown Greenville to a site north of US 264. The construction of the southeast connecting track would prevent trains from blocking Arlington Blvd and Howell St as direct south to east travel would now be possible. Relocation of the switching yard would move rail car sorting operations out of the city and limit the remaining impact on the CSX line to a smooth movement of freight through the urban area. Table 1 shows the costs and benefits of the two projects. Total construction costs for the two projects amount to $2.9 million. These projects also result in fuel and labor savings for the railroad companies estimated to total $467,298 per year.

Table 1. - Costs and Benefits Estimates

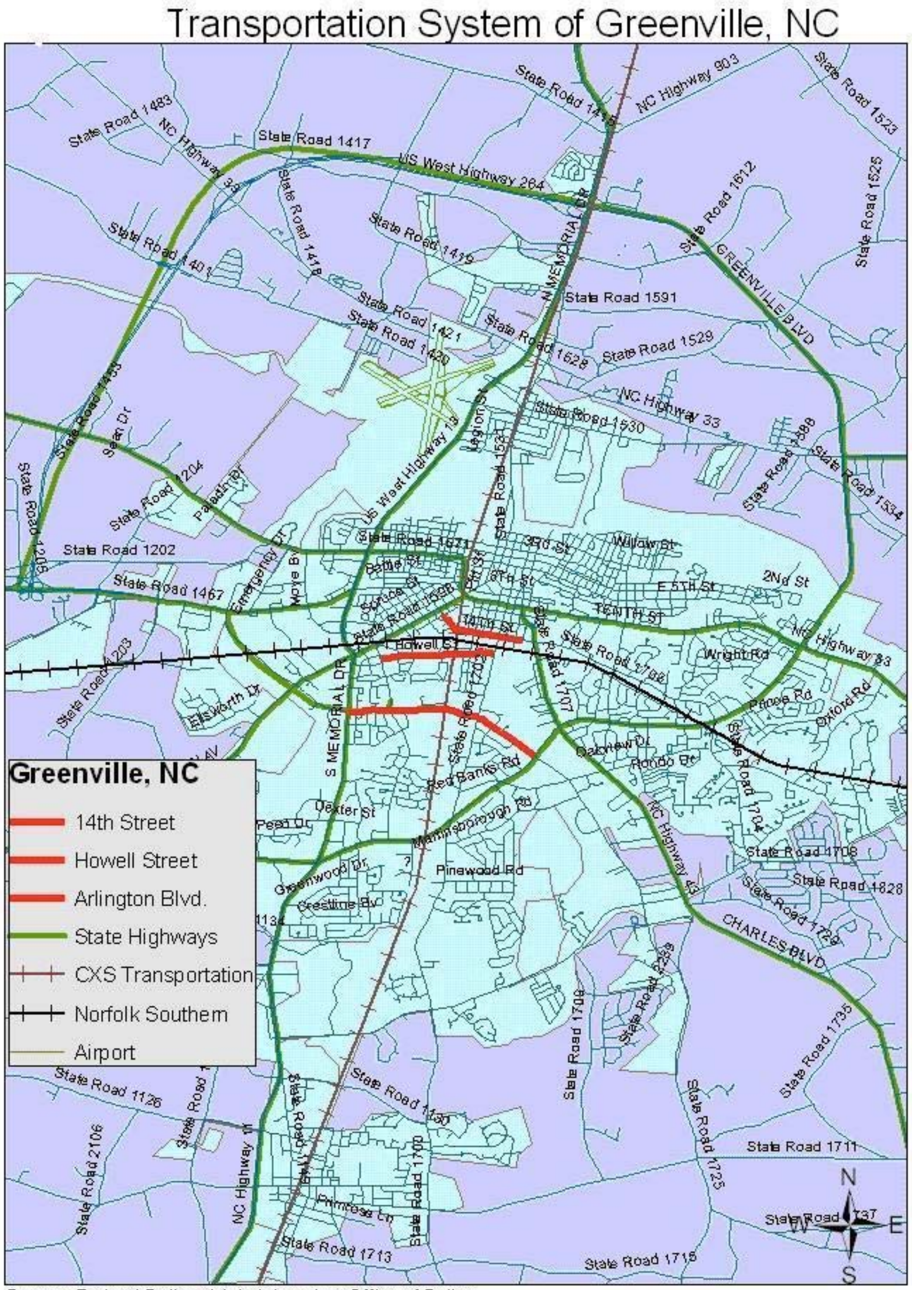
Total Construction Costs	Rail yard	$2,144,340
	South to East connector	$822,090
Benefits Per Year	Labor Savings	$467,298
	Fuel Savings	$158,080

Source: *Ralph Whitehead Associates, Inc.*

This project is still in its preliminary stage and stakeholders will need to coordinate and agree on many details. Some of the matters to be resolved include agreements between the railroads on granting each other operating rights on their tracks and whose trains should proceed first over jointly used tracks. The City of Greenville also needs to consider the plans that Eastern Carolina University has for a number of properties surrounding the study area that could potentially be affected by the project. [14]

[14] References:
Dehler, B.D. (2006). *Greenville Traffic Separation Study -Phase1 (DRAFT).* RalphWhitehead Associates, Inc.
Greenville-Pitt County Convention & Visitors Bureau. April 28th, 2006. http://www.visitgreenvillenc.com/
United States Census Bureau**.** **American Factfinder**. April 28th, 2006. http://factfinder.census.gov/home/saff/main.html

