U.S. Department of Transportation
Federal Railroad Administration

Grade Crossing Safety and Railroad Trespass Prevention Workshop

November 1–3, 2022

North Carolina State University
Duke Energy Hall at James B. Hunt Jr. Library
1070 Partners Way
Raleigh, NC 27606

Workshop Goals – One goal is to identify existing and emerging technology designed and used to mitigate, reduce, and ultimately eliminate highway-rail grade crossing and trespasser incidents. Other goals are to raise awareness of the dangers and effects of highway-rail grade crossing and trespasser incidents, to seek out low-cost solutions, and to discuss practicable ideas for technological improvements for vehicular and pedestrian safety at highway-rail grade crossings.

Day 1 – Trespasser Prevention

Time	Focus	Speakers
7:30 AM–5:00 PM	**Registration**	James B. Hunt Jr. Library Duke Energy Hall, Auditorium Foyer
8:30 AM–9:15 AM	**Welcome and Introductions** • Safety briefing • Agenda, goals, introductions • Welcoming remarks	**Michail Grizkewitsch**, Transportation Specialist – FRA **James Payne**, Staff Director – FRA **Jahmal Pullen**, Engineering Coordination and Safety Manager, Rail Division – North Carolina Department of Transportation **J. Eric Boyette**, North Carolina Transportation Secretary
9:15 AM–10:00 AM	**Data Analysis of Area of Trespasser Incidents** **FRA** • Overview of railroad grade crossing and trespassing data analysis • Data analysis of North Carolina area **NCDOT** • Comprehensive cost of rail incidents in North Carolina • Reduction in railroad right-of-way trespassing incidents	Moderator: **Monica Shaw,** Transportation Specialist – FRA **Michail Grizkewitsch** – FRA **Roger Smock**, Rail Safety Consultant, NCDOT, WGI **Steve Bert**, Policy Assessment Group – ITRE at NC State University **Chris Cunningham**, Associate Director – Institute for Transportation Research and Education at NC State University
10:00 AM–10:15 AM	**Break**	
10:15 AM–12:00 PM	**Local Railroad Trespassing Mitigation Strategies** **FRA** • Overview of railroad trespassing issues and prevention strategies **NCDOT** • Strategies for Deterring Trespassing on Rail Transit and Commuter Rail Rights-of-Way, Volume 2 **FRA** • Trespass & Suicide Prevention Toolkit	Moderator: **Francesco Bedini Jacobini**, Program Manager – FRA **Marco daSilva**, Mechanical Engineer – Volpe Center **Jahmal Pullen** – NCDOT **Hilary Konczal**, Chief Safety and Environmental Officer – Metra **Dr. Shala Blue**, Engineering Psychologist – FRA

12:00 PM–1:30 PM	**Lunch on Your Own**	
1:30 PM–3:00 PM	**Community and Public Outreach Engagement** **Greensboro, NC Police Department** • Overview of railroad trespassing enforcement program **University of North Carolina** • Investigating the public's perceptions toward railroad safety on social media **Operation Lifesaver** • North Carolina Operation Lifesaver- Overview of railroad trespassing educational and prevention strategies • Florida Operation Lifesaver - Overview of railroad trespassing educational and prevention strategies	Moderator: **Roger Smock**, Rail Safety Consultant, NCDOT, WGI **Greensboro Police Department** **Dr. Yuting "Tina" Chen**, Assistant Professor – UNC-Charlotte **Margaret Cannell**, State Coordinator – NCOL **Rob Stapleton**, Rail Manager – CTS Engineering, Inc.
3:00 PM–3:15 PM	**Break**	
3:15 PM–4:30 PM	**Innovation** **NCDOT** • Modeling the Effects of Rail Noise Propagation on Pedestrians in NC Railroad Environments **North Carolina Agricultural and Technical State University/Rutgers University** • Exploring trespassing issues through the Rutgers Master of Business and Science externship **NOVOAGLOBAL** • Brightline detection technologies **Safe House** • One App, Any Crisis	Moderator: **Daniel Findley, PhD.** Associate Director, Education and Training – Institute for Transportation Research and Education **Dr. Rongfang (Rachel) Liu**, Endowed Professor, Director of Transportation Institute – NC A&T **R. Michael White** – Global Information Systems, LLC **Carlos Löfstedt**, President, CEO – NOVOAGLOBAL, Inc **Eliza Conley-Lepene**, Founder, CEO, President – Safe House
4:30 PM–5:00 PM	**Wrap-Up and Next Steps** **Feedback on Trespasser Prevention Discussions** **Day 2 Grade Crossing Introduction**	**Monica Shaw and Michail Grizkewitsch** – FRA **Francesco Bedini Jacobini** – FRA **Debra Chappell,** Transportation Specialist – FRA

Day 2 – Grade Crossing

Time	Focus	Speakers
7:30 AM–5:00 PM	**Registration**	James B. Hunt Jr. Library Duke Energy Hall, Auditorium Foyer
8:30 AM–8:45 AM	**Welcome and Introductions** • Safety briefing • Agenda, goals, introductions • Welcoming remarks • Grade crossing data – national and local	**Debra Chappell** – FRA **James Payne** – FRA
8:45 AM–9:45 AM	**Grade Crossings and Trespassing** **FRA/FHWA** • Updated railway-highway crossings program guidance under the Bipartisan Infrastructure Law **NCDOT** • Back Creek Church Road (Charlotte, NC)	Moderator: **Bradley Hibbs,** Operations Engineer – FHWA **Esther Strawder**, Rail Highway Crossings Program Manager – FHWA **Brian Gackstetter**, Senior Project Engineer, Rail Division – NCDOT
9:45 AM–10:00 AM	**Break**	
10:00 AM–11:00 AM	**Highway Design** **FRA/NCDOT** • NCDOT Traffic Separation Study on and off the sealed corridor – How did NCDOT do it? • Kings Mountain Case Study	Moderator: **Randy Brown,** Project Manager, Southeast High-Speed Rail – FRA **Jahmal Pullen** – NCDOT

	Alfred Benesch & Company • Design of pre-signals at grade crossings	**Melissa B. Toth,** National Director, ITS & Traffic Engineering – Atkins **Rick Campbell,** Senior Technical Manager – Alfred Benesch & Company
11:00 AM–12:00 PM	**Innovative Technologies, Artificial Intelligence, and Machine Learning** **MTRI, Inc. and Michigan Technological University** • Grade crossing inspections and surveys **BNSF Railway** • Use of drones at BNSF Railway **TRAINFO** • TRAINFO – Blocked crossing prediction and communication	Moderator: **Ronald Lucas,** Manager – Planning and Project Development Branch, Rail Division – NCDOT **Colin Brooks**, Principal Investigator/ Senior Research Scientist – MTRI, Inc. and Michigan Technological University **Nick Dryer**, Sr Manager Technology Services – BNSF Railway **Cheryl Townlian**, Assistant Director Public Projects – BNSF Railway **Garreth Rempel**, CEO and Co-Founder – TRAINFO
12:00 PM–1:30 PM	**Lunch on Your Own**	
1:30 PM–2:30 PM	**Mitigating Highway Design Challenges at or Approaching Grade Crossings** **Brightline** • Grade crossing design in an urban environment **Elon University** • Elon, NC Trespass: Right-of-way-Fencing Partnership **Norfolk Southern Railway and CSX Transportation** • Class I railroad activities	Moderator: **Howard Gillespie,** Supervisory Railroad Safety Specialist – FRA **Michael Lefevre**, Vice President Operations – Brightline **Jana Lynn Patterson**, **Ph.D**., Associate VP for Student Life and Dean of Students – Elon University **W. R. (Will) Miller,** Public Safety Director – Norfolk Southern Railway **Mike Liebelt**, Project Manager II – CSX Transportation
2:30 PM–3:30 PM	**Crossing Program Planning and Policy** **FRA** • Emergency Notification System signs **NCDOT** • Freight Rail and Rail Crossing Safety Initiative • ENS driver education curriculum model legislation	Moderator: **Debra Chappell** – FRA **Elizbeth Hudd,** Grade Crossing Inspector – FRA **Neil Perry,** Rail Planning Manager, Rail Division – NCDOT **Mark Johnston**, Rail Planning Engineer Consultant, Rail Division – NCDOT **Ike Avery**, BeRailSafe Contractor, NCDOT, WGI
3:30 PM–3:45 PM	**Break**	
3:45 PM–4:45 PM	**Data Collection and Analyses** • North Carolina rail incident operations and call-taking survey • Pedestrian incidents at highway-rail grade crossings	Moderator **Todd Meyer,** Data Analysis & Inventory Manager, Rail Division – NCDOT **Roger Smock**, Rail Safety Consultant, NCDOT, WGI **Daniel Findley, PhD.** – Institute for Transportation Research and Education at NC State University **Nancy Horne,** Rail Signals Engineer, Rail Division – NCDOT **Richard Mullinax,** Rail Safety and Signals Consulting Engineer – Mott MacDonald
4:45 PM–5:00 PM	**Wrap-Up and Next Steps** **Feedback on Grade Crossing Discussions**	Moderator: **Debra Chappell** – FRA **Francesco Bedini Jacobini** – FRA

	Day 3 Research and Development Introduction	

Day 3 – Research and Development and Funding Opportunities

Time	Focus	Speakers
7:30 AM–12:00 PM	**Registration**	James B. Hunt Jr. Library Duke Energy Hall, Auditorium Foyer
8:30 AM–10:00 AM	**Welcome and Introductions** • Safety briefing • Agenda, goals, introductions • Welcoming remarks **FRA** • Discussion on future research needs topics	Moderator: **Francesco Bedini Jacobini** – FRA **Marco daSilva** – Volpe Center **Dr. Shala Blue** – FRA
10:00 AM–10:15 AM	**Break**	
10:15 AM–12:00 PM	**Funding Opportunities** **NCDOT** • Research Process – Overview of NCDOT research and development and discussion of funding opportunities **FRA** • FRA Civil Rights Team • Consolidated Rail Infrastructure and Safety Improvements (CRISI) grants	Moderator: **Michail Grizkewitsch** – FRA **Curtis Bradley, Ph.D.**, Research Implementation Manager – NCDOT **John Kirby**, Research Engineer - NCDOT **FRA Civil Rights Team** **FRA Grants Management Team**
12:00 PM	**Recap and Next Steps**	**FRA and NCDOT staff**

Grade Crossing Safety and Railroad Trespass Prevention Workshop

Day 1 Session One

RAIL

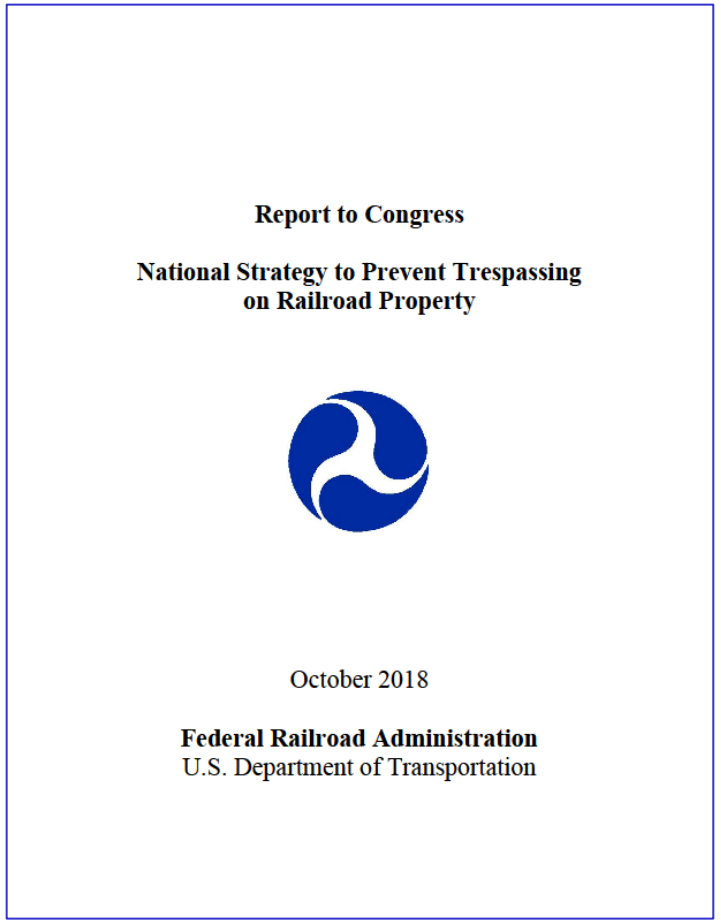
MOVING AMERICA FORWARD

Data Analysis of Area of Trespasser Incidents

National Strategy to Prevent Trespassing on Railroad Property

In its report on the Fiscal Year 2018 budget, the House Committee on Appropriations requested the FRA to:

- Identify and study the causal factors that lead to trespassing incidents on railroad property
- Develop a National Strategy


Report to Congress

National Strategy to Prevent Trespassing on Railroad Property

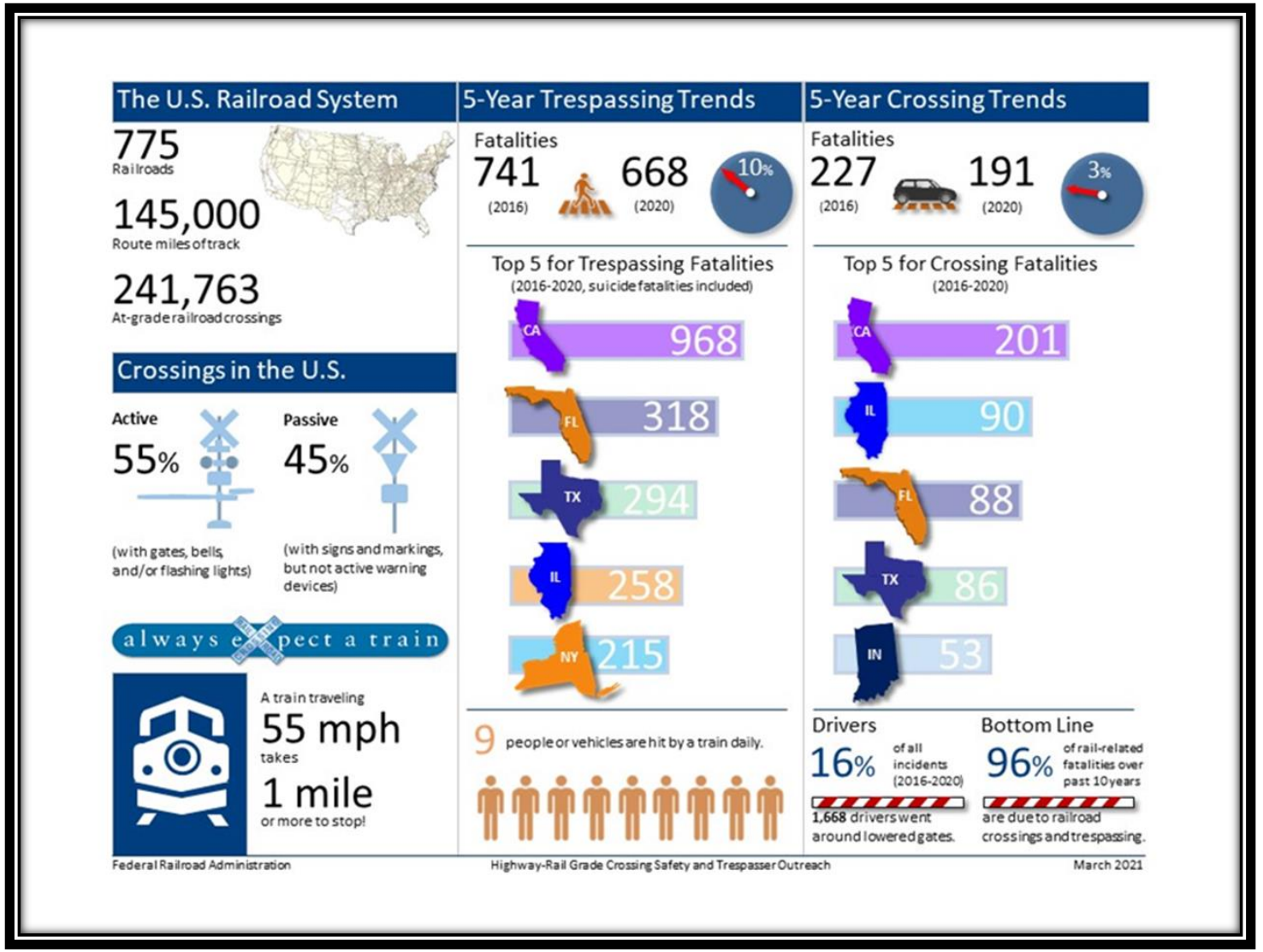
October 2018

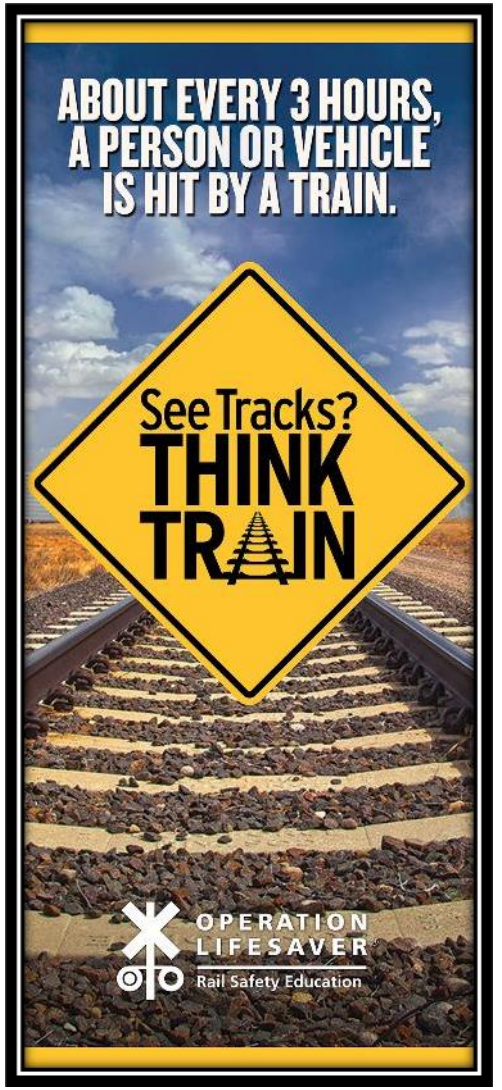
Federal Railroad Administration
U.S. Department of Transportation

