Florida East Coast Corridor Trespassing and Intrusion Mitigation Project

2022

RAISE Grant Application

TABLE OF CONTENTS

PROJECT DESCRIPTION

Project Summary

The Florida East Coast Corridor is a critical rail route that supports the state's economy, improves the mobility of people and goods, and creates environmental resiliency. When the rail corridor was constructed in the late 1800s, Key West was the largest city in Florida and most of central and southern Florida were still wilderness. Arrival of the railroad initiated the founding or growth of many of Florida's largest cities today, particularly metropolitan South Florida. This growth has persisted to the present, and today over 7 million Americans live along the Florida East Coast Rail Corridor (Corridor).[1] Both Brightline Trains Florida, LLC (passenger rail) and Florida East Coast Railway (freight rail) operate trains along this corridor to serve its growing communities.

The high population density that has developed along the rail corridor has created significant safety challenges for the state and regional partners. In 2019, Florida was ranked the third-highest state for railway trespassing causalities in the nation and the second-highest for casualties per track mile.[2] Over the past several years, the Florida Department of Transportation (FDOT), Brightline Trains Florida, LLC (Brightline), the Florida East Coast Railway (FECR), and the Federal Railroad Administration (FRA) have evaluated a broad range of solutions that could increase safety along the corridor. This partnership in collaboration with local stakeholders has led to pursuing a USDOT RAISE grant for the **Florida East Coast Corridor Trespassing and Intrusion Mitigation Project** (Project).

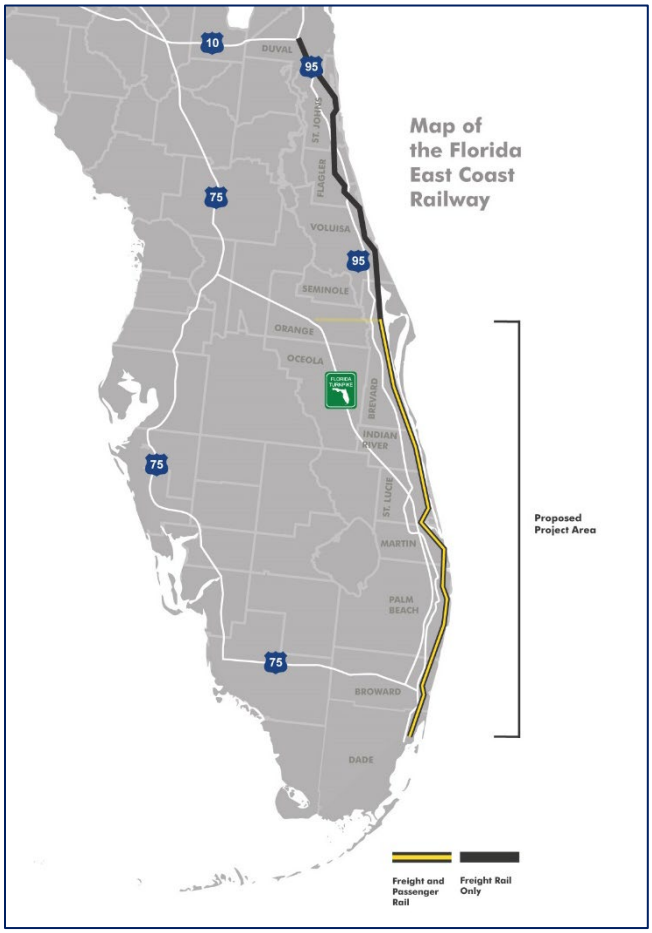

Figure 1: Project Corridor Map

The Project is a $45 million investment that will benefit the entire east coast of Florida by constructing supplemental safety measures at targeted locations along 195 miles of FECR/Brightline shared-use Corridor. FDOT is requesting $25 million in RAISE funding for the final design and construction activities that will enhance safety by reducing the two primary types of accidents experienced along the line: vehicle collisions and trespasser strikes. To this end, the project would install improvements at 328 road crossings and install 33 miles of pedestrian protection channelization features.

[1] United States Census, 2019
[2] FRA Office of Safety Analysis - safetydata.fra.dot.gov/officeofsafety/publicsite/query/castally4.aspx (search all for each query and 2019 calendar year). For number of track miles - www.bts.gov/state-transportation-infrastructure

Vehicle Incidents

The most common types of vehicle incidents along the rail corridor occur at roadway-rail grade crossings and include:

- Vehicles struck by a train after illegally stopping on the tracks (at times typically where there is a traffic backup or a stoplight near the grade crossing)
- Vehicles struck by a train after illegally turning onto and/or parking on the tracks (usually by accident)
- Vehicles struck by a train after illegally going around the crossing gates

Research performed by the FRA, FDOT[3], and other railroads has found that the frequency at which motorists illegally stop on the tracks can be reduced by painting "rail dynamic envelope" (RDE) markings on the crossing.[4] Also, the frequency at which motorists mistakenly turn onto the railroad tracks can be reduced by installing edge markings and delineators across grade crossings.[5] These improvements are effective and simple while also being low cost, providing a high return on investment. This Project aims to install edge markings with delineators and dynamic envelopes at every grade crossing on the Brightline/FECR shared Corridor (total of 328 crossings, subject to field verification and diagnostic review). The edge markings are a continuous white thermoplastic lane edge stripe across the panels, with raised pavement marker (RPMs) at 1' intervals along the edge stripe. These improvements would also add "Do Not Stop on Tracks" signs where needed.

Figure 2: An automobile that mistakenly turned onto the FECR corridor in Fort Lauderdale. *(Source: WPLG Local 10 News)*

[3] See Safety section for FDOT's data on RDE's (page 16)
[4] USDOT-FRA, *Effect of Dynamic Envelope Pavement Markings on Vehicle Driver Behavior at a Highway-Rail Grade Crossing*, 2014, Source
[5] USDOT, *System-Wide Implementation of Rail Right-of-Way Incursion Treatments*, 2019, Source

Trespassing Incidents

Along the Corridor, several areas on the railroad right of way see a high number of trespassers for various reasons such as convenience, recreation, loitering, unlawful activity, suicide, and/or lack of understanding. This Project would limit access to the railroad right of way and contribute to a reduction in the number of trespasser strikes by installing approximately 33 linear miles of a combination of fencing and/or landscaping at targeted locations along the corridor to deter pedestrians by obscuring the tracks and guiding (channelizing) people to designated, safer locations to cross. Suicide hotline signs would also be installed.

Figure 3: Example of a trespassing path in Delray Beach, FL

Over the past decade, trespassing incidents in Florida have increased.[6] Along the Corridor, incidents have almost doubled since 2018.[7] Many factors play a role in an individual's inability to safely navigate the state's rail transportation. In a report conducted by FRA on Trespass Event Risk Factors, it was found that the different factors can be split into two categories: individual behaviors (i.e., disregard for warning systems, use of alcohol/drugs, distraction from electronic devices, risky behavior, etc.) and location-based factors (i.e., population density, development of the built environment, spatial design, infrastructure needs, etc.).[8]

Taking Targeted Action to Prevent Future Accidents

Looking toward the future, Florida's population is projected to increase by 6 million residents by 2050.[9] The state's top economic driver, tourism, has also bounced back from the pandemic and is expected to increase.[10] Past research has shown that visitors can account for about 10% of all vehicle travel in the state. With this significant growth, there will be heightened challenges in meeting the mobility needs of the diverse population – from seniors to lower-income residents to persons with disabilities to visitors who are not familiar with the area.

This Project will improve the Corridor through grade crossing and pedestrian enhancements designed to greatly improve safety outcomes to the millions of people who cross the rail Corridor daily. The

[6] FRA's Trespasser Incident Timeline Database - https://dotcms.fra.dot.gov/accident-and-incident-reporting/casualty-reporting/trespasser-incident-timeline
[7] See Figure 4. Crossing Inventory and Accident Reports - safetydata.fra.dot.gov/OfficeofSafety/PublicSite/Crossing/Xingqryloc.aspx and Trespassing Data - safetydata.fra.dot.gov/officeofsafety/publicsite/query/castally4.aspx
[8] *Trespass Event Risk Factors*, USDOT-FRA, 2014, Source
[9] *Florida Population Studies*, University of Florida, Bureau of Business and Economic Research, April 2021, Source
[10] Florida Visitor Estimates - Visit Florida, 2021 - www.visitflorida.org/resources/research/

engineering enhancements proposed in this Project are part of a comprehensive set of strategies currently being implemented geared toward the safety of those individuals who traverse the corridor and the people on board the passenger and freight trains.