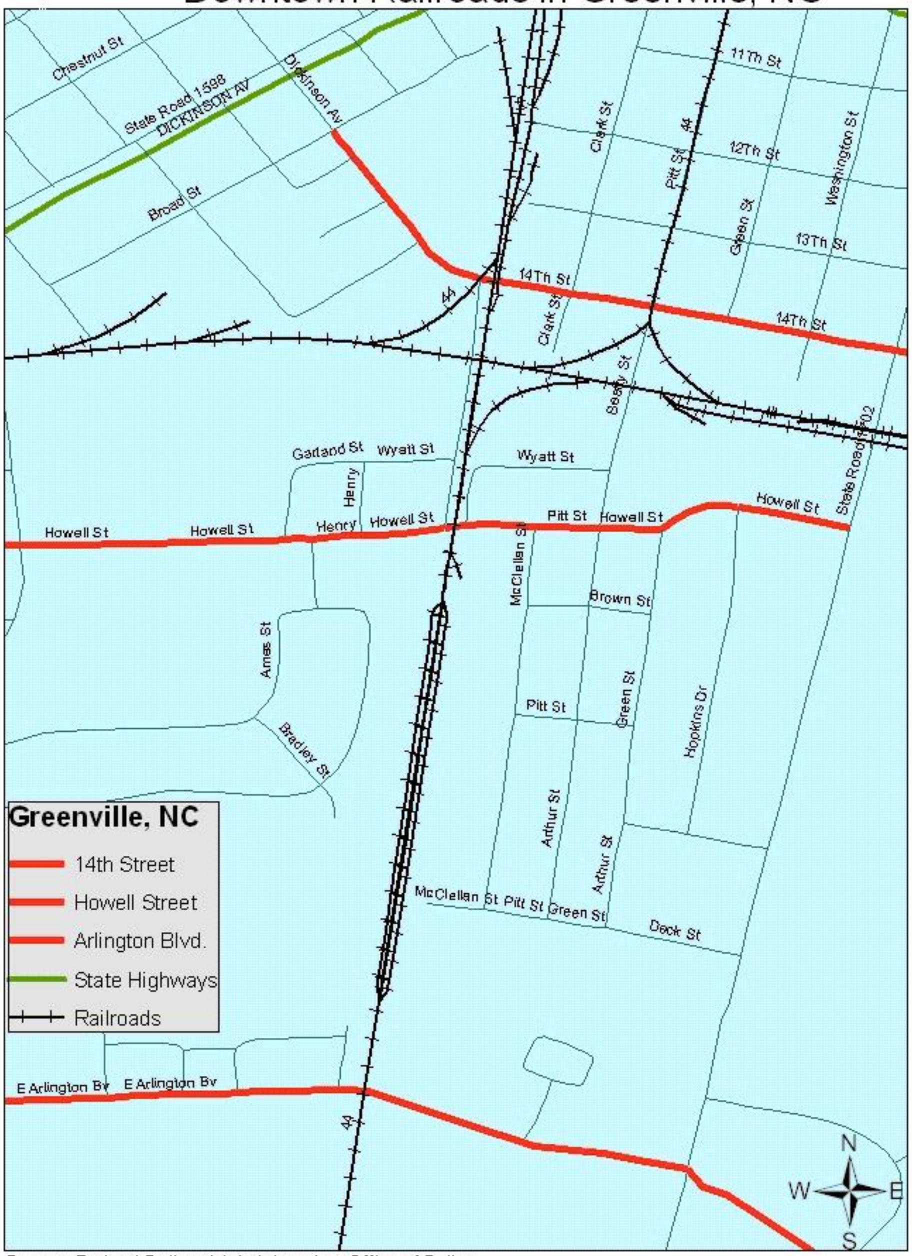
Map 4A



Source: Federal Railroad Administration, Office of Policy

Map 5A

Downtown Railroads in Greenville, NC



Source: Federal Railroad Administration, Office of Policy

2. Fayetteville, NC

Fayetteville is the sixth largest city in North Carolina and the county seat of Cumberland County. Located along the Cape Fear River, this city of 60 square miles has a population over 120,000.[15] Three railroads - CSX, the Norfolk Southern (NS), and the Aberdeen and Rockfish - traverse the city, resulting in 183 private and public at-grade highway-railroad grade crossings. Train volumes at each crossing vary from 3 to 39 trains per day.[16]

The CSX and NS rail lines enter the city from the northwest, north, and northeast corners of the city, crisscross each other along one of Fayetteville's central thoroughfares, where they also traverse the Aberdeen and Rockfish Railroad, which runs east to west. The CSX and NS rail lines continue out of the city towards the southwest, south, and southwest.

The dense web of Fayetteville's roads and railroads increases the probability of grade crossing accidents and auto traffic delay, especially in the central city, where all three rail lines intersect and conduct switching activity, often stopping at the grade crossing for more than 30 minutes at a time. When a grade crossing is blocked for such a long interval, it has a significant effect on auto traffic delay and, potentially, emergency response, especially during the morning and evening rush hours. This delay can affect the public services provided by hospitals, schools, fire and rescue stations.

The NCDOT has completed a Traffic Separation Plan for Fayetteville designed to improve highway-railroad grade crossing safety and to mitigate grade crossing traffic delay. The plan evaluated 52 grade crossings for potential closures, roadway improvements, signal upgrades and grade crossing separations. In North Carolina, the railroads and the state pay all the costs of closing grade crossings and any associated mitigation projects, although the state pays for grade separations.

The state, the city CSX and NS are planning two rail realignment projects, financed in part by Federal funds. The first realignment involves constructing a connection track between two CSX lines entering Fayetteville from the north. One track is the heavily used CSX "A" line and the other serves the Fort Bragg military base and is essential to the movement of military equipment. The second realignment will connect the NS main track to the Milan Yard. As a result, some railroad track and several grade crossings will be removed. These two new track improvements will allow all three of the city's railroads to reroute traffic from downtown Fayetteville to the Milan rail yard on the city's outskirts and hence eliminate the current midtown pushing and pulling of trains as they conduct switching activities.

