

**At-Grade Passenger Rail Pedestrian & Trail Crossings  
Empire Corridor South  
WHITE PAPER & RESOURCES**



Prepared for:



Prepared by:



November 2018

## INTRODUCTION

### Introduction

The National Railroad Passenger Corporation (Amtrak) has proposed constructing impasse fencing along the Empire Corridor South in locations where it currently does not exist to keep trespassers and vehicles off Amtrak right of way. The proposal was submitted and is subject to a New York State Coastal Management Program (CMP) Consistency Determination by New York's Department of State (DOS), the state's lead Coastal Management agency.

Scenic Hudson, a land preservation and environmental organization in the Hudson Valley, is concerned that this fencing—located between Poughkeepsie (MP 75) and Rensselaer (MP 141)—will eliminate public access to the Hudson River where water-dependent and water-related activities have been enjoyed for generations.

Municipal officials, advocacy organizations and hundreds of stakeholders in the corridor have submitted comments to the DOS expressing concerns about loss of river access for fishing, hunting and boating; impact on views; and increased response time for emergency providers such as police and fire departments and Emergency Medical Service (EMS) responders.

The project as currently proposed affects coastal resources and inhibits achievement of New York's CMP policies. Scenic Hudson has therefore retained McLaren Engineering Group (McLaren) to determine if practical at-grade protected pedestrian or trail crossing solutions exist that could be advanced at some of these locations.

McLaren has conducted a desktop literature review to assess current installations of conventional and higher speed at-grade pedestrian and trail rail crossings, policies and procedures, and applicable standards. Interviews with key individuals in the industry nationally were conducted to gather additional information.

**Higher speed rail is defined as trains that travel at top speeds of 90 to 110 mph. High speed rail is defined as speeds above 110mph.<sup>1</sup>**

McLaren also was asked to provide a preliminary overview of the proposed project's potential impact on coastal resources and achievement of New York's CMP policies. The findings are outlined in this white paper.



**Germantown Site Location (MP 105)**

### Background

The project's impact on the achievement of NYS CMP public access policies is of primary concern. For example, the shore of the Hudson River between Rhinecliff (MP 89.0) and Stuyvesant Landing (MP 123.8), the site of eight proposed fencing locations, is an important and well-used resource for water-dependent activities such as fishing, hunting and recreational boating. Access to the river requires crossing the Empire Corridor South tracks, which is done at designated crossings and other locations. Train speeds in this portion of the Empire Corridor South can reach 90 mph.<sup>2</sup>

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<sup>1</sup> New York State Department of Transportation. (2012). *High Speed Rail Empire Corridor Online Briefing*.

[https://web.archive.org/web/20160304074513/https://www.dot.ny.gov/content/delivery/Main-Projects/S93751-Home/S93751-Repository/ECHSR\\_Online\\_Briefing\\_March\\_2012.pdf](https://web.archive.org/web/20160304074513/https://www.dot.ny.gov/content/delivery/Main-Projects/S93751-Home/S93751-Repository/ECHSR_Online_Briefing_March_2012.pdf)

<sup>2</sup> New York State Department of Transportation. (2014). *Tier 1 Draft EIS. Draft Environmental Impact Statement, page 2-48*. New York State Department of Transportation. P10-11

<https://www.dot.ny.gov/content/delivery/Main-Projects/S93751-Home/S93751-Repository/04chap2.pdf>

Amtrak states that the fences will serve to direct pedestrians and vehicle traffic to public crossings that will be protected by crossing gates equipped with early warning devices.

In one instance, described in Amtrak's application (Amtrak Federal Consistency Form, January 12, 2018) as "MP 104.98—Germantown Town Park," no crossing currently exists and the 700-foot-long fence would prevent—and effectively end—generations of Hudson River access for water-dependent and water-related uses.

Proposed fencing at Tivoli (MP 99.2) has been deferred, as the village is in the process of planning a waterfront park at that site. CSX sold the site to the village in order to develop a park. The sale included a condition that upon park construction, the existing grade crossing at Diana Street would be closed and a grade-separated pedestrian overpass installed to access the riverfront. This requirement has caused concern among village officials; neighboring residents; people who have been launching kayaks, canoes and other small boats; anglers; and others. Their concern is based on an array of factors: high cost; reduced access to launch boats; dedication of valuable riverfront land to a large pedestrian bridge structure instead of park purposes; and visual impacts affecting the Hudson National Historic Landmark District and the Clermont Subunit (ED-1) of the Estates District Scenic Area of Statewide Significance.

This white paper provides a review of current literature, including the American Association of State Highway Transportation Officials (AASHTO), Manual on Uniform Traffic Control Devices (MUTCD), and other engineering standards that apply to pedestrian and railway crossings of high or higher speed passenger rail lines. The white paper will assess current installations of such at-grade crossings, as well as the techniques used and related policies and procedures. Based on this assessment, the white paper will provide guidance as to whether at-grade pedestrian crossings are a viable option in the Empire South Corridor.

## **Project Purpose & Need**

Amtrak has indicated it is proposing these actions to improve public safety along the Empire Corridor South. The recommendations from Federal Rail Administration (FRA) state: "Eliminate all redundant or unnecessary crossings, together with any crossings that cannot be made safe due to crossing geometry or proximity of complex highway intersections" and "Install the most sophisticated traffic control/warning devices compatible with the location, (e.g. four quadrant gates) where train operating speeds are between 80 and 110 mph."<sup>3</sup> Amtrak's application would not "eliminate...redundant or unnecessary crossings," nor does the proposal include "the most sophisticated traffic control/warning devices." As currently proposed, Amtrak would construct the gates and fences without conducting a regional assessment of access needs or undertaking an analysis of their impacts on coastal resources and achievement of NYS CMP policies.