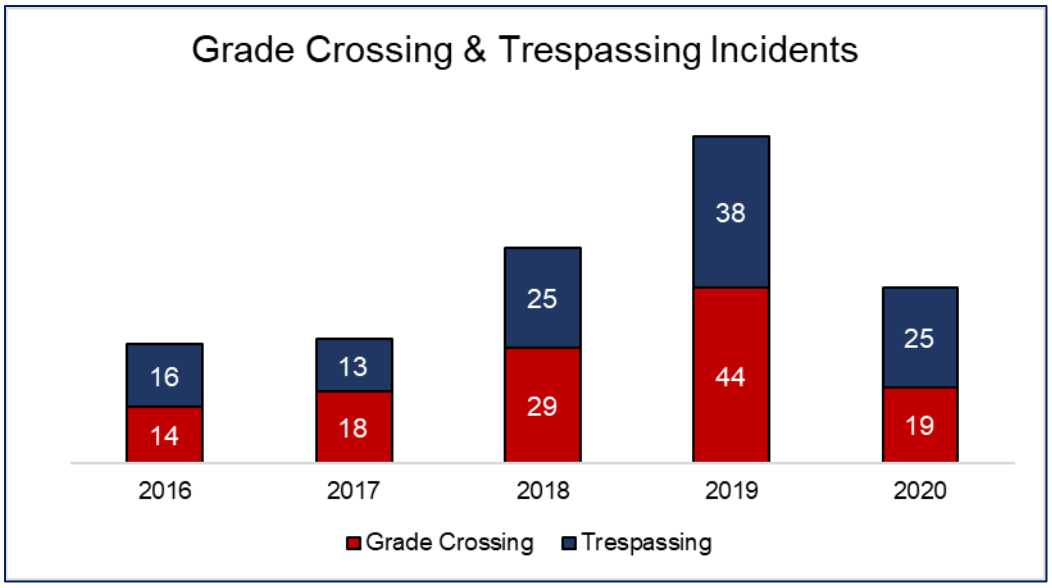

Figure 4: Incidents along FECR/Brightline Shared Corridor[7]

FDOT has been involved in many safety strategies, and local partners have also played a crucial role in implementing the multifaceted approach. FDOT's Freight and Rail Office (FDOT FRO) team has been implementing a program to evaluate strategies that would reduce trespassing. In 2019, Operation STRIDE (Statewide Traffic and Railroad Initiative Using Dynamic Envelopes) was rolled out, a comprehensive approach to prevent fatalities on or near rail crossings. In addition, the FDOT FRO developed a report that identified strategies for reducing railroad trespassing (SRRT-FECR) along the FECR/Brightline Corridor at non-grade crossings.[11] The strategies identified were based on a successful pilot program conducted in Central Florida. The SRRT-FECR report (and Brightline's System Safety Plan – 49 CFR Part 270) was integral in developing the scope being proposed in this RAISE grant application.

Brightline, the nation's only privately owned and operated intercity passenger rail service, currently runs service between the downtowns of Miami, Fort Lauderdale, and West Palm Beach. An extension of Brightline's service is now under construction and will soon connect to Orlando International Airport. Brightline's train speeds range from 79-125mph, and the extension of the service through Martin, St. Lucie, Indian River, Brevard, and Orange Counties will bring 36 new passenger trains along the Corridor each day. The Project features for this RAISE grant were developed in consideration of a broad focus on improving safety in the corridor. Brightline has already made significant safety infrastructure investments (see Background section for more detail) and has implemented parallel safety campaigns, including public service announcements on local broadcast and radio channels, training for first responders,

[11] See Appendix E for SRRT-FECR Report

distributing literature to schools along the Corridor[12], and connecting with Operation Lifesaver.[13] The investment to be made with the proceeds of this grant will supplement all of the current safety campaigns and make an even more meaningful impact.

Projected Growth in Freight and Commuter Rail Service

Also, along the Corridor, FECR carries about 14 freight trains each day. However, with the significant improvements that freight infrastructure has undergone throughout the last decade, there are plans to expand, strategically positioning the region for future growth opportunities. The freight infrastructure projects, some of which have been funded with federal grants, have included the dredging of the PortMiami, the 25th Street Viaduct extension in South Florida, the PortMiami tunnel, and the extension of rail to PortMiami. These improvements could increase freight rail to about 24 trains per day and expand the average train length to 8,150 feet.

There are also immediate plans to extend South Florida's existing commuter rail service, Tri-Rail, into downtown Miami along the southern portion of the Corridor (see Figure 22). And there are longer-term plans to create a new Miami commuter rail service on the Miami-Dade segment of the Corridor. These services would bring additional daily trains, totaling 50 and 30 respectively. The passenger and freight traffic growth could mean that segments of the Corridor could see more than 60 trains a day by 2023. FDOT's Highway-Rail Grade Crossing Action Plan[14] summarizes the transportation challenge clearly, "a growing high-density population mixed with increasing rail traffic will lead to an increase in human/rail traffic conflicts."

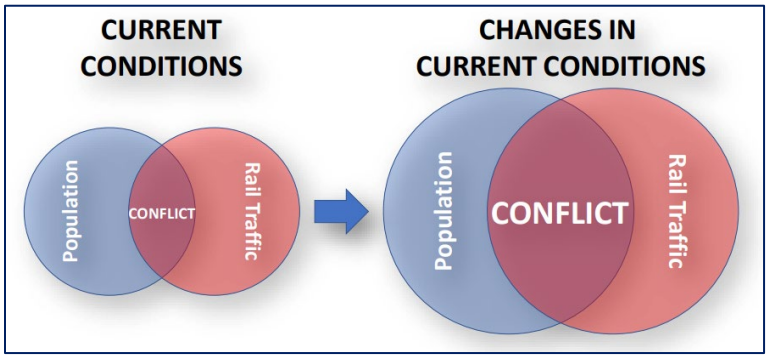

Figure 5: Changing Conditions and Impacts on Potential Conflicts *(Source: Draft Highway-Rail Grade Crossing Safety Action Plan – February 2022)*

Anticipated Outcomes and Benefits

The primary benefits of this Project are reduced loss of life and decreased number of traffic and railway incidents which may be prevented by the additional safety improvements. As former FDOT Secretary Kevin J. Thibault, P.E. has said, "One fatality on our rail crossings is one too many." The Benefit-Cost

[12] Brightline Safety - www.gobrightline.com/safety
[13] Operation Lifesaver - oli.org
[14] *FDOT's Highway-Rail Grade Crossing Safety Action Plan*, 2011, www.fdot.gov/rail/plandevel/highway-rail-grade-crossing-safety-action-plan

Analysis (BCA) determined an anticipated reduction in accidents based on a combination of effectiveness factors related to the proposed safety measures to be implemented as part of this Project (see BCA section for more details). It is anticipated that over the next 20 years, **146 accidents can be avoided, including 95 fatalities.**

Multiple additional outcomes and benefits will be realized through this Project (see Merit Criteria section for more detail). Some of the highlights include:

- Residents who live along the Corridor in areas of persistent poverty and in historically disadvantaged communities that may interact with the corridor without knowing the hazards will benefit from engineering solutions that channelize pedestrains to a safe location.
- By making the corridor safer, the possibility of the Miami-Dade Commuter Rail project, proposed along the same Corridor, will be strengthened. This will provide a much-needed affordable transportation option that builds connectivity for disadvantaged communities.
- By reducing delays, the efficient movement of freight can be maintained. It will improve economic competitiveness through increased cargo activity and reduce congestion by switching cargo that moves from truck to rail.
- Reliable intercity passenger rail will attract more people to utilize it, which will help reduce roadway congestion, reduce harmful air pollution, and improve safety.
- Efficient movement of freight and passenger rail will improve mobility for people that utilize other transportation modes and increase community connectivity.
- The amount of private vehicle damage due to road/rail accidents will decrease, along with the traffic backups and grade crossing closures that can result from an accident.
- The burden on local police forces of investigating roadway/railway accidents and trespasser deaths will be reduced.
- Some of the improvements, particularly the landscaping involved, will also provide ancillary environmental benefits and better esthetics to communities along the rail corridor.

Background

The settlement and development of Florida's east coast was kick-started by the expansion of Henry Flagler's railroad from Jacksonville to Miami and, ultimately, Key West. Freight and people were transported along the east coast, with freight service helping build cities and destinations and passenger service transporting people to those new locations. Much of the state's early development occurred in close proximity to the railroad, at a time when roadway connections were poor or non-existent. When roadways were built, they paralleled the railway, often on both sides. This further accentuated the density around railways. Growth created increased demands for new transportation modes.

The introduction of passenger rail in Florida has a long history that dates back to the 1970s. The goal was to implement a mobility option that would help sustain the region's economic growth and improve safety and the quality of life for residents and visitors. Decades later, in 2018, Brightline began running intercity passenger rail service between the downtowns of Miami, Fort Lauderdale, and West Palm Beach, on the Corridor upon completion of significant rail infrastructure improvements. Phase I ran for about a year and a half and then had to temporarily suspend passenger service due to the pandemic.

Service between Miami and West Palm Beach resumed in November 2021, and new stations in the Phase I segment are under construction in Aventura and Boca Raton. An extension of Brightline's service to Orlando, Phase II, is currently under construction and expected to be complete at the end of 2022 and open for passenger revenue service in 2023. 129 miles of the 170 miles Phase II segment is a shared Corridor with the Florida East Coast Railway, between West Palm Beach and Cocoa. The segment of service from Cocoa to Orlando is completely grade-separated and will only be used for intercity passenger rail. Brightline trains approach higher-speed conditions, up to between 110 and 125 mph depending on the segment. The overall service will operate 36 passenger trains per day along the entire corridor with one-hour headways.