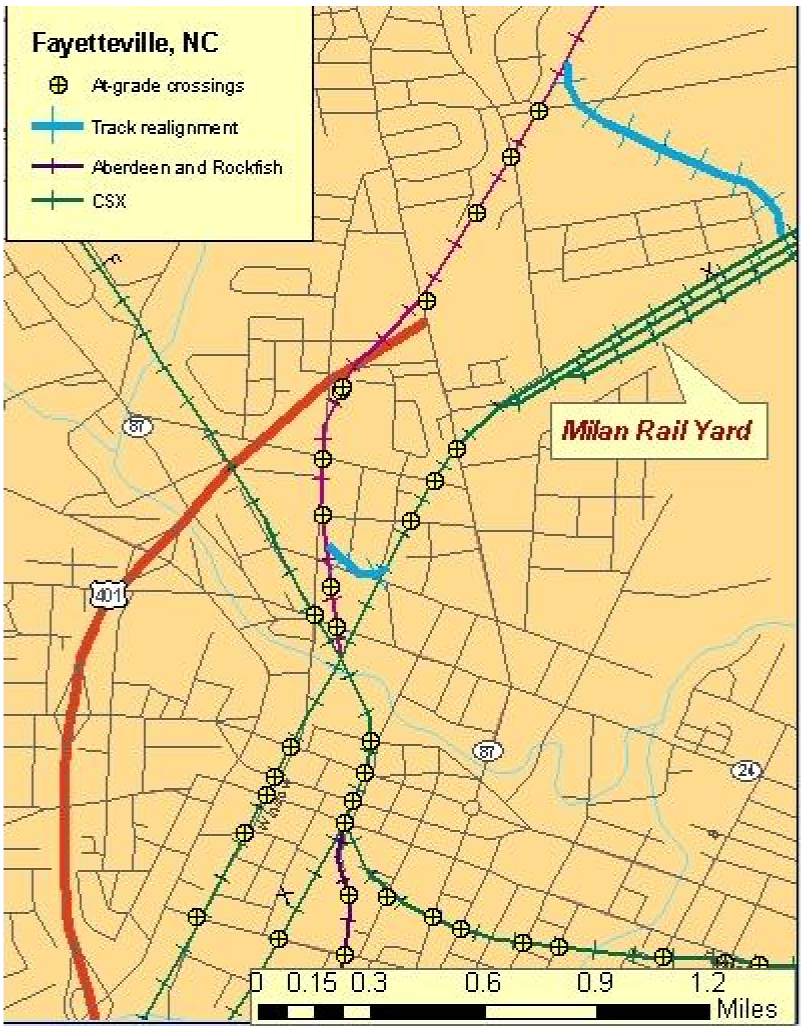
These cooperative efforts among the state, city, and the two Class 1 railroads will result in less traffic delay for all vehicles including emergency responders, less chance of rail-

[15] US Department of Census, American Fact Finder, 2006.
[16] Federal Railroad Administration, National Grade Crossing Inventory Database, 2006. This includes 117 public and 64 private at-grade crossings.

highway vehicle accidents, and improved movement of freight in and around the city of Fayetteville.

These projects demonstrate a comprehensive approach to crossing issues in Fayetteville. By adding rail connections, relocating rail lines, closing grade crossings and providing safety upgrades at remaining crossings, Fayetteville should see reduced traffic delays and improved safety. These projects also illustrate a cooperative effort involving several railroads, the state and the city. Funding also will come from a wide variety of sources, ranging from the railroads to the federal government.

Map 6A



Source: *FRA Office of Policy and Program Development*

D. Communications and Monitoring

1. Houston, TX

The Houston area may have more grade crossings than any other city of comparable size in the United States, because of its role as a major railroad and industrial center, and its location in a flat, low lying area. Railroads in many cities follow river bottoms, often in valleys well below the surrounding land, which has led to grade separations when highway bridges are built connecting hills on either side of the river. In Houston, highway bridges across non-navigable waterways do not need to be elevated above the adjacent railroad tracks because the terrain is so flat. Moreover, underpasses, for either highways or railroads, are subject to flooding. As a result, Houston has had serious grade crossing issues.

Faced with delays at grade crossings, two rail monitoring systems have been implemented in the Houston area. Within the City of Houston, a series of 18 cameras were placed at critical grade crossings in 2005. This is part of TransLink, the intelligent transportation system (ITS) research program of the Texas Transportation Institute (TTI). The web site http://traffic.houstontranstar.org/cctv/railroad/ provides video from these cameras. Emergency responders as well as citizens can use these videos to see if a grade crossing is blocked. The usefulness of the system depends on the emergency responder or the dispatcher taking the time to check the cameras. If they have access to the internet, that can be done quickly. If the crossings on the route to the scene of an incident are rarely blocked, responders often do not take the time to check.

In nearby Sugar Land, Texas, a more elaborate system was installed in 2002. In cooperation with Texas DOT, TTI developed the Sugar Land rail monitoring implementation project. Funding for the program also came from the U.S. DOT ITS Priority Corridor Program. The system monitors all the crossings on a 6.4 mile rail corridor. TTI developed a train detection/projection system for the corridor and a graphic display (available on line at http://traffic.houstontranstar.org/rail/). The system indicates real time train status and arrival time projections at the various crossings. Kiosks displaying this information are provided at two fire stations and at the police/fire communications center. The train detection is based on a Doppler radar system at each crossing connected by cellular wireless communications equipment to the central system.