**Germantown Site Location (MP 105)**

In addition, a recent study of the safety record of trains in the Empire Corridor (Buffalo to New York City) conducted by the New York State Department of Transportation (NYSDOT) states, "From 2002 to 2011, of the 10 incidents which occurred at public grade crossings along the Empire Corridor, seven resulted in injuries, but no fatalities."<sup>4</sup> This would appear to obviate—or

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<sup>3</sup> US Dept. of Transportation - Federal Highway Administration. (Last Modified 2014, October 15). *Safety*.

[https://safety.fhwa.dot.gov/hsip/xings/com\\_roaduser/07010/sec04a.cfm](https://safety.fhwa.dot.gov/hsip/xings/com_roaduser/07010/sec04a.cfm)

<sup>4</sup> New York State Department of Transportation. (2014). *Tier 1 Draft EIS. Draft Environmental Impact Statement, page 2-48*. New York State Department of Transportation. P2-48

at least reduce—the need for a grade-separated overpass at Tivoli.

## **NYS CMP POLICIES & GUIDELINES**

The federal Coastal Zone Management Act requires the federal government to comply with a state’s approved CMP when taking actions that are likely to affect coastal resources. The CMP agency and DOS are responsible for reviewing proposed federal actions. They either concur with or object to the federal proposal as being consistent with the state’s CMP.

The CMP and the Local Waterfront Revitalization Program (LWRP), also administered by the New York DOS, provide clear direction for the provision of public access in proposed actions affecting coastal uses and resources. LWRPs are locally-prepared, comprehensive land- and water-use programs for a community's natural, public, working waterfront and developed coastal areas. They provide a comprehensive structure within which critical coastal issues can be addressed. Both the Town of Rhinebeck and Village of Tivoli, which are among the eight proposed fencing locations, have completed approved LWRPs.<sup>5</sup>

Once an LWRP is approved by the New York State Secretary of State, state agency actions are required to be consistent with the approved LWRP to the maximum extent practicable. When the federal government concurs with the incorporation of an LWRP into the CMP, federal agency actions also must be consistent with the approved addition to the CMP.<sup>6</sup>

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<https://www.dot.ny.gov/content/delivery/Main-Projects/S93751-Home/S93751-Repository/04chap2.pdf>

<sup>5</sup> New York State Department of State. Planning & Development. *Frequently Asked Questions. Local Waterfront Revitalization Program (LWRP)* <https://www.dos.ny.gov/opd/faq.html>

<sup>6</sup> New York State Department of State. Planning & Development. *Local Waterfront Revitalization Program (LWRP)*. Division of Planning. <https://www.dos.ny.gov/opd/programs/lwrp.html>

## **POLICIES, STANDARDS AND TECHNIQUES FOR AT-GRADE, GATE-PROTECTED PEDESTRIAN CROSSINGS**

In its January 12, 2018, Federal Consistency Assessment Form, Amtrak acknowledges that the project will reduce public access to the Hudson River and shoreline. As currently proposed, it primarily affects coastal resources and achievement of NYS CMP policies 19, 20 and 21.

**Policy 19 guidelines state, “the existing access from adjacent or proximate public lands or facilities [such as public parks, parking lots or other public property] to public water related recreation resources and facilities [Hudson River and shoreline] shall not be reduced, nor shall the possibility of increasing access in the future...be eliminated.”**

Since the project would reduce—and not increase—public access, it does not appear to achieve or advance Policy 19.

**Policy 20 Explanation of Policy states, “in coastal areas where there are little or no recreation facilities providing specific water-related recreational activities, access to the publicly-owned lands of the coast at large should be provided for numerous activities:**

- walking along a beach or a city waterfront
- bicycling
- bird watching
- photography
- nature study
- beachcombing
- fishing and hunting”

**There are several methods of providing access...[including] “the provision of access across transportation facilities.”**

Since this project does not provide new access for a variety of water-related activities, it appears neither to achieve nor advance Policy 20.

**Policy 21 Explanation of Policy states, “among priority areas for increasing water-related recreation opportunities are those areas where access to the recreation opportunities of the coast can be provided...and those areas where the use of the shore is severely restricted by...railroads.”**

Since the project does not provide new access opportunities over railroads, it does not appear to achieve or advance Policy 21.