FRA Developed a National Strategy, focusing on four strategic focus areas:

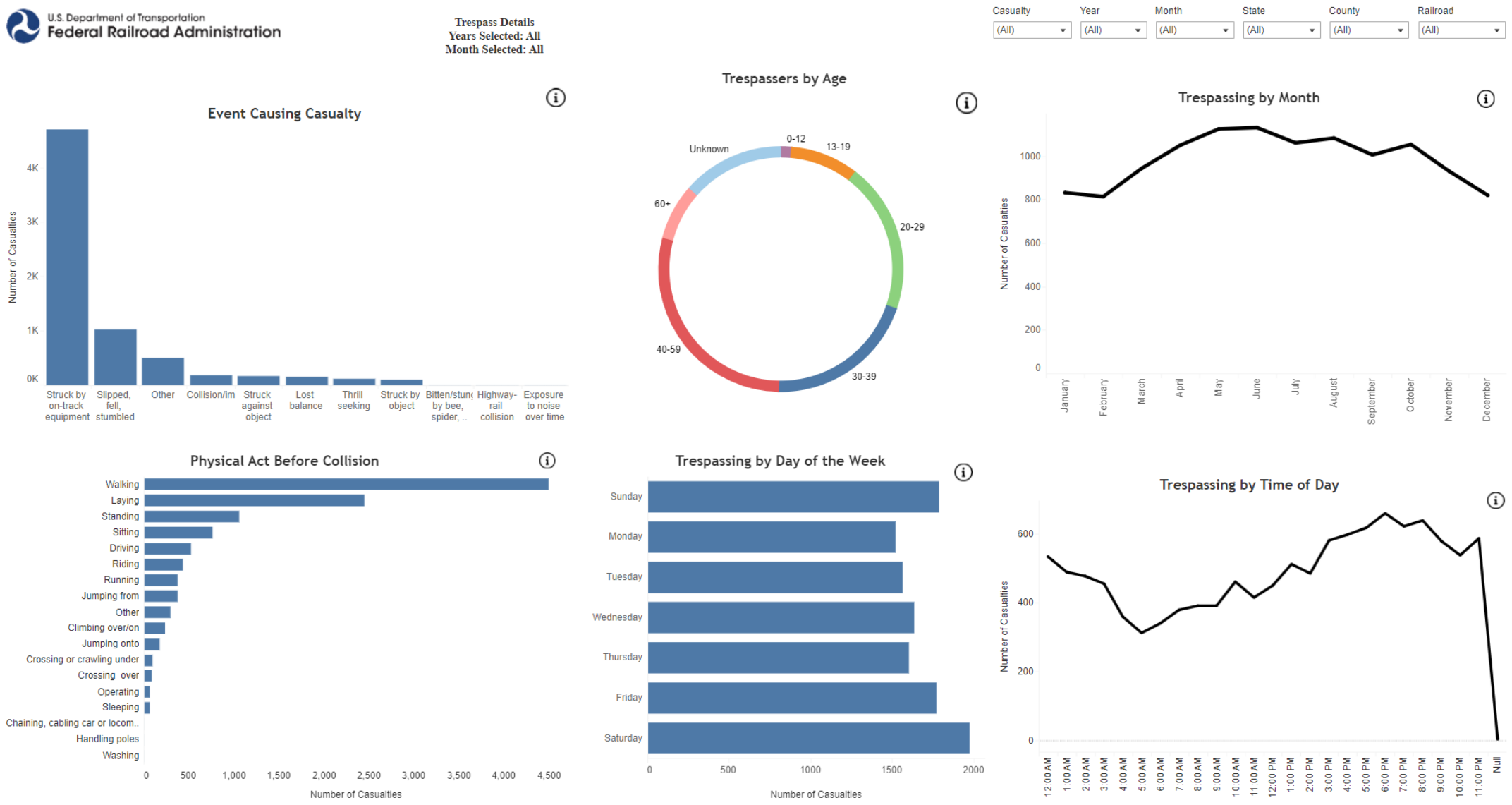
1. Data Gathering and Analysis,
2. Community Site Visits,
3. Funding,
4. Partnerships with Stakeholders.

National Trends

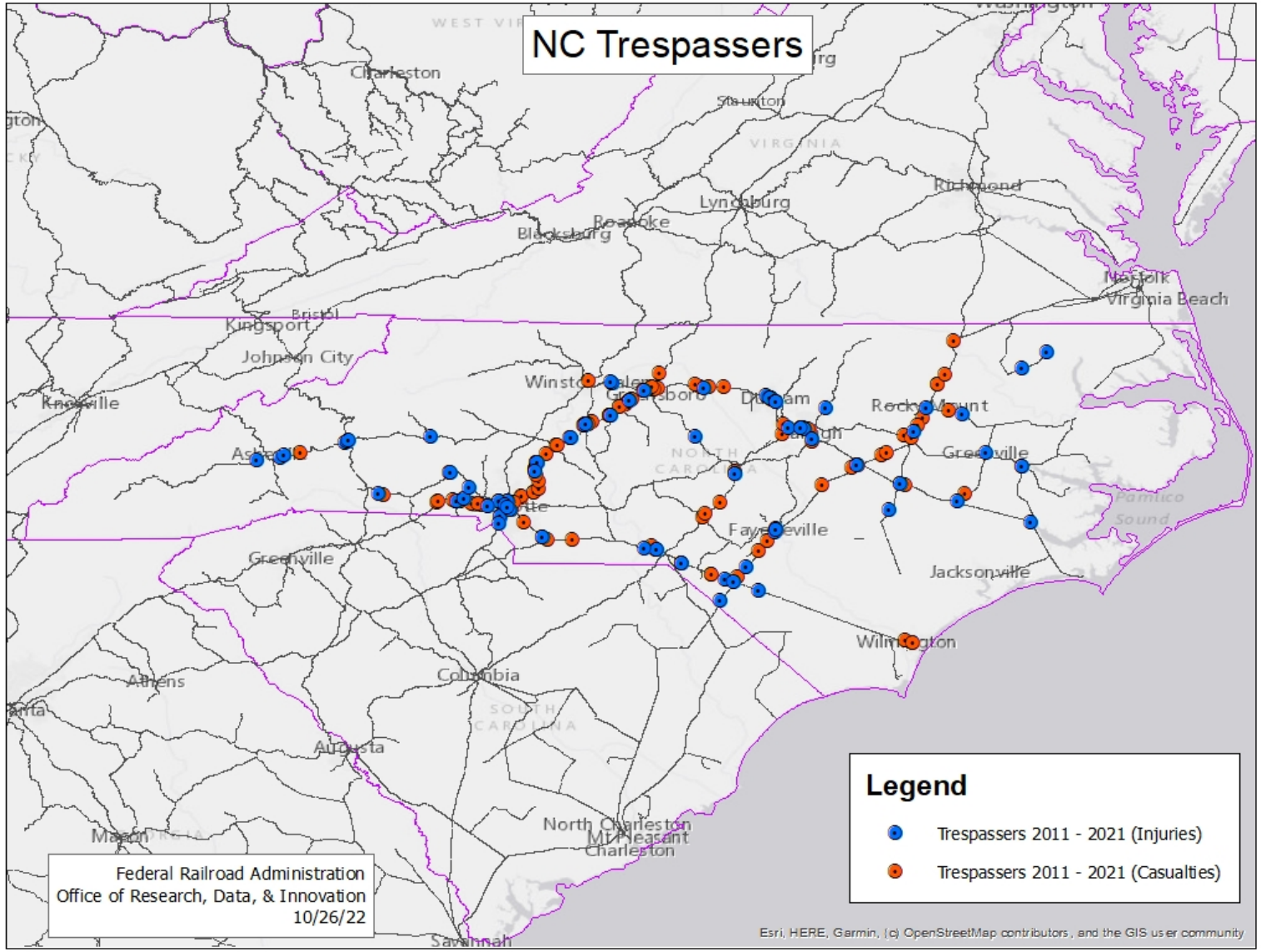




Trespassing Actions – United States 2011-2022



Trespassing Casualties in North Caroline



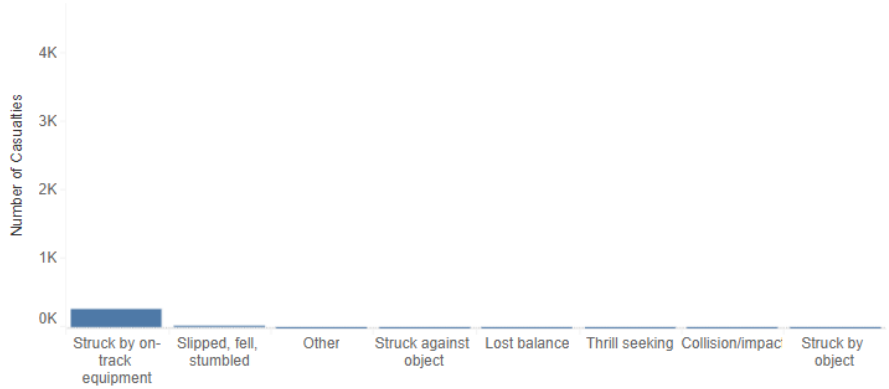
Trespassing Actions – State of North Caroline

U.S. Department of Transportation
Federal Railroad Administration

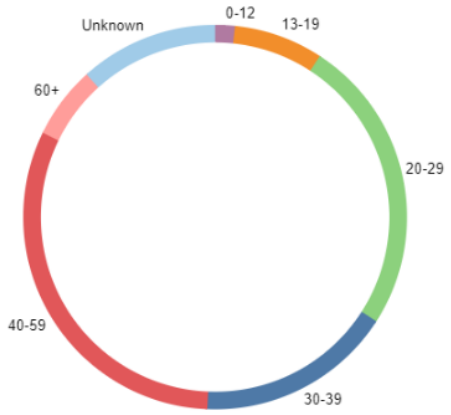
Trespass Details
Years Selected: All
Month Selected: All

Casualty	Year	Month	State	County	Railroad
(All)	(All)	(All)	North Car...	(All)	(All)