The Sugar Land system, unlike the monitoring system in Houston, was designed particularly for the need of the emergency response community. It has prevented at least one very serious incident when a truck carrying sodium hydroxide, an extremely hazardous chemical, stalled on a crossing. Police dispatchers spotted the stalled truck and saw that a train was approaching at 44 miles per hour. The dispatcher immediately alerted the railroad and police units to the situation. Dispatchers continued to monitor the train's location and speed as it drew closer to the disabled truck. Alerted to the problem, the train crew was able to safely stop the train before a collision occurred. A collision that resulted in a spill would have required a full evacuation of the area.

TTI, a part of Texas A&M University, has also installed a similar system in College Station, TX. The College Station community is split by a rail line carrying 20-24 trains a day. Train speeds vary from 10 to 45 miles per hour and the gates at crossings may be down from 1 to 10 minutes. Using a system of sensors mounted on poles located off the railroad right of way, this system uses solar power to operate the radar and wireless communication system. College Station does have fire stations on both sides of the track, providing some flexibility in dispatching. The system includes a display kiosk that is located in the fire house on the route used by emergency personnel to reach the fire stations bays where the emergency vehicles are positioned. Responders can check crossing status as they go to their vehicles. A system with both cameras and radars was preferred, since the Doppler radars do not detect stopped trains that may be blocking a crossing. Emergency responders have been rerouted about 15-18 times a year.

With the research completed, a system such as that at Sugar Land can be relatively inexpensive, depending on the length of the corridor, the number of radars and or cameras used and local conditions. The components are "off the shelf." While experience indicates the system is reliable, it is essential to determine who is responsible for maintenance.

2. Albany, OR

Albany, Oregon, is located in Linn County in the central Willamette Valley in Oregon, bordering Interstate Five. Albany has a population of approximately 43,000. Queen Avenue is a centrally located main East-West route through Albany. One main line track and three yard tracks cross over Queen Avenue at this location. One block away, the west side of the crossing connects at an intersection to the main highway (Hwy. 99). The crossing is equipped with gates and cantilever flashing lights.

The Queen Avenue crossing is on the Union Pacific Railroad (UP) north-south mainline between California and the Pacific Northwest. It is at the south entrance to the UP yard, currently leased to the Willamette & Pacific Railroad. The yard, once used by a single freight railroad, currently serves one Class I railroad (UP), two short line railroads (the Willamette & Pacific Railroad and the Albany & Eastern Railroad) and Amtrak. There are six Amtrak trains, approximately 25 through-freight train movements and 125 switching movements over the crossing each day. The average daily auto traffic count is just over 16,000.

In 1980, the Public Utility Commission of Oregon (PUC) granted the Southern Pacific Railroad (the UP's predecessor) a variance to the blockage rules the Commission had established stipulating the amount of time a railroad could block a crossing. The PUC variance extends the amount of time the railroad can block the crossing from 10 to 20 minutes at a time. This increase in blockage time can only be applied to road trains, not switching movements, and cannot be used during designated rush hours (between 6:00am to 9:00am and 4:00pm to 6:00pm). The railroad must use outlying sidings for set outs and pick-ups. Because a 20 minute grade crossing blockage will cause significant delay for all highway vehicles, including emergency vehicles, the railroad is required to give at least 1-hour advanced notice to the city of Albany before blocking the Queen Avenue crossing. Oregon also requires the railroads to coordinate road closures and re-openings with the public authority during blockages.

The Oregon State Department of Transportation Rail Division receives at least one blockage complaint per day on this crossing, but often more, due to railroad operations at this crossing. Traffic queues grow quickly. When the railroad completes its move and clears the crossing for a minute or two, traffic will have typically backed up onto the highway and to the east approximately one-quarter of a mile. When the railroad resumes switching over the crossing, traffic that was previously queued may once again be stopped. Railroad operations affect traffic flow and create mobility issues from the east to west side of Albany. Upon approaching Queen Avenue from either direction, should the crossing be occupied, there is some opportunity for motorists to choose an alternate route, which makes this crossing an excellent candidate for intelligent signaling. However, Queen Avenue is only one part of a larger congestion problem in Albany, so that frequent blockages at this crossing during rush hour can cause significant delays throughout the area.

Currently, ODOT, the railroads, and local governments are reviewing a number of options to alleviate the motor vehicle congestion issues in the Albany region. Unfortunately, there is no room for any type of yard expansion. While any complete solution will take time and likely be expensive, a warning/communication system such as used in Sugar Land might provide an interim step to reducing the problem.

Map 7A

Source: *FRA Office of Policy and Program Development*

E. Rail Relocation

1. Hidalgo County, TX

Hidalgo County, TX (population 658,248) is a fast growing rural area located on Rio Grande River at the southern most part of Texas near Brownsville. Its population grew 19.1 percent from 2000 to 2005, compared to 9.6 percent for the state of Texas, and 5.3 percent for the entire US for the same time period.[17] Most of the county residents live and work near the railroad-highway configuration described in this section.

Hidalgo County's rail lines and highway network provide intermodal freight transportation between the United States, Texas and Mexico. While intermodal transportation is key to the area's current economic prosperity, long traffic delays at

[17] US Census Bureau, Population Finder, www.census.gov.

highway-rail grade crossings have become a costly and dangerous problem for all transportation users, including emergency vehicles.

This is especially so along a stretch of rail track owned by Rio Valley Switching Company (RVSR) short line railroad that extends 65 miles from the Union Pacific Railroad's (UP) Harlingen Rail Yard westward through Hidalgo County, into the small interchange yard in the City of Mission, before connecting with the Border Pacific Railroad (BOP). RVSR track runs parallel to US Business 83. Warehouses and transloading facilities along US Business 83 use team tracks (rail sidings that are accessible to trucks) to transfer freight from truck to railcars on the RVSR track.

