STATE HIGHWAY-RAILROAD GRADE CROSSING ACTION PLAN

CONNECTICUT DEPARTMENT OF TRANSPORTATION

2022

Table of Contents

Acknowledgments

Rail Grade Crossing Project Team

Eric Bergeron, *CTDOT Bureau of Public Transportation - Office of Rail*

Robert Bradway, *CTDOT Bureau of Public Transportation - Office of Rail*

Kevin Burns, *CTDOT Bureau of Public Transportation - Office of Rail*

Stephen Curley, *CTDOT Bureau of Public Transportation - Office of Rail*

Zigmund Korenkiewicz II, *CTDOT Bureau of Public Transportation - Office of Rail*

John Mandeville, *CTDOT Bureau of Public Transportation - Office of Rail*

Anna Mermelstein, *CTDOT Bureau of Engineering & Construction - Division of Traffic Engineering*

Sharon Okoye, *CTDOT Bureau of Engineering & Construction - Asset Management Group*

Barry Schilling, *CTDOT Bureau of Engineering & Construction - Division of Traffic Engineering*

Prepared by

This plan was prepared by the following consultant team from Michael Baker, International.

Michael Baker INTERNATIONAL

Aarion Franklin, Ph.D.

DeRon Jordan

Elizabeth Bechtel

Emily Webb

Tayleigh Trussell

Vickie Karandrikas

Shauna Powers

Section 1: Introduction

The intersection of roadways and railways presents the potential for deadly collisions across the United States. According to the National Safety Council (NSC), a person is hit by a train every 4 hours in the United States. Trespassing and abandoned vehicles are the most common causes of highway-rail crossing incidents. According to the Federal Railroad Administration (FRA), trespassing along a railroad's right-of way is the leading cause of rail-related deaths in the nation. However, collisions at highway-at-grade rail crossings are preventable.

This State Highway-Railway Grade Crossing Action Plan (State Action Plan [SAP]) is designed to meet the requirements of the Federal Railroad Administration's (FRA) State Highway-Rail Grade Crossing Action Plans regulation, 49 CRF § 234.11, published December 14, 2020. Following preliminary submission to the FRA in 2021, this SAP was revised to address comments from the review.

MISSION

The Connecticut Department of Transportation (CTDOT) recognizes that collisions between trains and motor vehicles on Connecticut roadways have the potential to cause severe personal injuries and property damage. CTDOT is also aware of the potential increase of incidents involving bicyclists and pedestrians at highway-railway grade crossings. As a result, CTDOT is committed to enhance safety for all roadway users by reducing the number of crashes at all highway-railway grade crossings, public and private, in the state of Connecticut.

SCOPE

The FRA issued a final rule on State Action Plans on December 14, 2020. The rule, which became effective on January 13, 2021, modified 49 CFR Part 234 and required all states and the District of Columbia to comply with the action plan requirements of the Rail Safety Improvement Act of 2008. The final rule is intended to implement the Fixing America's Surface Transportation (FAST) Act mandate requiring states to develop and implement action plans which identify specific solutions for improving grade crossing safety with an emphasis on crossings that have experienced or are at a higher risk for multiple crashes.

The FRA requires the SAP to identify specific strategies for improving safety at grade crossings and to designate a state official responsible for managing implementation of the plan. Each state has the flexibility to develop the plan in a manner consistent with its own assessment of the hazards related to their highway-grade crossings. For Connecticut, this plan is a continuation of good business practices intended to keep its transportation network safe. In an effort to make transportation in Connecticut even safer, the Safety and Security Section in CTDOT's Office of Rail, will be responsible for the submittal and implementation of the SAP. Listed directly below are the primary and secondary contacts for the SAP:

Primary Contact

Eric Bergeron
Assistant Rail Administrator

Office of Rail – Operations
Connecticut Department of Transportation
CCO Building #24 (3rd Floor)
4 Brewery Street
New Haven, Connecticut 06511

Office Phone: (203) 497-3436
Cell Phone: (860) 913-1121
Email: Eric.Bergeron@ct.gov

Secondary Contact

Robert W. Bradway
Rail Officer 2

Office of Rail – Safety & Security
Connecticut Department of Transportation
CCO Building #24 (3rd Floor)
4 Brewery Street
New Haven, Connecticut 06511

Office Phone: (203) 497-3424
Cell Phone: (860) 992-5970
Email: Robert.Bradway@ct.gov

The FRA's final rule identified minimum requirements for each SAP. Action Plans must identify grade crossings that meet the following requirements:

- **A** Have experienced recent crashes or incidents (i.e., in the previous three years)
- **B** Have experienced multiple crashes or incidents in the previous five years
- **C** Are at high-risk for crashes or incidents

GOALS

CTDOT has determined the following goals to be implemented under this SAP. The goals are as follows:

- Develop a new CTDOT railroad crossing inventory database
- Expand public education efforts regarding railroad crossing safety by use of media
- Perform diagnostic reviews of crossings with higher risk assessments
- Enhance visibility to railroad crossing signing using new type of reflective sheeting
- Increase the installation of active devices at public railroad crossings
- Improve pedestrian facilities at railroad crossings
- Renew statewide upgrades of passive devices at public crossings
- Expand the use of federal and state funds to initiate crossing surface replacement projects
- Expand the use of federal and state funds to install pavement markings and flexible tubular delineators to enhance visibility of grade crossings
- Develop master agreements with our freight railroad carriers
- Work with passenger railroad carriers to close railroad crossings on higher speed lines
- Implement the use of new technologies at railroad crossings

These goals are addressed in greater detail in Section 7 of this SAP.

Section 2: Statewide Highway-Railway Grade Crossing Safety Efforts

CONNECTICUT RAIL SYSTEM

Approximately two-thirds of Connecticut's highway-railway crossings occur over freight lines, and the proportion of crossings that occur at municipal-owned roads compared to state-owned roads is similar. CTDOT has less direct control over crossings with private or local ownership, therefore the majority of crossings in the state necessitate close coordination and communication with respective owners. The statewide Rail Line Name and Location Identification Map can be found online at the State's media portal.

The passenger rail network in Connecticut consists of commuter and intercity passenger rail. The commuter rail service is comprised of the New Haven Line (NHL), Hartford Line (NHHS) and Shore Line East (SLE). CTDOT provides financial support to these specific commuter services. Metro-North Railroad (MNR) is responsible for operating the NHL. Transit America Services Inc./ Alternate Concepts Inc. (TASI/ACI) is responsible for operating the NHHS, while the National Railroad Passenger Corporation (Amtrak) provides operations for SLE. In addition to operating the SLE, Amtrak also operates its Northeast Corridor intercity passenger rail service over a combination of Amtrak- and state-owned track.

In Connecticut, there are numerous freight carriers, ranging from large Class 1 railroad, such as CSX, to small, short line railroads, like the Branford Steam Railroad. Connecticut also has railroad companies, such as the Valley Railroad, that provide excursion passenger service oriented to serve tourists. Some of these freight carriers operate on privately owned railroad right-of-way, 246.7 miles total, while others operate on 259.3 miles of track owned by the State or local municipalities.

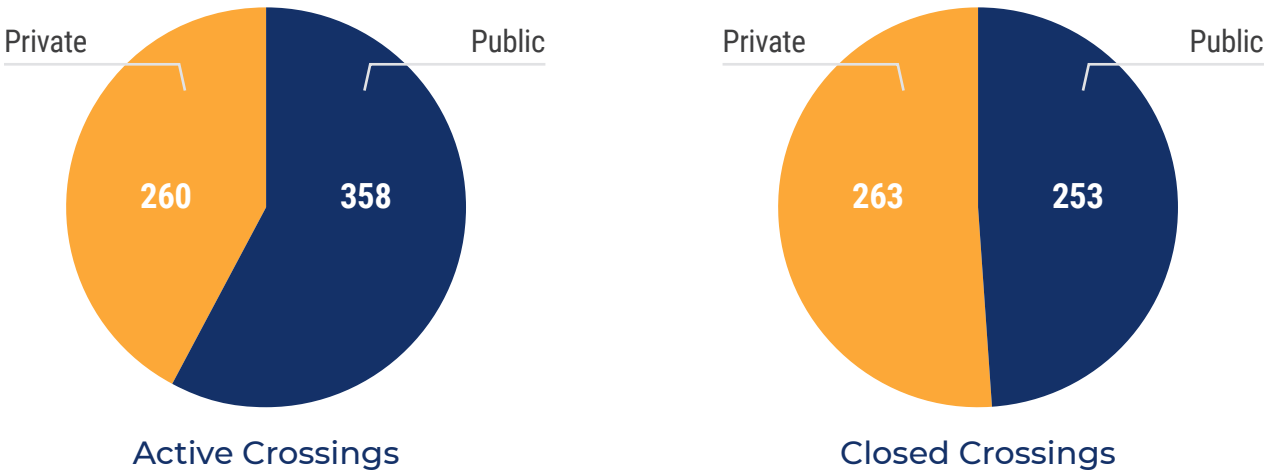
Listed below are the names of the ten private freight and tourist railroad companies that operate in Connecticut:

- Berkshire and Eastern
- Branford Steam Railroad
- Central New England Railroad
- Connecticut Southern Railroad
- CSX Transportation
- Housatonic Railroad Company
- Naugatuck Railroad
- New England Central Railroad
- Providence and Worcester Railroad Company
- Valley Railroad Company

CONNECTICUT HIGHWAY-RAILWAY GRADE CROSSINGS

According to Connecticut's database of rail crossings, there are 618 active highway-railway grade crossings, as well as 516 closed crossings. Public crossings can be located on either a state-owned or municipal roadway while private crossings are located on a privately owned roadway, such as a farm or an industrial property.