Warning devices and traffic control for railroad-highway crossings consist primarily of signs, pavement markings, flashing light signals and automatic gates. Criteria for the design, placement, installment and operation of these devices are covered in the MUTCD.<sup>7</sup> Crossing angle, crossing surfaces, trail width and flange opening between the rail and trail surface are important considerations in the design of an at-grade trail-rail crossing.<sup>8</sup>

A 2002 US DOT report that assesses rails with trails provides considerable detail on the design of at-grade rail-with-trail and trail-related crossings.<sup>9</sup> In addition to the MUTCD standard devices, innovative treatments have been developed to encourage cautious pedestrian behavior. The appropriate traffic-control system should be determined by an engineering study for all trail-rail crossings to determine the best combination of active safety devices. Key considerations include train frequency and speed, sight distance, other train operating characteristics, presence of potential

obstructions and volume of trail users. Active traffic control systems advise trail users of the approach or presence of a train at railroad crossings. Information regarding the appropriate uses, location and clearance dimensions for active traffic control devices can be found in Part 8 of the MUTCD.<sup>10</sup>

Passive and active devices may be used to supplement highway-related active control devices to improve non-motorist safety at trail-rail crossings. Passive devices include fencing, swing gates, pedestrian barriers, pavement markings and texturing, refuge areas and fixed message signs. Active devices include flashers, audible active control devices, automated pedestrian gates, pedestrian signals, variable message signs and blank-out signs. These devices should be considered at crossings with high pedestrian traffic volumes, high train speeds or frequency, extremely wide crossings, complex crossing geometry with complex right-of-way assignment, school zones, inadequate sight distance and/or multiple tracks. All pedestrian facilities should be designed to minimize pedestrian crossing time, and devices should be designed to avoid trapping pedestrians between sets of tracks.<sup>11</sup>

The MUTCD provides guidance on the types of signage, signals and warning devices for at-grade rail crossings. Chapter 8 focuses specifically on at-grade trail-rail crossings for pedestrians.

“Traffic control for trail grade crossings includes all signs, signals, markings, other warning devices, and their supports at trail grade crossings and along trail approaches to grade crossings. The function of this traffic control is to

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<sup>7</sup> American Association of State Highway & Transportation Officials. (2011 - 6th Edition). *A Policy on Geometric Design of Highways & Streets*.

<sup>8</sup> American Association of State Highway & Transportation Officials. (2012 - 4th Edition). *Guide for the Development of Bicycle Facilities*.

<sup>9</sup> US Department of Transportation. (2002). *Rails with Trails: Lessons Learned*. US Department of Transportation. P74  
<https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/RailsWithTrails.pdf>

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<sup>10</sup> US Department of Transportation. (2002). *Rails with Trails: Lessons Learned*. US Department of Transportation. P77  
<https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/RailsWithTrails.pdf>

<sup>11</sup> US Dept. of Transportation - Federal Highway Administration. (Last Modified 2014, October 15). *Safety*.  
[https://safety.fhwa.dot.gov/hsp/xings/com\\_roaduser/07010/sec04c.cfm#j](https://safety.fhwa.dot.gov/hsp/xings/com_roaduser/07010/sec04c.cfm#j)

promote safety and provide effective operation of both rail and trail traffic at trail grade crossings.<sup>12</sup>

The requirement for extra warning time for pedestrians and motorists at grade crossings with higher speed rail operations is emerging as an additional issue for safety upgrades. Currently, the typical warning time at crossings where pedestrians may be present is between 20 and 30 seconds for conventional-speed trains. In areas with train speeds up to 110 mph, confirmation signals are needed to inform the crew and the onboard computer that the crossing is clear, and a warning time of at least 80 seconds is recommended.<sup>13</sup>

Bridge structures provide another option for pedestrian and trail crossings over rail lines. However, while bridges can provide an additional level of safety over at-grade crossings, there are drawbacks, which may include cost (a bridge costs approximately \$1.5 million versus \$50,000-\$300,000 for an at-grade crossing designed to current standards)<sup>14</sup>; aesthetics, with site constraints due to the location of the tracks in relation to the river; ADA standards; and kayak/canoe portage. In addition, maintenance and emergency-vehicle access to the riverfront will be needed in most cases, which would require an at-grade crossing in addition to a pedestrian or trail bridge.

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<sup>12</sup> Manual on Uniform Traffic Control Devices (MUTCD). (2009). *2009 Edition Chapter 8D. Trail Grade Crossings*. MUTCD.

<https://mutcd.fhwa.dot.gov/hlm/2009/part8/part8d.htm#figure8D01>

<sup>13</sup> Paul Metaxatos & P.S. Sriraj, P. M. (April 2013). *Pedestrian/Bicyclist Warning Devices & Signs at Highway-Rail and Trail-Rail Grade Crossings*. Illinois Center for Transportation.

<https://www.americantrails.org/files/pdf/FHWA-ICT-rail-path-crossing.pdf>

<sup>14</sup> PEDSAFE/FHWA. (2013). *Pedestrian Safety at Railroad Crossings*.

[http://www.pedbikesafe.org/pedsafe/countermeasures\\_detail.cfm?CM\\_NUM=66](http://www.pedbikesafe.org/pedsafe/countermeasures_detail.cfm?CM_NUM=66)

## ILLUSTRATIVE EXAMPLES

Examples of current conventional and higher speed at-grade pedestrian and trail-rail crossings include the Illinois High Speed Rail, Florida Brightline and Orange County Metrolink.

### ILLINOIS HIGH SPEED RAIL, CHICAGO-ST. LOUIS

The overall purpose of the Illinois High Speed Rail project is to enhance the passenger transportation network within the 284-mile Chicago to St. Louis corridor, resulting in a more balanced use of the transportation system. Although the project is still in progress, much has already been done toward accomplishing the goal of a 110-mph corridor. The program has consisted of track improvements, enhanced signal systems and grade-crossing improvements that have included four quadrant gates, pedestrian gates and fencing, as well as pedestrian escape gates. An 80-second warning signal prior to a train's arrival affords vehicles and pedestrians time to cross.

The Illinois Department of Transportation (IDOT) Bureau of Railroads is leading the overall management for the project's development and implementation.