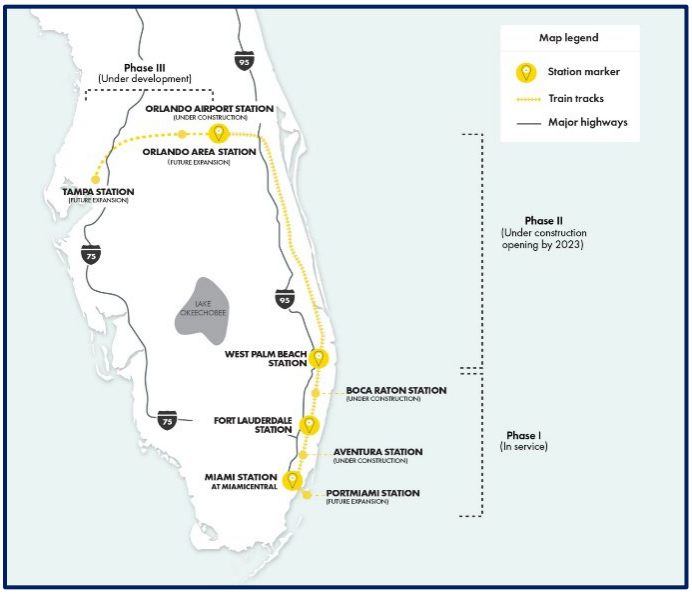

Figure 6: Brightline's Current and Future Service
(Source: Brightline Trains Florida, LLC)

Construction of Brightline's intercity passenger rail service included building new track or double-tracking nearly the entirety of the route, installing Positive Train Control (PTC) and broadband, replacing or repairing multiple bridges, modifying several curves to accommodate higher speeds, adding new safety equipment and re-profiling approaches to grade crossings, adding 187 pieces of special track (turnouts, crossovers), and many other critical elements. Safety crossing improvements have been made in close coordination with FDOT and FRA on Phase I and II. These include:

- Railroad dynamic envelope markings warning of railroad crossings, at all crossings between West Palm Beach and Cocoa, including state and local roads
- Installation of medians in locations where space permits to prevent vehicular runaround
- Quad gates at all crossings where trains travel above 79 mph where there is no median to meet the FRA's sealed-corridor guidelines
- Revised profile grades at most crossings to improve sightlines and reduce instances of lowboy bottom-out
- Increased warning signage and pavement markings
- Pedestrian gates in locations where there is a sidewalk, plus a pedestrian exit gate preventing access from the other side
- Demonstration examples at certain crossings between Miami and West Palm Beach, funded by an FRA Consolidated Rail Infrastructure and Safety Improvements (CRISI) grant:
    - Delineators to prevent turn onto railroad ROW
    - Dynamic message signboards
    - Pavement edge striping through the grade crossing
    - Exit gates

Implementation Roles and Responsibilities

FDOT will lead the overall implementation of the Florida East Coast Corridor Trespassing and Intrusion Mitigation Project and partner/contract with Brightline and FECR through a project agreement that will need to be executed prior to grant agreement which will lay out the funding and flow down provisions required as part of a USDOT/FRA grant agreement. FECR and Brightline share the use of the Corridor according to the terms of a Joint Use Agreement (the "JUA"). The JUA grants Brightline the permanent, perpetual, exclusive right to develop and operate Passenger Railroad Service over the Corridor and reserves to FECR the permanent, perpetual, exclusive right to develop and operate Freight Railroad Service over the Corridor. Under the rights of the JUA, Brightline, in collaboration with FDOT, will lead the design and construction of the activities proposed through this Project. Brightline and FDOT have experience working together in a similar manner for other safety-related projects that have been implemented on the corridor. Brightline will perform the maintenance of the improvements covered by the RAISE grant. When grade crossings, including delineators and striping, are ultimately re-constructed in accordance with FECR's schedule, individual municipalities will be billed in accordance with their agreement (see State of Good Repair section for more detail).

Detailed Statement of Work

The elements to be constructed within this Project are site-specific to each of the 328 individual crossings and the 33 miles of fencing/landscaping along the entire corridor. A breakdown of the mitigations planned by county is laid out in Figure 7. The overall goal for all improvements is to create an enhanced environment for drivers, pedestrians, bicyclists, passengers, and rail operations. The proposed Project consists of a set of service-proven safety improvements aimed at reducing both vehicle and trespasser collisions. These include channelization fencing and landscaping improvements, delineators and roadway striping, rail dynamic envelopes (RDE), crisis support signs, and R8-8 ("do not stop on tracks") signs.

Mitigation Method	Unit	Brevard	Indian River	St Lucie	Martin	Palm Beach	Broward	Miami-Dade	Total*
Dynamic Envelopes	Crossing	2	0	0	2	75	57	19	155
Delineators, RPMs, and Edge Striping	Crossing	49	32	19	25	93	41	21	280
"Do Not Stop on Tracks" Sign Modifications	Each	3	2	0	0	76	55	21	157
Crisis Support Signs	Each	3	0	0	1	78	64	22	168
Length of Fencing	Miles	4.58	0.3	1.29	5.36	9.23	8.22	4.17	33.15

* This is subject to be adjusted based on final field verification and diagnostic review. Individual crossings may receive multiple mitigations. A total of 328 roadway crossings are planned to be enhanced from Miami to Cocoa.

Figure 7: Mitigation Method Breakdown by County

The Project is currently in the conceptual design phase and a typical sections plan has been provided in Appendix D. The proposed mitigation solutions are not complex and preliminary engineering will be complete before the grant award. Some minor refinement of the Project locations and scope may be adjusted as final field verification and diagnostic review is complete. If selected, federal grant funding will be used to support the final design and construction of the following safety mitigations.

- FENCING/CHANNELIZATION

A significant portion of the Project is devoted to channelization fencing and landscaping improvements. This combination of fencing, landscaping, or both discourages trespassers from crossing or walking along the track and instead redirects them to the nearest safe crossing. Two major independent studies have previously identified the need for these improvements.[15] Additionally, a demonstration fencing project installed by Brightline in Palm Beach County has already shown a promising reduction in incidents. The planned improvements consist of a 6-ft tall FDOT Type B chain link fence and/or a native hedge or shrub used to discourage potential trespassers from cutting the fence. In addition, it will help obscure the view of the tracks. As part of the Project approximately 33 miles of such fencing and/or landscaping will be installed at targeted areas as determined by previous studies, review of the FRA WBAP incident database, field investigations, accident history, and train crew reports.

Figure 8: Example of Brightline Fencing

- DELINEATORS AND ROADWAY STRIPING

Delineators and roadway edge striping have been installed on Long Island Railroad (LIRR) and SunRail. They have been found to be highly effective in preventing vehicle incursion onto the railroad right of way by making the edge of the roadway more obvious (particularly at night) and preventing motorists from mistaking the track for a road and turning onto it. Delineators and edge-striping are a proven technology; one study performed by the FRA found that the delineator installation on 296 crossings on LIRR reduced vehicle incursion events by 85%. Another study performed on the SunRail corridor in Orlando has shown similarly promising results.[16]

Brightline is currently in the process of installing these improvements at 48 crossings in South Florida. This Project would install edge delineators and roadway striping at approximately 280 crossings in the Brightline/FECR shared corridor from Miami to Cocoa. The edge markings are a continuous white thermoplastic lane edge stripe across the panels, with RPMs at 1' intervals along the edge stripe. The

Figure 9: Example image of delineator and edge striping installation at LIRR

[15] SRRT-FECR Report (See Appendix E) and Brightline's System Safety Plan – 49 CFR Part 270
[16] See Safety section for more details

flexible blade-style delineators are proposed to be placed along the lane edge markings at 2-foot intervals on the roadway approach and exit and 1 delineator placed in between track lanes. Some crossings would also receive median delineators based on their risk and geometric feasibility.

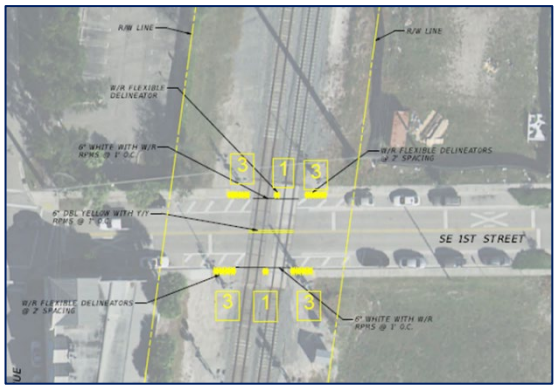

Figure 10: Example design for a crossing with edge delineators and striping

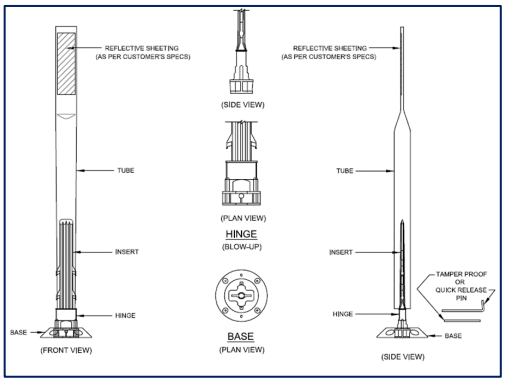

Figure 11: Sample detail of a delineator – final product chosen may

- RAIL DYNAMIC ENVELOPES

Rail Dynamic Envelopes (RDEs) are now an FDOT standard for state roads and are intended to make motorists and pedestrians aware of the location of a rail dynamic envelope at grade crossings. The goal of this Project would be installed rail dynamic envelopes at the remaining 155 of the 343 grade crossings on the FECR/Brightline Corridor from Miami to Cocoa that do not have them. All of the 155 proposed RDEs locations are within the segment from Brightline's Miami station to the West Palm Beach station and include state and local roadway-railroad crossings.