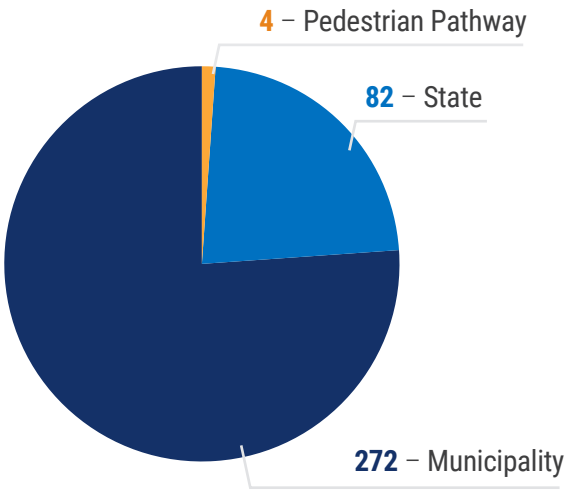
Figure 1: Active and Closed Crossings, Public and Private, 2022



Source: Connecticut's Rail Crossing Database, 2022

Of the 358 active public crossings, 76% are located on municipal roadways or pathways, while the remaining 23% are on state roadways or pedestrian pathways. The chart below exhibits the number of public crossings on state and municipal roads.

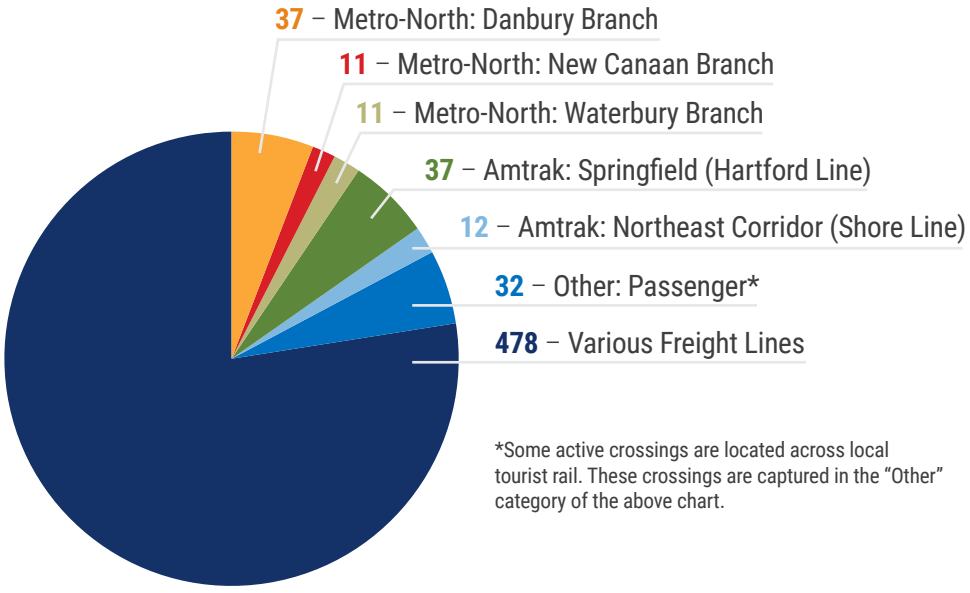
Figure 2: Road Ownership of Public Active Crossings, 2022



Source: Connecticut's Rail Crossing Database, 2022

More than 75% of crossings* (either public or private) occur over freight lines, and approximately 75% of crossings that occur at publicly owned roads are municipal roads. CTDOT has less direct control over either freight line crossings or crossings over private municipal-owned roads, so a significant number of crossings in the state necessitate close coordination and communication between CTDOT and external stakeholders.

Figure 3: Total Active Crossings Per Rail Line, 2022



*Some active crossings are located across local tourist rail. These crossings are captured in the "Other" category of the above chart.

Source: Connecticut's Rail Crossing Database, 2022

Nearly 25% of active public crossings and over 80% of active private crossings have passive traffic control, such as a crossbuck assembly at the crossing, which do not warn highway users if a train is actively approaching the crossing. This can present a hazard to highway users if the line of sight from the crossing is obstructed by buildings or trees, or if the weather conditions are unfavorable (dark, raining, etc.). The table below shows the distribution of passive and active warning devices the active highway-railway grade crossings in Connecticut.

Table 1: Type of Select Warning Devices at Active Crossings, 2022

Type of Warning Device	Public	Private
PASSIVE CROSSINGS		
Crossbuck Sign or No Device	87	214
ACTIVE CROSSINGS		
Flashing Lights Only	112	21
Flashing Lights and Gates	153	24
Traffic Control Signals	6	1

A statewide map of rail ownership is available online from the Connecticut State Government's website.

HIGHWAY-RAILWAY CROSSING PLANNING

Prior to the development and submission of the SAP, data and strategies relating to Connecticut's railways and grade crossings could be found in Connecticut's State Rail Plan (SRP). The SRP was originally developed to comply with the requirements set forth in the Passenger Rail Investment and Improvement Act of 2008 (PRIIA), Public Law No. 110-432. The SRP contains an overview and inventory of the passenger and freight rail system and facilities in Connecticut, the services provided, asset conditions and constraints, a vision and goals for future improvements, and near and long-term investment priorities for passenger and freight rail. A copy of the existing SRP can be found here: Connecticut State Rail Plan 2022-2026.

All CTDOT projects, including projects to improve Connecticut's rail system and grade crossings, are included in the Statewide Transportation Improvement Program (STIP). The STIP is a four-year planning document that lists all projects expected to be funded in those identified four years (2021-2024) with Federal Highway Administration (FHWA) and Federal Transit Administration (FTA) participation. It is developed in compliance with Title 23 of the United States Code, the Clean Air Act Section 176(c) and Title VI requirements. The STIP, which is multimodal, includes investments in various modes, such as transit, highways, and bicycle facilities. Goals and objectives that are identified in regional and state long-range transportation plans are implemented in the STIP. The STIP is developed in collaboration with federal agencies, state government and Metropolitan Planning Organizations (MPO) and in consultation with the Rural Planning Agencies. A copy of the current STIP can be found here: 2021 Statewide Transportation Improvement Plan. A copy of the list of projects in the current STIP can be found here: 2021 STIP Projects List.

Crash data for all crashes, including grade crossings, occurring on state and local roadways is presented in Connecticut's State Highway Safety Plan (SHSP). The SHSP provides historic, trends, and current crash data available as well as other state-provided data detailing highway safety in Connecticut. In addition to providing and analyzing crash data, the SHSP details Connecticut education, research, and enforcement programs and strategies to reduce road traffic crashes, prevent injuries, and save lives. The SHSP serves as Connecticut's application to the National Highway Traffic Safety Administration (NHTSA) for federal funds for the 2022 Federal Fiscal Year. A copy of the current SHSP can be found here: Connecticut Highway Safety Plans and Reports.

HIGHWAY SAFETY IMPROVEMENT PROGRAM (HSIP)

The Highway Safety Improvement Program (HSIP) is a core Federal Highway Administration (FHWA) program with the purpose of achieving a significant reduction in fatalities and serious injuries on all public roads, including non-state-owned public roads and roads on tribal lands. The HSIP was originally initiated under the Moving Ahead for Progress in the 21st Century Act (MAP-21) and was extended and expanded under the Fixing America's Surface Transportation (FAST) Act and continued in the Bipartisan Infrastructure Law (BIL).

CTDOT's Safety Engineering Section, located within the Division of Traffic Engineering, Bureau of Engineering and Construction utilizes both a spot improvement approach and a systemic approach to identify, select, and implement HSIP projects. The spot improvement approach, known as High Frequency Crash Locations (HFCL) results in safety investments at specific locations. The systemic approach results in a widespread implementation of mitigation strategies to reduce potential fatalities and/or serious injuries, regardless of whether any crashes have occurred at the location. Projects can qualify for the HSIP funds and placement on the HSIP Safety Project Plan when they are initiated from the following sources:

- High Frequency Crash Locations (HFCL)
- Local Road Safety Program (LRSP)
- Railway-Highway Grade Crossing Program (RHGCP)
- Projects supporting SHSP Emphasis Areas
- High Risk Rural Roads (HRRR)

As per 23 U.S.C. 148(h) and 23 CFR 924.15, states are required to report annually on the progress being made to advance HSIP implementation and evaluation efforts. The format of this report is consistent with the HSIP Reporting Guidance dated December 29, 2016, and consists of five sections: program structure, progress in implementing highway safety improvement projects, progress in achieving safety outcomes and performance targets, effectiveness of the improvements and compliance assessment. A copy of the most recent CTDOT's HSIP can be found here: 2022 Highway Safety Improvement Program Annual Report.

Railway-Highway Grade Crossing Program (RHGCP)

As mentioned above, CTDOT's Division of Traffic Engineering is responsible for overseeing the various individual programs under the HSIP in Connecticut. One of those programs within the HSIP, is the Railway-Highway Grade Crossing Program (RHGCP), also known as the Section 130 program.

Section 130 Program funds the elimination of hazards at railway-highway crossings. All public crossings, including roadways, bike trails, and pedestrian paths are eligible for Section 130 program funds. Under 23 U.S. Code 130(e), funds can also be used as an incentive for local agencies to close public crossings as long as matching funds are provided by the railroad. Funds may also be used for local agencies to provide matching funds for state-funded projects Previous 23 U.S. Code 130(e) requirements called for 50% of a state's apportionment of RHGCP funds to be dedicated towards the installation of warning devices at crossings, while the remainder of the funds were allowed to be used for any hazard elimination project, which included warning devices. Eligibility also included projects at grade crossings to eliminate hazards posed by blocked crossings due to stopped trains. Under the Bipartisan Infrastructure Law (BIL) the 50% program requirement has been eliminated. The BIL has also increased the federal share for a project financed with Section 130 funds from a previous maximum of 90% to 100% and has increased the incentive payment for crossing closure from $7,500.00 to $100,000.00.

Annually, CTDOT is allocated approximately $1.4 million in federal funds under Section 130 for improvements at public crossings. CTDOT has used Section 130 to fund projects that have installed new active warning devices and upgraded existing devices, improved signing and pavement markings, upgraded track circuitry, replaced traffic control signals with railroad pre-emption, replaced grade crossing surfaces, increased sight distance, and modified horizontal and vertical alignments. As required under the RHGCP, an annual report of CTDOT's Section 130 program must be submitted to FHWA by August 31st of each year.