*Illinois High Speed Rail crossing*

Installation of the improved at-grade crossings and signals began in 2014 and is just being completed. Trains are currently operating at 79 mph, but will soon increase to 90 mph as software improvements are completed. The trains will eventually run at up to 110 mph. According to phone interviews conducted with two IDOT officials, no issues have been reported with the upgraded crossings.<sup>15</sup>

The 284-mile Illinois High Speed Rail program clearly demonstrates that a system containing dozens of at-grade crossings can be operated and maintained safely. The 80-second advance notification to clear the track is recommended for the Empire Corridor South.

### FLORIDA BRIGHTLINE

The Florida Brightline is an express intercity rail line operating at speeds up to 79 mph between Miami and West Palm Beach, with an intermediate stop at Fort Lauderdale. Developed by All Aboard Florida, a wholly owned subsidiary of Florida East Coast Industries, it is the nation's only privately owned and operated intercity passenger railroad. The Brightline runs along the state's densest population corridor, which contains more than 6 million residents and a regular influx of tourists.



Florida Brightline (*Palm Beach Post*)

The Fort Lauderdale to West Palm Beach segment opened on January 13, 2018, followed by Fort Lauderdale to Miami on May 19. An extension from West Palm Beach to Orlando via Cocoa is scheduled to open in 2021, with more extensions planned. The project included more than \$1.5 billion in upgrades to the rail corridor between Miami and Cocoa. These improvements included double tracking the corridor, improving signaling systems and upgrading some grade crossings.<sup>16</sup>

However, grade-crossing improvements have not been made at all locations. In Palm Beach County, 20 out of 80 Brightline crossings are not being improved to keep motorists, bicyclists or pedestrians from maneuvering around lowered warning gates. Curbed median islands and flexible polymer markers will be added to some crossings in West Palm Beach to deter this activity.<sup>17</sup> Less than half of the Brightline crossings have quad gates.

Since Brightline service began in January 2018, there have been several fatalities and injuries that occurred as a result of pedestrians and bicyclists moving around a lowered gate or crossing along the tracks.

The Florida Brightline clearly has encountered serious safety issues. While we should pay close attention to the lessons learned, it should be noted that the Brightline introduced high speed trains in an urban corridor without making sufficient upgrades. In contrast, the Empire Corridor South is proposing modest speed increases in a corridor where open access to the river predates the rail line's construction in the 19th century.

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<sup>15</sup> Interviews with Elliott Ramos and Bryan Trygg, IDOT 2018  
Illinois Department of Transportation and Federal Railroad Administration, (2018). *Chicago to St. Louis High Speed Rail Project*.  
<http://www.idothsr.org/about/team.aspx>

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<sup>16</sup> Wikipedia, (2018). *Brightline*.  
<https://en.wikipedia.org/wiki/Brightline>  
<sup>17</sup> Palm Beach Post. (2018) *Brightline*.

## METROLINK ORANGE COUNTY LINE

California's Metrolink Orange County is a commuter rail service operating between Los Angeles and Oceanside in San Diego. It is part of the larger Metrolink system operating on 534 miles of rail in Southern California. The City of San Clemente, Orange County Transportation Authority (OCTA) and Metrolink worked cooperatively to construct safety enhancements, including five new at-grade pedestrian crossings along a 2.5-mile segment providing connections to an oceanside trail and popular beach. The latest at-grade crossing equipment was installed, including pedestrian crossing gate arms, lights, bells, emergency egress gates, fencing and an audible warning system that was part of a quiet zone initiative. The crossings were installed in 2008 and the audible warning systems for quiet zones around 2014. Although operating speeds along portions of the Orange County line reach up to 90 mph, speeds on the San Clemente segment are below 50 mph due to the line's curvature. The example is nonetheless instructive since the crossing equipment upgrades are similar to those used in the Illinois High Speed Rail systems. No formal reports have been prepared about the crossings, but rail operators reported to the city that they like the improvements because fencing along the 2.5-mile segment directs people to the crossings, preventing them from crossing the tracks anywhere. There has been one incident, a fatality, in the area where improvements were made; however, police determined it to be a suicide.<sup>18</sup>

The Metrolink Orange County Line is an excellent example of pedestrian rail crossing upgrades being made to achieve improved waterfront access.



*San Clemente Metrolink Crossing*

## SUMMARY OF FINDINGS

The purpose of this white paper is to conduct a preliminary desktop review of pedestrian crossings of high or higher speed rail lines, and to follow up with a few select interviews with industry experts. Its findings would determine if at-grade protected crossings are practical in the Empire Corridor South (particularly Rhinecliff to Stuyvesant Landing), where Amtrak train speeds may be as high as 90 mph. The paper also provides a preliminary overview of the project's impact on coastal resources and achievement of the NYS CMP policies.

Preliminary findings strongly show that by using readily available technology, at-grade, gate-protected pedestrian crossings are a viable, safe and practical alternative to bridge construction or total elimination of access at Germantown, Tivoli and other locations along the Empire Corridor South.

Public access to the Hudson River has been an important tradition in the communities between Rhinecliff and Stuyvesant Landing for generations. Indeed, the LWRPs of Rhinebeck and Tivoli provide blueprints for the stewardship and enjoyment of natural, public and developed waterfront resources along the river.