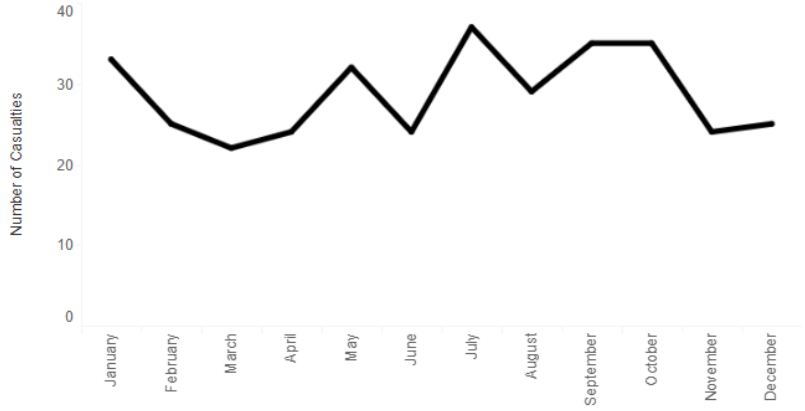
Event Causing Casualty



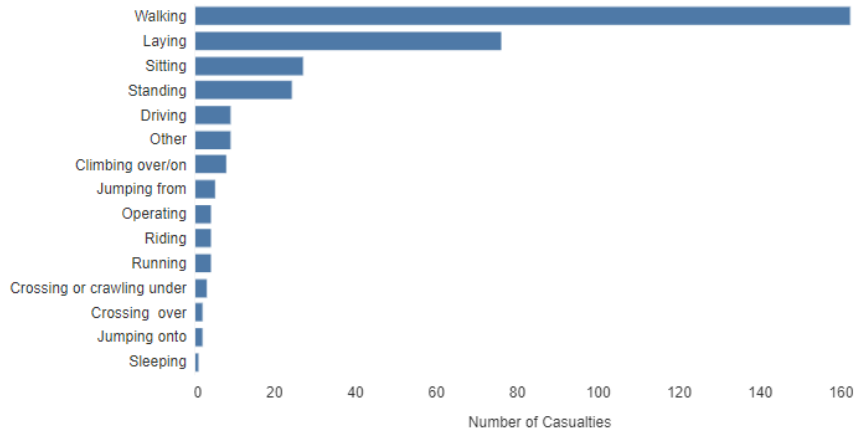
Trespassers by Age



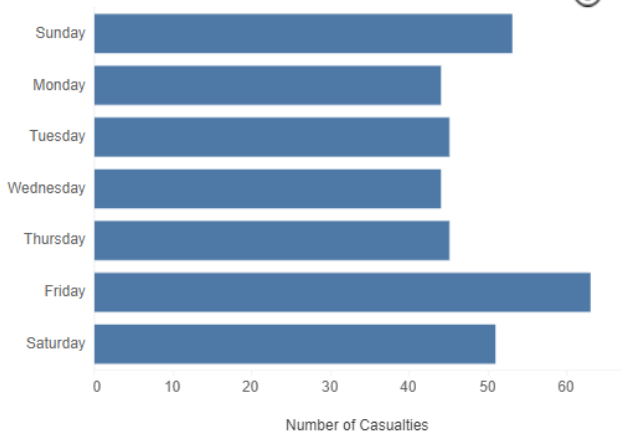
Trespassing by Month



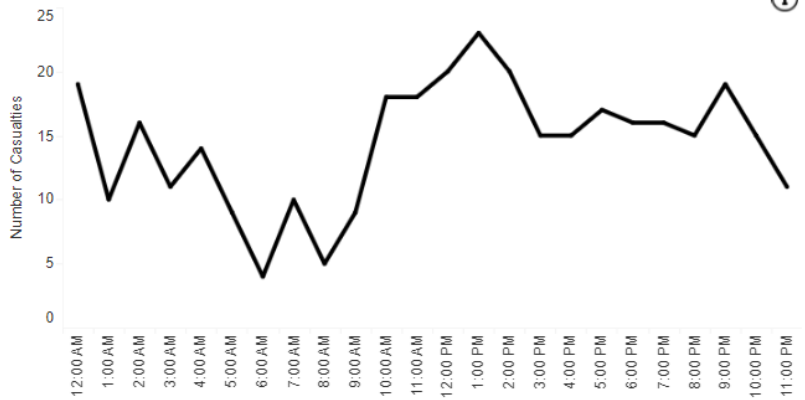
Physical Act Before Collision



Trespassing by Day of the Week



Trespassing by Time of Day



Thank You

FRA / NCDOT Rail Workshop

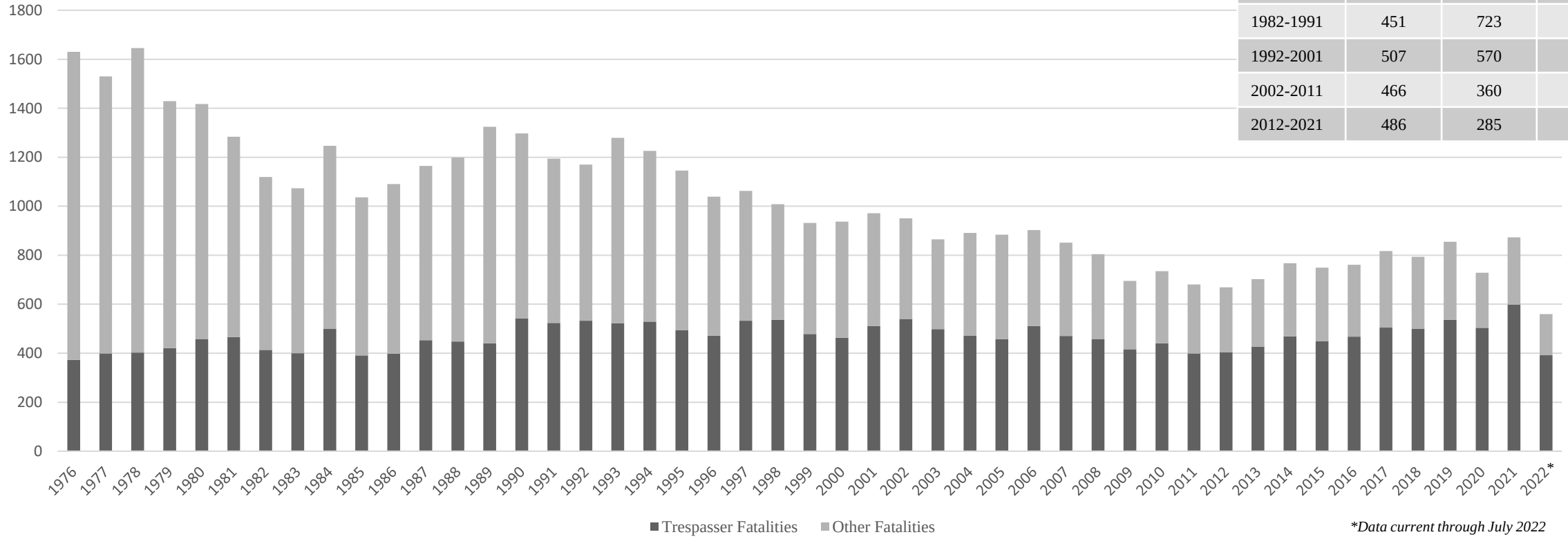
The Comprehensive Cost of Rail Incidents in North Carolina

STATE OF NORTH CAROLINA · DEPARTMENT OF TRANSPORTATION

ITRE

U.S. Trespass vs. Other Fatalities Over Time

Figure 1. Reported U.S. Rail Incident Fatalities over Time (FRA 1976-2022)



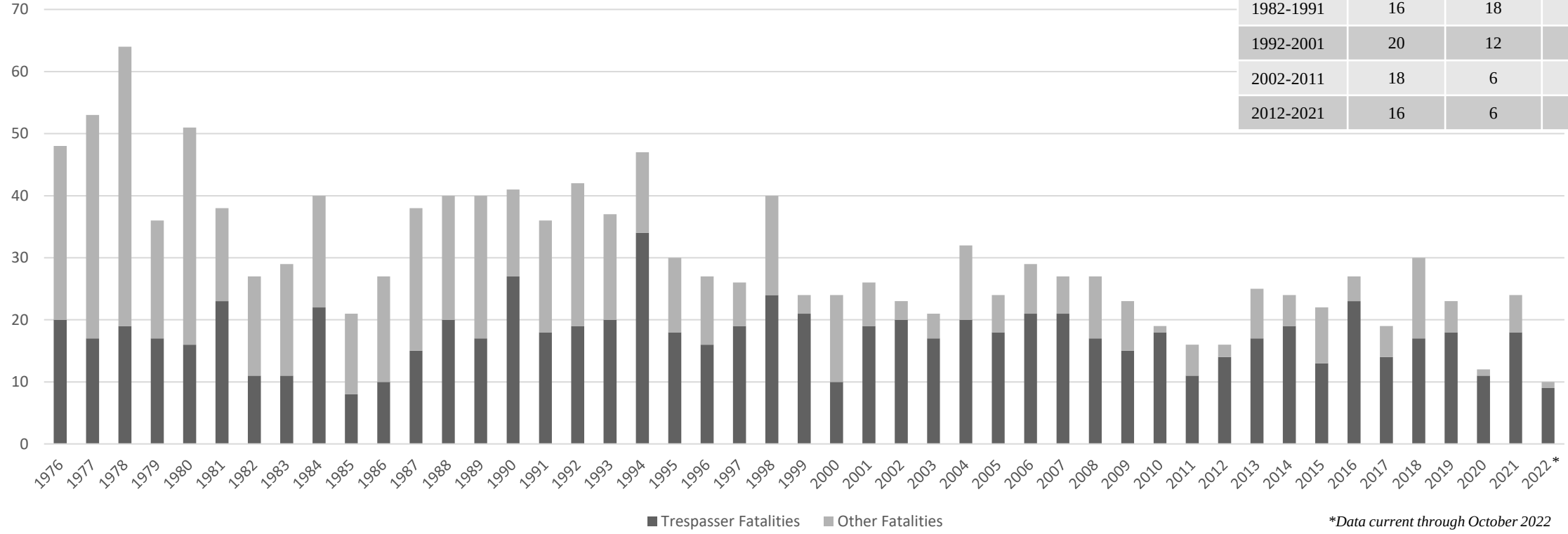
*Data current through July 2022

Annual Average Occurrence per Time Period

Time Period	Trespass Fatalities	Other Fatalities	Total Fatalities
1976-1981	419	1,069	1,489
1982-1991	451	723	1,174
1992-2001	507	570	1,077
2002-2011	466	360	826
2012-2021	486	285	771

N.C. Trespass vs. Other Fatalities Over Time

Figure 2. North Carolina Fatalities from Rail Incidents over Time (FRA 1976-2020, NCDOT 2021-2022)



Annual Average Occurrence per Time Period

Time Period	Trespass Fatalities	Other Fatalities	Total Fatalities
1976-1981	19	30	49
1982-1991	16	18	34
1992-2001	20	12	32
2002-2011	18	6	24
2012-2021	16	6	22

**Data current through October 2022*

Project Reflection

Objectives

- Determine the full spectrum of costs that result from railroad incidents in North Carolina.
- Develop a tool that is capable of estimating these costs.

Comprehensive Cost of Rail Incidents: Cost Tool

Part I: Property Damage Model Inputs

	Property Damage Input Guidance	Dropdown Menu	Total Damages Incurred
Option A	If rail incident damage costs are unknown, ***select from a set of default values*** from the dropdown menu		--From Dropdown Menu to Left--
Option B	If costs are known, ***enter the total dollar value*** (in $2022) of property damages incurred the during incident.[1]		
Option C	Build a more in-depth custom estimate of incurred damages via the "PropDMG_Custom" Tab		--From PropDMG_Custom Tab--

Clear Values

...sts into 2020 dollars using the Bureau of Labor Statistics CPI Inflation Calculator (https://www.bls.gov/data/inflation_calculator.htm), or use the converter located in cell T8 - V10.

Step by Step Guidance	Property Damage Subtotal
...formation provided in Options A, B, or C, the Total Property Damage tabulated for Part I of the model is...	--Enter Values Above--

...I: Casualty Input Values

Step by Step Guidance
...e number of fatalities and injury by type that have occurred during a rail incident. Rail casualty statistics can be found in Tables 2, 3, and 4 may be used as benchmarks.

Clear Values

Casualty Charactertistics for a Rail Incident				
Casualty Type	Fraction of VSL	No. of Occurances	Monetized Injury Cost in $2022	Total Casualty Cost Incurred
MAIS Scale				
	1.000		$10,883,000	--
...3,000 | 0.003 VSL)	0.003		$33,000	--
...200 | 0.047 VSL)	0.047		$511,000	--
...VSL)	0.105		$1,143,000	--
	0.266		$2,895,000	--

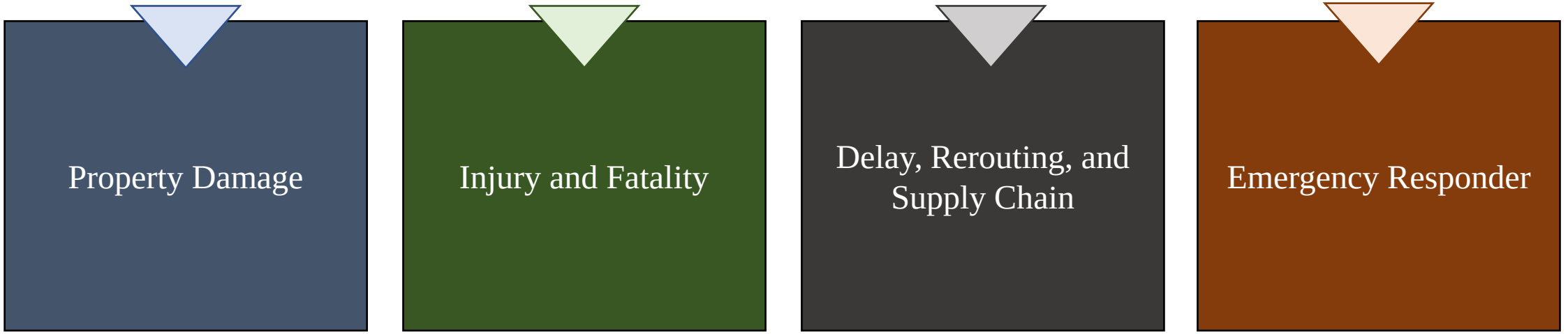
Roger Smock | Literature review sources, key project contacts, emergency responder insight and oversight, project leadership and coordination | Alix Demers | Waybill data, methodology oversight, SIAP grant oversight | plus other key input

Comprehensive Cost of Rail Incidents

Foundational Literature and Data Sources

application and other cost factors |

	Property Damage	Injury and Fatality	Delay, Rerouting, and Supply Chain	Emergency Responder
Lit	USDOT BCA Guidance, FRA Documentation	USDOT BCA Guidance, FRA Documentation	USDOT BCA Guidance, NCHRP 755, Lovett et al. (2015), Winston and Shirley (2004), other Lit	NCHRP 755, US Fire Administration, other Lit and interviews
Data	FRA 6180.54, FRA 6180.57, AAR Cost Repair & Replacement Matrix	FRA 6180.55	Amtrak Status Maps Archive Database, NC Waybill Data Sample, NC Freight Plan, NCHRP 755, and others	Computer Aided Dispatch Records, Public Service Answering Point Interviews, FEMA cost schedule



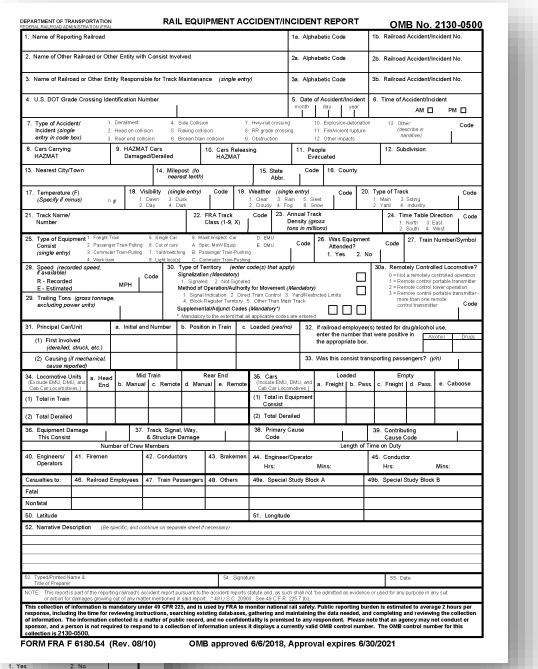
coordination and insight, | Tom Brown | video tutorial

in-depth report review | Chris Raichle | SARAH data-base, tool oversight, in-depth report review, key emergency responder insight and oversight | Jahmal Pullen | in-depth knowledge and context, methodology oversight, key project contacts | John Kirby |

Property Damage Components

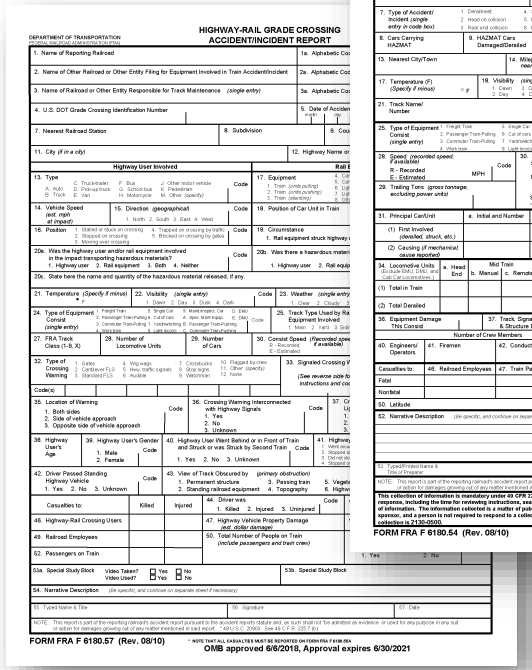
- Railroad rollingstock
  (locomotives, carriages, wagons, or other vehicles used on a railroad)
- Railroad Infrastructure
  (ballast, ties, track, bridges, tunnels, signs,
  mileposts, switches, or other elements in the right-of-way)
- Highway vehicles, infrastructure, and other property

FRA 6180.54

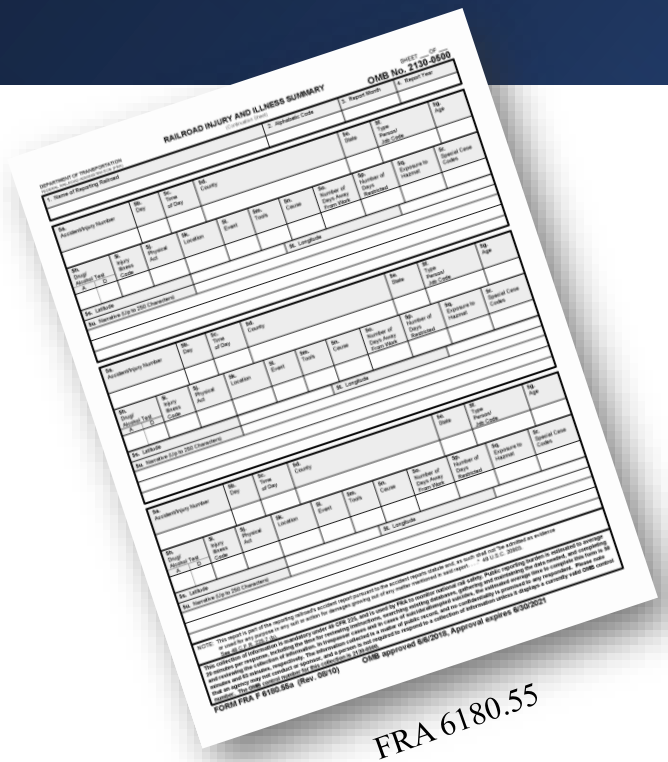

RAIL EQUIPMENT ACCIDENT/INCIDENT REPORT

OMB No. 2130-0500

FRA 6180.57


HIGHWAY-RAIL GRADE CROSSING ACCIDENT/INCIDENT REPORT

Casualty Cost Components



FRA 6180.55

- Injuries
- Fatalities

USDOT Recommended Parameter Values

MAIS Level	Severity	Fraction of VSL	Unit value ($2018)
MAIS 1	Minor	0.003	$28,800
MAIS 2	Moderate	0.047	$451,200
MAIS 3	Serious	0.105	$1,008,000
MAIS 4	Severe	0.266	$2,553,600
MAIS 5	Critical	0.593	$5,692,800
Fatal	Not Survivable	1.000	$9,600,000