Under Section 130, each state is required to conduct and systematically maintain a survey of all public roadways, state and municipally owned, to identify those crossings that may require separation, relocation, or warning devices and to establish and implement a projects schedule. In Connecticut, CTDOT uses a combination of factors and resources to determine potential future Section 130 projects. The FRA's Web Accident Prediction System (WBAPS) lists are reviewed annually along with other factors, such as numbers of incidents, sight distances, pedestrian facilities, adjacent intersections, presence of pre-empted signals, and projects in the area, to determine candidate locations for diagnostic review. On-site diagnostic reviews are conducted with the Division of Traffic Engineering, Office of Rails, the Railroad Company, and Municipality. The final decision to implement a grade crossing project is based upon the input from a multi-disciplinary diagnostic review team and professional judgement on the part of agency staff. The CTDOT's current and future Section 130 projects for Federally Fiscal Year (FFY) 2021 through FFY 2023 are included in **Appendix A** with other major grade crossing improvement projects.

OTHER EXISTING SAFETY PROGRAMS

Highway-railway grade crossing improvements in Connecticut are also funded through other federal, state, and private programs.

Federal Funding

There are two other primary federal agencies that have provided CTDOT funds for rail systems and highway-railway grade crossing improvements, the FRA and the Federal Transit Administration (FTA). The FRA provides funding for both passenger and freight systems, while funding through the FTA is specific to passenger rail only. Listed below are some of the federal programs that CTDOT has petitioned for funding.

High-Speed Intercity Passenger Rail Program (HSIPR)

The FRA periodically solicits applications and proposals for the High-Speed Intercity Passenger Rail (HSIPR) Program. In the spring of 2011, FRA solicited grant applications under the HSIPR Program for Individual Projects and Service Development Programs. As part of CTDOT's New Haven/Hartford/Springfield High Speed Rail Program, $160 million of HSIPR funding were used for double track restoration. Sixteen highway-railway grade crossings included in the double track restoration project were located in the Towns of North Haven, Wallingford, Meriden, and Windsor were upgraded.

Consolidated Rail Infrastructure and Safety Improvements Program (CRISI)

The Consolidated Rail Infrastructure and Safety Improvements Program (CRISI) is a competitive discretionary grant authorized under the FAST Act that provides funding to improve the safety, efficiency, and reliability of intercity passenger and freight rail.

Rail safety projects include, but are not limited to the following:

- Grade crossing enhancements
- Rail line relocations and improvements
- Deployment of railroad safety technology

Eligible activities include the following:

- Regional rail and corridor planning
- Environmental analyses
- Research
- Workforce development
- Training

Specific funding amounts are set aside for rural projects, intercity passenger rail development, and capital improvements for trespass prevention. Non-CRISI grant funding helps to implement the FRA's National Strategy to Prevent Trespassing, Railroad Trespassing Enforcement for law enforcement agencies and Railroad Trespassing Suicide Prevention for outreach campaigns. CTDOT received $17.49 million in CRISI grants to build the new Windsor Lock Rail Station. As part of the Windsor Locks station project, the nearby busy intersection of Route 159 (Main Street) and Route 140 (Bridge Street) will be reconstructed and the Bridge Street highway-railway grade crossing, USDOT #500747H, will be upgraded into a four-quadrant gate system.

Rebuilding American Infrastructure with Sustainability and Equity (RAISE)

Rebuilding American Infrastructure with Sustainability and Equity (RAISE) grants is a discretionary grant program for regionally significant surface transportation infrastructure projects. RAISE grants were formerly known as the Better Utilizing Investments to Leverage Development (BUILD) and Transportation Investment Generating Economic Recovery (TIGER) discretionary grants. The U.S. DOT grants capital awards and funding, for the eligible planning, preparation, or design of RAISE Grant eligible projects that do not result in construction. New guidelines for the RAISE program were issued in April 2021. In the past, CTDOT has partnered with freight railroad companies, such as the New England Central Railroad on their Palmer Line, to receive TIGER grants to perform various grade crossings improvements.

New England Grade Crossing Elimination Program

Amtrak is sponsoring the New England Grade Crossing Elimination Program, for the section of Amtrak's Northeast Corridor (NEC) from Boston to New Haven, conducted in partnership with CTDOT. Although

Amtrak initially suggested eliminating the at-grade crossings along the entire NEC two decades ago in preparation for electrified rail, only some were successfully removed, due to public opinion that closing the crossings would block shoreline neighborhood access and hinder emergency vehicles, leaving 11 highway-railway grade crossings in place. Instead of removing some of these crossings, the nation's first four-quadrant gate quadrant systems were installed.

Of the 11 at-grade crossings remaining along the NEC in Connecticut, the Shore Line East Grade Crossing Elimination projects will remove four crossings between Stonington and New Haven to minimize the risk of collisions and delays caused by malfunctions to grade crossing warning devices. According to the Northeast Corridor Commission Connect 2035 Plan, the four crossing improvements detailed below are predicted to begin in 2025 and be completed by 2030.

- **Elihu Island Road (Stonington) Grade Crossing Closure** Permanently remove crossing by building a connection to an upgraded Walker's Dock Grade Crossing or a locally preferred alternative.
- **Wamphassuc Road (Stonington) Grade Crossing Closure** Permanently remove crossing by building a connection to Joy Avenue or a locally preferred alternative.
- **Latimer Point Road (Stonington) Grade Crossing Closure** Build a bridge or a locally preferred alternative to close Latimer Point Road Grade Crossing.
- **Miner Lane (Waterford) Grade Crossing Closure**
  Permanently remove crossing by building a connection to CT 213 or a locally preferred alternative.

FTA Section 5307 Urbanized Area Formula Funding Program

The FTA's Urbanized Area Formula Funding program assists urbanized areas in gaining access to federal resources and for governors to access transit capital and operating assistance for transportation related planning. Urbanized areas are determined by the Census and are designated areas that have a population of 50,000 or more. Eligible activities include aspects regarding transportation-related studies, bus-related capital investments and maintenance, and capital investments in new and existing fixed guideway systems. Capital costs include preventative maintenance and some ADA complementary paratransit service costs.

CTDOT previously used Section 5307 funds to help construct the nine-mile New Britain-Hartford Busway, also known as CTfastrak. CTfastrak is Connecticut's first Bus Rapid Transit (BRT) system. It is comprised of a system of bus routes that utilize a bus-only roadway for a portion of the entire trip. As part of the busway project, Oakwood Avenue, USDOT #500697G, and Hamilton Street, USDOT #500700M, highway-railway grade crossings were upgraded while the Flatbush Avenue crossing, USDOT # 500698N, was grade separated and the Flower Street, USDOT #500710T, was closed.

State Funded Programs

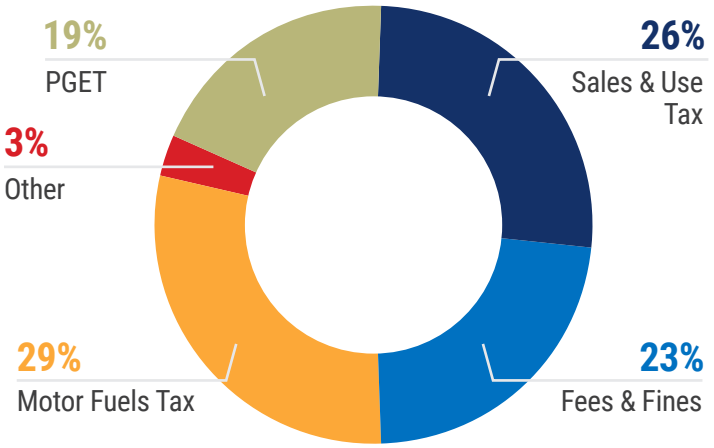
CTDOT provides funding to three commuter rail services: the NHL, SLE, and Hartford Line, despite the operations of these rail services being the responsibility of private companies Metro-North, Transit America Services Inc./Alternate Concepts Inc., and Amtrak respectively. This section details the possible state-funded programs available to CTDOT to financially support these rail systems.

Special Transportation Fund (STF)

The Connecticut General Assembly has appropriated funds, the Special Transportation Fund (STF), separate from the General Fund, that helps finance most of the state's capital and operating dollars towards state transportation infrastructure programs run by CTDOT and the Department of Motor Vehicles. The State has a statutory and constitutional "lockbox" provision protecting the STF and restricting its use. In 2018, voters approved a constitutional amendment that preserved the state's STF as a permanent fund, requiring that the fund be used exclusively for transportation purposes, and that any current funding sources directed to the STF continue.

The STF is funded primarily by tax revenue dedicated by law to the fund. The largest contributor to the STF is state motor fuel taxes which includes the gas tax, diesel tax, motor carrier tax, and petroleum products gross earnings tax. Additional sources of revenue include general sales and use taxes, motor vehicles sales taxes and receipts, licenses, permits and fees, and interest income. Operating expenses can be paid for with STF appropriations, which mainly include expenses for CTDOT and debt service. Capital expenses include improvement and repair projects. In the past, funds from the STF have been used to support many projects on the New Haven Line, such as the recent Waterbury Branch Signalization Project. This project provided circuitry upgrades and surface replacements for crossings to all eleven public and private highway-railway grade crossings, as well as installing active devices at the private crossings on the branch line.

Figure 4: 2019 STF Revenue Sources



Source: Office of Fiscal Analysis

Rail Freight Infrastructure Program (RFIP)

The Rail Freight Infrastructure Program (RFIP) can be used to fund at-grade crossing improvements. In July 2021, the state of Connecticut authorized bonding for ten million dollars ($10,000,000.00) for a new round of RFIP grants. CTDOT's Office of Rail will be responsible for awarding the entire amount authorized in the current application period with a two-million-dollar ($2,000,000.00) cap per applicant. RFIP funds must be used to improve, repair, or modernize the right of way. The funding can cover up to one hundred percent of costs on state-owned rail right of way and up to seventy percent on privately owned rail right of way. The state statute authorizing RFIP funding provides guidance that freight rail projects that improve at-grade rail crossings are one of the priorities of the program. CTDOT plans to have grant selections completed and the RFIP funded projects begin construction by mid-2022. Construction is expected to be completed within 18 months of the grant award. In the past, previous funding under the RFIP has improved highway-railway crossings on the Griffin Industrial Track of the Central New England Railroad.