<sup>18</sup> Tom Bonigut, City of San Clemente Engineering Office (October 1, 2018) *Phone interview* Orange County Transportation Authority Website, 2013 Orange County Transportation Authority, (2013). *San Clemente Pedestrian Crossings*.

<https://www.octa.net/Projects-and-Programs/All-Projects/Rail-Projects/Railroad-Crossing-Enhancements/San-Clemente-Pedestrian-Crossings/>



As noted by PEDSAFE<sup>19</sup>, a pedestrian bridge can cost \$1.5 million or higher, as documented in the preliminary budget developed for Village of Tivoli waterfront park (2016 Master Plan). Conversely, state-of-the-art at-grade crossings can cost \$50,000-\$300,000, depending on existing conditions. In addition to being significantly lower in construction costs, at-grade crossings require less maintenance, provide easier portage opportunities (kayaks/canoes) and are more aesthetically pleasing. At-grade crossings for pedestrians also can be combined with emergency and maintenance vehicle access.

Based on McLaren's review of literature, interviews and illustrative examples, at-grade pedestrian or trail crossings of the Empire South corridor between Rhinecliff and Stuyvesant Landing, if properly designed to current AASHTO and MUTCD standards, are feasible. Such a design would include features such as pedestrian gates, pedestrian escape gates, fencing and an 80-second signal delay.

Based on analysis of the NYS CMP Policies, approved LWRPs and public comments, it appears the project as currently proposed may affect coastal resources and may not achieve or advance NYS CMP policies.

At-grade pedestrian crossings using state-of-the-art engineering practices and solutions would provide safety and increase access to the Hudson River. This approach, considering safety and access together, is needed to satisfy consistency requirements of local LWRPs and NYS Coastal policies, and may be an acceptable solution to all stakeholders.

## CONTACTS

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### **Scenic Hudson, Inc.**

Jeffrey Anzevino, AICP  
Director of Land Use Advocacy  
(845) 473 4440 Ext 221  
janzevino@scenichudson.org

### **McLaren Engineering Group**

Peter Melewski, PE  
National Director of Strategic Planning  
5 Clinton Square, 3<sup>rd</sup> Floor  
Albany, NY 12207  
(518) 992-4830  
pmelewski@mgmclaren.com

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<sup>19</sup> PEDSAFE/FHWA. (2013). *Pedestrian Safety at Railroad Crossings*.

[http://www.pedbikesafe.org/pedsafe/countermeasures\\_detail.cfm?CM\\_NUM=66](http://www.pedbikesafe.org/pedsafe/countermeasures_detail.cfm?CM_NUM=66)

## APPENDIX – VARIOUS RESOURCES

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These additional resources were reviewed in the development of the white paper.

### Interviews

Wes Coates, former Amtrak General Manager—Empire Service Product Line; currently Executive Director, Catskill Revitalization Corporation/General Manager—Delaware & Ulster Railroad, interviewed September 2018 by Peter Melewski, PE, MEG.

Elliott Ramos, Project Engineer, Illinois DOT Rail Division, interviewed September 17, 2018, by John DiMura, MEG.

Brian Trygg, Illinois DOT Local Roadways Bureau, interviewed September 14, 2018, by John DiMura, MEG. During the public comment period, DOS received comments from 302 individuals and a petition with 108 signatures. There are two still-active (change.org) petitions, one with 495 signatures, the other with 1,643 signatures.

Tom Bonigut, City of San Clemente Engineering Office, interviewed October 1, 2018, via phone by John DiMura, MEG.

### **Rails to Trails Conservancy: Rails -with Trails Design, Management and Operating Characteristics of 61 Trails Along Active Railroads**

Rails to Trails Conservancy. (2005). *Rails with Trails: A Preliminary Assessment of Safety and Grade Crossings*. Rails to Trails Conservancy.

[https://www.railstotrails.org/resourcehandler.ashx?name=rails-with-trails-a-preliminary-assessment-of-safety-and-grade-crossings&id=4616&fileName=RwT\\_Grade\\_Crossings\\_Report\\_final\\_Ir.pdf](https://www.railstotrails.org/resourcehandler.ashx?name=rails-with-trails-a-preliminary-assessment-of-safety-and-grade-crossings&id=4616&fileName=RwT_Grade_Crossings_Report_final_Ir.pdf)

### **Rails-with-Trails: A Preliminary Assessment of Safety and Grade Crossings**

[https://www.railstotrails.org/resourcehandler.ashx?name=rails-with-trails-a-preliminary-assessment-of-safety-and-grade-crossings&id=4616&fileName=RwT\\_Grade\\_Crossings\\_Report\\_final\\_Ir.pdf](https://www.railstotrails.org/resourcehandler.ashx?name=rails-with-trails-a-preliminary-assessment-of-safety-and-grade-crossings&id=4616&fileName=RwT_Grade_Crossings_Report_final_Ir.pdf)

### **America's Rails-with-Trails**

[https://www.railstotrails.org/resourcehandler.ashx?name=americas-rails-with-trails-report&id=2982&fileName=RwT%20Report\\_FINAL\\_103113\\_low%20res.pdf](https://www.railstotrails.org/resourcehandler.ashx?name=americas-rails-with-trails-report&id=2982&fileName=RwT%20Report_FINAL_103113_low%20res.pdf)

### **Transportation Research Board (TRB) – Innovations Deserving Exploratory Analysis (IDEA) High Speed Rail Final Reports**