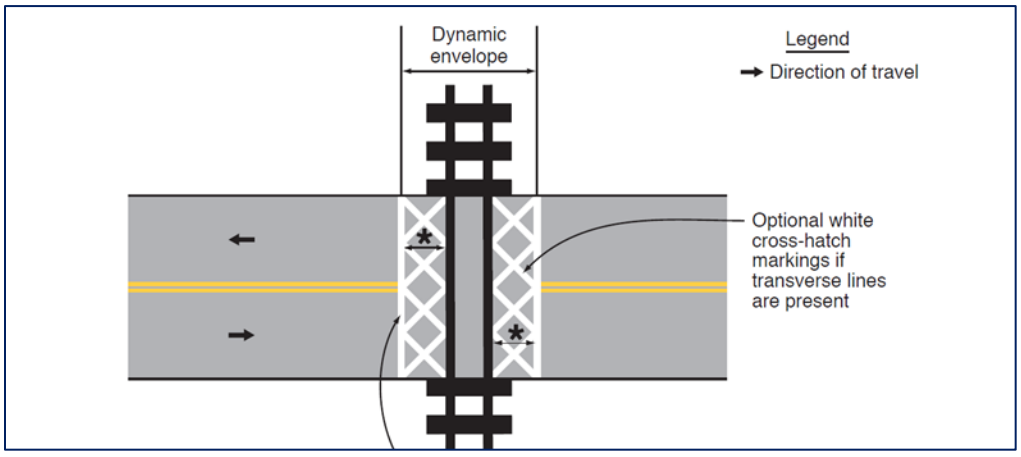

Figure 12: Example design for a crossing with a rail dynamic envelope

Figure 13: Example design for a crossing with RDE and a median

- CRISIS SUPPORT SIGNS AND R8-8 ("DO NOT STOP ON TRACKS") SIGNS

Finally, the Project would install or renew more than 300 signs. Crisis support signs are to be placed in locations with a history of suicides or where suicide attempt risk is considered to be high. The R8-8 ("Do not stop on tracks") signs are already installed at grade crossings along the corridor. Still, Brightline reviews suggest that some locations with a history of traffic backups onto the track could benefit from additional signage.

Figure 14: Example of Signage

PROJECT LOCATION

The 195-mile Project Corridor is located along the eastern coast of Florida, from Miami to Cocoa. According to the 2019 Census, Florida's population is more than 21 million, with an expected growth of 26% by 2040.[17] Seven counties with a combined total population of almost 7 million are within the Project area: Dade, Broward, Palm Beach, Martin, St. Lucie, Indian River, and Brevard. The locations where the safety enhancement will be implemented are primarily located in urban areas. Of the 33 miles of fencing and landscaping and the 328 crossings that are planned to be enhanced through this grant, more than 50 Historically Disadvantaged Communities and 40 Areas of Persistent Poverty are adjacent to the Corridor and will be directly impacted by the Project (approx. 30 communities fall into both categories). On average 24% of the people living in these areas are living below the poverty line, with many neighborhoods experiencing poverty rates ranging between 30-50%. In addition, there are five federally-designated Community Empowerment Zones near the southern point of the corridor in the historic Miami neighborhood of Overtown. This rail corridor provides an alternative transportation option connecting passengers and freight throughout the region. The reliability of the corridor is also critical for people and goods in effectively connecting to their communities, local, and regional transit systems, and the surrounding area.

Figure 15: Project Map with Mileposts *(see Appendix C: Project Location Mapping for more detail and a legend)*

[17] *Florida Population Studies*, University of Florida, Bureau of Business and Economic Research, April 2021, Source

GRANT FUNDS, SOURCES, AND USES OF PROJECT FUNDING

Previously Incurred Funding

There has been some limited state and private funding that has been spent on the development of this Project to date. Partners have worked on activities related to corridor analysis, planning, conceptual design, and other preconstruction activities to support the Project's development. These costs have not been included in the total project costs.

Project Budget

A high-level cost estimate (Figure 16) has been developed for the Project, based on the conceptual engineering completed to date. The project estimate has been broken into the main mitigation methods.

FDOT recently performed two Strategies for Reducing Railroad Trespassing (SRRT) studies in Florida, one for the 61-mile SunRail corridor and one for the 195 miles of the FECR corridor between Miami and Cocoa. K&J Consulting has assisted Brightline in preparing the Hazard Analysis for the System Safety Program required under 49 CFR Part 270, covering the corridor between Miami and West Palm Beach where Brightline is currently operating passenger trains. These studies reference the Trespass Prevention Research Study – West Palm Beach, prepared by the Federal Railroad Administration at Volpe National Transportation Systems Center in 2014. The prior works were collated and reconciled as a part of the preparation for this grant application, resulting in agreement that trespass protection is needed for approximately 175,027 lineal feet (33.149 miles). The trespass protection will consist of a combination of FDOT Type B fence and/or landscaping treatment.

For the grade crossings, the team analyzed the FRA's Web Accident Prediction System (WBAPS) for all 343 grade crossings in the 195-mile Project Corridor. Please see the Merit Criteria in the following section of this document for a full description of the process utilized to determine the scope of this Project.

The cost estimate was developed by Brightline, utilizing its actual cost data from bid tabs for grade crossing and corridor fencing components of its Phase II West Palm Beach to Cocoa rail infrastructure project. Brightline developed unit cost assemblies for fencing, landscaping, RDE markings, edge striping and other roadway markings, delineators, and signage. The assemblies include the raw cost, contractor general conditions and markups, professional services, project management, and contingency. The budget is also presented in Standard Form, SF-424C: Budget Information for Construction.

Mitigation Method	Estimated Quantity	Unit	Construction Cost	Design Cost	Project Management Cost	Contingency	Implementation Cost
RDE ("Rail Dynamic Envelopes")(Delineators Existing)	48	Crossing	$ 2,326,080.00	$ 232,608.00	$ 434,928.00	$ 471,486.00	$ 3,465,102.00
Delineators, RPMS, and Striping (RDE existing)	173	Crossing	$ 8,364,550.00	$ 836,455.00	$ 1,564,093.00	$ 1,695,472.28	$ 12,460,570.28
Delineators, RPMS, and Striping, and RDE	107	Crossing	$ 6,466,866.00	$ 646,686.60	$ 1,209,207.00	$ 1,310,810.94	$ 9,633,570.54
Crisis Support Signs	168	Sign	$ 168,000.00	$ 16,800.00	$ 31,413.48	$ 33,945.52	$ 250,159.00
"Do Not Stop on Tracks" Sign Modifications	157	Sign	$ 157,000.00	$ 15,700.00	$ 29,356.65	$ 31,823.35	$ 233,880.00
Channelization (Fence and/or Landscaping)	33.149	Mile	$ 12,725,412.00	$ 1,272,541.20	$ 2,379,588.00	$ 2,579,176.99	$ 18,956,718.19
Total			**$ 30,207,908.00**	**$ 3,020,790.80**	**$ 5,648,586.13**	**$ 6,122,715.07**	**$ 45,000,000.00**

Figure 16: Project Budget

Funding Sources

The total capital costs for the Florida East Coast Corridor Trespassing and Intrusion Mitigation Project equal $45 million. The RAISE funds will help support the final design and construction of the proposed elements. A total of $25 million of RAISE funding, which is 56% of the total project, is being requested as a part of this application. The remaining project funds will be provided by Brightline (22%), and FDOT (22%). Brightline is committed to providing its portion of the non-federal match (commitment letter attached in Appendix G). If cost increases due to the final field verification and diagnostic review or the total amount of federal funding is not received, the FDOT and Brightline will look at adjusting scope or seeking additional support from local municipalities. The priority will remain focused on crossings with the highest probability of an incident based on history and traffic volumes.

Sources			
Brightline - Private	$	10,000,000.00	22%
FDOT - State	$	10,000,000.00	22%
Federal - RAISE	$	25,000,000.00	56%
Total Project	$	45,000,000.00	100%

Figure 17: Project Source of Funding

MERIT CRITERIA

Safety

Safety is the top driver for this Project. The number of casualties along the FECR/Brightline corridor have increased significantly over the past couple of years, including those due to suicides (see Figure 18).[18] With the new passenger rail service, the two potential commuter rail services, and expanding freight service, coupled with higher/lower speed trains and trains coming from both directions, the number of incidents will likely increase if no action is taken.

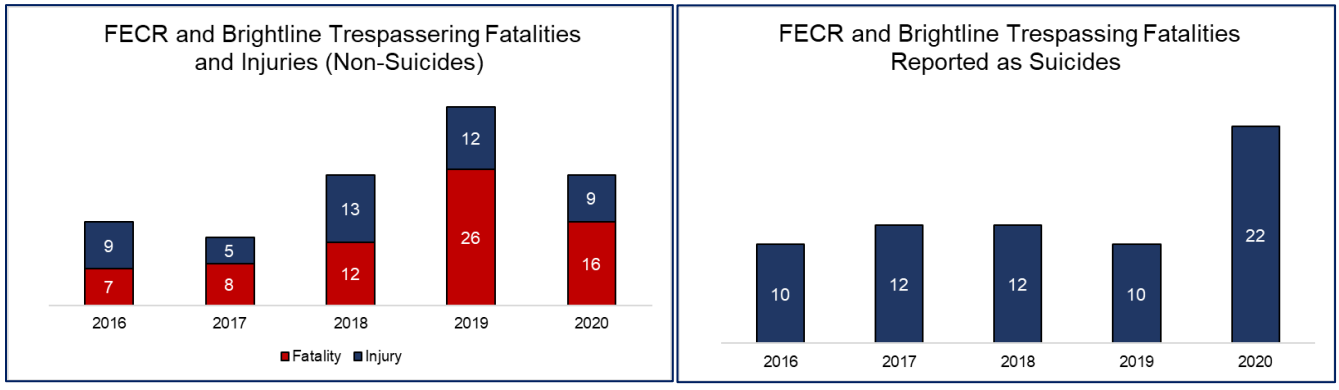

Figure 18: Casualty Data[18]

[18] Trespassing Data - safetydata.fra.dot.gov/officeofsafety/publicsite/query/castally4.aspx. Suicide Data - explore.dot.gov/t/FRA/views/TrespassandSuicideDashboard/SuicidesOverview. Incidents reported as suicides are classified by a coroner.