Tax Exemption Program (TEP)

The Tax Exemption Program (TEP) can help railroads afford to make investments in their infrastructure, including at-grade crossing improvements. Section 13b-228 of the Connecticut General Statutes allows railroad companies transporting freight or passengers within the state, or between Connecticut and other states, the opportunity to qualify for an exemption from the gross earnings taxes it owes to Connecticut in exchange for undertaking projects to preserve or improve its facilities. Annually, railroad companies must submit their proposed railroad preservation and improvement projects to the state, which is reviewed and approved by CTDOT's Office of Rail as eligible TEP projects. Railroad companies must submit monthly progress reports, submit to an inspection by CTDOT upon completion of the work, and then are audited. The state then determines how much each railroad company qualifies for in a tax exemption and provides them with Tax Exemption Certification. Recent crossing surface improvements by the Providence and Worcester Railroad Company in the City of North Haven and the Town of Wallingford, and by the Connecticut Southern Railroad in the towns of South Windsor and Windsor Locks, are examples of how highway-railway grade crossings are improved under this program.

Operation Lifesaver, Inc. (OLI)

Operation Lifesaver Incorporated (OLI) is a non-profit national public safety education and awareness program based in Washington, D.C. that is dedicated to reducing collisions, fatalities, and injuries at highway-rail grade crossings, and trespassing on or near railroad tracks. The program has been in effect since 1996 in Connecticut and is administered through CTDOT under Connecticut General Statute, Section 13b-376. The program is supported by a wide variety of partners, including federal, state, municipalities, school districts, and community-based agencies. CT Operation Lifesaver is funded through CTDOT with a $20,000 material budget. The program also receives two small grants (totaling $2,550) from OLI. CT Operation Lifesaver also periodically applies for other competitive grants from OLI.

Section 3:
Public Engagement

STAKEHOLDER OUTREACH

Between June and November 2021, the project team held virtual meetings with both internal and external stakeholders. The internal stakeholder session brought together representatives of the State's Bureau of Public Transportation and Bureau of Engineering and Construction, while the two external stakeholder sessions initiated discussions among representatives of private freight companies and among representatives of passenger rail providers.

Participants at the stakeholder meetings identified key areas of need where the safety of highway-rail at-grade crossings could be improved.

ENGINEERING/SITE DESIGN

- Sight Distance/Illumination
- Vehicle Queues at Stoplights Crowding onto Tracks
- Crossing Equipment and Pavement Markings over Tracks

DRIVER/PEDESTRIAN BEHAVIOR

- Inattentive Drivers and Pedestrians
- Trespassing
- Abandoned Vehicles

COMMUNICATION

- Among CTDOT Bureaus
- With Local Police and Municipalities

STATE STAKEHOLDER PARTICIPANTS (JUNE 15, 2021):

- Angelo Asaro, CTDOT Bureau of Public Transportation - Office of Rail
- Matthew Burns, CTDOT Bureau of Public Transportation - Office of Rail
- Michael Chachakis, CTDOT Bureau of Engineering & Construction - Division of Traffic Engineering
- Tracy Fogarty, CTDOT Bureau of Engineering & Construction - Division of Traffic Engineering
- Leo Fontaine, CTDOT Bureau of Engineering & Construction - Division of Facilities & Transit
- Jon Foster, CTDOT Bureau of Public Transportation - Office of Rail
- LeVance James, CTDOT Bureau of Engineering & Construction - Division of Traffic Engineering
- Richard Jankovich, CTDOT Bureau of Public Transportation - Office of Rail
- Andrea Merejo, Federal Highway Administration (FHWA) - Connecticut Division
- Julie Thomas, CTDOT Bureau of Public Transportation - Office of Rail
- Matthew Vail, CTDOT Bureau of Engineering & Construction - Division of Highway Design

FREIGHT RAIL STAKEHOLDER PARTICIPANTS (SEPTEMBER 29, 2021):

- Chad Boutet, Genesee & Wyoming, Inc.
- Brett Briggs, Connecticut Southern Railroad (CSO) & New England Central Railroad (NECR)
- Jeffrey Castle, Connecticut Southern Railroad (CSO) & New England Central Railroad (NECR)
- Charles Hunter, Genesee & Wyoming, Inc.
- Jarrod Hutcheson, Providence and Worcester Railroad (PW)
- Howard Pincus, Naugatuck Railroad (NAUG)
- Matt Whitney, Housatonic Railroad Company (HRRC)

PASSENGER RAIL STAKEHOLDER PARTICIPANTS (NOVEMBER 16, 2021):

- John Deptulski, Metro-North Railroad (MNR)
- Thomas Donahue, Metro-North Railroad (MNR)
- Juan Cuesta-Garcia, Metro-North Railroad (MNR)
- Adam Kulwicki, National Passenger Railroad Corporation (Amtrak)
- Michael Loney, Metro-North Railroad (MNR)
- John Longobardi, Metro-North Railroad (MNR)
- Thomas McCarthy, Transit America Services, Inc. (TASI) / Alternate Concepts, Inc. (ACI)
- Matt Palmer, Transit America Services, Inc. (TASI) / Alternate Concepts, Inc. (ACI)
- Shelley Prettyman, Metro-North Railroad (MNR)
- Richard Roberto, Metro-North Railroad (MNR)
- Joseph Streany, Metro-North Railroad (MNR)
- Aaron Thompson, National Passenger Railroad Corporation (Amtrak)
- Timothy Tyran, National Passenger Railroad Corporation (Amtrak)
- Justin Vonashek, Metro-North Railroad (MNR)

OPERATION LIFESAVER OUTREACH

Operation Lifesaver (OLI) is a nonprofit organization dedicated to educating the public about safety at highway-rail crossings, with branch programs in states across the US. The program uses nationally scripted safety message presentations to communicate with K-12 students, trucking companies, first responders, bus companies, and driving schools.

Connecticut Operation Lifesaver (CTOL) conducts outreach through presentations and attending special events (i.e., fairs). As of 2022, CTOL has approximately 69 volunteers, known as Operation Lifesaver Authorized Volunteers (OLAV), who conduct the presentations and attend special events throughout the state. In 2018, CTOL established a school outreach program targeting cities and towns with high rail traffic. In response to the COVID-19 pandemic in 2020, OLI assisted all states by developing various virtual presentations that can be shown to all audiences.

CTOL outreach partners also include the following agencies and organizations:

- Connecticut Department of Transportation
- Connecticut Department of Motor Vehicles (CTDMV)
- Connecticut Department of Emergency Services and Public Protections (CT State Police)
- Connecticut State Department of Education
- Amtrak
- Metro-North Railroad
- Valley Railroad Company (Essex Steam Train)

CTOL is overseen by a committee with members from various rail organizations and agencies, including three representatives from CTDOT, CTDMV, and CT State Police, and a state coordinator who runs the day-to-day operations. The committee conducts bi-annual meetings to discuss the status of the program and to provide guidance for future direction.

Since 2017, CTOL has conducted extensive outreach in preparation for the launch of service for the Hartford Line. In September 2021, Connecticut's state coordinator traveled throughout the state for Rail Safety Week, with a focus on visiting school bus companies on the Hartford Line. The companies were contacted about the possibility of redesigning school bus routes around grade crossings and about how to read Emergency Notification Systems (ENS) signs, which are located at every highway-rail grade crossing. Communication with commercial buses has been ongoing to educate commercial bus operators about emerging rail-related issues and ways to reroute in the event of blocked crossings.

Section 4:
Data Analysis

According to the FRA Office of Safety Analysis, 39 highway-rail grade crossing incidents occurred in Connecticut from 2011 to 2020. Seventeen of these incidents resulted in injuries either to roadway users or rail employees, and an incident in 2011, two in 2012, and one in 2018 resulted in the death of a pedestrian or highway user.

Table 2 illustrates the number of highway-rail grade crossings incidents, fatalities, and injuries in Connecticut between 2011 and 2020. Within that period, the number of incidents annually has ranged from one to ten, with an average of 3.9 incidents per year and a fatal or non-fatal casualty for every 2.3 incidents. In a promising trend, the average occurrence of both fatal and non-fatal casualties during the most recent five years decreased from 2.9 casualties per year from 2011 to 2015 to 1 per year from 2016 to 2020. Similarly, incidents of any type decreased from 21 over the five-year period from 2011 to 2015 to 18 from 2016 to 2020.

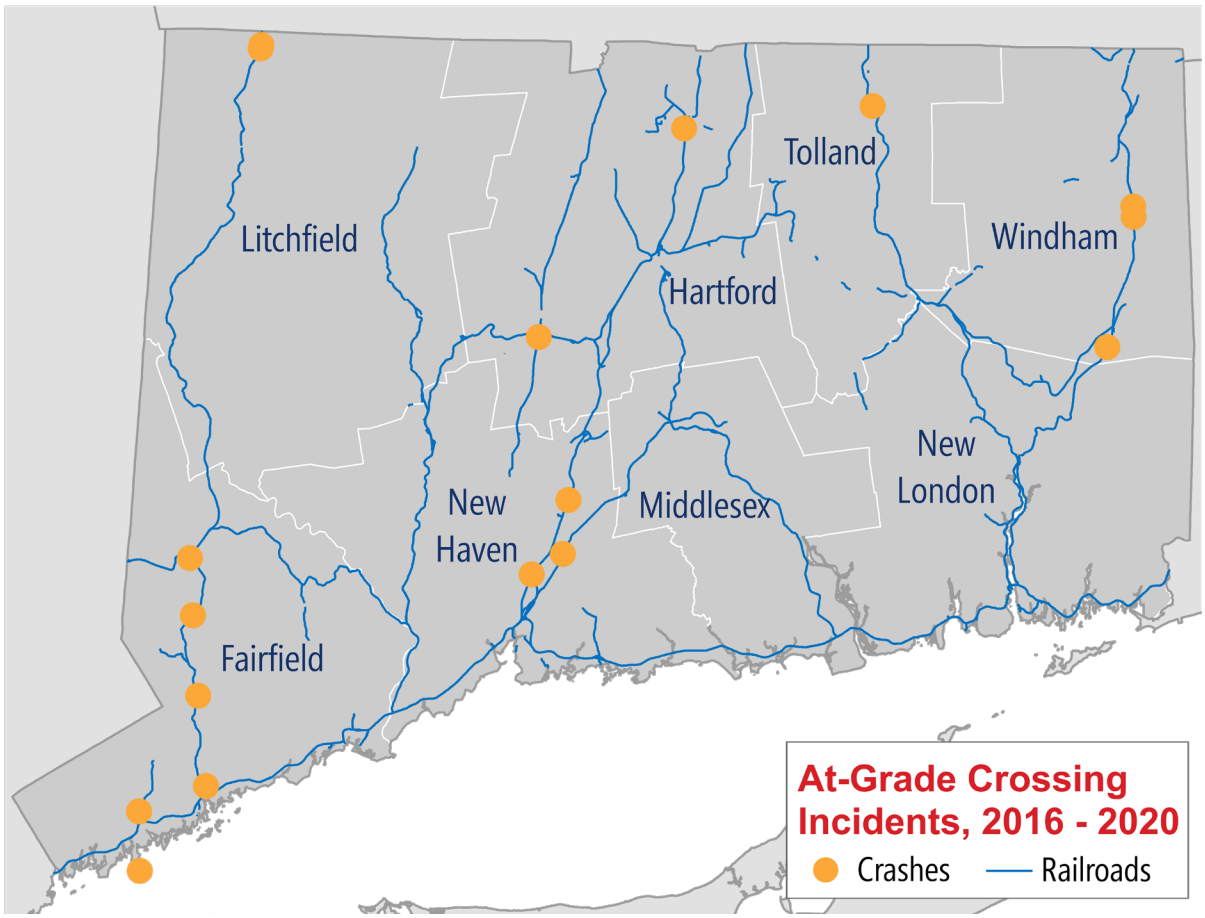
Table 2: Connecticut Crossing Incidents – Public and Private At-Grade Crossings, 2011-2020