<http://www.trb.org/Publications/PubsIDEAHighSpeedRailFinalReports.aspx>

- Project 11: Integrated Quad Gate Crossing Control Systems
- Project 8: Remote Sensing Advance Warning Systems Test Project
- Project 5: Enhanced Proximity Warning System for Locomotives

### **Progressive Railroading**

Crossings w/better warning devices – Jan. 2010

[https://www.progressiverailroading.com/c\\_s/article/Railroads-arm-grade-crossings-with-better-warning-devices-22316](https://www.progressiverailroading.com/c_s/article/Railroads-arm-grade-crossings-with-better-warning-devices-22316)

### **Florida WTOP – New High-Speed Train – 4<sup>th</sup> death**

<https://wtop.com/travel/2018/01/man-hit-by-floridas-new-high-speed-train-4th-death-so-far/>

15 second warning before train goes by.

## **PEDSAFE: Pedestrian Safety at Railroad Crossings**

[http://www.pedbikesafe.org/pedsafe/countermeasures\\_detail.cfm?CM\\_NUM=66](http://www.pedbikesafe.org/pedsafe/countermeasures_detail.cfm?CM_NUM=66)

## **Crossing collisions & fatalities by year (general) has decreased**

<https://oli.org/about-us/news/collisions-casulties>

## **Published on Aug 21, 2017—New Railroad Crossing**

New railroad crossing installation on Daniels Road in Moore Haven, Florida, next to Sportsman Village near the Caloosahatchee Canal and Lake Okeechobee. A wood post and cross bucks (visible on Google Maps) previously provided the only warning at this SCFE former CSX crossing.

There were no signals, lights, gates or bells. <https://www.youtube.com/watch?v=nUGSXQO96rs>

## **Meadowview Road Railroad Crossing with New Gate Getting Installed, SACRT 122 Light Rail**

### **Published on Aug 24, 2015**

The Sacramento Regional Transit Blue line opened today with service to CRC for the light rail. A new gate is being installed on UPRR gate because a car hit the gate and broke it when it was lowered. While the gate was being fixed, trains had to blow its horn through the crossing. Also, the SACRT Gateless mast signal had its lights twisted more toward the sidewalk. More info below.

### **Crossing Info:**

4 Signals, 2 Gateless, 2 Gated, 1 Lindsay Rail Cantilever, 1 WCH Cantilever, 2 General Signal Type 2 Electronic Bells, 1 NEG Electronic Bell, and 1 WCH Mechanical Bell. Signals by me are owned by SACRT and Bells ring through whole activation. Signals on other side are owned by UP and Bells ring till gates rise. New Gateless Mast Signal by Me has Newer Gen 12" Harmon Fading LEDs inside Safetran Light Frames, Safetran Brackets, Siemens Signal Base, Safetran Dwarf Signal for Light Rail, and GS Type 2 E-Bell. New Cantilever on my side has newer gen 12" Harmon Fading LEDs inside WCH Light Frames, WCH Brackets, and GS Type 2 E-Bell. New Cantilevers Gated Mast Signal has a pair of newer gen 12" Harmon Fading LEDs inside Safetran Light Frames, Safetran Brackets, Siemens Mechanism, Safetran/Siemens Counterweight Arms, and Siemens Signal Base. New Gateless Mast Signal on other side of tracks has 12" General Electric/WCH LEDs inside Safetran Light Frames, Safetran Brackets, Safetran Signal Base, and NEG E-Bell. Old Cantilever Mast on other side has 12" WCH 2nd Gen LEDs inside Safetran Light Frames, Safetran Brackets, and WCH Mechanical Bell. Cantilever on other side overhead has 12" UP LEDs inside Federal Signal/WCD Light Frames and WRRS Brackets. Cantilevers Gated Mast Signal has a short mast with UP Gate LEDs, Safetran Mechanism, Safetran Counterweight Arms, and Safetran Signal Base. The Tram Sign Signals in the middle of the tracks are owned by SACRT. One of them to the right has a Siemens Signal base and a Safetran Dwarf Signal for Light Rail. There are also two Yellow Flasher Signals that activate if there is car traffic stopped at railroad tracks.

### **Trams:**

Train to Cosumnes River College Station

- SACRT 122 Siemens Duewag u2a

- SACRT 120 Siemens Duewag u2a

<https://www.youtube.com/watch?v=5k0gWiwM6OA>

### **Train Lines:**

UPRR Sacramento Sub and SACRT Blue Line/Sacramento, CA.

## **Minneapolis Light Rail - Pedestrian Crossing**

<http://oldtrails.com/LightRail/Minneapolis/railmin45.htm>

## Pedestrian RR crossing

[https://www.reddit.com/r/CitiesSkylines/comments/327u6m/a\\_pedestrian\\_railroad\\_crossing\\_using\\_dirt\\_roads/#bottom-comments](https://www.reddit.com/r/CitiesSkylines/comments/327u6m/a_pedestrian_railroad_crossing_using_dirt_roads/#bottom-comments)