The improvements proposed through this Project and the elements being constructed as part of the larger extension of passenger rail service is a system safety approach that is needed and broadly supported. On the current system under operation, FECR and Brightline meet or exceed FRA's railroad safety requirements and the federal laws and regulations governing the safety of rail operations nationwide. But as mentioned previously, various factors create a uniqueness to this corridor requiring the State, railroad partners, and local stakeholders to seek innovative strategies to improve safety.

The risk profile of each crossing was evaluated using the FRA's Web-Based Accident Prediction System (WBAPS), which analyzes numerous crossing characteristics to provide a weighted average associated to the chance of collision at each crossing. This model projects the statistical frequency of a train-vehicle collision at a specific crossing in relation to the surrounding crossings. The results of this model were used to make comparative assessments of multiple crossings and prioritize the application of risk reduction techniques. The analysis establishes a probability that if a collision occurs again, the likelihood that it would occur at a certain crossing. It does not speak to the probability of future incidents at a crossing. The outputs were cross-checked with a field analysis to examine the proximity to signals, severity of collisions, skew of tracks, and gate configurations to provide a more holistic view of the crossing when assigning mitigation methods.

Each of the mitigation methods to be installed through this Project are proven features that have reduced trespassing in similar applications. The data collected from past applications were used to determine an effectiveness factor utilized in the BCA to determine the number of incidents and fatalities that could potentially be avoided. The track incursion effectiveness factor related to the proposed mitigation improvements in this Project was determined to be in the range of 15% to 91%. An overview of the sources of data used to assess the impact of the countermeasures are detailed here:

- Fencing/Landscaping - Sunrail observed a 91% reduction in trespassers over the two years following the installation of fencing in the Sanford area in 2018. This is consistent with a study that analyzed the effect of three different countermeasures. The results showed that fencing reduced trespassing by 94.6%, followed by landscaping (91.3%) and prohibitive signs (30.7%).[19]
- Delineators and Roadway Striping - In 2018, the Long Island Railroad installed high-visibility safety delineators and striping at railroad crossings. The results indicated that there was a positive effect on reducing ROW intrusions by motor vehicles:[20]
    - 85% reduction in vehicle ROW intrusion
    - 100% reduction in train/vehicle crashes due to vehicle ROW intrusion
    - 86% reduction in the number of trains delayed by reports of vehicles on tracks
    - 89% reduction in total train delay time due to report of vehicles on tracks

[19] *Effect of Three Countermeasures Against the Illegal Crossing of Railway Tracks*, Accident Analysis and Prevention, 2011, Source
[20] USDOT, *System-Wide Implementation of Rail Right-of-Way Incursion Treatments*, 2019, Source

- Rail Dynamic Envelopes (RDE) - FDOT issued this new standard in February 2020 after a safety countermeasure pilot program indicated that the number of vehicles that stopped on or too close to the rail tracks was reduced by at least 15% after RDE was installed.[21]

Incidents along the corridor have been broken into two main categories: grade crossing-related incidents account for 35% of casualties, and non-grade crossing locations account for 65%. The additional enhancements made in this Project will target safety measures to address both areas and build consistency along the whole corridor. It is anticipated that over the next 20 years, up to 146 incidents can be avoided, including 95 fatalities (see BCA section for more detail).

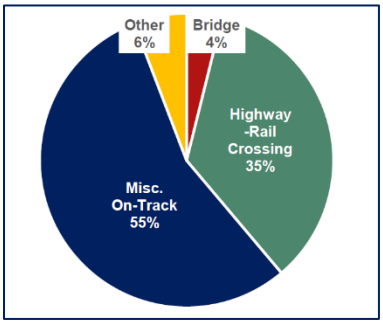

Figure 19: Casualties by Location
(Source: FDOT SRRT-FECR Report)

This Project is consistent with the USDOT's strategic goal to minimize transportation-related fatalities and injuries across the transportation system. In addition to passenger rail travel being one of the safest modes of transportation in terms of total accidents and fatalities, an important secondary outcome of this Project is the diversion of up to 2 million vehicles per year off the highway system (I-95) that is rated the most dangerous in the nation.

Environmental Sustainability

A direct and significant component of the Project is the channelization along the corridor, including the use of landscaping as an intrusion deterrent. Final locations of landscaping will be determined during the preliminary engineering and field verification phase. For conceptual design, the Project team has evaluated a variety of Florida native/Florida friendly species that support public safety goals and build in biological connectivity. The ecosystem benefits the native shrubs will provide to the area include:[22]

- $1.5 million of stormwater benefits
- $5.8 million of energy saved
- $7.7 million of air quality improved

This Project will add Florida native plants that attract bees, butterflies, and birds. Since many of the selected plants have thorns to inhibit pedestrian crossings, they are plants species that are not commonly used in the landscape palette, making them even more valuable to wildlife. Butterflies use these plants as larval hosts and nectar plants. In addition, these native plants provide fruit and insects to birds along the Atlantic Flyway, a major north-south path for migratory birds of North America. Lastly, pollinators, including bees, are disappearing partly due to habitat loss. This Project will significantly impact bees and other pollinators by adding native wildlife habitats.

[21] FDOT Operation STRIDE - www.fdot.gov/rail/programs/operation-stride
[22] The info below is based on a model conceived and developed by national urban forestry experts. A plants specific geography, climate, and interactions with humans and infrastructure is highly variable and makes precise calculations that much more difficult. Given these complexities, these numbers should be considered a starting point for understanding the value landscaping in the community rather than a scientific accounting of precise values.

Landscaping has the added benefit of reducing atmospheric carbon. For trees and shrubs, this is done in two primary ways: (1) By sequestering CO2 in their roots, trunks, stems, and leaves while they grow, and in wood products after they are harvested. (2) Trees near buildings can reduce heating and air conditioning demands, reducing emissions associated with power production and cutting energy needs by increasing shade, evapotranspiration, and slowing down wind. The estimated impacts that are directly generated through this Project are provided in Figure 20.

Carbon Sequestered	Carbon Avoided	Stormwater Benefits	Energy Benefits
184,800 pounds	132,000 pounds	1,346,400 gallons intercepted	79,200 kilowatt hours conserved

Figure 20: Summary of Landscape Benefits

Looking at the environmental impacts more broadly also provides some perspective on the secondary outcomes of the Project. Similar to other parts of the nation, transportation accounts for 48% of the greenhouse gas emissions across the Southeast Florida region. The landscaping planted as part of this Project will provide impact by reducing emissions. Also, worth noting is that as part of making the passenger rail service more reliable from the reduced delays caused by each incident, there will be increased use of a low-carbon transportation alternative (i.e., intercity passenger rail). This reduction in the use of single-occupancy vehicles will lower the emission of air pollutants and build environmental resiliency. In addition, an analysis of carbon monoxide emissions from vehicles queuing at grade crossings under proposed passenger train cycles was conducted as part of the environmental review for Brightline's Phase I and II service and included in the overall emission estimates.[23] Secondarily related to Project outcomes in this grant application, at full build-out and efficiency, the passenger rail service to Orlando would reduce carbon monoxide emissions by 1,654 tons, nitrogen oxides by 192 tons, volatile organic compounds by 59 tons, and particulate matter less than 10 microns in diameter by 7 tons.

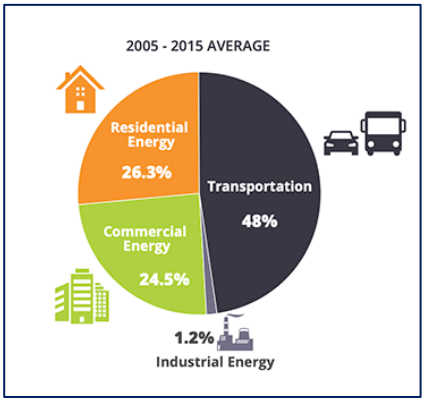

Figure 21: Regional Green House Gas Emissions by Sector (*Source: Southeast Florida Regional Climate Change Compact)*

As outlined in the Project Location section, the corridor and planned mitigations fall within many areas of persistent poverty and historically disadvantaged communities.[24] Data has shown that low-income and minority communities are disproportionally impacted by air quality.[25] This Project will help reduce the exposure of harmful transportation-related emissions on underserved and overburdened communities aligning with President Biden's Justice 40 goals.[26]

As identified during the NEPA process conducted for the implementation of Brightline service, the overall project improvements would not disproportionately impact environmental justice communities along the

[23] All Aboard Florida/Brightline FEIS - railroads.dot.gov/environmental-reviews/all-aboard-florida/all-aboard-florida-miami-orlando-passenger-rail-service-0
[24] See Appendix C for Project Location Mapping
[25] *Environmental Justice: Addressing the Burden of Air Pollution*, August 26, 2020, Source
[26] USDOT Justice40 Initiative - www.transportation.gov/equity-Justice40#more-about-justice-40

corridor. Additional steps have been taken to consider the impacts on vulnerable communities. The FDOT has woven equitable transportation planning into the 2045 Transportation Plan and the public involvement. Each project conducts specific steps during the outreach phase to provide equitable access to transportation, provide information clearly and early, and utilize multiple techniques to engage the public.