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	TOTAL
Incidents	10	2	2	6	1	4	2	4	7	1	39
Fatalities	1	2	0	0	0	0	0	1	0	0	4
Injuries	7	2	1	11	0	1	0	2	1	0	25

Source: FRA 2011 – 2020

Of Connecticut's eight counties, six counties (excluding New London and Middlesex Counties) have had incidents since 2016. Between 2016 and 2020, only one crossing in Norwalk (Fairfield County) was the site of multiple incidents.

Figure 5: Location of Highway-Rail Grade Crossing Incidents, 2015-2020



RECENT INCIDENTS (THREE-YEAR PERIOD)

Between 2018 and 2020, Connecticut ranked 43rd in the nation for total highway-railway grade crossings incidents. According to the FRA Office of Safety Analysis, 12 incidents occurred on either public or private highway-railway crossings in Connecticut during a three-year period from 2018 to 2020. Of the 12 incidents, three collisions resulted in either injury or death. Two incidents involved injury to the vehicle user or a rail employee, and one incident resulted in the death of a pedestrian. The 12 incidents occurred in a variety of weather conditions and at crossings with various types of warning devices. The three incidents with either fatal or non-fatal casualties occurred under challenging environmental conditions (nighttime and/or rainy weather) at crossings and at crossings with active warning devices, railroad flashing lights and gates.

Active crossings are equipped with automatic warning devices such as bells, railroad flashing lights, and vehicular and pedestrian gates that are activated when a train is approaching. Passive crossings have regulatory warning signs such as crossbucks, yield or stop signs, as well as railroad related warning signs and pavement markings to alert of a possible hazard.

While crossings with gates may seem safer than those without, highway users may misinterpret a crossing with raised gates as safe to cross. In the case of the two incidents which occurred in 2018 and 2019 and resulted in injuries, vehicles were struck when the driver moved through the crossing immediately before or after the gates were lowered. In addition, drivers may assume that a crossing with railroad flashing lights will also have gates, leading them to cross the tracks even when the lights have already begun to flash.

The following tables detail where and how incidents occurred from 2018 through 2020. (See **Appendix B** for a detailed list of the at-grade crossings in Connecticut where incidents occurred recently.)

Table 3: Type of Crossing Where Incidents Occurred, 2018-2020

Type of Crossing	Incidents	Percentage
Public	9	75.0%
Private	3	25.0%

Source: FRA 2018 – 2020

Table 4: Type of Incident for Vehicles and Non-Vehicles, 2018-2020

Type of Incident – Vehicle	Incidents	Percentage
Stopped on crossing	3	25.0%
Stalled or stuck on crossing	2	16.7%
Moving over crossing	6	50.0%
Type of Incident – Non-Vehicle	**Incidents**	**Percentage**
Pedestrian	1	8.3%

Source: FRA 2018 – 2020

Table 5: Types of Warning Devices at Crossings Where Incidents Occurred, 2018-2020

Type of Warning Device	Incidents	Percentage
Passive Crossings		
Crossbuck	0	0.0%
No Device	2	16.6%
Sub Total	**2**	**16.6%**
Active Crossings without Gates		
RR Flashing Lights	3	25.0%
Cantilever RR Flashing Lights	0	0.0%
Sub Total	**3**	**25.0%**
Active Crossings with Gates		
RR Flashing Lights and Gates	5	41.7%
Cantilever RR Flashing Lights and Gates	1	8.3%
Sub Total	**6**	**50.0%**
Other Crossings		
Flagged by Crew	**1**	**8.3%**

Source: FRA 2018 – 2020

CROSSINGS WITH MULTIPLE INCIDENTS (FIVE-YEAR PERIOD)

Between 2016 and 2020, one highway-rail grade crossing was the site of multiple incidents. A table with detailed information on the highway-rail grade crossing location with multiple incidents in the past five years can be found in **Appendix C**.

The two incidents occurred on the driveway to the United Marine Boat Yard in Norwalk, Fairfield County, first in 2016 and again in 2019. The 2016 vehicle strike left the motorist injured when the back of his vehicle was struck by a train, causing the car to spin out.

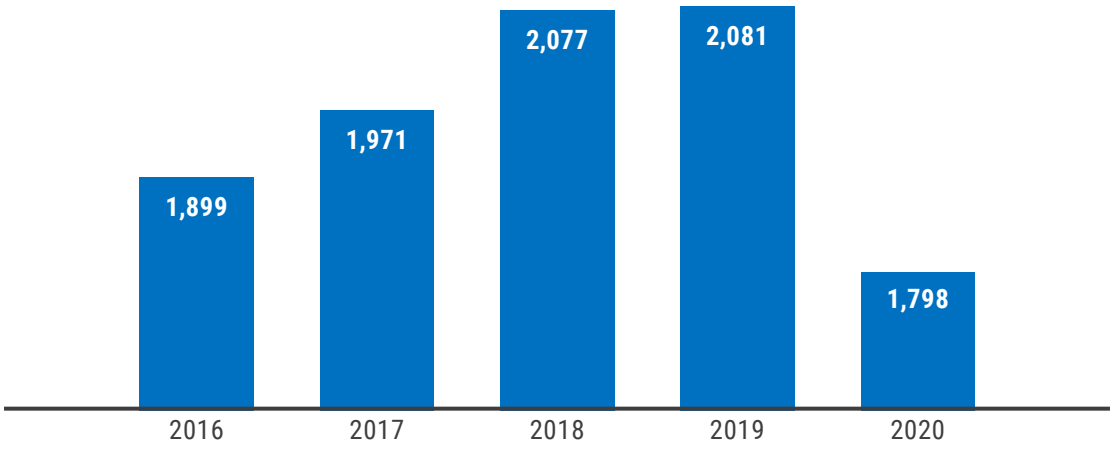
This passive crossing has only a cross buck sign to warn motorists at the crossing. Both incidents occurred during clear, daytime conditions, indicating that poor roadway configuration or driver behavior were important factors that led to an increased risk of incidents at the site.

CTDOT has had success in recent years reducing risk at similar multi-incident crossings. For example, the private crossing on Riverbend South Drive (Stamford, Fairfield County) was the site of four incidents between 2011 and 2016. Initially, this crossing had only passive warnings such as a crossbuck sign, and limited sight distance due to adjacent buildings and landscaping. After three incidents occurred there between 2011 and 2013, railroad flashing lights and vehicular gates were installed at the crossing. These active warning measures have been more successful in preventing incidents, as the most recent incident in 2016 was due to a snowplow getting stuck in the snow rather than a vehicle moving across the tracks while unaware of an oncoming train.

COMPARISON TO NATIONAL TRENDS

From 2016 to 2020, there were 9,826 highway-rail crossing incidents across the country. During that time, 11.4% of incidents occurred in Texas (1,119 incidents) and 6.5% of incidents occurred in California (640 incidents). New Hampshire (with three incidents) followed by Alaska (with four incidents), had the fewest incidents in that period.

Figure 6: Number of Highway-Rail Grade Crossing Incidents Nationally, 2016 – 2020



Source: FRA Highway-Rail Crossing Incidents Dashboard, 2016 – 2020

Connecticut ranks consistently low in highway-rail incidents compared to the other 48 states with railways. Between 2018 and 2020, Connecticut ranked 43rd in the nation for total highway-railway incidents. While this points to Connecticut's success thus far in implementing programs and practices to reduce the number of highway-railway incidents, safety at grade-crossings requires constant improvements and coordination. CTDOT will continue to improve upon its low rates of incidents.

Section 5:
Risk Assessment

CTDOT's Section 130 Department maintains a list of highway-rail crossings that require hazard mitigation. The list of crossing priorities is updated every five years using a combination of factors and resources to determine potential Section 130 projects.

See **Appendix A** for a table of Connecticut's current Section 130 projects.

FRA'S WEB ACCIDENT PREDICTION SYSTEM (WBAPS)

The FRA has a web-based tool, known as the Web Accident Prediction System (WBAPS), where highway engineers and rail safety specialists may view current estimates of the predicted annual crash frequency for any public highway-railway grade crossing in the national inventory database. WBAPS generates reports listing public highway-railway grade crossings ranked by predicted collisions per year for a state, county, city, or railroad company. **The WBAPS accident prediction formula is based upon two independent variables which includes:**

1. Basic data about a crossing's physical and operating characteristics, and
2. Five years of accident history data at the crossing.

This data is obtained from the FRA's inventory and accident/incident files. Listed below are the top 20 highest priority public crossings in Connecticut in 2021, based upon the predicted collisions. Of those, 16 are located on passenger rail lines, 17 have active control warning signaling (such as flashing lights and gates), and 8 were the sites of crashes within the past five years.