The RVSR traffic includes agricultural products, paper, and other manufactured goods that have been trucked across the Mexican border over three international bridges. All RVSR traffic is interchanged with UP at the Harlingen Rail Yard, but RVSR does not have access to the Harlingen Yard to switch or sort cars. Instead, RVSR brings entire trains of unsorted cars to Mission Yard, where cars are blocked in groups for local customers. The Mission Yard has no yard lead track and very little storage capacity. Hence, rail operations at this yard often block adjacent grade crossings on major thoroughfares, including US 83, for over 30 minutes at a time. The condition of the rail track in this area is so poor that the maximum train speed is limited to 10 miles per hour.[18] Since many of the trains handled by the RVSR are 100 cars long, through trains can block a crossing for 5 minutes at a time.

Local government entities approached RVSR to discuss relocating its rail line away from Business 83 when they first began operations in 1993, after purchasing the line from UP. But RVSR and their customers argued that the combined costs of relocating the rail line and the warehouse facilities in the immediate area made this proposition financially impractical.

Train traffic volumes on the RVSR line have grown from 2,700 carloads in 1993 to 11,000 carloads in 2003. Growth is attributed to the railroad's ability to provide specialized customer service. Because Hidalgo County is so far from any major urban area, there is little direct competition from the trucking industry.[19]

While the railroad acknowledges serious operating constraints, RVSR hopes to nearly double its 2003 traffic volume to 20,000 carloads by 2010. To accomplish this, RVSR would like to build an intermodal terminal. Local business development groups support this type of investment to encourage growth. Toyota recently decided against development in Hidalgo County for lack of intermodal access.

Hidalgo County Metropolitan Planning Organization (HC MPO) has commissioned the Hidalgo County Rail Study to evaluate a series of at-grade roadway enhancements, adjustments to railway sidings, grade separations, and railroad track improvements as

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[18] Hildalgo County Rail Study, Hildalgo County Metropolitan Planning Association, February 28, 2005, p. 12.
[19] Id. at 12.

short and mid-term solutions. The roadway enhancements would improve safety and traffic flow. The adjustments to railway sidings would facilitate switching and sorting operations in the Mission Yard. Grade crossing separations would eliminate all highway-rail problems at the separated crossing and could alleviate traffic congestion at adjacent crossings if traffic is successfully redirected. The railroad track improvements would allow trains to travel at higher speeds to reduce the amount of time crossings are blocked for each through train.

In the long term, the Rail Study recommends relocating railroad track and building an intermodal yard. The HC MPO Rail Study proposes using multiple sources to fund these projects. The study states that the track siding improvements and track upgrades may qualify for the Short Line and Regional Railroad Rehabilitation Tax Credit Program.[20] But since the total value for this tax credit program is capped, it is likely that the funding for the siding improvements would have to come from a combination of funds from RVSR, online shippers at affected sidings, and local municipalities. Shared funding would be justified by the shared benefits of the improved sidings including improved rail service and reduced grade crossing delay.

The grade separations may be eligible for funding under the Federal Highway Administration's Surface Transportation Program (STP) apportionment for Texas, although the projects must compete with many other eligible highway projects in Texas. Funds from this program may be used to provide up to 80 percent of the funding, with the remaining 20 percent provided by state or local entities. Within the State of Texas, the Unified Transportation Program (UTP) provides the 20 percent matching funds for their Grade Separation Program.[21]

The rail relocation and intermodal facility are costly investments and require further study. HC MPO Rail Study identifies these projects as good candidates for a Railroad Rehabilitation and Improvement Financing (RRIF) loan from FRA.[22]

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[20] The Short Line and Regional Railroad Rehabilitation Tax Credit (26 USC 45G) provides a tax credit of 50 cents on the dollar for every dollar invested in track rehabilitation or maintenance, not to exceed $3,500 per mile. The credit is available every year but expires at the end of 2007.

[21] Hildalgo County Rail Study, Hildalgo County Metropolitan Planning Association, February 28, 2005, 1p. 39.

[22] The Railroad Rehabilitation & Improvement Financing (RRIF) Program, administered by FRA, provides direct loans and loan guarantees up to railroad-related projects. For more information, see the FRA website: http://www.fra.dot.gov/us/content/177

Map 8A

***Source**: FRA Office of Policy and Program Development*

2. Spokane, WA

The "Bridging the Valley" program is a community-initiated project to explore creation of one common railroad corridor over which BNSF and UP would operate between Spokane, WA and Athol, ID. This 42 mile two-railroad corridor presently has 72 grade crossings with over 70 trains a day. The UP and BNSF lines are roughly parallel, a mile or two apart. Growth in train traffic is forecast to increase annually by 3.4 percent over the next 20 years.

The project would move UP's operations onto a triple track railroad along the BNSF corridor, although local rail service to customers on the UP would be retained. The project would eliminate approximately 51 at-grade crossings through closure and the relocation of the UP line. The remaining 21 crossings either are or would be grade separated. The total cost was estimated at $252 million in 2001 dollars.

While not primarily a response to emergency response issues, reduced traffic congestion and crossing delays should benefit emergency response in the areas while also improving crossing safety and reducing emissions in a serious non-attainment areas. Although total funding for the project has not been secured, work has begun on some parts of the project.

F. Grade Separation, Line and Yard Relocation

El Paso, TX

The city of El Paso is located in far west Texas at the tip that meets New Mexico and Mexico. In 2005, the area had a total population of 721,598. The El Paso region is at a strategic location in the midpoint of the Southern California-East Texas route and at the border with Mexico (Map 9A, pg. 31). The community has a high level of passenger and freight movement. The region is served by two railroad companies: Union Pacific (UP) and Burlington Northern Santa Fe (BNSF). UP has two routes serving the region, the Sunset Route which travels from southern California to East Texas and Louisiana and the Tucumcari line which connect El Paso with Kansas City and the Midwest. BNSF has one line traveling north to its main route in Albuquerque, New Mexico. UP and BNSF lines are connected with Ferromex (FXE) in Mexico by two bridges over the Rio Grande river. The El Paso metropolitan area has 141 at-grade crossings. The high number of highway-railroad crossings creates safety and congestion problems.