The FDOT is also set up to support other agencies and strengthen the role that equity has within the planning process.[27] The different transportation planning organizations along the corridor take steps to identify racial and ethnic minorities, transportation disadvantages, economic challenges, language proficiencies, elderly, and other populations that could be impacted by discrimination. Examples include:

- Miami-Dade County Transportation Planning Organization (TPO) - Incorporates 'Sociocultural Effect' features in its planning process to ensure community values and concerns receive proper attention throughout the entire transportation development process.
- Broward Metropolitan Planning Organization (MPO) – Created an Equity Assessment Tool which helps ensure that the benefits and impacts of plans, programs, and projects are not disproportionately impacting certain communities during the planning process.

Consistent with Southeast Florida Regional Climate Action Plan, this Project complements transportation solutions that enhance Florida's environment and help to conserve energy.[28] Agile, resilient, and quality transportation infrastructure is considered a wise investment.

Quality of Life

The quality-of-life perspective for this Project is centered on preventing the loss of life. Many of the causalities along a railroad system are preventable, and engineering solutions are one strategy that must be considered when evaluating a comprehensive approach. FRA recently hosted a meeting with Florida railroads and local partners to discuss safety. The messaging was that federal, state, and local governments should collaborate to implement and fund mitigation strategies in partnership with rail lines.[29]

Suicides continue to account for a portion of the casualties along the project corridor. Crisis information signage will be installed as a component of the Project. Separately, FDOT, Operation Lifesaver, Brightline, and other local partners have suicide prevention campaigns that will continue to connect directly with people.

The BCA quantifies various monetized benefits for the corridor users and the traveling public, which are important to justify the project investment. Additionally, the qualitative outcomes of the Project and the people that benefit are also essential to highlight, especially as they relate to the details behind the data. In FDOT's SRRT-FECR Report, a casualty trend analysis was done for the incidents that occurred not at highway-rail crossings, which account for 65% of total casualties. The results showed that people between 30 and 59 were more susceptible.[30] The SRRT-FECR Report also references a study done by

[27] *Florida 2045 Transportation Plan*, 2020, floridatransportationplan.com/policyelement2020.pdf
[28] Southeast Florida Regional Climate Change Compact - southeastfloridaclimatecompact.org/
[29] Terry Spencer, *Railroads, Gov't Officials Press for Higher-Speed Train Safety,* IEN, February 24, 2022, Source
[30] See Appendix E for SRRT-FECR Report

Ian Savage in 2011, which found the most common victim is in an urban area, living within 1 mile, of lower socioeconomic status, unmarried, and between the ages of 20 to 49.[31] This is important to highlight because these are likely hard-to-reach community members that may be accessing isolated parts of the corridor and unaware of their dangerous position. The channelization proposed in this Project will help guide people away from these hazardous areas to a safe crossing. It is safe to make a correlation that this Project will likely prevent the loss of life of community members who have been faced with inequities because of the significant overlap of the Project are with Areas of Persistent Poverty and Historically Disadvantaged Communities (see Project Location section for more details).

Mobility and Community Connectivity

Another crucial outcome of the Project is by investing in the safety improvements today, the Project will help lay the groundwork for implementing a broader Miami-Dade public transportation system that aligns with the USDOT goals of building access to opportunities for communities that have been underserved and overburdened. The Miami-Dade Commuter Rail (called the Northeast Corridor) is expected to become a reality over the next five years and is proposed to use the same Corridor as Brightline and FECR.[32] The service will attract over 3 million riders in the first year and expand a network of employment opportunities, education centers, and health assets to many disadvantaged communities. In addition, the existing Tri-Rail commuter service is soon planned to connect to MiamiCentral along the southern section of the Corridor. This will create a critical connection for people that live along the western portion of South Florida directly to downtown Miami.

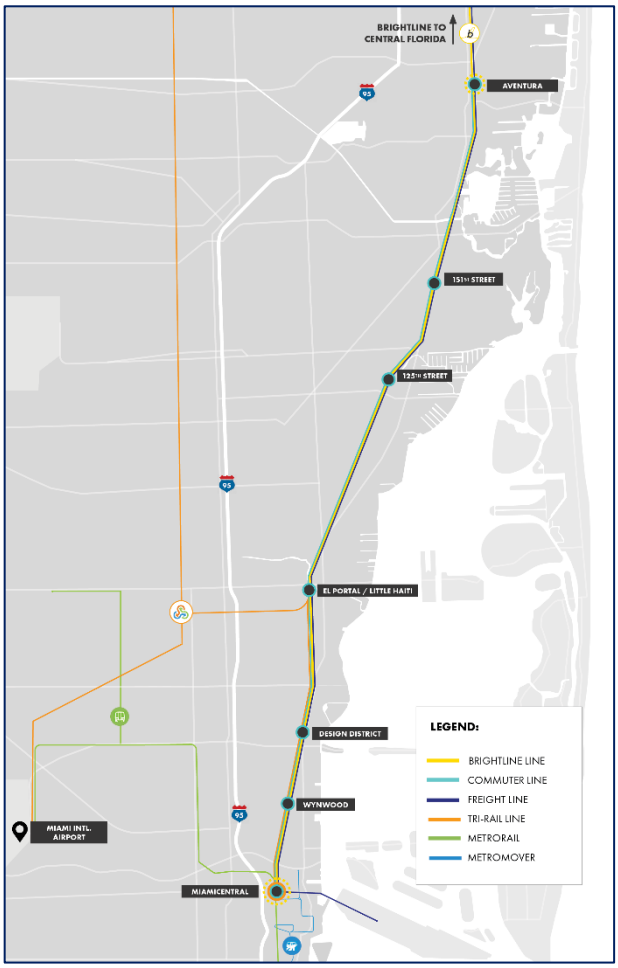

Figure 22: Miami-Dade County Commuter Rail and Other South Florida Transportation Options
(Source: Brightline Trains Florida, LLC)

By reducing the number of incidents along the Corridor, freight movement will be more efficient which will significantly increase capacity and reduce trip time for rail-bound intermodal freight movements, making rail a more competitive shipping option. This truck-to-rail transfer will increase capacity along the National Highway Freight Network and the National Highway System. These efficiencies will improve the distribution

[31] Topel, Kurt, et al., *A Literature Review of Rail Trespassing and Suicide Prevention Research*, Transportation Research - Circular EC242, TRB, National Research Council, Washington, D.C., 2019, Source
[32] Miami-Dade Transportation Planning Organization, *SMART Plan – Northeast Corridor*, 2020, www.miamidadetpo.org/smartplan.asp

of goods and services and result in significant economic benefits for the South Florida region, the State of Florida, and North America.

Economic Competitiveness and Opportunity

In Florida, freight carries more than 67 million tons, valued at approximately $11 billion. Travel time and reliability savings, in addition to the improved overall safety, will increase the economic competitiveness of the FECR. Decreased reliability and increased travel time negatively affect competitiveness with other travel modes and the broad regional transportation network. Resilience will be enhanced through the implementation of the Project.

The State of Florida anticipates considerable population and employment growth based on the analysis of local, regional, and national trends, population data, and employment data. This growth will require a comprehensive investment in transportation infrastructure to reduce congestion, prevent accidents, and build the region's economic competitiveness. This Project improves the movement of workers and goods, decreases transportation costs and improves access, and supports the region's economic growth.

The Project will bring construction opportunities to the area in the short term. Brightline will manage a competitive process for selection of the contractors that will perform the crossing and fencing work and will aim to achieve a DBE goal set by the FDOT. Although only temporary, the skillset gained through the railroad work may lead to other employment opportunities for residents. In addition, in past Brightline landscaping projects, the work has been done by a local non-profit who is committed to hiring and training individuals who are from the surrounding neighbors. The project team would consider utilizing this non-profit organization for this Project.

State of Good Repair

FECR currently maintains critical rail infrastructure along the entire Corridor, with individual municipalities providing reimbursement as per the existing maintenance agreements. In the situation that the Project enhancements are not covered by the maintenance agreements, Brightline is committed to maintaining the enhancements installed as part of this Project from Miami to Cocoa. Brightline, as holder of the perpetual passenger easement, has full access to maintain the enhancements proposed in this Project. Brightline already has maintenance forces working along the Corridor in Miami, West Palm Beach, and Cocoa to Orlando and they are able to maintain these enhancements as well.

Partnership and Collaboration

This Project also requires strong collaboration with the individual counties and cities, who maintain sole authority over road crossings traversing the rail tracks, Brightline, the owner, builder, and operator of the new higher-speed passenger rail service, FECR, the owner of the right of way and operator of the freight service, and FDOT, who collaborates with the FRA and creates the grade crossing standards for the State of Florida. Regional and local partners have a strong desire to balance corridor safety and quality of life through this Project which has been the foundation for identifying the best supplemental safety treatments. The lead project partners for implementation and funding are:

- The **Florida Department of Transportation** (FDOT) is an executive agency focused on providing a safe transportation system that ensures the mobility of people and goods, enhances economic prosperity and preserves the quality of our environment and communities. In addition to being the lead applicant and a funding partner, FDOT will review grade crossing designs to assure that they meet the State of Florida's evolving rail safety best practices. FDOT will initiate a project agreement with Brightline related to project delivery.
- **Brightline Trains Florida LLC** (Brightline) is a privately owned and operated intercity passenger rail company that runs service along the corridor from downtown Miami to downtown West Palm Beach. Current stations include MiamiCentral, Fort Lauderdale, and West Palm Beach, with Aventura and Boca stations expected to open in 2022. In addition, an extension to Orlando is under construction with service opening in 2023, and plans are underway to continue service to Tampa. Brightline will lead and be responsible for designing and constructing the safety improvements planned for this Project.
- **Florida East Coast Railway LLC** (FECR) is a Class II regional railroad that owns the freight rights for the 351-mile mainline track from Jacksonville to Miami. It is the exclusive freight rail provider for Port Miami, Port Everglades, and Port of Palm Beach. FECR connects freight rail service in and out of Georgia, Tennessee, South Carolina, and North Carolina.