Table 6: Highest Priority Crossings by Predicted Collisions

Rank	Predicted Collisions	Crossing	Railroad	City	Road	Total Collisions 2016-2020
1	0.105	500747H	ATK	Windsor Locks	Bridge St.	1
2	0.076	500601P	MNCW	Danbury	Taylor St.	1
3	0.070	500645P	ATK	Wallingford	North Plains Hwy.	1
4	0.066	504166Y	ST	Plainville	West Main St.	1
5	0.062	500593A	MNCW	Redding	Long Ridge Rd.	1
6	0.061	504296V	HRRC	North Canaan	Main St.	1
7	0.053	500578X	MNCW	Wilton	Seeley Rd.	1
8	0.051	500564P	MNCW	Norwalk	New Canaan Ave.	0
9	0.050	500898X	PW	Cromwell	Main St.	0
10	0.048	500622H	ATK	North Haven	Sackett Point Rd.	0
11	0.048	500562B	MNCW	Norwalk	Cross St.	0
12	0.047	500655V	ATK	Meriden	South Colony St.	0
13	0.047	500656C	ATK	Meriden	East Main St.	0
14	0.046	500533R	MNCW	Stamford	Glenbrook Rd.	0
15	0.046	504075T	PW	Wallingford	Clintonville Rd.	1
16	0.045	500597C	MNCW	Bethel	Greenwood Ave.	0
17	0.044	500641M	ATK	Wallingford	Quinnipiac St.	0
18	0.044	500600H	MNCW	Danbury	Triangle St.	0
19	0.043	500637X	ATK	Wallingford	Toelles Rd.	0
20	0.043	500541H	MNCW	Darien	Hoyt St.	0

Source: FRA Web Accident Prediction System

Section 6:
Highest Priority Highway-Railway Grade Crossing Safety Challenges

As stated in Section 4, separate incidents and multiple incidents occurring at highway-railway grade crossings remain low in Connecticut. That being stated, the stakeholder meetings did identify key areas of need where the safety of highway-railway grade crossings could be improved.

ENGINEERING/SITE DESIGN

Lighting Upgrades

Figure 7: Dark At-Grade Crossing
Source: Lightguard Systems

There were concerns raised during the stakeholder meetings that obstructions such as vegetation and lack of illumination at night can restrict visibility to the traffic control devices at the crossing. Lighting around grade crossings has the potential to reduce the likelihood of a collision occurring. Researchers have identified a positive relationship between illumination at the crossing and appropriate driver behavior. An FRA study from 1995, revealed two principal needs: the need to illuminate the sides of railroad cars by in-place lighting at the crossing so that they can be recognized by a motorist at a stoppable distance, and the need to provide characteristic lighting of the horizontal crossing area for the purpose of forewarning the motorist of the approach to a crossing. Improvements to the lighting at grade crossings including increased ambient lighting, as well as specific lighting targeted towards drivers, can mitigate inappropriate driver behaviors and inattentiveness at crossings. Illumination at grade crossings requires coordination with local municipalities and the public. While everyone values the need for safety, individuals living close to grade crossings often object to projects that create large amounts of ambient lighting which impact their properties. This balancing act will require public engagement and the use of newer lighting technologies to direct the illumination at the grade crossing while limiting impacts on the surrounding areas.

Vehicles Queuing Over Crossings

Another concern raised during the stakeholder meetings is the queuing of motor vehicles over a grade crossing due to impact from a nearby intersection. Traffic volumes, hazmat and other commercial type vehicles, presence of adjacent driveways, unsignalized intersections, and traffic backed up from a nearby signalized intersection are all factors that could influence the queuing of vehicles over the railroad crossing. One way to clear vehicles away from the crossing is to install a traffic control signal with railroad pre-emption phasing. Railroad pre-emption phasing allows for the normal sequence of the traffic control signal to be suspended while a programmed alternative sequence operates. The pre-emption sequence usually has a “track clear” phase that works to clear motor vehicles on the approach leg where the crossing is located, in advance of the activation of the active devices (railroad flashing lights and gates). Providing railroad pre-emption phasing is most effective for traffic signals within 200 feet of a crossing.

When the crossing is located close to the signalized intersection, typically 75 feet or less, the use of pre-signal indications can be used to stop vehicles prior to entering the railroad crossing envelope. While the use of regulatory signing such as “DO NOT STOP ON TRACKS” and traffic control signals equipped with railroad pre-emption phasing and pre-signal indications aid in reducing the number of vehicles stopped within the railroad crossing envelope, these treatments are not fool-proof and cannot correct poor driver behavior by the motorist.

Crossing Equipment and Roadway Markings

Pavement marking can supplement other passive warning devices such as crossings signs and signals. Many accidents in the past five years were caused by vehicles stopping on the track because drivers did not realize how far they needed to be from the crossing to safely stop. However, pavement markings are not always effective as they can become obstructed by snow, may not be visible when wet, and may not withstand the wear and tear caused by heavy traffic. It has been observed that drivers will drive up to the crossing, see the stop line and think it is an intersection. Drivers will then end up turning left or right onto tracks.

DRIVER/PEDESTRIAN BEHAVIOR

A great deal of conversation during the stakeholder meetings was focused on inattentive or inappropriate driver and pedestrian behavior occurring at grade crossings. While many examples of motorists and pedestrians violating the traffic control at crossings were discussed, there was a sense of frustration on what could be done to reduce or correct these activities caused by poor driving habits. The use of video monitoring at crossings was raised as a possible method to assess and document driver/pedestrian behavior.

Surveillance At-Grade-Crossings via Cameras

CTDOT has worked with some of their freight line railroad stakeholders to include closed-circuit television (CCTV) cameras in the design of grade crossing upgrades. Installing video monitoring helps with post-incident investigations. CCTV could also be used for proactive monitoring of crossings for potential safety issues. This simple, yet effective, technology could allow for future analysis of driver behaviors at grade crossings. The FHWA and FRA recommend, but do not require, to have some sort of video monitoring at highway-railway grade crossings.

COMMUNICATION

Managing the myriad of communications related to planning and operations is challenging for any organization, especially one as large as a state transportation agency. Adding to that complexity are multiple rail carriers, multiple municipalities, multiple emergency responders, and the general public. CTDOT and its stakeholder participants discussed the need to improve communications between these distinct groups.

Enhancing Collaboration

Multiple units within CTDOT's Bureau of Engineering and Construction and the Office of Rail that work with various railroad companies. While these units may be working on separate projects, many of the tasks and processes overlap, and delays can occur when communication breaks down. Communicating and collaborating across CTDOT departments and with rail carriers would help align interests, remove barriers, and encourage collaborative solutions. A single, clear line of communication could be reached by establishing a single entity that handles communication within CTDOT.

See **Appendix D**, ECTDOT Organization Charts, for a listing of railroad related duties within the individual units of CTDOT.

Education and Enforcement

Stakeholders also identified a need for providing additional education to the general public about coordinating activities near railroads. Anecdotal examples were discussed where activities near rail crossings created hazardous conditions which could have been mitigated via simple communication. For example, coordinating large community events, funeral processions, and parades that may lead to an increase of traffic across an at-grade crossing is an easy way to mitigate factors such as inattention. Motorists in a hurry to reach an event or participating in an organized procession are less likely to pay the full level of attention required at an active grade crossing. Early communication from local governments and municipalities of such events would allow the railroad company to issue warning and other orders to trains operating in those areas.

Ongoing outreach and education should be continued through the Operation Lifesaver program. Prior to the COVID-19 pandemic, Operation Lifesaver partnered with police departments, fire departments, school districts, emergency medical services (EMS), driving schools, and other community-based agencies. However, due the recent the recent COVID pandemic, CTOL outreach was limited to virtual presentations. With the impacts of the pandemic winding down, the CTOL program will resume its outreach to the public.

Section 7: Action Plan

Mitigation strategies were developed with assistance from the stakeholders and through research of best practices based upon the key areas of need. **As stated in Section 1 of the SAP, CTDOT has determined the following goals to be implemented under the SAP:**

- Develop a new CTDOT railroad crossing inventory database,
- Expand public education efforts regarding railroad crossing safety by use of media,
- Perform diagnostic reviews of crossings with higher risk assessments,
- Enhance visibility of railroad crossing signing using new type of reflective sheeting,
- Increase the installation of new active devices at public railroad crossings,
- Where appropriate, improve pedestrian facilities at railroad crossings,
- Renew statewide upgrades of passive devices at public crossings,
- Expand the use of federal and state funds to initiate crossing surface replacement projects,
- Expand the use of funds to install pavement markings and flexible tubular delineators to enhance visibility of grade crossings,
- Develop master agreements with freight railroad carriers,
- Work with passenger railroad carriers to close railroad crossings on higher speed lines,
- Investigate the use of new technologies at railroad crossings.

These goals shall be categorized as either short-term or long-term efforts.

SHORT-TERM GOALS

Develop a New CTDOT Railroad Crossing Inventory Database

CTDOT is working with a consultant team to develop a Railroad At-Grade Crossing Inventory System (RRAGS). The system will be used by the Division of Traffic Engineering and the Office of Rail's Safety & Security Section and Maintenance-of-Way Section with each having the separate authorizations to maintain and update their core data fields as needed. The system will provide employees performing at-grade rail crossing inspections with a cloud-based, mobile data collection capability, based in Esri's geographic information system. This system will improve the quality of the inspection process by providing inspectors access to additional information during field work. For example, inspectors will have access to previous inspection photos via the mobile application and can upload new photos during new inspections.

The RRAGS will serve as a centralized database for rail crossing data, from both rail carriers and the FRA, which will help to select projects for CTDOT's Section 130 program. The system is also intended to improve the quality of and speed at which inspection data is entered into CTDOT's information systems to facilitate appropriate actions to mitigate safety findings. Finally, the system will have the capability to export data for standard FRA reporting requirements. This system will become operational by summer 2023.