Zaragoza Road

One problem crossing is the Zaragoza Rd crossing, an important arterial highway. Zaragoza Road is in the east side of the city and travels north-south, serving residential, commercial and industrial areas along its corridor. This road is crossed at-grade by the double track of the UP Sunset Route. Map 10A (pg. 32) shows the location of this road in the study area and the direction it follows from the north limit near IH-10 to the south at the Ysleta International port of entry. Congestion in this arterial is forecast to increase in the mid-term as adjacent vacant land is developed. New residential neighborhoods and retail facilities are being developed to the north of I-10. Also, railroad traffic on the Sunset line has increased due to intermodal freight moving from the Ports of Long Beach and Los Angeles (see previous discussion of Alameda Corridor and Alameda Corridor East) to Texas and the Midwest. In 2003, Moffat and Nichols Engineers reported that there were 40 trains traveling over the Sunset line but the freight traffic has probably grown since then. Of those 40 trains, 25 percent divert to the Tucumcari line to the Midwest, the rest continue to travel east on the Sunset Route to Dallas, Houston and the south

Figure 1F. - Sunset Route and Zaragoza Rd. in El Paso, Texas

Source: El Paso Metropolitan Planning Organization, 2006

The picture above shows the Sunset Route Zaragoza Road at-grade crossing. The El Paso MPO considers that this crossing presents a problem for effective emergency response. The railroad is between a major entertainment center and the regional command center of that area. An officer from the El Paso Police Department reported an incident when he was struggling to contain a brawl at the Speaking Rock Casino and, as the incident involved multiple individuals, he requested support from the police central command. At the moment when the other police cars were on their way to the nightclub to help their colleague, a train blocked the Zaragoza Road crossing which prevented the needed support to reach the scene immediately. Once at the blocked crossing, it would take longer to do a U-turn and go through the nearest separated grade crossing, thus, police cars decided to wait. The blockade lasted only for a few minutes and reinforcements eventually arrived at the incident location without serious consequences to the first officer on the scene. However, these types of incidents have the possibility of tragic results because they require immediate response. Medical services face the same type of problems in this area as most hospitals and providers are adjacent to I-10. Residents near Zaragoza Road must travel north to arrive to the closest hospital and face the same problem as the police department did in the example.

The El Paso Metropolitan Planning Organization's long-term transportation plan projects an overpass construction in this location by 2015 but no funds have been allocated. This project seems to be the best solution because the source of the problem is the amount of both railroad and automobile traffic passing through this crossing. The crossing is a six-lane divided road and a double track railroad. The total cost for this project is $9,312,360 and no cost-benefit analysis has been carried out. Unquantified benefits include reductions in emissions, delay and accidents, as well as the intangible benefit of improved emergency response.

<u>Doniphan Road</u>

The Burlington Northern-Santa Fe line connecting El Paso to the BNSF main east-west line in central New Mexico passes through the west side of El Paso from the yard in downtown El Paso. This line handles about four through trains a day and two local switching trains. The rail yard is also connected to Ferromex (FXE) through two international bridges in downtown El Paso. Currently two trains are exchanged daily.

Figure 2F. – BNSF railway in El Paso, Texas

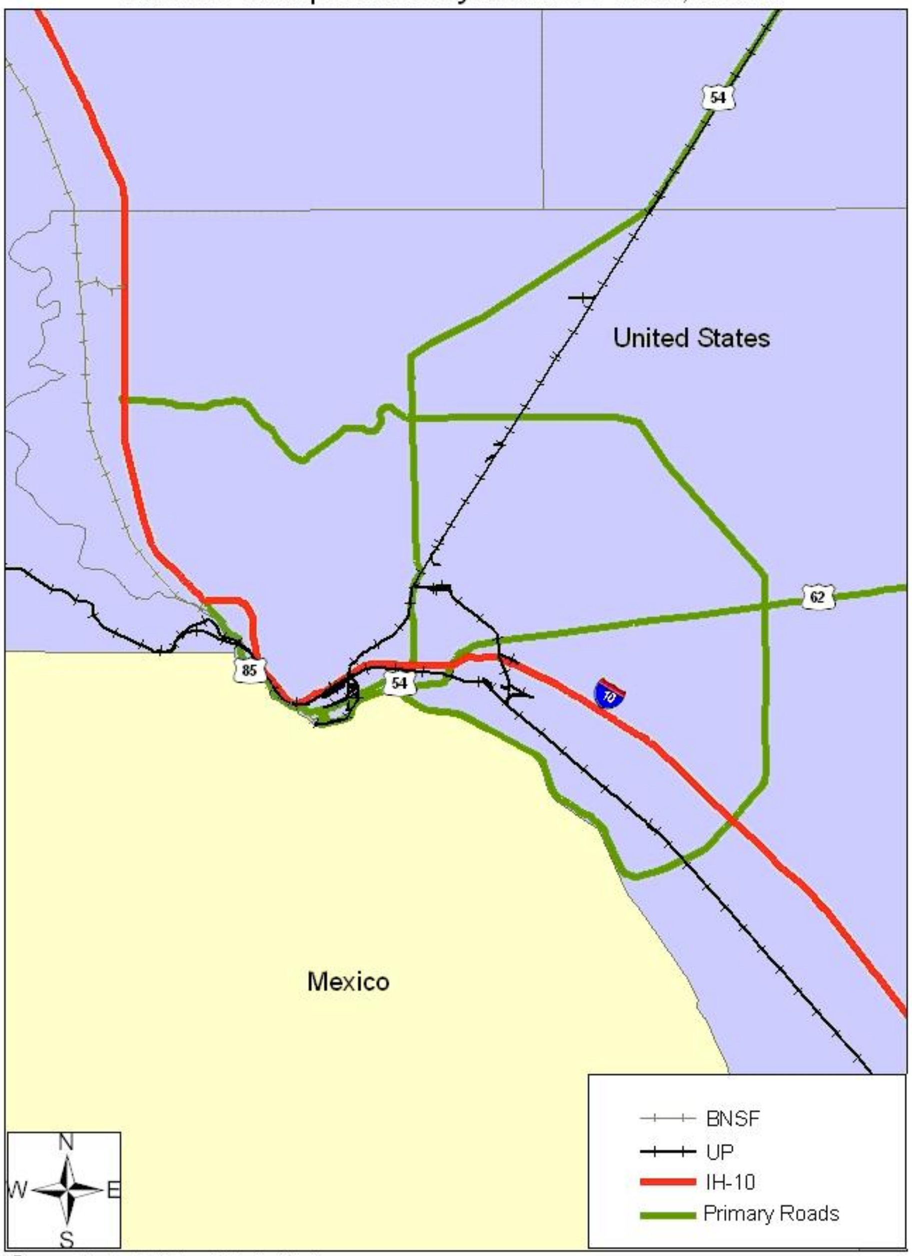
Source: El Paso Metropolitan Planning Organization, 2006.