Source: USDOT 2020

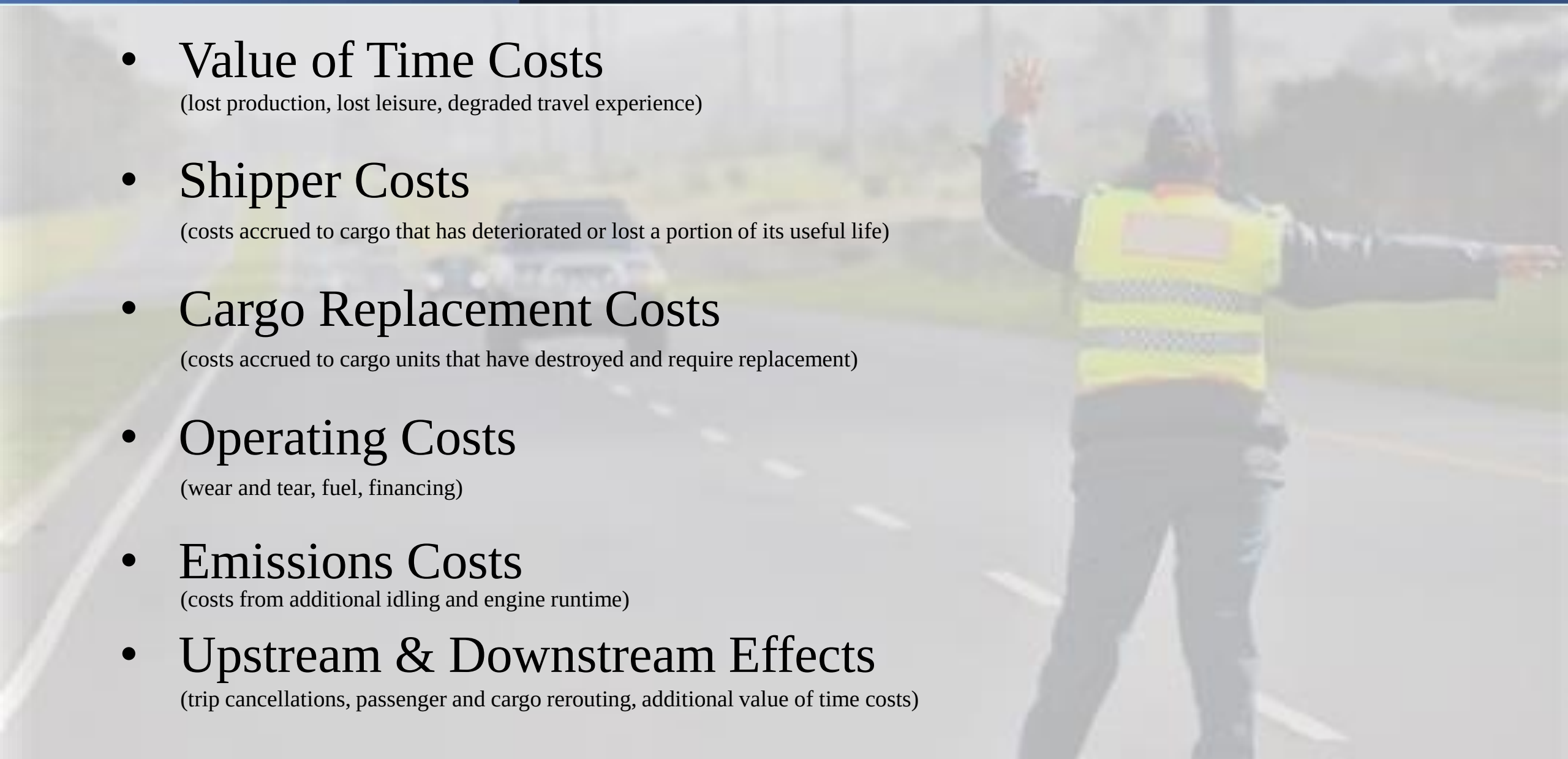
**not provided in USDOT March 2022 update*

KABCO Level	Monetized Value (2020 $)
O – No Injury	$3,900
C – Possible Injury	$77,200
B – Non-incapacitating	$151,100
A – Incapacitating	$554,800
K – Killed	$11,600,000
U – Injured (Severity Unknown)	$210,300
# Accidents Reported (Unknown if Injured)	$159,800

Source: USDOT 2022

ITRE

Delay, Rerouting, & Supply Chain Cost Components



- **Value of Time Costs**
  (lost production, lost leisure, degraded travel experience)
- **Shipper Costs**
  (costs accrued to cargo that has deteriorated or lost a portion of its useful life)
- **Cargo Replacement Costs**
  (costs accrued to cargo units that have destroyed and require replacement)
- **Operating Costs**
  (wear and tear, fuel, financing)
- **Emissions Costs**
  (costs from additional idling and engine runtime)
- **Upstream & Downstream Effects**
  (trip cancellations, passenger and cargo rerouting, additional value of time costs)

First & Emergency Responder Costs

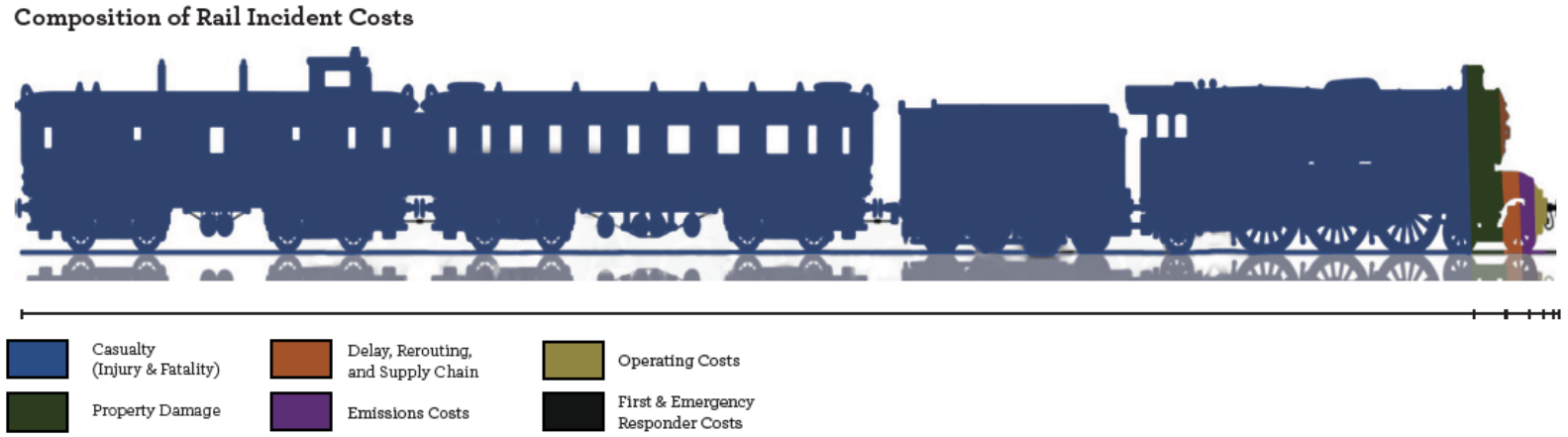
- **Emergency Responder Personnel**
  (Law enforcement, EMS, medic, county rescue, fire suppression, Hazmat, other safety response personnel)

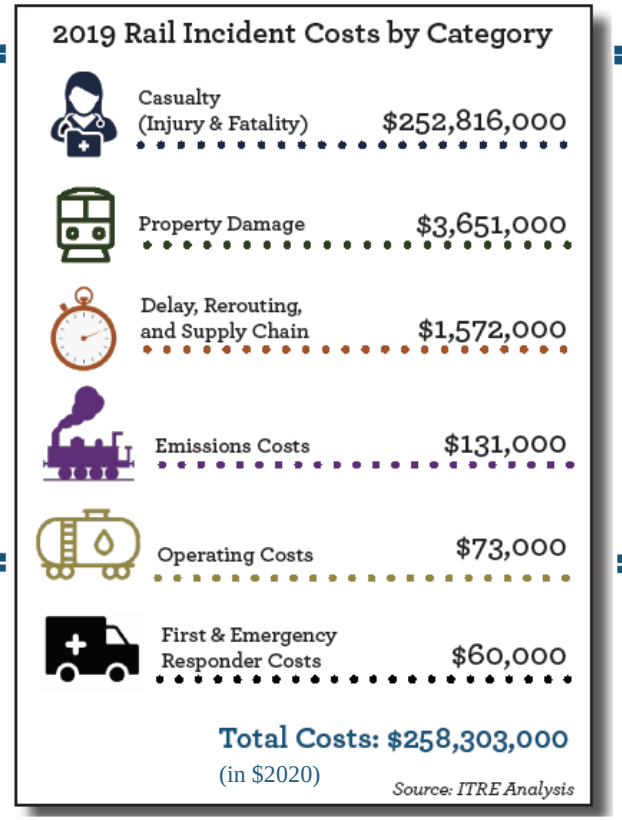
- **Emergency Responder Equipment Costs**
  (Police cars, ambulances, helicopters, fire engines, fire rescue trucks, quick response and other safety vehicles)

Emergency Response Organizations and Types of Data Inputs Gathered

County / Organization	Recorded Events	Type
Guilford County	10	Computer Aided Dispatch
Lincoln County	5	Computer Aided Dispatch
Cumberland County	3	Computer Aided Dispatch
Burke County	2	Computer Aided Dispatch
Rutherford County	5	Phone Interview
Moore County	4	Phone Interview
Mitchell County	3	Phone Interview
Cleveland County	2	Phone Interview
Warren County	2	Phone Interview
Hoke County	1	Phone Interview
Wake County	1	Phone Interview
Pitt County	1	Phone Interview
Rockingham County	1	Phone Interview
Edgecombe County	Provided Context	Phone Interview
Forsyth County	Provided Context	Phone Interview
Granville County	Provided Context	Phone Interview
Macon County	Provided Context	Email Information
Perquimans County	Provided Context	Phone Interview
Stanly County	Provided Context	Phone Interview
Wilkes County	Provided Context	Email Information
NC Association of Police and Fire Chiefs	Provided Context	Phone Interview
21	40	

ITRE



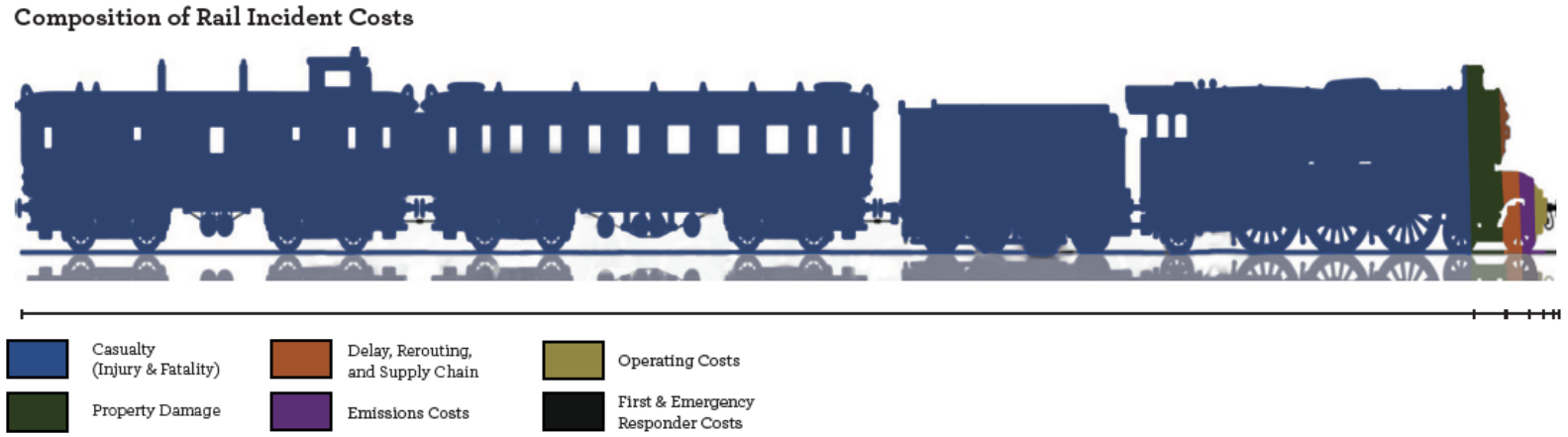


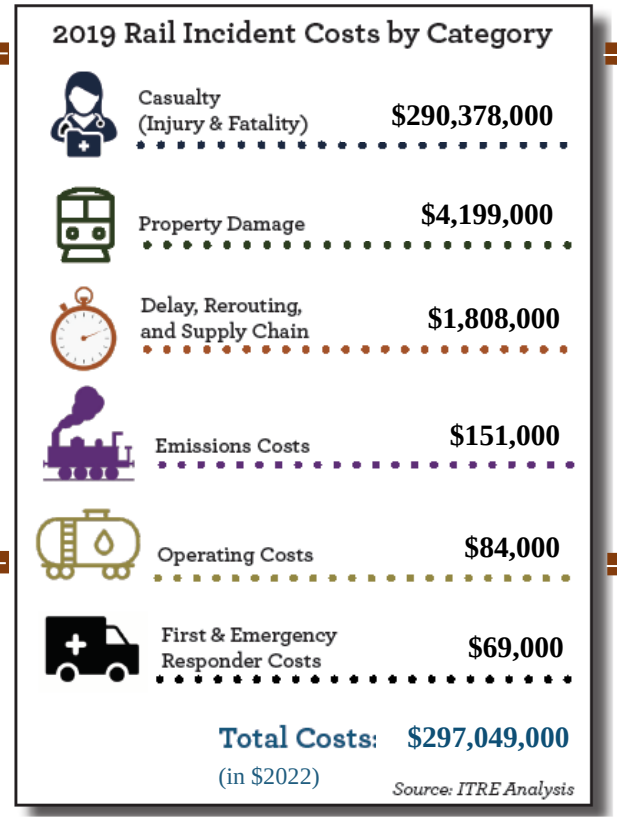
Summary of Findings

FRA Reported Incidents in 2019

- 187 total incidents
- 53 highway-rail; 26 not at grade crossings; 108 other incidents*
- 96 injuries, 24 fatalities

*It should be noted that the FRA database contains records of safety incidents that are generally not included in rail incident totals reported by NCDOT. These types of incidents are classified as "other incidents" by the FRA and generally result from accidents that occur independently of railroad crashes, collisions, or other events caused by railroad operational issues.





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*It should be noted that the FRA database contains records of safety incidents that are generally not included in rail incident totals reported by NCDOT. These types of incidents are classified as "other incidents" by the FRA and generally result from accidents that occur independently of railroad crashes, collisions, or other events caused by railroad operational issues.