## MN at Grade Trail Crossing

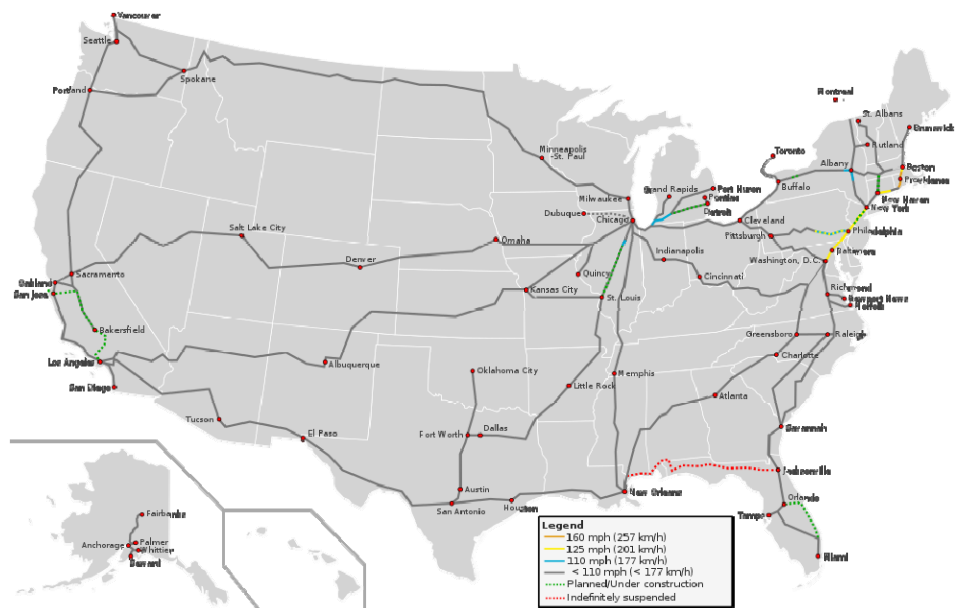
The following treatments are considered applicable only to trail crossings with a high-speed crossed road:

- Painting the “standard” pattern (has less paint compared to other patterns) for the crosswalk (Treatment PMS-06) is only appropriate for high-ADT crossed roads as recommended by the Florida’s Trail Crossing Design Handbook [6].
- Refuge islands (Treatments RI-01 through RI-03 and TRSS-10) are only necessitated by high travel speed or high traffic volume on the crossed road [17, 46]. Therefore, refuge islands are recommended only for trail crossings with high-speed or high-ADT crossed road.
- Pedestrian/bicycle signals (Treatment TSGB-01 and TRSS-06) are only recommended for installation at midblock trail crossings with a high-ADT crossed road [6, 71], as low-ADT roads usually do not require signals. The final recommendation should be based on the result of the signal warrant analysis.
- HAWK signals (Treatments TSGB-07 and TRSS-09) are only recommended for installation at midblock trail crossings with a high-ADT crossed road per Association of Pedestrian and Bicycle Professionals [71].
- RRFB and yellow flashing beacon related treatments (Treatments TSGB-06, TSGB-08, TRSS-11, TRSS-12, and TRSS-14) are only recommended for installation at trail crossings with a high-ADT crossed road per Association of Pedestrian and Bicycle Professionals [71].

<http://www.dot.state.mn.us/research/TS/2013/201323.pdf>

The requirement for extra warning time for pedestrians and motorists at grade crossings of high-speed rail operations is emerging as an additional issue for safety upgrades at such crossings. Currently, the typical warning time at crossings where pedestrians may be present is between 20 and 30 seconds for conventional-speed trains. In an environment with 110-mph hour trains, there would be a need to provide confirmation signals to the train crew and the onboard computer that the crossing is clear, which would likely require a warning time of at least 80 seconds. The question about how pedestrians will react to such extended warning times at pedestrian crossings remains to be determined. This is because, currently, most of the warning time is built into the time that the train occupies the crossing. When high-speed trains begin to operate, most of the warning time is going to be built into the time for the train approaching the crossing. Therefore, an extended warning time would be necessary when the crossing remains unoccupied and a high-speed train could not be seen on the horizon. This situation will require reeducation of the public, especially in areas where crossings are very near to each other.

<https://www.americantrails.org/files/pdf/FHWA-ICT-rail-path-crossing.pdf> (pg15)



## Germantown/Empire Corridor South Amtrak Fencing Articles

<https://www.hudsonvalley360.com/article/town-supers-call-suspend-amtrak-fencing-public-comment-period>

<https://theotherhudsonvalley.com/2018/04/15/amtrak-fences/>

<https://www.hudsonvalley360.com/article/amtrak-fence-opponents-rally-germantown>

## University of Memphis Railroad Right of Way to Become Safer, Greener

<https://www.memphisdailynews.com/news/2016/jul/9/storied-university-of-memphis-railroad-right-of-way-to-become-safer-greener/>

## Florida's new high-speed train - 4th death so far

<https://wtop.com/travel/2018/01/man-hit-by-floridas-new-high-speed-train-4th-death-so-far/>

BOYNTON BEACH, Fla. (AP) — Bells clang and lights flash 15 seconds before the high-speed train zips through the crossing where Jeffrey King died. Five seconds later, Florida's new Brightline train is gone. Train travels at more than 70 mph through Boynton Beach.

## Race Street Pedestrian Schuylkill River Trail Crossing

Schuylkill Banks/City of Philadelphia Parks & Recreation. At grade rail pedestrian electric gate rail crossing to reach river side that has boat launch and kayaks.

<https://www.schuylkillbanks.org/landmarks/race-st-crossing>



## Railroad Pedestrian Crossings, University of Memphis

### ◆ 2017 ACEC Tennessee Small Projects Honoree ◆

As the University grew, so did its footprint which now includes buildings and parking on the south side of the Norfolk Southern Railway and Southern Avenue. With more than 3,000 parking spaces on the south side of the tracks and street and with classrooms on the north side, thousands of students are required to cross the rails by foot daily.