Doniphan Road runs parallel to the BNSF rail line. Local streets intersecting Doniphan also intersect the railroad. This causes problems as cross traffic may be stopped by traffic lights at Doniphan Road and then again at the grade crossing. Emergency responders are delayed when trains are in the crossings, especially those trains conducting switching operations. Blocked crossings are an issue because the zone to the west of the railroad is mainly residential and rural and first responder facilities are located more toward the center of town to the east. Figure 2F shows the BNSF railroad and the intersection of Doniphan Rd and Sunland Park Dr. The railroad separates emergency responders located to the left in this picture from residential areas to the right. Map 10A shows the layout of the zone and location of the police department. As can be seen, responders may be forced to take alternative longer routes that increase the time of response substantially.

Moffatt & Nichols Engineers carried out a study in 2003 on the overall railroad infrastructure in El Paso and recommended the construction of a new port of entry, rail yard and a fly-over crossing. The new port and rail yard is suggested to be located west of El Paso in Santa Teresa, New Mexico and would include a fly-over at the railroad-railroad crossing between BNSF and UP railroads. The railroad-to-railroad separated crossing is necessary so easy and fast operations are possible for both BNSF and UP. The project is at a very early stage and needs coordination between all the stakeholders, including the federal government, three railroads, two states, local authorities, and the Mexican government.

Map 9A

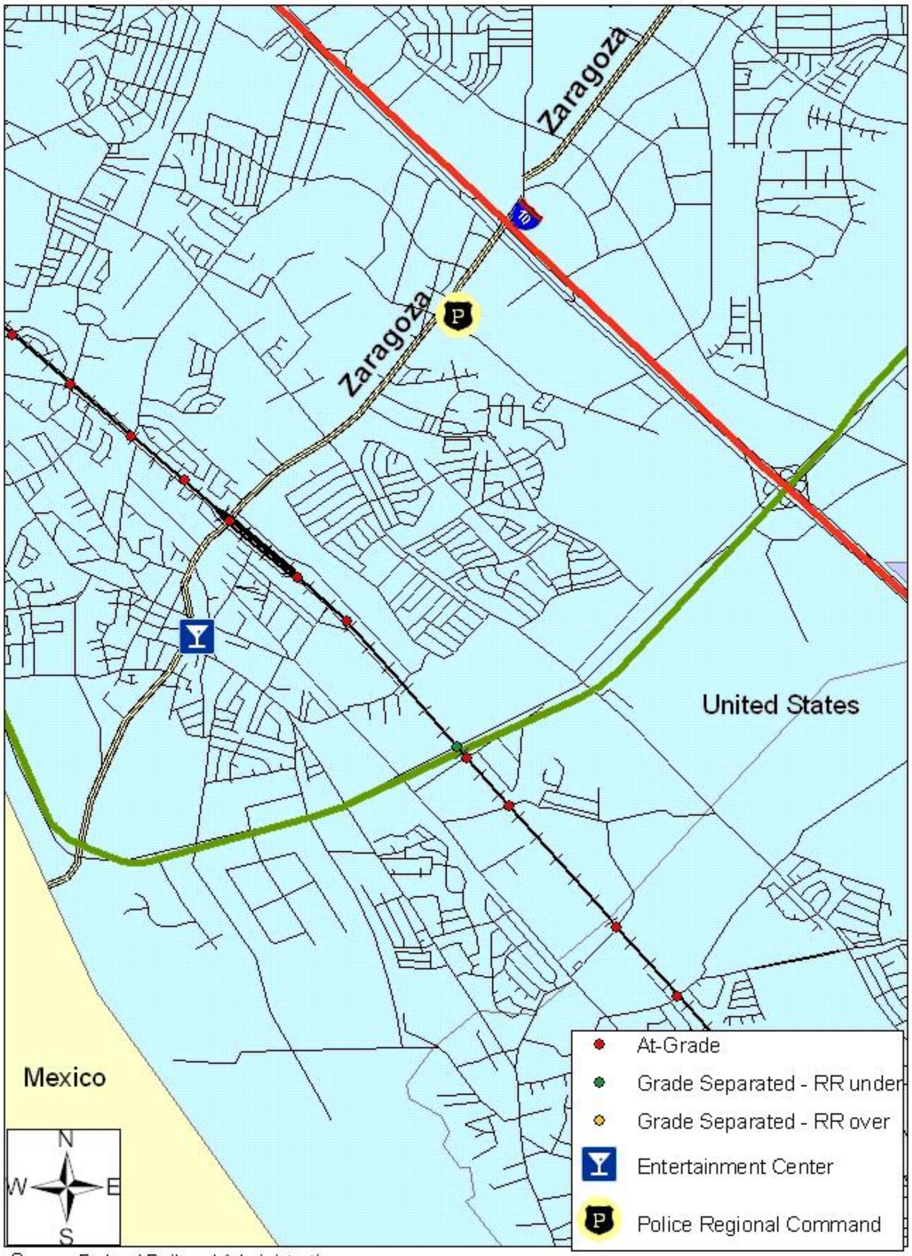
Surface Transportation System in El Paso, Texas.