In addition, the Project is supported by:[33]

- Local Transportation Planning Organizations
- Counties: Dade, Broward, Palm Beach, Martin, St. Lucie, Indian River, and Brevard

The Project corridor is also located within several Congressional Districts, and many of the region's elected officials have provided letters of support.

- Congressman Bill Posey - Florida's 8th District
- Congressman Brian Mast – Florida's 18th District
- Congresswoman Lois Frankel – Florida's 21st District
- Congressman Ted Deutch – Florida's 22nd District
- Congresswoman Debbie Wasserman Schultz – Florida's 23rd District
- Congresswoman Frederica Wilson – Florida's 24th District

FDOT and the county transportation departments have conducted a significant amount of public outreach as part of more comprehensive engineering solutions to improve safety in the area. Brightline has connected with each of the counties and local community partners to discuss safety campaigns and improvements. Over the course of developing the scope of this Project, Brightline has conducted over twenty meetings with local stakeholders to discuss Project details and gain their input. This process will continue as the Project progresses.

[33] See Appendix G for Letters of Support

Additionally, Brightline frequently connects with partners and community members through innovative methods focused on raising public awareness of railroad safety and mental health. Brightline's "BuzzBoxx" mobile RV provides free haircuts while talking with people about the Operation Lifesaver Rail Safety Pledge and providing information on mental health resources. This has helped raise mental health awareness and reached people whose patterns bring them in proximity to the rail alignment. Brightline also is active with railroad safety advocacy in schools, frequently giving presentations tailored to K-12 audiences about grade crossings and rail corridor dangers. The feedback collected during Brightline's outreach help to inform future safety campaigns and projects along the Corridor.

Innovation

This Project is innovative in that its scope results directly from Federal research[34], prior FDOT studies[35], and a comprehensive analysis and field review commissioned by Brightline as a part of this grant application and focused specifically on the current environment and incident history in this railroad corridor. In conjunction with this review, FDOT, Brightline, and its consultants further evaluated the applicability to Florida distinguished by the historical development of the state. Henry Flagler purchased, improved, and combined several northeast Florida railroads between 1885 and 1889 that resulted in rail service reaching from Jacksonville to Daytona Beach. Between 1892 and 1896, Flagler extended the railway south from Daytona to Miami with new construction through sparsely settled land along Florida's east coast ridge. The railroad spurred the development of the state, and when the Dixie Highway was built in the 1910s, followed by US Route 1 in the 1920s, they paralleled the existing railroad Corridor. Fast-forwarding to today, the heavily developed corridor closely parallels the railroad with US Route 1 (also called Florida State Road 5), typically just east. In many places, the Old Dixie Highway or other local roads just west (see Figure 23). This parallel roadway development has created dangerous conditions and heightened the potential for trespassing and grade crossing collisions. It is these conditions that the funding provided by this grant will help ameliorate.

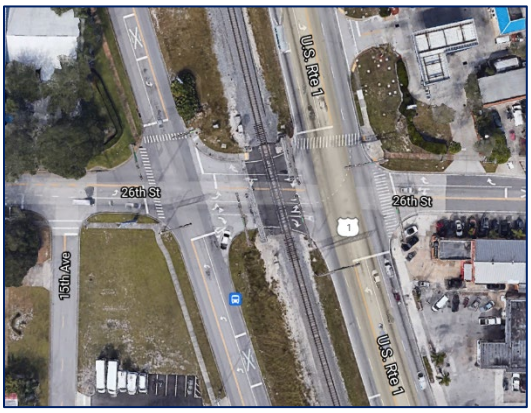

Figure 23: Roadways Parallel to Corridor
(Source: Google Earth)

Innovative Technologies: The grade crossing improvements, particularly the dynamic envelope striping and delineators, are newer technologies that have demonstrated positive results for preventing vehicle intrusion. After completing this Project, the goal will be that the majority, if not all crossings along the Miami to Cocoa Corridor will have dynamic envelope striping. All of the 155 proposed RDEs locations

[34] *Trespass Prevention Research Study – West Palm Beach, FL*, US Department of Transportation, Federal Railroad Administration, Research and Innovative Technology Administration, John A. Volpe National Transportation Systems Center, July 2014, Source
[35] *Strategies for Reducing Railroad Trespassing*, *Pilot Program* (Central Florida Rail Corridor), January 2020, and *Strategies for Reducing Railroad Trespassing, Florida East Coast Railway Corridor-Cocoa to Miami, August 6, 2021* (See Appendix E)

are within the Phase I segment of Brightline's service which includes both state and local roadway-railroad crossings. Brightline will coordinate with local municipalities through their permitting process.

Innovative Project Delivery: The Project partners have built a solid partnership to safely and efficiently deliver this safety improvement Project. FDOT, FECR, and Brightline will conduct a unique simultaneous design review process for each crossing to assure a holistic analysis and improve schedule performance. The review includes both permanent design and maintenance of traffic. Brightline, FECR, and FDOT have each partnered together on other various railroad corridor projects and will set up a similar agreement if this project is funded.

Innovative Financing: This Project would not be possible without the strong public-private partnerships that have been established. The Project is being funded from state and private sources.

PROJECT READINESS

- State Planning Documentation

This Project supports the advancement of passenger rail in the State of Florida, which will help provide transportation alternatives for residents, visitors, and businesses, expand economic development, create jobs, and improve air quality. The 2045 Florida Transportation Plan (FTP) identifies seven goals for Florida's transportation future.[36] Specifically, the Project helps accomplish these goals by increasing safety, creating better mobility for people and freight, strengthening the economy, supporting diverse communities, and reducing the impacts on Florida's environment.

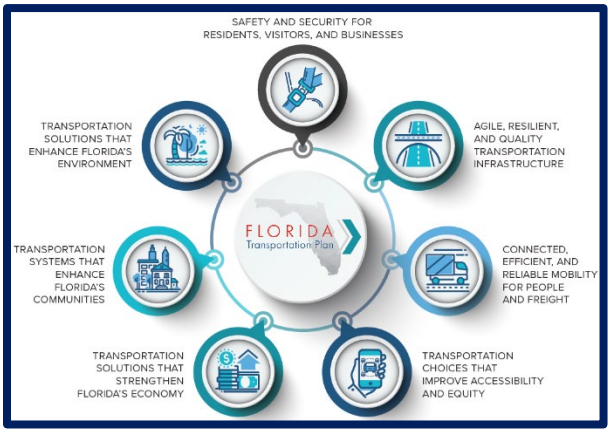

Figure 24: Florida's Transportation Goals
(*Source: 2045 Florida Transportation Plan*)

As part of Florida's long-range transportation planning, FDOT developed a statewide Rail System Plan[37], which aligns with the vision and goals set in the FTP. Brightline's passenger rail service and the continuing need to increase safety through improvements are identified as priorities in the Florida Rail System Plan (RSP). The RSP meets FRA's requirements for a comprehensive view of the state's rail system and helps identify short- and long-range program funding for statewide planning. The type of investments identified within the RSP includes railroad infrastructure needs and highway-rail crossing safety improvements.

The Project also falls in line with the goals of FDOT's Highway-Rail Grade Crossings Action Plan, which aims to eliminate safety hazards to the maximum extent possible.[38] The plan explores how each safety

[36] *Florida Transportation Plan*, 2020, floridatransportationplan.com/
[37] *FDOT's Rail System Plan*, 2018, www.fdot.gov/rail/plans/railplan
[38] *FDOT's Highway-Rail Grade Crossing Safety Action Plan*, 2011, www.fdot.gov/rail/plandevel/highway-rail-grade-crossing-safety-action-plan

challenge is selected and follows with proactive and predictive measures to eliminate or significantly reduce risks in the short term and create favorable future impacts.

- Technical Capacity

Through the strong partnership that has been established between all partners, there is a skilled team of technical experts that will be working on delivering this Project. The experienced team includes:

FDOT: The FDOT FRO team in combination with the individual FDOT districts have extensive professional experience implementing similar grade crossing projects and best practices across the state. This team will lead design review and approval and overall project management, specifically the grade crossing improvements. FDOT has a proven record of accomplishment in completing major infrastructure and railroad projects on schedule, within budget, and with a critical emphasis on safety. FDOT has the means to deliver projects such as this one under different funding arrangements. Since Brightline and FECR own and control the corridor, an agreement will be executed to address all the grant/project construction details. All construction-related work proposed to be carried out by Brightline will meet federal requirements. The majority of fencing/landscaping will be placed on Brightline/FECR right of way and may involve a different level of review by FDOT.