Summary of Rail Incident Costs from 2010-2019 (in $2020)

Year	Casualty Costs[1]	Equipment Damage[2]	Delay, Rerouting & Supply Chain[3]	Emissions Costs[4]	Operating Costs[5]	Emergency Responder Costs[6]	Total Costs
2010	$207,296,000	$7,945,000	$776,000	$102,000	$59,000	$63,000	$216,241,000
2011	$175,556,500	$3,631,000	$1,074,000	$112,000	$64,000	$143,000	$180,580,500
2012	$177,069,000	$2,624,000	$658,000	$95,000	$55,000	$74,000	$180,575,000
2013	$270,225,000	$3,195,000	$1,531,000	$146,000	$83,000	$74,000	$275,254,000
2014	$257,766,000	$3,507,000	$1,449,000	$141,000	$81,000	$160,000	$263,104,000
2015	$247,835,500	$4,849,000	$1,484,000	$140,000	$80,000	$90,000	$254,478,500
2016	$285,930,500	$2,919,000	$1,222,000	$117,000	$67,000	$68,000	$290,323,500
2017	$177,069,000	$2,663,000	$1,082,000	$121,000	$69,000	$62,000	$181,066,000
2018	$324,766,500	$10,554,000	$2,585,000	$169,000	$96,000	$164,000	$338,334,500
2019	$252,816,000	$3,651,000	$1,572,000	$131,000	$73,000	$60,000	$258,303,000
Total	$2,376,330,000	$45,538,000	$13,433,000	$1,274,000	$727,000	$958,000	$2,438,260,000

[1]Monetized cost of injuries using the KABCO injury scale at unknown injury severity and the USDOT value of statistical life for fatalities (see "Monetized Casualty Costs" for methodology)

[2]Equipment damage reported on FRA form 6180.54 and 6180.57 (Train Accidents and Highway-Rail Accidents) from 2010-2019, converted to $2020 (see "Property Damage Costs" for methodology)

[3]Includes value of time for passengers and workers, opportunity, spoilage, useful life, and replacement costs for cargo, and up/downstream delay effects (see "Delay, Rerouting, and Supply Chain Costs" for methodology)

[4]Includes emissions costs resulting from additional locomotive runtime (see "Additional Emissions Costs" for methodology)

[5]Includes fuel and ownership costs resulting from additional locomotive runtime (see "Additional Operating Costs" for methodology)

[6]Includes first responder and emergency personnel and equipment costs resulting from an incident (see "First Responder and Emergency Management Costs" for methodology)

Summary of Rail Incident Costs from 2010-2019 (in $2022)

Year	Casualty Costs[1]	Equipment Damage[2]	Delay, Rerouting & Supply Chain[3]	Emissions Costs[4]	Operating Costs[5]	Emergency Responder Costs[6]	Total Costs
2010	$238,390,000	$9,137,000	$892,000	$117,000	$68,000	$72,000	$248,677,000
2011	$201,890,000	$4,176,000	$1,235,000	$129,000	$74,000	$164,000	$207,667,000
2012	$203,629,000	$3,018,000	$757,000	$109,000	$63,000	$85,000	$207,661,000
2013	$310,758,000	$3,674,000	$1,761,000	$168,000	$95,000	$85,000	$316,542,000
2014	$296,430,000	$4,033,000	$1,666,000	$162,000	$93,000	$184,000	$302,569,000
2015	$285,010,000	$5,576,000	$1,707,000	$161,000	$92,000	$103,000	$292,650,000
2016	$328,820,000	$3,357,000	$1,405,000	$135,000	$77,000	$78,000	$333,871,000
2017	$203,629,000	$3,062,000	$1,244,000	$139,000	$79,000	$71,000	$208,226,000
2018	$373,481,000	$12,137,000	$2,973,000	$194,000	$110,000	$189,000	$389,084,000
2019	$290,738,000	$4,199,000	$1,808,000	$151,000	$84,000	$69,000	$297,048,000
Total	$2,732,775,000	$52,369,000	$15,448,000	$1,465,000	$835,000	$1,100,000	$2,803,995,000

[1]Monetized cost of injuries using the KABCO injury scale at unknown injury severity and the USDOT value of statistical life for fatalities (see "Monetized Casualty Costs" for methodology)

[2]Equipment damage reported on FRA form 6180.54 and 6180.57 (Train Accidents and Highway-Rail Accidents) from 2010-2019, converted to $2022 (see "Property Damage Costs" for methodology)

[3]Includes value of time for passengers and workers, opportunity, spoilage, useful life, and replacement costs for cargo, and up/downstream delay effects (see "Delay, Rerouting, and Supply Chain Costs" for methodology)

[4]Includes emissions costs resulting from additional locomotive runtime (see "Additional Emissions Costs" for methodology)

[5]Includes fuel and ownership costs resulting from additional locomotive runtime (see "Additional Operating Costs" for methodology)

[6]Includes first responder and emergency personnel and equipment costs resulting from an incident (see "First Responder and Emergency Management Costs" for methodology)

Summary Rail Incident Costs from 2010-2021 (in $2022)

Year	Casualty Costs[1]	Equipment Damage[2]	Delay, Rerouting & Supply Chain[3]	Emissions Costs[4]	Operating Costs[5]	Emergency Responder Costs[6]	Total Costs
2010	$238,390,000	$9,137,000	$892,000	$117,000	$68,000	$72,000	$248,677,000
2011	$201,890,000	$4,176,000	$1,235,000	$129,000	$74,000	$164,000	$207,667,000
2012	$203,629,000	$3,018,000	$757,000	$109,000	$63,000	$85,000	$207,661,000
2013	$310,758,000	$3,674,000	$1,761,000	$168,000	$95,000	$85,000	$316,542,000
2014	$296,430,000	$4,033,000	$1,666,000	$162,000	$93,000	$184,000	$302,569,000
2015	$285,010,000	$5,576,000	$1,707,000	$161,000	$92,000	$103,000	$292,650,000
2016	$328,820,000	$3,357,000	$1,405,000	$135,000	$77,000	$78,000	$333,871,000
2017	$203,629,000	$3,062,000	$1,244,000	$139,000	$79,000	$71,000	$208,226,000
2018	$373,481,000	$12,137,000	$2,973,000	$194,000	$110,000	$189,000	$389,084,000
2019	$290,738,000	$4,199,000	$1,808,000	$151,000	$84,000	$69,000	$297,048,000
2020	$170,587,000	$3,273,000	$944,000	$93,000	$53,000	$70,000	$175,020,000
2021	$341,175,000	$6,546,000	$1,888,000	$185,000	$106,000	$141,000	$350,041,000
Total	$3,244,537,000	$62,188,000	$18,280,000	$1,743,000	$994,000	$1,311,000	$3,329,056,000

[1]Monetized cost of injuries using the KABCO injury scale at unknown injury severity and the USDOT value of statistical life for fatalities (see "Monetized Casualty Costs" for methodology)

[2]Equipment damage reported on FRA form 6180.54 and 6180.57 (Train Accidents and Highway-Rail Accidents) from 2010-2019, converted to $2020 (see "Property Damage Costs" for methodology)

[3]Includes value of time for passengers and workers, opportunity, spoilage, useful life, and replacement costs for cargo, and up/downstream delay effects (see "Delay, Rerouting, and Supply Chain Costs" for methodology)

[4]Includes emissions costs resulting from additional locomotive runtime (see "Additional Emissions Costs" for methodology)

[5]Includes fuel and ownership costs resulting from additional locomotive runtime (see "Additional Operating Costs" for methodology)

[6]Includes first responder and emergency personnel and equipment costs resulting from an incident (see "First Responder and Emergency Management Costs" for methodology)

Extrapolated Rail Incident Costs in the U.S. from 2010-2021 (in $2022)

Year	Casualty Costs[1]	Equipment Damage[2]	Delay, Rerouting & Supply Chain[2]	Emissions Costs[2]	Operating Costs[2]	Emergency Responder Costs[2]	Total Costs
2010	$10,132,800,000	$194,400,000	$56,100,000	$5,500,000	$3,100,000	$4,200,000	$10,396,100,000
2011	$9,388,400,000	$180,100,000	$52,000,000	$5,100,000	$2,900,000	$3,900,000	$9,632,400,000
2012	$9,222,900,000	$176,900,000	$51,000,000	$5,000,000	$2,900,000	$3,800,000	$9,462,500,000
2013	$9,677,900,000	$185,700,000	$53,600,000	$5,300,000	$3,000,000	$4,000,000	$9,929,500,000
2014	$10,574,000,000	$202,900,000	$58,500,000	$5,700,000	$3,300,000	$4,400,000	$10,848,800,000
2015	$10,325,800,000	$198,100,000	$57,100,000	$5,600,000	$3,200,000	$4,300,000	$10,594,100,000
2016	$10,491,200,000	$201,300,000	$58,100,000	$5,700,000	$3,300,000	$4,300,000	$10,763,900,000
2017	$11,263,300,000	$216,100,000	$62,300,000	$6,100,000	$3,500,000	$4,600,000	$11,555,900,000
2018	$10,946,200,000	$210,000,000	$60,600,000	$5,900,000	$3,400,000	$4,500,000	$11,230,600,000
2019	$11,787,100,000	$226,100,000	$65,200,000	$6,400,000	$3,700,000	$4,900,000	$12,093,400,000
2020	$10,050,100,000	$192,800,000	$55,600,000	$5,500,000	$3,100,000	$4,100,000	$10,311,200,000
2021	$12,035,300,000	$230,900,000	$66,600,000	$6,500,000	$3,700,000	$5,000,000	$12,348,000,000
Total	$125,895,000,000	$2,415,300,000	$696,700,000	$68,300,000	$39,100,000	$52,000,000	$129,166,400,000

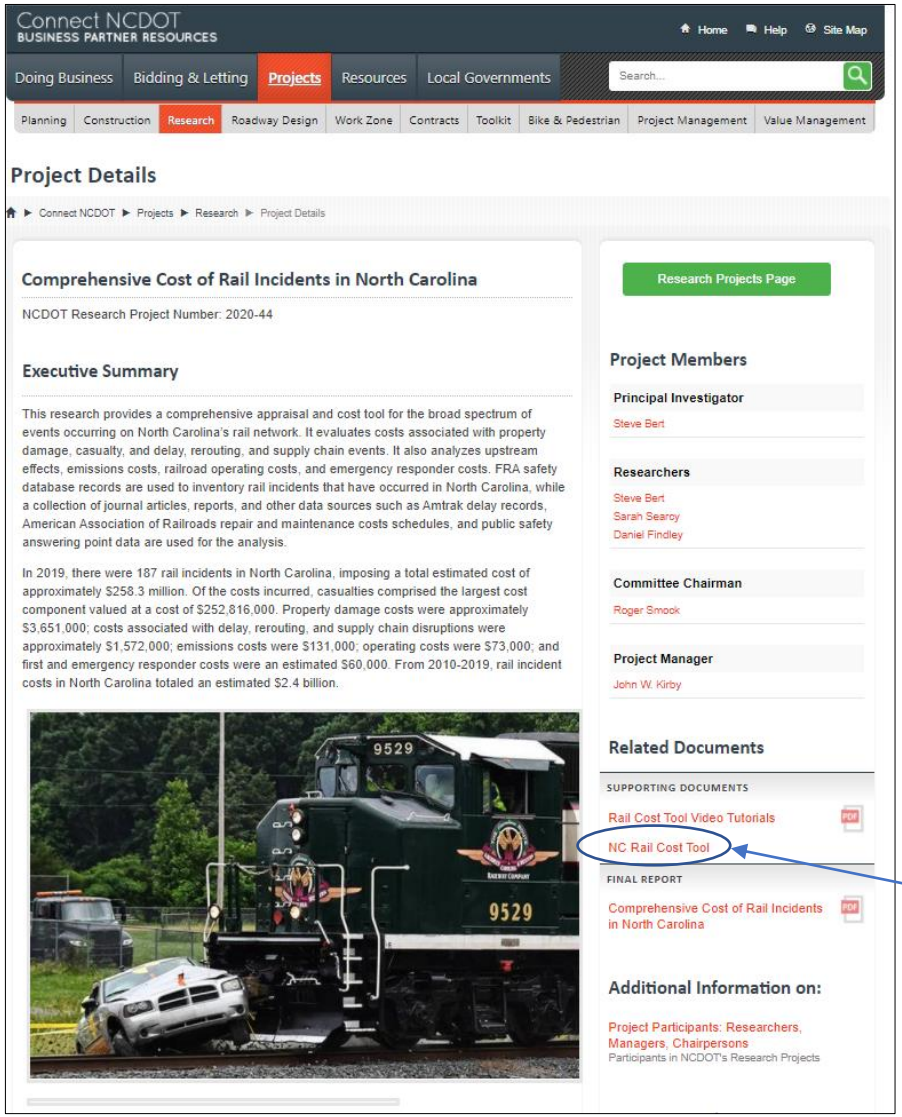
[1]From 2010-2021 there were 9,132 reported fatality events totaling an estimated $115.5 billion in $2022

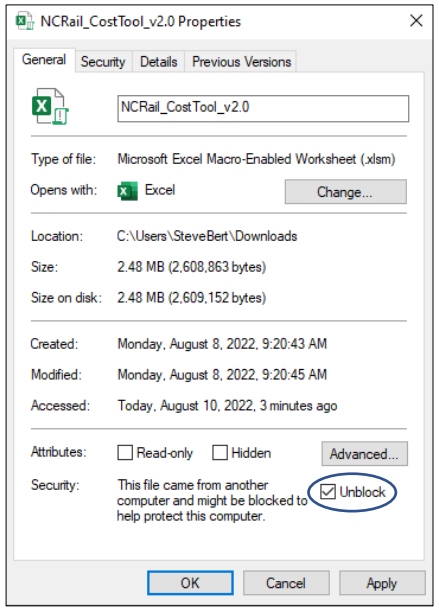
[2]Extrapolating comprehensive costs with the same cost relationships witnessed in NC, there was an estimated a cost of $129.2 billion in $2022 at the national level

Accessing the Cost Tool

Find the tool online

- Google “Comprehensive Cost of Rail Incidents NCDOT Connect”
- Select “Project Details – Connect NCDOT”



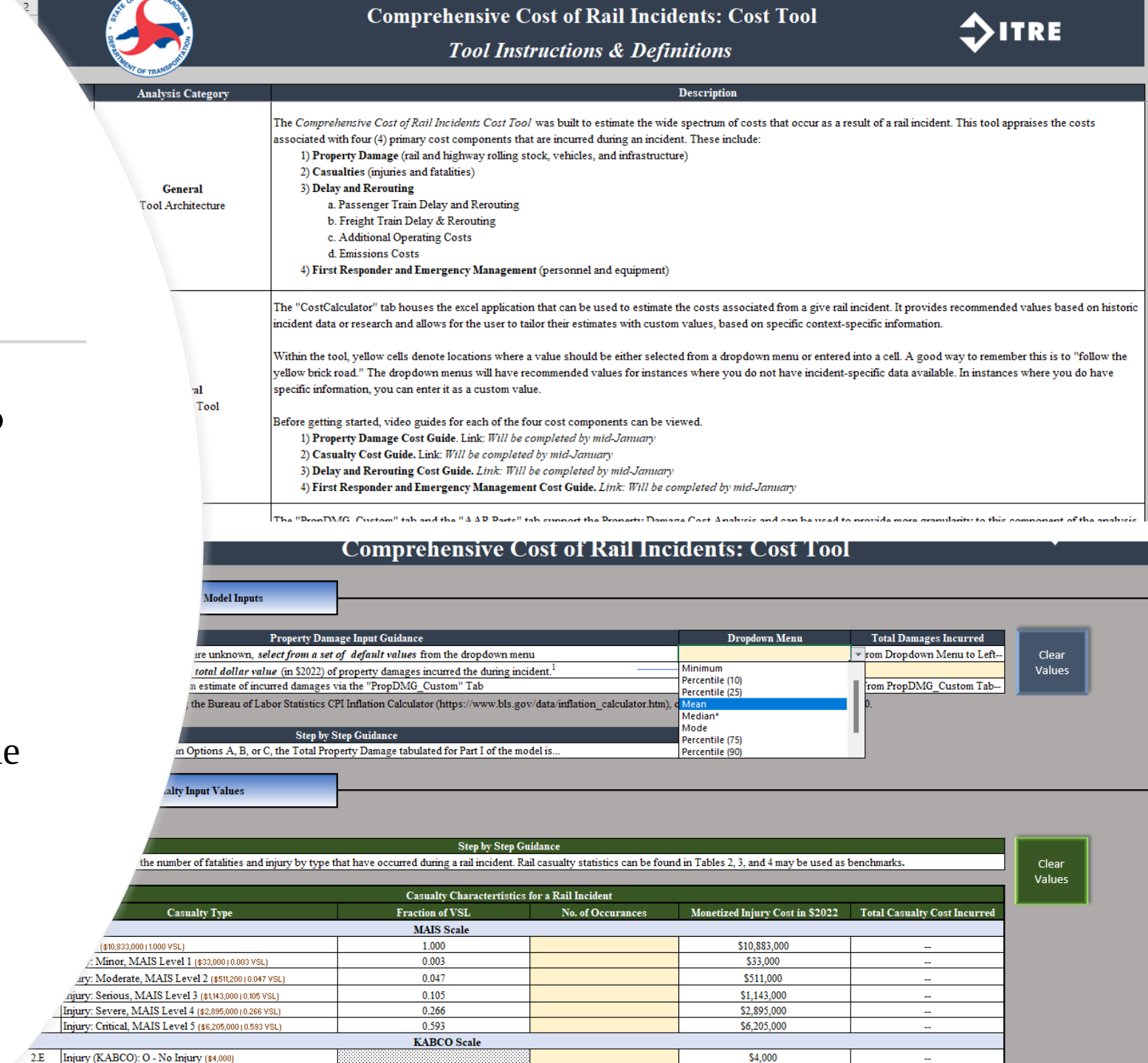


Enable Macros
1. Right-click the file and choose Properties from context menu
2. At the bottom of the General tab, select Unblock checkbox and select OK

Download the cost tool here

Tool Overview

- "Plug and play" tool with dropdowns to select expected values by incident type
- Guidance and instructions are offered within the tool
- Meant to be flexible and adaptable to the full spectrum of incidents that occur



Pedestrian Strike

Durham, North Carolina
October 11, 2022

- Pedestrian fatality
- 2-hour delay
- Police
- Paramedics / EMTs
- Forensics
- Other personnel
- Quick response vehicles

NEWS

Pedestrian hit, killed by train in downtown Durham; roads reopen

by: Ashley Anderson, Crystal Price, Rodney Overton
Posted: Oct 11, 2022 / 04:31 PM EDT
Updated: Oct 12, 2022 / 08:16 AM EDT

SHARE

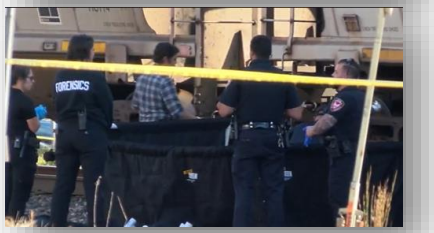
DURHAM, N.C. (WNCN) — A pedestrian was struck and killed by a train at the intersection of W. Ramseur Street and S. Corcoran Street on Tuesday afternoon, police said.