Source: Federal Railroad Administration

Map 10A

Zaragoza Road and Sunset Route Crossing in El Paso Texas



Source: Federal Railroad Administration

G. Private Investments in Railroad Infrastructure

In these cases, private investments by the railroad have or will ameliorate delays due to blocked crossings.

1. Hammond, IN

One contributor to crossing delays is the need to throw manual turnouts (switches). A crew member (usually the conductor) must get off the train, move the switch to the desired direction, and wait as the train pulls through. After the train has cleared the turnout, the crew member must walk back to the locomotive before the train can proceed. These delays can be avoided if remote controlled turnouts are installed. These powered turnouts, remotely controlled by dispatchers or tower operators, can be changed before the train arrives and, if needed, returned to the original position after the train passes without requiring the train to stop. While the railroad obviously gains a benefit from speeding its operation, such improvements can be expensive, costing perhaps as much as $500,000 each and requiring more maintenance than manual turnouts. However, in some cases, powered turnouts can provide substantial benefits in terms of reducing the length of time that crossings are blocked.

Hammond, IN experienced serious delays at crossings due to trains stopping while switches were thrown. By automating the Osborn Interlocking in 2000, Norfolk Southern and the Indiana Harbor Belt Railroad were able to dramatically improve NS train operations through Hammond. Completion of the Hohman Interlocking in 2001 continued the marked improvement in movement of NS trains through Hammond. These trains also are now able to travel at higher speeds, further reducing delays. NS continues to work with Hammond and nearby cities, the “Four Cities Consortium,” to address any blocked crossing issues that occur, although now these are generally concerned with a specific train, rather than the day-to-day problems that formerly existed in the area.

2. Eloy Fire District, AZ

The Union Pacific Sunset Route runs through the middle of Eloy, where there are three at-grade crossings, all of which may be blocked at the same time. The Eloy Fire District also includes Toltec, which has a single crossing. This crossing may be blocked for up to 20 minutes by stopped trains.

The Sunset Route is a single line railroad with sidings. Currently, due to growth in intermodal traffic originating at the ports of Los Angeles and Long Beach, the line is very congested. While UP is in the process of double tracking the line, it may be several years before this portion of the line is double tracked. The delays at Eloy may be due to trains stopped at sidings waiting for oncoming trains to pass. Double tracking should reduce the delay times, although a grade separation would be preferred solution. In New Mexico, through which the Sunset Route also passes, most of the railroad route has been double tracked. As a result, discussions with the railroad indicate few problems on the double tracked section in New Mexico. As the Union Pacific continues to upgrade its infrastructure, especially that of the former Southern Pacific, the length of time crossings are blocked on the Sunset Route are likely to decline, despite increased traffic on the line.

Appendix 2

FEDERAL RAILROAD ADMINISTRATION
Regional Managers for Highway-Rail Crossing Safety
and Trespass Prevention Programs
(Updated—August 22, 2006)

Region I CT NJ ME NY MA RI NH VT	Mr. Randall L. Dickinson Federal Railroad Administration P.O. Box 2144 Ballston Spa, New York 12020	(O) (518) 899-5372 (F) (518) 899-5372
Region II DE PA MD VA OH WV	Mr. Donald P. Thomas Federal Railroad Administration Baldwin Tower, Suite 660 1510 Chester Pike Crum Lynne, Pennsylvania 19020	(O) (610) 521-8212 (F) (610) 521-8225
Region III AL MS FL NC GA SC KY TN	Mr. Thomas Drake Federal Railroad Administration 61 Forsythe Street, SW, Suite 16T20 Atlanta, Georgia 30303-3104	(O) (404) 562-3824 (F) (404) 562-3830
Region IV IL MN IN WI MI	Ms. Tammy Wagner Federal Railroad Administration 200 West Adams, Suite 310 Chicago, Illinois 60606	(O) (312) 353-6203 ext 49 (F) (312) 886-9634
Region V AR OK LA TX NM	Ms. Carolyn Cook Federal Railroad Administration P.O. Box 1522168 Austin, Texas 78715-2168	(O) (512) 282-8412 (F) (512) 282-8412
Region VI CO MO IA NE KS	Mr. Bennie D. Howe Federal Railroad Administration P.O. Box 758 Liberty, Missouri 64069-0758	(O) (816) 407-9651 (F) (816) 792-2881
Region VII AZ NV CA UT	Mr. Charles M. Hagood Federal Railroad Administration P.O. Box 453 Oakhurst, California 93644	(O) (559) 641-7649 (F) (559) 641-7649
Region VIII AK OR ID SD MT WA ND WY	Ms. Chris Adams Federal Railroad Administration 500 East Broadway, Suite 240 Vancouver, Washington 98660	(O) (360) 694-1797 (F) (360) 694-1797