Brightline: The Brightline team has successfully managed the engineering and construction of over $4 billion in improvements to this rail corridor over the last 7 years. These projects have included the permitting processes with USACOE, State of Florida, Federal NEPA, and local municipalities, corridor clearing and grading, drainage structures and improvements, new fixed and movable bridges, new track and special track, grade crossing reconstructions and upgrades, safety device installations, new positive train control systems, and rolling stock procurement and commissioning. This 50-person team will manage the improvements planned for this Project in close coordination with FECR and FDOT.

FECR: The FECR team owns the corridor and operates the freight rail system. FECR also maintains the rail infrastructure between Jacksonville and Miami. As a result, FECR's knowledge of the infrastructure is unparalleled. FECR and Brightline have a long history of cooperating to increase the capacity of this significant corridor to enable passenger usage in our rapidly densifying state. FECR will provide access to the corridor for the construction of the Project improvements.

- Financial Capacity

FDOT has committed $10 million in state resources to support the Project. Brightline has committed $10 million in private equity funding to support the Project (support letter provided in Appendix G). A 15% contingency has been included in the project estimate, which has been identified as a sufficient level of funding to support the level of risk at this phase of the Project. If cost increases due to the final field verification and diagnostic review or the total amount of federal funding is not received, the project team will look at adjusting scope or seeking additional support from local municipalities. FDOT, as a multi-departmental agency, has a solid and robust team that has a proven track record of carrying out multi-billion-dollar projects.

- Project Schedule

The overall scope of the Project is not complex, but because of the span of the corridor and broad range of counties and municipalities that need to be coordinated with, we expect an 18-month construction duration. Initial coordination has already begun with each county, and letters of support are provided in Appendix G. FDOT in coordination with Brightline will progress over the next several months to complete NEPA and preliminary engineering. Once the RAISE project announcement is made in August of 2022, the team will move with the final design to start construction at the execution of a grant agreement in March 2023. This schedule can be adjusted to fit within the process of obtaining pre-award authority and developing the terms of a grant agreement with the USDOT.

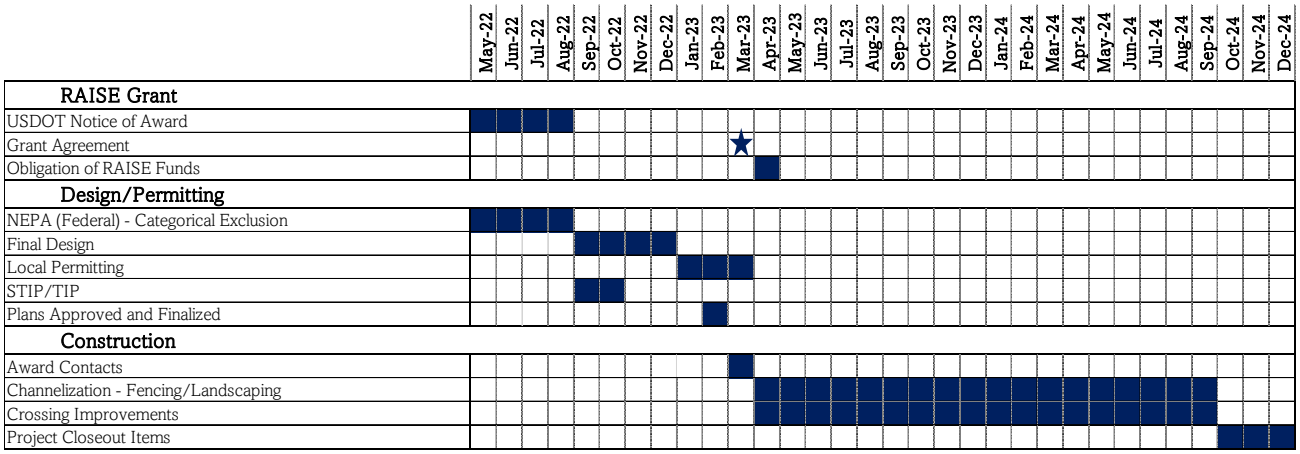

Figure 25: Project Schedule

- Environmental Risk/NEPA

The NEPA process for Brightline's Phase I and II introduction of service will serve as the starting point for evaluating the environmental impacts of this Project. Since all construction activities will occur within the existing railroad right of way, the expectation is that this Project would fall under a Categorical Exclusion (CE) classification. Initial discussions with the FRA regional office occurred on March 16, 2022. Based on the preliminary meeting, the safety improvements proposed in this Project could fall under a CE classification. As part of this application submittal, a Categorical Exclusion Worksheet has been attached which lays out the preliminary review of the environmental risks identified for the Project.[39] Brightline submitted the inventory/evaluation checklist to FRA in March 2022. Brightline is committed to demonstrating that the Project will have no significant adverse effects on the environment, per applicable NEPA requirements, before a grant agreement is executed. The original environmental record includes the following:

- Miami to West Palm Beach – Final Environmental Assessment (October 2012)[40]

[39] See Appendix F for CE Worksheet and Technical Memo
[40] Final EA - railroads.dot.gov/environment/environmental-reviews/all-aboard-florida-passenger-rail-project-west-palm-beach-miami

- Miami to West Palm Beach - Finding of No Significant Impact (January 2013)[41]
- Miami to Orlando – Final Environmental Impact Statement (August 2015)[42]
- Miami to Orlando – Record of Decision (December 2017)[43]

- Other Approvals and Permits

FDOT and Brightline will lead a collaborative process with FECR and individual municipalities to complete the design review and approval, which has proven effective for identifying and resolving design comments in past projects. In addition, maintenance of traffic permitting would occur in concurrence with each crossings design approval to expedite the Project's permitting process.

- Risk and Mitigation Strategies

The Brightline team has conducted a risk analysis and has documented a list of potential risks and opportunities relevant to the Project. Each has been assessed relative to the probability, impact, and risk scoring matrix. All the data has been collected into the project risk register. The Brightline project manager, as part of the ongoing management activities, will conduct a review of the Risk Register with a focus on actionable activities to mitigate risks and capitalize on opportunities. As the Project consists of the design and construction of relatively well-known activities with well-established means and methods, all Probability and Impact scores assessments are made by experiential assessment. A list of the risks identified for the Project is provided in Figure 26.

PXI Scope Category	Title	Details	P-Level	I-Level
Construction	Local Permitting	Delays by municipalities in timely review of MOT plans and issuance of permits	Low	Moderate
	Contractor Productivity	Insufficient construction windows could delay schedule and impact cost	Moderate	High
	Coordination with Other Projects	Multiple construction projects with the potential for interference	Low	Low
Other	Funding	If cost increases project team will look at adjusting scope or seeking additional support from local municipalities	Moderate	Moderate
	Partner Coordination	Multiple partners are collaborating on project and need to continue to be active participants, including FDOT, Brightline, FECR	Low	Low

Figure 26: Project Risk Register

[41] FONSI - railroads.dot.gov/elibrary/all-aboard-florida-passenger-rail-project-fonsi
[42] Final EIS - railroads.dot.gov/environmental-reviews/all-aboard-florida/all-aboard-florida-miami-orlando-passenger-rail-service-0
[43] ROD - railroads.dot.gov/environmental-reviews/all-aboard-florida/all-aboard-florida-miami-orlando-passenger-rail-service-1

BENEFIT-COST ANALYSIS

This section summarizes the findings of the Florida East Coast Corridor Trespassing and Intrusion Mitigation Project's Benefit-Cost Analysis (BCA) performed in accordance with the latest USDOT Guidance for Discretionary Grant Programs.[44] The figure below presents the project BCA findings. All monetary values are expressed in 2020 constant dollars. The period of analysis used to estimate benefits and costs related to the differences between the Baseline (Build) and the Alternative (Build, with safety improvements) scenarios runs from 2022 to 2044 (23 years). This evaluation timeframe includes the initial capital deployment (in 2022 through 2024), and 20 full years (2025 through 2044) of operations during which benefits accrue.

As shown in Figure 27, most of the benefits generated by the proposed project are safety related. Given the 7 percent real discount rate, the total monetized benefits of the proposed safety improvements project are forecasted at $514.4 million (in present discounted value terms) while the total discounted costs of the project are forecast at $54.1 million. This results in a Benefit-Cost Ratio of 9.2, and a net present value (NPV) of $460.3 million. The corresponding internal rate of return (IRR) of the project is projected at 92.8 percent, while the breakeven year would be in 2025. If only a portion of the benefits are realized, there would still be significant monetized benefits and many fatalities avoided.

Benefit and Cost Metrics	2022-2044 Totals	
	Discounted at 7%	Before Discounting
Project Benefits		
Safety Benefits	$507.5	$1,101.2
Travel Time Savings	$5.0	$11.3
Residual Value	$1.9	$8.5
Total Benefits	**$514.4**	**$1,121.0**
Project Costs		
Capital	$39.5	$43.4
O&M Costs Increment	$14.60	$31.11
Total Project Costs	**$54.1**	**$74.5**
Key Metrics		
Total Benefits less Total Costs (NPV)	**$460.3**	
Benefit-Cost Ratio	**9.2**	
Internal Rate of Return	92.8%	
Breakeven Year	2025	

Figure 27: Benefit-Cost Analysis Summary (in millions of 2020$)
*Unless specified otherwise, the numbers are rounded

Details pertaining to the methodology, assumptions, and additional results presentation pertaining to the BCA of this project are presented in the Technical Memorandum (Appendix A).

[44] Benefit-Cost Analysis Guidance for Discretionary Grant Programs, USDOT, Revised 2022, Source