Expand Public Education Efforts Regarding Railroad Crossing Safety by Use of Media

Operation Lifesaver has produced safety message advertisements for both radio and television. Any member of the Operation Lifesaver program has full access to these materials. CTOL is in the process of planning an upcoming safety campaign to utilize these advertisements on mainstream television and connected (streaming) television. The campaign budget for this is $50,000. CTDOT will be funding this initial effort with state funds and hopes to start the safety campaign sometime in 2022.

Perform Diagnostic Reviews of Crossings with Higher Risk Assessments

The Manual on Uniform Traffic Control Devices (MUTCD) recommends conducting diagnostic team reviews at all at-grade railroad crossings considered for future improvements in order to properly evaluate existing hazards and to ensure that proposed changes will address concerns of the stakeholders.

Enhance Visibility of Railroad Crossing Signing Using New Type of Reflective Sheeting

The use of enhanced retroreflective sign sheeting provides road users with improved sign visibility during both day and night hours. This can be accomplished by utilizing fluorescent yellow Type XI sign sheeting on all railroad related warning signs. CTDOT has fabricated several railroad crossing warning signs using this type of sheeting and installed these signs at select crossings throughout 2022. Durability will be monitored annually through routine field inspections of highway-railways at-grade crossings.

LONG-TERM GOALS

Increase the Installation of Active Devices at Public Railroad Crossings

Active railroad devices provide warning about approaching trains to the roadway users and increase conspicuity of the railroad crossings. The department will continue working on installing active railroad warning devices at public crossings that currently are equipped with passive control devices. Priority will continue to be given to the crossings with higher risk assessments.

Improve Pedestrian Facilities at Railroad Crossings

ADA-compliant pedestrian ramps and crossing surfaces improve mobility and help achieve complete streets design goals. Pedestrian signage, warning flashers, and gates provide additional warning to the pedestrian about the approaching train and help improve compliance and safety. In recent years, there has been an increase of new sidewalk and streetscape projects by municipalities. Sometimes these sidewalks run adjacent to a highway-railway grade crossing; however, the municipal project did not have the means to upgrade the existing active devices at the crossing to include additional treatments for pedestrians.

Renew Statewide Upgrades of Passive Devices at Public Crossings

Railroad warning signs and pavement markings enhances conspicuity of the railroad crossing and provides the roadway user with advance warning of the potential hazard. Timely replacement of existing passive devices on approaches to the railroad crossings improves their visibility. Providing passive control at all public highway-railway grade crossings is a minimum MUTCD requirement. CTDOT has previously initiated statewide upgrades of passive control at public crossings and will, through its inspection program, determine when upgrades will be needed in the future.

Expand the Use of Federal and State Funds to Initiate Crossing Surface Replacement Projects

While Connecticut law places responsibility of the crossing surface at public railroad crossings on the operating railroad company, there are simply too many crossings across the state that need replacement of the cross surface. This is especially true on the freight lines, where many railroad companies' budgets and staffing levels have been impacted by the recent COVID pandemic. CTDOT is optimistic that there will be new opportunities under the bipartisan infrastructure bill to work with the freight companies on federal grants, as well as state infrastructure grants, to address this issue.

Expand the Use of Funds to Install Pavement Markings and Flexible Tubular Delineators at Crossings

Using surfaces and flexible delineators at at-grade crossing approaches can be a low-cost measure to enhance grade crossing visibility and to discourage drivers from turning into the railway/railroad tracks. Delineators are durable posts made of plastic or other flexible material, usually about two to four feet tall with retroreflective strips. Flexible delineators in combination with edge lines provide additional visual cues to allow motorists to distinguish the railroad crossing from the travel lane and aid in preventing turns onto the railroad tracks. Vehicles turning onto railroad tracks may become trapped and could create a hazard to trains, vehicle occupants, and other roadway users. It should be noted that this type of

situation was raised during our stakeholder meetings. CTDOT, working with MNR, has recently installed flexible delineators at all public and private crossings on the three branches (Danbury, New Canaan, and Waterbury) of the New Haven Line. Edge lines are included on CTDOT standard sheets to be installed across grade crossing, but additional coordination with municipalities is needed to implement them at public crossings on town roads. CTDOT is planning to include the installation of edge lines and flexible delineators when designing highway-railway grade crossing improvements in future projects.

Develop Master Agreements with Our Freight Railroad Carriers

Establishing master agreements with freight rail carriers would assist in streamlining and expediting processes and projects. Without a master agreement, separate PE agreements and construction force account agreements must be performed each time CTDOT works with a railroad company. Also, since several offices within CTDOT are responsible for drafting their own separate agreements when working with a freight company, time can be lost due to extensive reviews of the agreement by the railroad company. Once a master agreement is developed, a Project Authorization Letter (PAL) would only be required to initiate design reviews and construction.

Work with Passenger Railroad Carriers to Close Railroad Crossings on Higher Speed Lines

As mentioned in Section 2, the Shore Line East Grade Crossing Elimination projects of Amtrak's New England Grade Crossing Elimination Program will remove four crossings in the Towns of Stonington and Waterford to minimize the risk of collisions and delays caused by malfunctions to grade crossing warning devices. These projects are scheduled to begin in 2025 and be completed by 2030. CTDOT will work with Amtrak to ensure that these projects come to fruition.

Investigate the Use of New Technologies at Railroad Crossings

CTDOT is willing to implement new, and nontraditional, methods and treatments to enhance safety at highway-railway grade crossings. Connecticut was one of the first states in the nation to use gate skirts at a pedestrian pathway grade crossing to reduce the number of people trying to violate the traffic control at the crossing. During our stakeholder meetings, different types of new or nontraditional treatments were discussed. **As a result, CTDOT will be focusing on the following:**

- Technologies such as queue cutter signals can provide enhanced queue management at railroad crossings. A queue cutter signal is a one direction traffic control signal that can be used to stop vehicles in advance of a railroad crossing to prevent the queuing of vehicles across the tracks. The operation of the queue cutter signal can be activated by an approaching train, actuation from downstream queue detection, or coordinated with an adjacent traffic control signal.
- The installation of back-up batteries at traffic control signals with railroad pre-emption phasing will allow traffic control signals to continue to operate during power outages, thereby providing continuous railroad pre-emption phasing to reduce the queuing of vehicles on a crossing.
- Investigating the possible implementation of user-submitted GPS navigation applications such as Waze and utilizing HAAS alerts to notify motorist in real-time when they are driving near a potential hazard or malfunction at a crossing.

Section 8:
Next Steps

CTDOT and its stakeholders have discussed the potential opportunities to improve safety at highway-railway grade rail crossings in Connecticut. The following next steps will ensure that the goals outline in Section 7 will continue to be addressed moving forward:

1. To continue to hold monthly status meeting with the consultant team to finalize the Railroad At-Grade Crossing Inventory System (RRAGS).
2. For Office of Rail's Maintenance of Way Section to coordinate with municipalities for the installation of the fluorescent yellow Type XI sheeting warning signs at specific public highway-railway grade crossing.
3. For the Office of Rail to meet with the Division of Traffic Engineering to discuss the status of crossing inspections and review existing and future Section 130 projects.
4. For the Office of Rail to meet with the Agreements Unit in CTDOT's Bureau of Finance to coordinate the development of master agreements with freight rail carriers.
5. To discuss with Amtrak during monthly service meetings the initiation and status of the Shore Line East Grade Crossing Elimination projects.
6. For the Office of Rail and the Division of Traffic Engineering to meet to discuss the possibility of implementing new technologies at specific crossings.

Appendices

- **Appendix A:** Connecticut's Ongoing and Future Major Grade Crossing Improvement Projects
- **Appendix B:** Appendix B: Recent Incidents on Connecticut Railroad Crossings, 2018 – 2020
- **Appendix C:** Connecticut Grade Crossing with Multiple Incidents, 2016 – 2020
- **Appendix D:** Connecticut DOT Organization Charts

  Office of Rail

  Bureau of Engineering & Construction

APPENDIX A: Connecticut's Ongoing and Future Major Grade Crossing Improvement Projects

FFY 2021		
Project Number	**Phase**	**Location**
0139-0103	Design	Harvey Lane, Suffield - Active Devices Installation
0170-3490	Design	Rte 5 (Various Locations), Wallingford - Upgrade RR Pre-empted Traffic Control Signals
0011-0155	Construction	Park Avenue, Bloomfield - Track Circuitry Upgrade
0099-0114	Construction	US 7/44 (East Xing), North Canaan - Installation of Active Devices
0117-0164	Design	Deport Rd, Ridgefield – Removal of Vehicular Access, Installation of Active Pedestrian Devices
0117-0164	Design	Portland Ave, Ridgefield – Crossing Realignment and Upgrade of Active Devices
0304-0016	Construction	Oronoque Road, Milford – Integration with signalization upgrade
0304-0016	Construction	Hollis Road, Milford – Installation of active protection devices
0304-0016	Construction	Wheelers Farm Road, Milford – Installation of active protection devices
0304-0016	Construction	Great River Road, Orange – Upgrade of active protection devices
0304-0016	Construction	Farrell's Road, Ansonia – Installation of active protection devices
0304-0016	Construction	Eagle Street, Waterbury – Upgrade of active protection devices

FFY 2022		
Project Number	**Phase**	**Location**
0134-0152	Construction	Spring Street, Stafford - Installation of Active Devices
0099-0114	Construction	US 7/44 (East Xing), North Canaan - Installation of Active Devices
0099-0115	Construction	US 7/US 44 (West Xing), North Canaan - Installation of Active Device
0170-3490	Construction	Rte 5 (Various Locations), Wallingford - Upgrade RR Pre-empted Traffic Control Signals
0320-0016	Design	Bridge St, Windsor Locks - Upgrade of Active Devices and RR Pre-empted Traffic Control Signal

FFY 2023		
Project Number	**Phase**	**Location**
0049-0111	Design	Town Dump Rd, Essex Upgrade of Active Devices and RR Pre-empted Traffic Control Signal
0320-0016	Construction	Bridge St, Windsor Locks - Upgrade of Active Devices and RR Pre-empted Traffic Control Signal

Source: Connecticut Department of Transportation, Division of Traffic Engineering