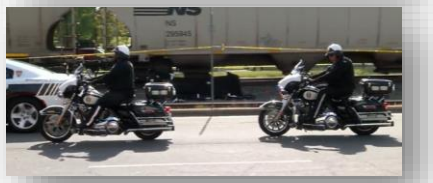
Police officers responded to the intersection around 2 p.m.

The incident was first reported by Durham Fire Department just after 2:05 p.m.

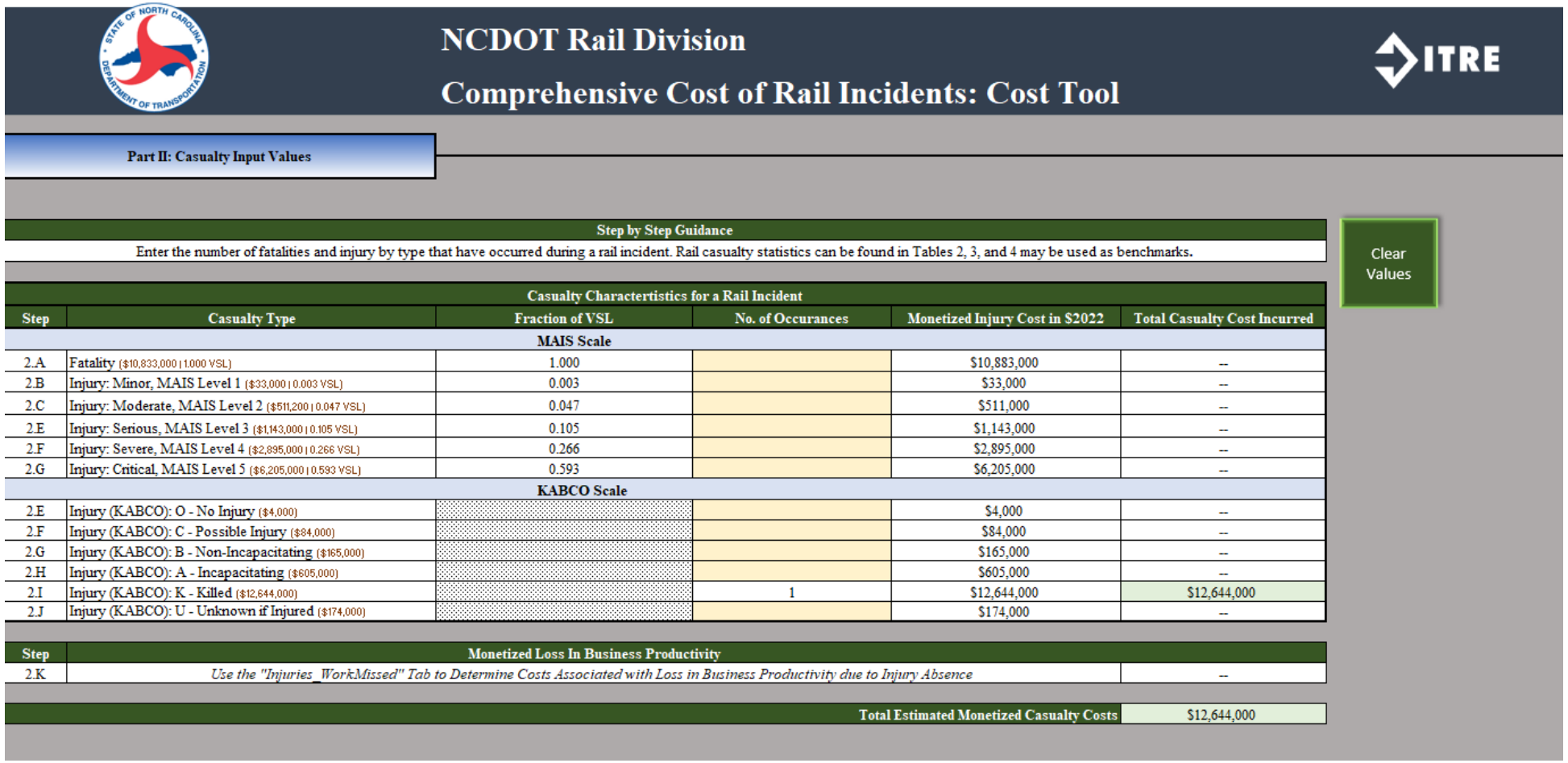
Authorities have not released the name of the individual and police are still investigating what happened.

Multiple intersections in downtown Durham were closed for several hours as investigators assessed the scene. Motorists, cyclists, and pedestrians were forced to find alternative ways to get around downtown during rush hour.





Casualty Values



NCDOT Rail Division

Comprehensive Cost of Rail Incidents: Cost Tool

ITRE

Part II: Casualty Input Values

Step by Step Guidance

Enter the number of fatalities and injury by type that have occurred during a rail incident. Rail casualty statistics can be found in Tables 2, 3, and 4 may be used as benchmarks.

Clear Values

Casualty Charactertistics for a Rail Incident

Step	Casualty Type	Fraction of VSL	No. of Occurances	Monetized Injury Cost in $2022	Total Casualty Cost Incurred
	MAIS Scale				
2.A	Fatality ($10,833,000 | 1.000 VSL)	1.000		$10,883,000	--
2.B	Injury: Minor, MAIS Level 1 ($33,000 | 0.003 VSL)	0.003		$33,000	--
2.C	Injury: Moderate, MAIS Level 2 ($511,200 | 0.047 VSL)	0.047		$511,000	--
2.E	Injury: Serious, MAIS Level 3 ($1,143,000 | 0.105 VSL)	0.105		$1,143,000	--
2.F	Injury: Severe, MAIS Level 4 ($2,895,000 | 0.266 VSL)	0.266		$2,895,000	--
2.G	Injury: Critical, MAIS Level 5 ($6,205,000 | 0.593 VSL)	0.593		$6,205,000	--
	KABCO Scale				
2.E	Injury (KABCO): O - No Injury ($4,000)			$4,000	--
2.F	Injury (KABCO): C - Possible Injury ($84,000)			$84,000	--
2.G	Injury (KABCO): B - Non-Incapacitating ($165,000)			$165,000	--
2.H	Injury (KABCO): A - Incapacitating ($605,000)			$605,000	--
2.I	Injury (KABCO): K - Killed ($12,644,000)		1	$12,644,000	$12,644,000
2.J	Injury (KABCO): U - Unknown if Injured ($174,000)			$174,000	--

Step	Monetized Loss In Business Productivity	
2.K	*Use the "Injuries_WorkMissed" Tab to Determine Costs Associated with Loss in Business Productivity due to Injury Absence*	--

Total Estimated Monetized Casualty Costs	$12,644,000

- Use KABCO Scale
- Enter 1 for “K – Killed” designation
- Appraised Value will populate

Delay, Routing, & Supply Chain Values

Personnel Value of Time

NCDOT Rail Division

Comprehensive Cost of Rail Incidents: Cost Tool

ITRE

Clear Values

Freight Train Delay (Time in Minutes)				
Step	Monetization Factor	Value Section	Minutes of Delay	Custom Value (Minutes of Delay)
3.I	Total Minutes of Delay	Custom	Add Value	120

Freight Train Delay: Human Worker Costs						
Step	Delayed Human Type	Value of Time Selection	Value	Custom	Incidence (No. of This Type)	Total VOT Costs
3.J.1	Locomotive Engineer (SIAP)	Median	$45.34		2	$181.38
3.J.2			--			--
3.J.3			--			--
3.J.4			--			--
3.J.5			--			--
3.J.6			--			--
3.J.7			--			--
3.J.8			--			--
3.J.9			--			--
3.J.10			--			--
3.J.11			--			--
3.J.12			--			--
3.J.13			--			--
3.J.14			--			--
3.J.15			--			--
3.J.16			--			--
3.J.17			--			--
3.J.18			--			--
3.J.19			--			--
3.J.20			--			--

Freight Train Delay: Human Worker Costs		
3.K	Subtotal of Human Delay Costs >>>	$181.38

- Total Minutes of Delay = 120
- Personnel Delayed = 2 Locomotive Engineers with median hourly salary
- Appraised Values will populate

Delay, Routing, & Supply Chain Values

Shipper Costs, Upstream Effects

Freight Train Delay: Shipper Costs (Opportunity, Spoilage, Useful Life)				
Step	**Monetization Factor**	**Value Section**	**Value**	**Custom**
3.L.1	Value of Freight Cargo per Ton	Default Value	$2,200.52	
3.L.2	Freight Tons per Carload	Default Value	65.0	
3.L.3	Freight Carloads per Train	Default Value	25.6	
3.L.4	Total Minutes of Cargo Delay	Same as 3.I	120	
3.L.5	Shipper Costs (Cargo Disc. Rate Per Minute)	Default	0.0066%	
The "Freight_Cargo" tab can be used to develop a custom Commodity Mix to estimate the value of freight cargo				

Clear Values

Freight Train Delay: Opportunity, Spoilage, Useful Life Costs Cost Summary		
3.M	Subtotal of Shipper Costs >>>	$29,077.45

- Use default values
- Use same as 3.I = 120 minutes of time delayed
- Values will populate

Freight Train Delay: Upstream Effects				
Step	**Monetization Factor**	**Value Section**	**Value**	**Custom**
3.P.1	Total Minutes of Delay Upstream	Median	26	
3.P.2	Crew Size	Default	2	
3.P.3	Crew Size Value of Time per hour	Default	$41.60	
3.P.4	***Upstream and Downstream Crew Delay Costs***			$36.05
3.P.5	Value of Freight Cargo per Ton	Default	$2,200.52	
3.P.6	Freight Tons per Carload	Default	65	
3.P.7	Freight Carloads per Train	Default	25.6	
3.P.8	Shipper Costs (Cargo Disc. Rate Per Minute)[1]	Default	0.0066%	
3.P.9	***Upstream and Downstream Shipper Costs (only tabulated if delay is greater than 60 minutes)***			--

Clear Values

Freight Train Delay: Upstream Effects		
3.Q	Subtotal of Upstream Freight Costs >>>	$36.05

- Use median value for upstream delay
- Use default values for upstream parameters
- Values will populate

Operating and Emissions Costs

Railroad Operating Costs: FOR FREIGHT TRAIN INCIDENTS				
Step	Monetization Factor	Value Section	Value per Minute	Custom
3.S.1	Locomotive Ownership / Leasing	Default	$0.59	
3.S.2	Locomotive Units	Default	2.3	
3.S.3	Locomotive Fuel (per-locomotive minute)	Default	$4.17	
3.S.4	Other Car Cost (per car-minute)	Default	$0.01	
3.S.5	Minutes of Delay Occuring from Rail Incident	Same as 3.I	120	
3.S.6	***Additional Operating Costs: Freight Rail***			$1,326.88

Freight Train Delay: Railroad Operating Costs		
3.T	Subtotal of Rail Operating Costs >>>	$1,326.88

Clear Values

- Use default values
- Use same as 3.I = 120 minutes of time delayed
- Values will populate

Environmental Emissions Costs (costs per minute of delay) - FREIGHT TRAIN				
Step	Monetization Factor	Value Section	Value	Custom
3.V.1	Additional Idle/Running Time	Same as 3.I	120	
3.V.2	Number of Locomotives per train	Default	2.3	
3.V.3	CO_2 (cost per locomotive minute)	Default	$0.55	
3.V.4	Nox (cost per locomotive minute)	Default	$2.25	
3.V.5	PM (cost per locomotive minute)	Default	$3.82	
3.V.6	***Environmental Costs: Passenger Rail Delay***			$1,843.44

Environmental Emissions Costs		
3.W	Subtotal of Rail Emissions Costs >>>	$1,843.44

Clear Values

- Use same as 3.I = 120 minutes of time delayed
- Use default emissions costs
- Values will populate

First Responder & Emergency Costs

Magnitude of Event

Part IV: First Responder & Emergency Costs

Step	Magnitude of Rail Event Definitions Definitions for Cost Tool Determinations
4.A	**Low Impact:** No injuries or fatalities are reported or anticipated. The train, its crew, and any passengers are minimally affected by the incident, which may include: brush or spot fires, a non-vehicle object struck on tracks, a vehicular crash with a positive ID of no-one in the vehicle, first response, or other incidents expected to have a minimal property damage outcome.
	Medium Impact: Based on 911 caller information the rail event could result in injuries, or the magnitude of the event is unknown. This may include events such as, derailments, train to vehicle collisions, train fires, or other incidents expected to have property damage outcomes that could result in injuries.
	High Impact: Based on 911 caller information the rail event is likely to result in injuries or fatalities. This could include a derailment, a collision, a pedestrian strike, a vehicle strike, an explosion or detonation, a Hazmat spill, or other incidents that are likely to result in significant property damage and likely injuries or fatalities.
	Very High Impact: A very high impact event goes above and beyond a high impact event. Catastrophic injuries or fatalities are reported or anticipated. An example of a catastrophic event includes the 1986 collision between an Amtrak passenger train and three Conrail locomotives. During this event 400 victims were assessed at secondary triage, 177 were transported to 11 hospitals and 22 were admitted. A total of 37 fire and rescue department vehicles, and 7 private ambulances transported the casualties.