The University of Memphis wanted to make much safer, more attractive pedestrian crossings for the active railroad dividing the campus. The project created three pedestrian crossings, and the design included passive gates, pedestrian signals to flash and sound warnings of an approaching train, solar-powered lights to illuminate the crossings at night, and a sidewalk running parallel to Southern Avenue and the tracks. They have solar-powered lighting and flashing crossing lights and audible signals as a train approach. The crossings meet Americans with Disabilities Act standards, and they have gates designed to make pedestrians think before they cross.

Allen & Hoshall Engineers-Architects-Surveyors, (2016). *Railroad Pedestrian Crossings, University of Memphis*.

<http://www.allenhoshall.com/portfolio/railroad-pedestrian-crossing-improvements-university-of-memphis/>

### Trimet Installs Swing Gates & Fenced Switchbacks

Portland's regional transit agency has installed swing-out gates that biking advocates say will force people on bikes and trikes to stop or dismount in order push gates open to cross its new MAX tracks at SE 11th Avenue.

The city's Bicycle Advisory Committee later expressed its opposition to swing gates. The Pedestrian Advisory Committee did, too, because of the difficulty of getting through the gates while using a wheelchair or other mobility device. After that response, TriMet changed its plans at the 8th Avenue crossing and built fenced switchbacks. It also added a triangular concrete island placed on the south side of light rail tracks west of 12th. TriMet spokeswoman Mary Fetsch said in an email that those are "to help orient riders to look both ways before crossing. Andersen, M. (2015, 12 23). *TriMet installs Swing-gates at 11th Ave. Rail Crossing.*

<https://bikeportland.org/2015/12/23/171072-171072>



### USDOT/FHWA – Safety: Pedestrian Safety Guide for Transit Agencies

#### ***Pedestrian Crossings of Rail Systems***

In some areas, pedestrians may need to cross railroad or light rail tracks to access a transit station or stop. The design of these crossings is critical, as pedestrian/train collisions typically result in severe or fatal injuries. While most current standards and requirements for railroad at-grade warning systems are tailored to motor vehicle traffic, the Federal Highway Administration's *Railroad-Highway Grade Crossing Handbook*<sup>44</sup> provides guidance about pedestrian crossings. Additional guidance is provided by the MUTCD (see Part 8 and Part 10),<sup>45</sup> American Railway Engineering and Maintenance of Way Association (AREMA) *Signal Manual* (see Volume 1, Section 3),<sup>46</sup> and Code of Federal Regulations 49 (see Part 234).<sup>47</sup> Different standards apply to at-grade crossings of light rail tracks which often have no gates or warning devices.

Railroads shall provide a minimum of 20 seconds of warning time, with the active devices (bells, flashing lights, barricades, etc.) fully deployed five seconds before the arrival of a transit vehicle.<sup>45</sup> This gives a pedestrian a minimum of 15 seconds to complete crossing the tracks. Longer crossings may necessitate additional warning time built into the train detection system. In addition to time, the type of surface material used at the rail crossing must be designed in accordance with the ADAAG.

At-grade crossings with multiple tracks can present additional dangers to pedestrians who may assume that a warning has been deployed for a train that is currently stopped on one of the tracks, when in reality a second train is also coming on another track. Separate warnings may be necessary for these locations to help alert pedestrians of the full extent of the danger of the at-grade rail crossing.



Safety treatments that can be used at rail locations include:

- *Traditional gate/flasher/bell assemblies*—These devices are useful for warning pedestrians of oncoming vehicles, but all of should be considered "supplemental" and are typically deployed as part of an engineering decision or a diagnostic team review. While these traditional devices have been reliable and effective in the past, newer devices are entering the marketplace, such as digital voice announcements and strobe lights.
- *Active or Passive Warnings*—Active warnings, such as bells or whistles mounted near the crossing or on the train, are recommended at pedestrian at-grade crossings. Passive warnings, such as signs, can also be used.
- *Fencing*—Fences and other visible demarcations like landscaping, curbing and/or signage can be used to discourage pedestrians from crossing rail tracks in undesigned locations. Fencing in places such as Orange County’s Metrolink Line, University of Memphis in Tennessee, and in Portland, Oregon has been installed at heights as low as 4 ft to 5 ft.
- *Grade-separated crossing* —Railroad tracks with high-speed and high-frequency train service may require pedestrian tunnels or overpasses to ensure the safety of crossing pedestrians.
- *Surveillance, education, and enforcement*—Enforcement can help reduce the number of pedestrians trespassing (e.g., walking on railroad tracks).

When considering what, if any, pedestrian warning is to be deployed, a thorough review of the environment around the crossing is recommended. This includes evaluating the frequency of rail service and number of tracks that are present. It is also important that the assessment include land uses and frequently-used pedestrian pathways in the vicinity of the railroad track. Railroads near schools, playgrounds, hospitals, retail centers and other major pedestrian generators may have a much greater need for safety treatments than a railroad track in a rural setting.

[https://safety.fhwa.dot.gov/ped\\_bike/ped\\_transit/ped\\_transguide/ch3.cfm](https://safety.fhwa.dot.gov/ped_bike/ped_transit/ped_transguide/ch3.cfm)