APPENDIX B:
Recent Incidents on Connecticut Railroad Crossings, 2018 – 2020

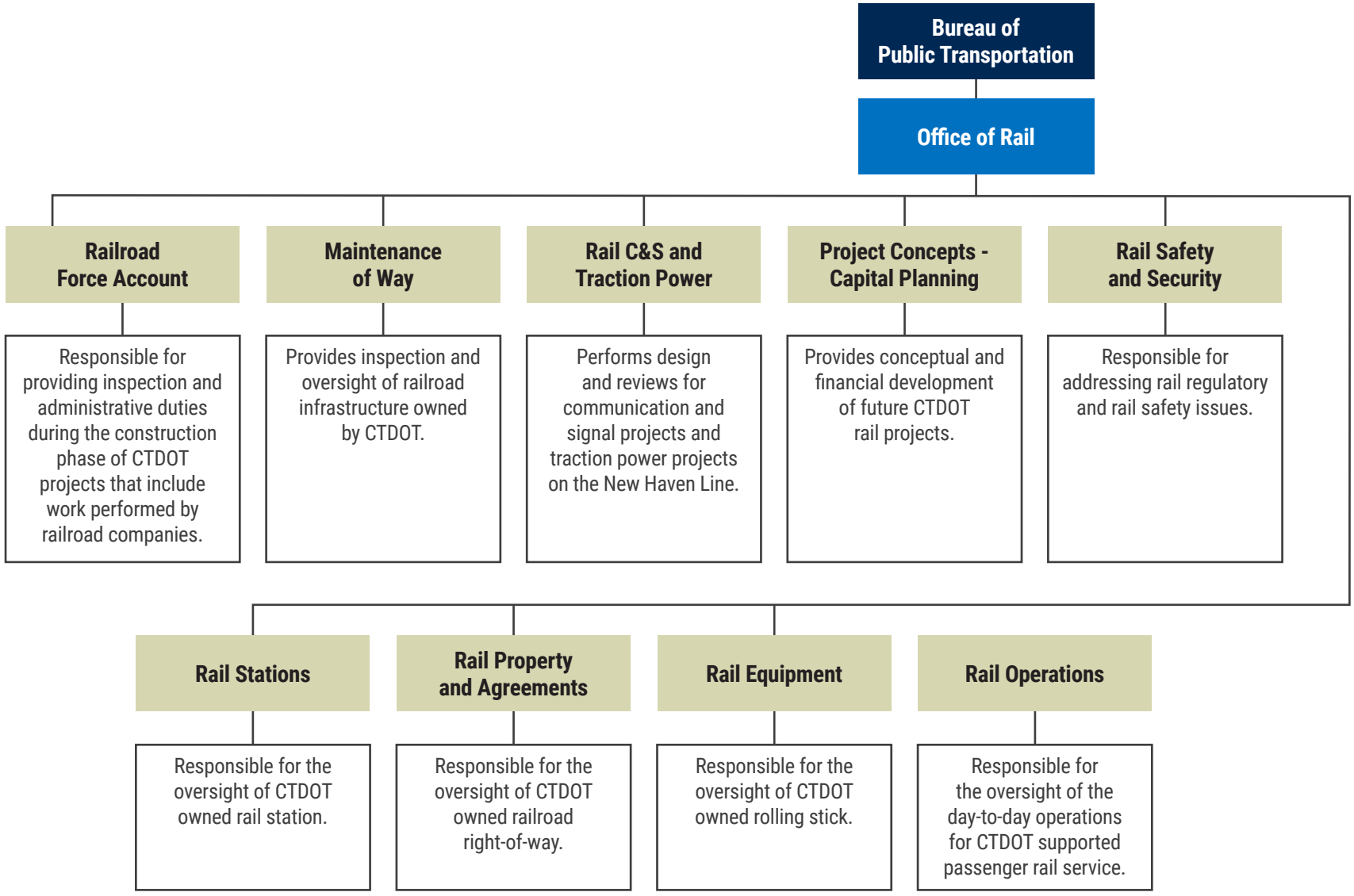
Crossing ID	Incident Year	Highway User	Injuries	Fatalities	Railroad	Crossing Ownership	County	City	Street	Conditions	Type of Warning Device
500593A	2020	Car	-	-	MNCW	Public	Fairfield	Redding	Long Ridge Rd.	Dark (with lighting), Wet	Active with Gates
500645P	2019	Car	1	-	ATK	Public	New Haven	Wallingford	North Plains Hwy.	Dark (with lighting), Dry	Active with Gates
504403H	2019	Delivery Truck	-	-	PW	Public	Windham	Plainfield	Lillibridge Rd.	Day, Dry	Active without Gates
500747H	2019	Car	-	-	ATK	Public	Hartford	Windsor Locks	Bridge St.	Day, Dry	Active with Gates
500557E	2019	Car	-	-	MNCW	Private	Fairfield	Norwalk	Boat Yard	Day, Dry	Passive
504428D	2019	Car	-	-	PW	Public	Windham	Killingly Center	North St.	Day, Dry	Active without Gates
504075T	2019	Car	-	-	PW	Public	New Haven	Wallingford	Clintonville Rd.	Day, Dry	Passive
504296V	2019	Car	-	-	HRRC	Public	Litchfield	North Canaan	Main St./Route 44	Day, Dry	Flagged by Crew
500578X	2018	Car	2	-	MNCW	Public	Fairfield	Wilton	Seeley Rd.	Day, Wet	Active with Gates
504429K	2018	Truck with Trailer	-	-	PW	Public	Windham	Killingly Center	Rock Ave.	Day, Wet	Active without Gates
500625D	2018	Pedestrian	-	1	ATK	Private	New Haven	North Haven	Devine St.	Dark (with lighting), Dry	Active with Gates
500538A	2018	Car	-	-	MNCW	Private	Fairfield	Stamford	Largo Dr.	Day, Ice	Active with Gates

APPENDIX C:
Connecticut Grade Crossing with Multiple Incidents, 2016 – 2020

Crossing ID	Incident Years	Injuries	Fatalities	Railroad	County	City	Street	Current Type of Warning Device
500557E	2019, 2016	1	-	MNCW	Fairfield	Norwalk	Private, unnamed	Passive crossbuck sign

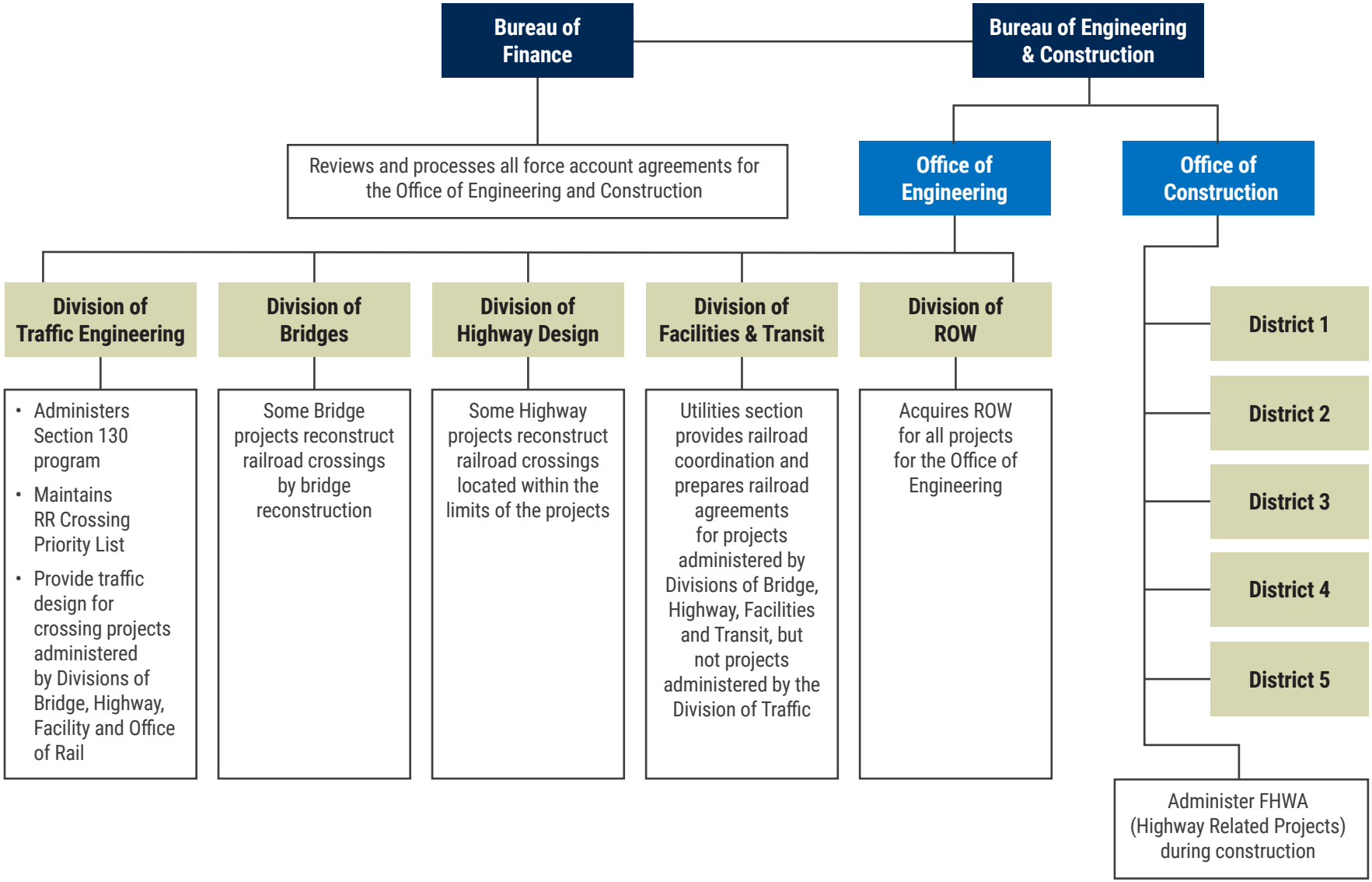
APPENDIX D: Connecticut DOT Organization Charts

OFFICE OF RAIL



APPENDIX D: Connecticut DOT Organization Charts

BUREAU OF ENGINEERING & CONSTRUCTION



PREPARED BY

Michael Baker INTERNATIONAL

STATE HIGHWAY-RAILROAD GRADE CROSSING ACTION PLAN

2022