Step	Select Event Magnitude (see definitions above)
4.A	High Impact

- Select event magnitude based on type of event
- Select “High Impact” due to prevalence of fatality

First Responder & Emergency Costs

First Responder and Emergency Personnel Costs

Step	First Responder and Emegency Personnel	No. of Individuals Dispatched		
		Dropdown Selection	Value	Custom Value
4.B.1	Law Enforcement / Sheriff's Office / State Highway Patrol	Mean	8.00	
4.B.2	EMS / Medic / County Rescue	Mean	3.73	
4.B.3	Fire Response	Mean	6.55	
4.B.4	Contract Workers or Other Safety Response Personnel	Mean	1.00	
4.B.5	Hazmat Team		--	

Clear Values

Step	First Responder and Emegency Personnel	Total Time Involved (Minutes)		
		Total Time Involved	Value	Custom Value
4.C.1	Law Enforcement / Sheriff's Office / State Highway Patrol	Mean	170	
4.C.2	EMS / Medic / County Rescue	Mean	55	
4.C.3	Fire Response	Mean	97	
4.C.4	Contract Workers or Other Safety Response Personnel	Mean	90	
4.C.5	Hazmat Team		--	

Step	First Responder and Emegency Personnel	Personnel Time Costs Accrued per Minute		
		Total Time Involved	Value	Custom Value
4.D.1	Law Enforcement / Sheriff's Office / State Highway Patrol	Median	$0.40	
4.D.2	EMS / Medic / County Rescue	Median	$0.32	
4.D.3	Fire Response	Median	$0.27	
4.D.4	Contract Workers or Other Safety Response Personnel	Median	$0.24	
4.D.5	Hazmat Team		--	

Step	First Responder & Emegency Personnel	Emergency Personnel Costs Accrued
4.E.1	Law Enforcement / Sheriff's Office / State Highway Patrol	$538.99
4.E.2	EMS / Medic / County Rescue	$65.44
4.E.3	Fire Response	$173.25
4.E.4	Contract Workers or Other Safety Response Personnel	$21.60
4.E.5	Hazmat Team	--
4.E.6	***Total Emergency Personnel Costs***	$799.28

- Skip HAZMAT values, because no mention of HAZMAT being dispatched in article
- Select mean values for no. of individuals dispatched
- Select mean values for time involved of personnel
- Emergency personnel costs will populate

First Responder & Emergency Costs

First Responder and Emergency Equipment Costs

Step	First Responder and Emegency Vehicles	No. of Units Dispatched		
		Dropdown Selection	Value	Custom Value
4.F.1	Ambulance / EMS	Mean	1.7	
4.F.2	Fire Engine	Mean	1.8	
4.F.3	Fire Rescue Truck	Mean	0.5	
4.F.4	Police Cars	Mean	5.4	
4.F.5	Helicopter		--	
4.F.6	All Other Vehicles	Mean	1.3	

Clear Values

Step	First Responder and Emegency Vehicles	Total Time in Use (Minutes)		
		Dropdown Selection	Value	Custom Value
4.G.1	Ambulance / EMS	Mean	57	
4.G.2	Fire Engine	Mean	50	
4.G.3	Fire Rescue Truck	Mean	36	
4.G.4	Police Cars	Mean	187	
4.G.5	Helicopter		--	
4.G.6	All Other Vehicles	Mean	48	

Step	First Responder and Emegency Vehicles	Vehicle Operating Costs per Minute		
		Dropdown Selection	Value	Custom Value
4.H.1	Ambulance / EMS	Medium	$0.63	
4.H.2	Fire Engine	Medium	$2.42	
4.H.3	Fire Rescue Truck	Medium	$2.85	
4.H.4	Police Cars	Medium	$0.27	
4.H.5	Helicopter		--	
4.H.6	All Other Vehicles	Medium	$0.62	

Step	First Responder and Emegency Vehicles	Emergency Equipment Costs Accrued
4.I.1	Ambulance / EMS	$62.16
4.I.2	Fire Engine	$219.29
4.I.3	Fire Rescue Truck (Ladder Truck)	$55.85
4.I.4	Police Cars	$267.63
4.I.5	Helicopter	--
4.I.6	All Other Vehicles	$37.72
4.I.7	***Total Emergency Equipment Costs***	$642.64

- Skip helicopter values, because no mention of helicopter being dispatched in article
- Select mean values for no. of vehicles dispatched
- Select mean values for time in use
- Select medium values for equipment operating costs
- Emergency equipment costs will populate

Comprehensive Cost Summary

Part V: Cost Output Summary

Comprehensive Cost of Rail Incident Output			
Cell	**Section**	**Value**	**Color Coding**
Property Damage Cost Summary			
E15	Property Damage Summary	--	
Casualty Cost Summary			
F44	Monetized Cost of Injuries and Fatalities	$12,644,000	
Delay and Rerouting Cost Summary			
G96	Passenger Train Delay: Value of Time Costs	--	
E93	Bus Rerouting and Additional VOT Costs	--	
G125	Passenger Rail Up/Downstream Costs	--	
G157	Freight Train Delay: Value of Time Costs	$181	
E170	Shipper Costs (Opportunity, Spoilage, Useful Life)	$29,077	
E181	Replacement: Damaged or Destroyed Cargo	--	
E198	Freight Rail Up/Downstream Costs	$36	
E208	Passenger Rail: Additional Operating Costs	--	
E217	Freight Rail: Additional Operating Costs	$1,327	
E230	Passenger Rail Emissions Costs	--	
E239	Freight Rail Emissions Costs	$1,843	
First and Emergency Response Cost Summary			
C289	Emergency Personnel Costs	$799	
C326	Emergency Equipment Costs	$643	
Total Cost of Incident		$12,677,907	

One injured after being struck by train in Landis

Police say victim was "lying or sitting on the railroad tracks"

The incident happened just before 11:00 p.m. on Wednesday. (WBTV File)

By David Whisenant

Published: Jul. 28, 2022 at 9:53 AM EDT

LANDIS, N.C. (WBTV) - Police in Landis are reporting that one person was injured after being struck by a train. The incident happened Wednesday night just before11:00 p.m. near the 1400 block of Pinnacle Way Dr.

According to a press release, emergency personnel immediately responded to the scene and located the patient. The patient was airlifted to a nearby trauma center by Novant MedFlight with life-threatening injuries.

The initial investigation by the Landis Police Department indicates the patient was lying or sitting on the railroad tracks at the time of the incident and that alcohol/impairment may have been a factor.

"We greatly appreciate all of the agencies who assisted us during this rescue operation and pray that the patient makes a full recovery," said Dr. Zachary Lechette, Public Safety Director for the Town of Landis. "This is a tragic reminder of the dangers associated with pedestrians on and near railways, and would like to remind the public to stay clear of the tracks at all times. According to preliminary Federal Railroad Administration statistics, North Carolina ranked 12th highest in the nation for train/pedestrian deaths in 2021, with 16 reported deaths and 8 injuries."

Source: WBTV, 2022

Pedestrian Strike

$6.3 million
pedestrian strike
with a critical injury

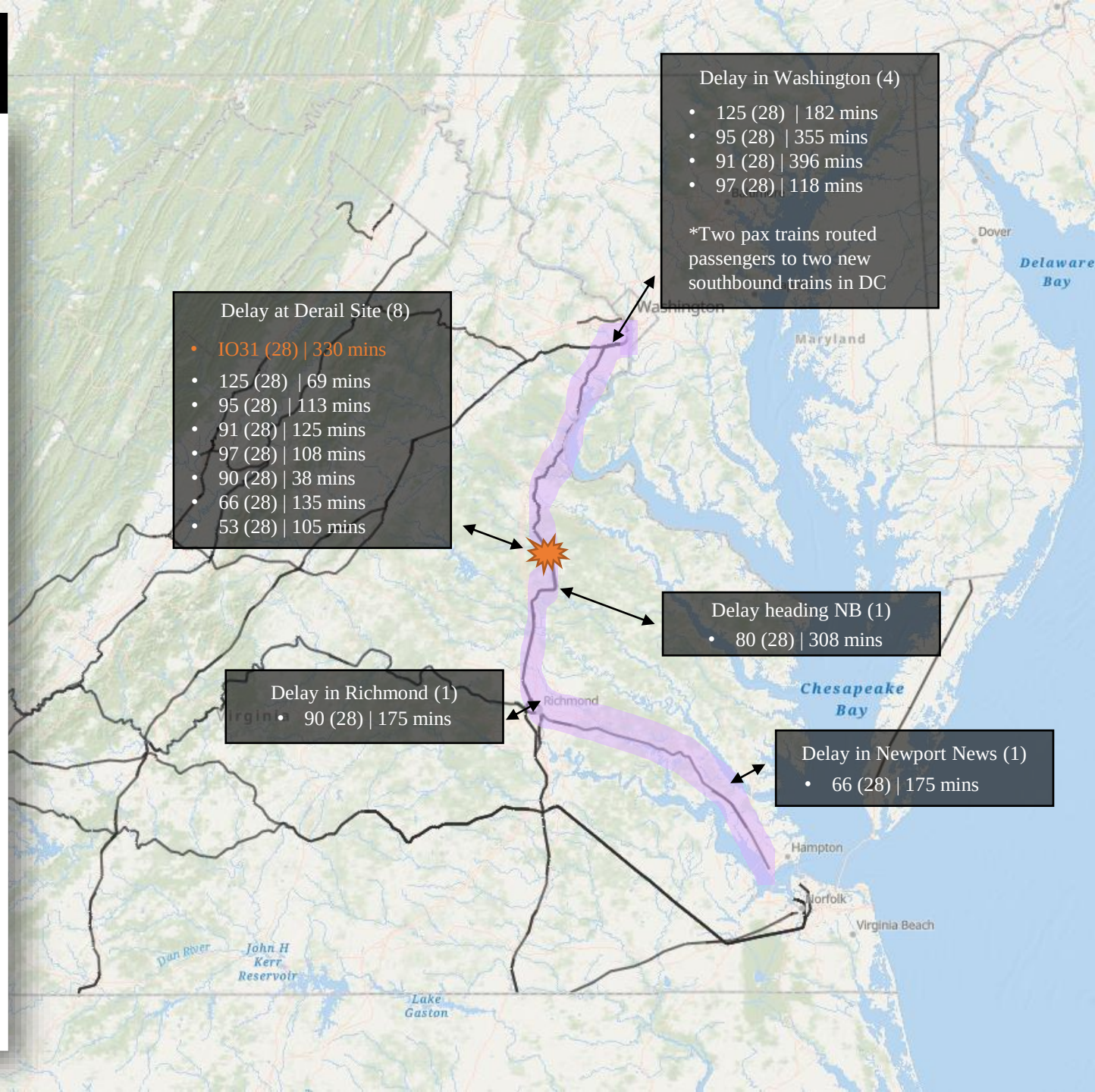
Part V: Cost Output Summary

Comprehensive Cost of Rail Incident Output			
Cell	Section	Value	Color Coding
Property Damage Cost Summary			
E15	Property Damage Summary	$3,840	
Casualty Cost Summary			
F44	Monetized Cost of Injuries and Fatalities	$6,205,000	
Delay and Rerouting Cost Summary			
G96	Passenger Train Delay: Value of Time Costs	--	
E93	Bus Rerouting and Additional VOT Costs	--	
G125	Passenger Rail Up/Downstream Costs	--	
G157	Freight Train Delay: Value of Time Costs	--	
E170	Shipper Costs (Opportunity, Spoilage, Useful Life)	$68,817	
E181	Replacement: Damaged or Destroyed Cargo	--	
E198	Freight Rail Up/Downstream Costs	$36	
E208	Passenger Rail: Additional Operating Costs	--	
E217	Freight Rail: Additional Operating Costs	$3,140	
E230	Passenger Rail Emissions Costs	--	
E239	Freight Rail Emissions Costs	--	
First and Emergency Response Cost Summary			
C289	Emergency Personnel Costs	$799	
C326	Emergency Equipment Costs	$1,027	
Total Cost of Incident		$6,282,659	

Derailment Resulting in Delay of 9 Trains

Rail Incident Costs by Category

Casualty (Injury & Fatality)	n/a
Property Damage	$74,780
Delay, Rerouting, and Supply Chain	$174,140
Emissions Costs	$13,300
Operating Costs	$9,600
First & Emergency Responder Costs	$800
Total Costs: (in $2020)	$272,620



Tractor-Trailor Collision

Source of Photos: Dye, Andew. *Winston Salem Journal.* 2019.

One dies after train crashes into tractor-trailer, North Carolina police say

BY NOAH FEIT

AUGUST 28, 2019 09:00 PM, UPDATED AUGUST 30, 2019 04:53 PM

One person is dead after a train collided with a tractor-trailer in North Carolina on Wednesday, the Kernersville Police Department said.

Emergency officials responded to the Forsyth County crash at about 3:30 p.m., police said in a news release.

The driver of the 18-wheeler truck was killed in the wreck, but no passengers on the freight train were injured, the Winston-Salem Journal reported.

The driver will not be publicly identified until the coroner notifies the family.

Roads in the area near the collision are expected to remain closed through the night, according to WXII.

Visit: https://www.youtube.com/watch?v=zpiWxtoCIUc

ITRE

Questions?

Comprehensive Cost of Rail Incidents in North Carolina

- Cost Tool
- Video Tutorials
- Final Report

- Link: https://connect.ncdot.gov/projects/research/Pages/ProjDetails.aspx?ProjectID=2020-44

NCDOT Project Coordinator
Roger Smock | Rdsmock1@ncdot.gov

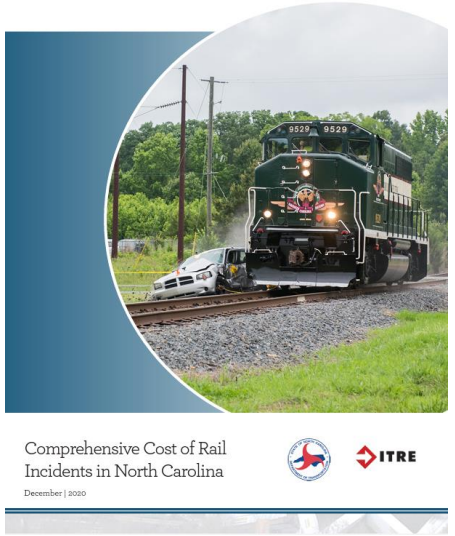
NCDOT Research Engineer
John Kirby | jkirby@ncdot.gov

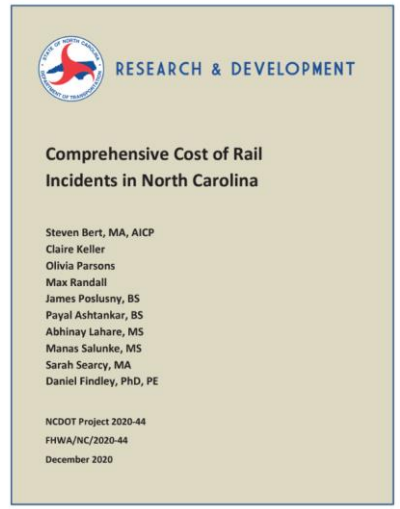
Principal Investigator
Steve Bert | stevebert@ncsu.edu

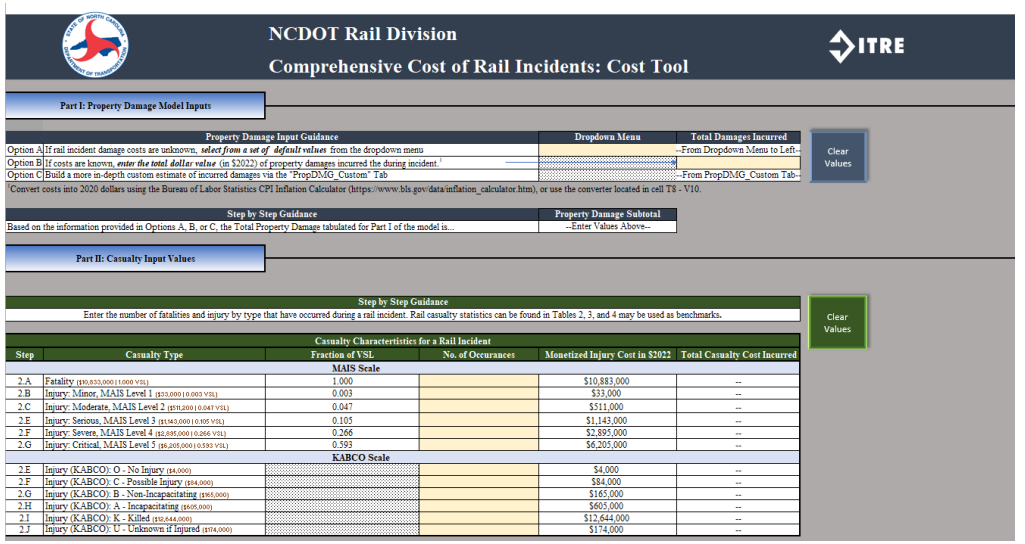
Comprehensive Cost of Rail Incidents in North Carolina

Grade Crossing Safety and Railroad Trespass Prevention Workshop

Data Analysis of Area of Trespasser Incidents







North Carolina
Rail Network Trespasser Severity Assessment

Static and Dynamic Thermal Video Detection of Rail Trespassing Events

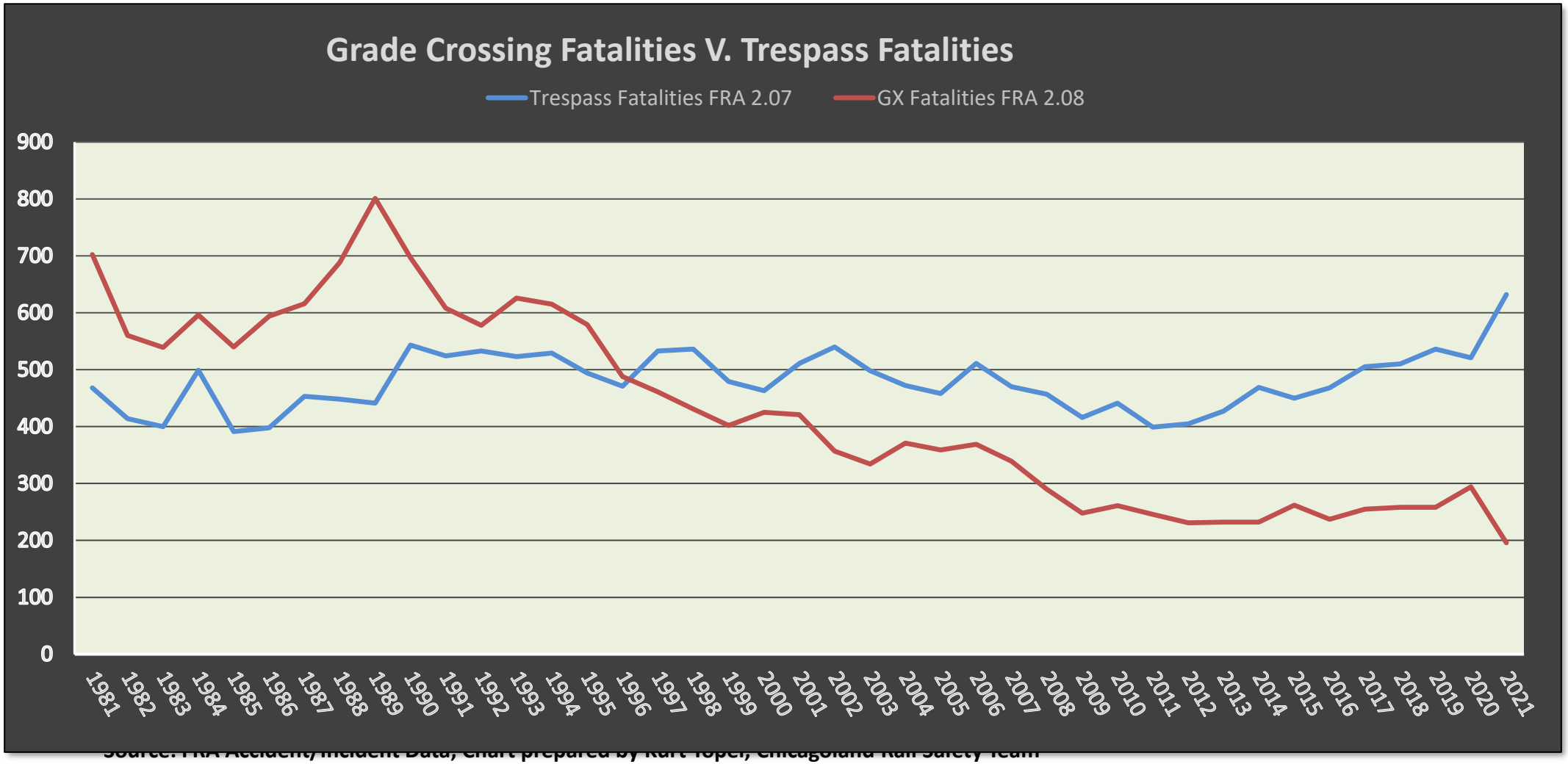
Christopher Cunningham
Sarah Searcy
Christopher Vaughan
Daniel Coble
Roger Smock
Jahmal Pullen

November 1st, 2022

http://www.itre.ncsu.edu

ITRE

The Trespass Problem



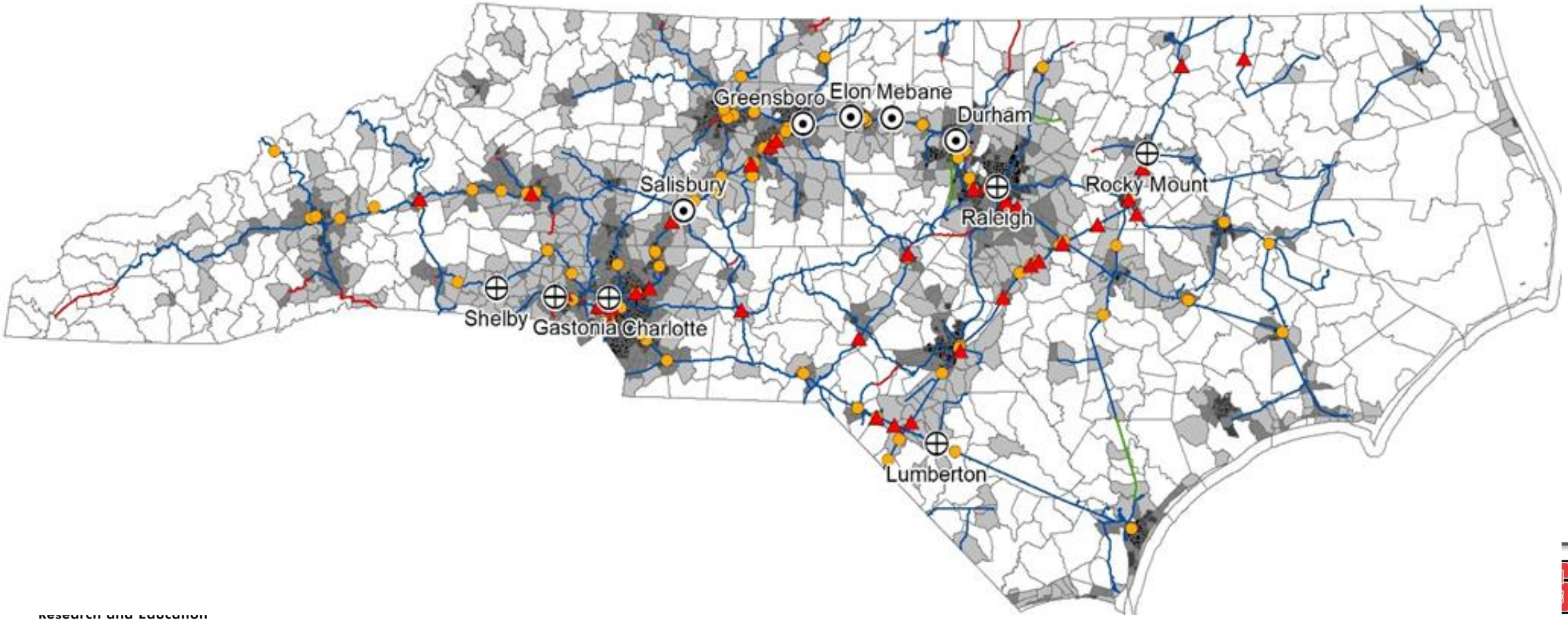
Source: FRA Accident/Incident Data, Chart prepared by Kurt Topel, Chicagoland Rail Safety Team

Key Project Objectives

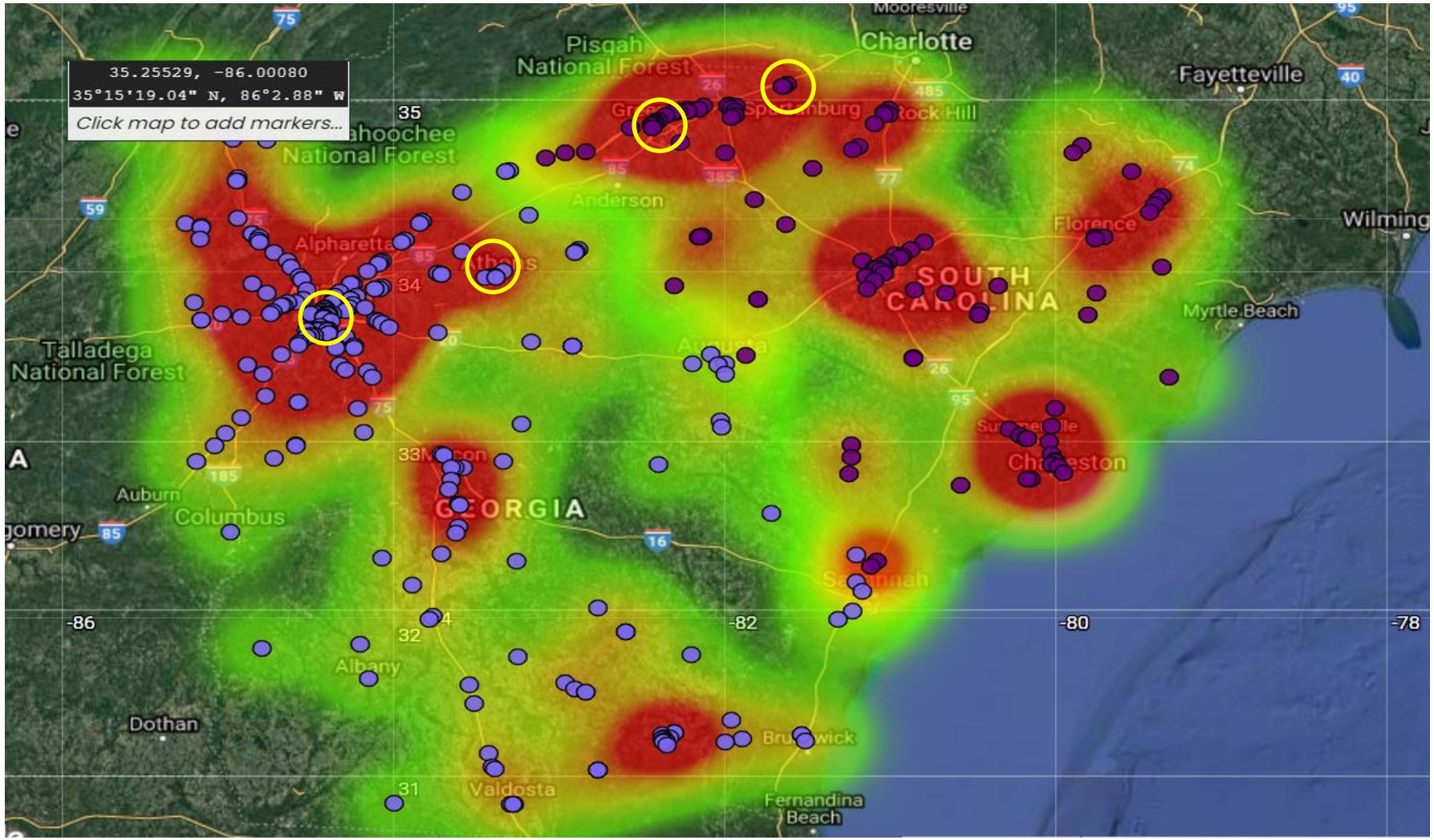
- Provide NCDOT with an estimate of the real frequency and characteristics of trespassing events along NC railroad ROW "hot spots"
- Help determine a more realistic picture of train-ped crashes by supplementing actual crashes with "near-miss" events.
- Develop tools to assist in identifying areas at high risk for trespassing based on empirical data
- Provide evidence to citizens, enforcement agencies, and policy-makers on the concerns of trespassing to inform educational initiatives and countermeasures

Candidate Sites_NC (Rounds 1 & 2)

- Identify Sites of Interest
  - **206** FRA trespasser incidents (casualties/fatalities) for 2013-2017 in NC



Candidate Sites_SC & GA (Round 3)



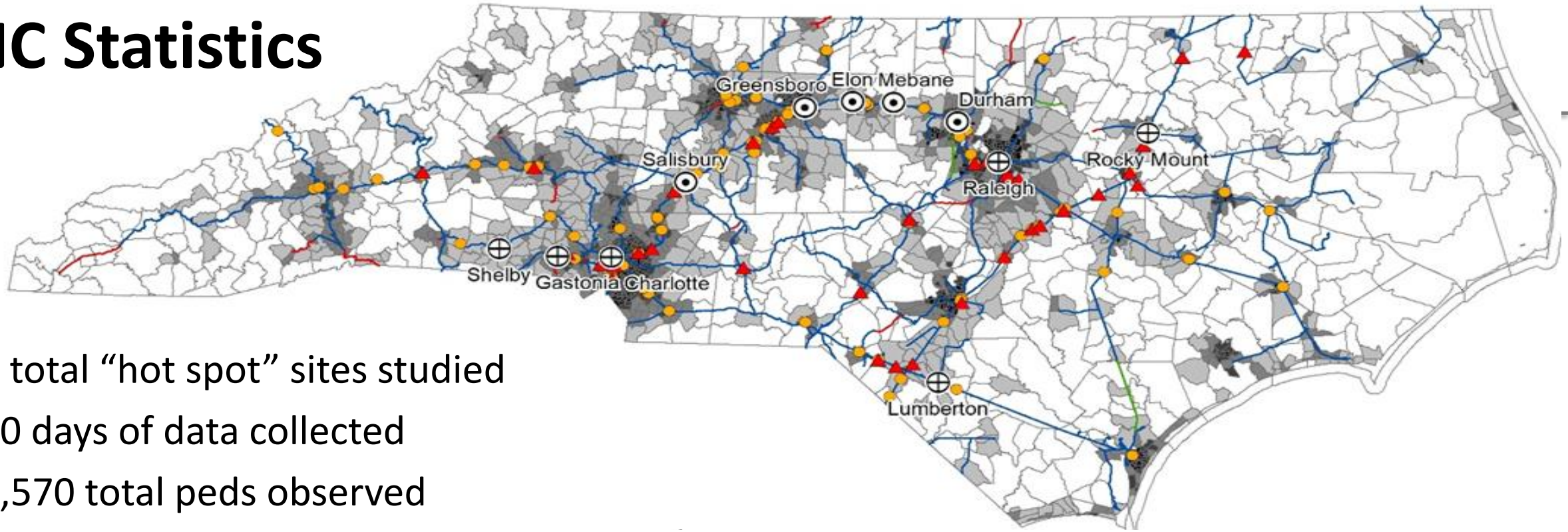
Sampling Plan

- Review of FRA trespasser incident data for rail networks of interest
- Train crew surveys
- Identify “hot spot” locations for static camera detection
- Review of environmental context (e.g. “goat paths” at shortest routes to attractors)

At least one complete week (7 days) of 24/7 data for each season for each site.

- Winter (Jan., Feb., Mar.)
- Spring (Apr., May, Jun.)
- Summer (Jul., Aug., Sept.)
- Fall (Oct., Nov. Dec.)

NC Statistics



- 11 total “hot spot” sites studied
- 680 days of data collected
- 15,570 total peds observed
- Avg. of 23 peds/day in Rail ROW
- Median time for peds in the path of a train = 3 secs
- 100 near miss interactions
- 65% single ped. events

2013-2017 FRA Trespass Incidents (Fatalities + Injuries)

- Crossing Incidents (Highway-Rail Collision/Impact)
- Non-Crossing Incidents

North Carolina Railroad Track Status

- Active
- Inactive
- Preserved Corridor

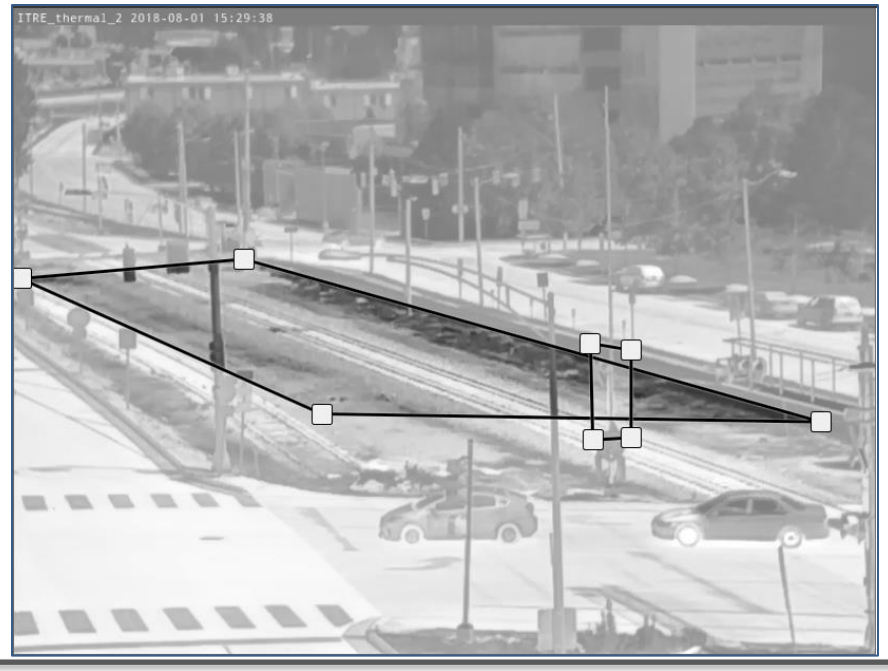
2010 U.S. Census - Total Population by Census Tract

People per Square Mile

- 2,224 - 12,920
- 968 - 2,223
- 352 - 967
- 117 - 351
- 0 - 116

- 2017-2018 Study Locations on the Piedmont Corridor
- 2019-2020 Study Locations on the Wider Railroad Network

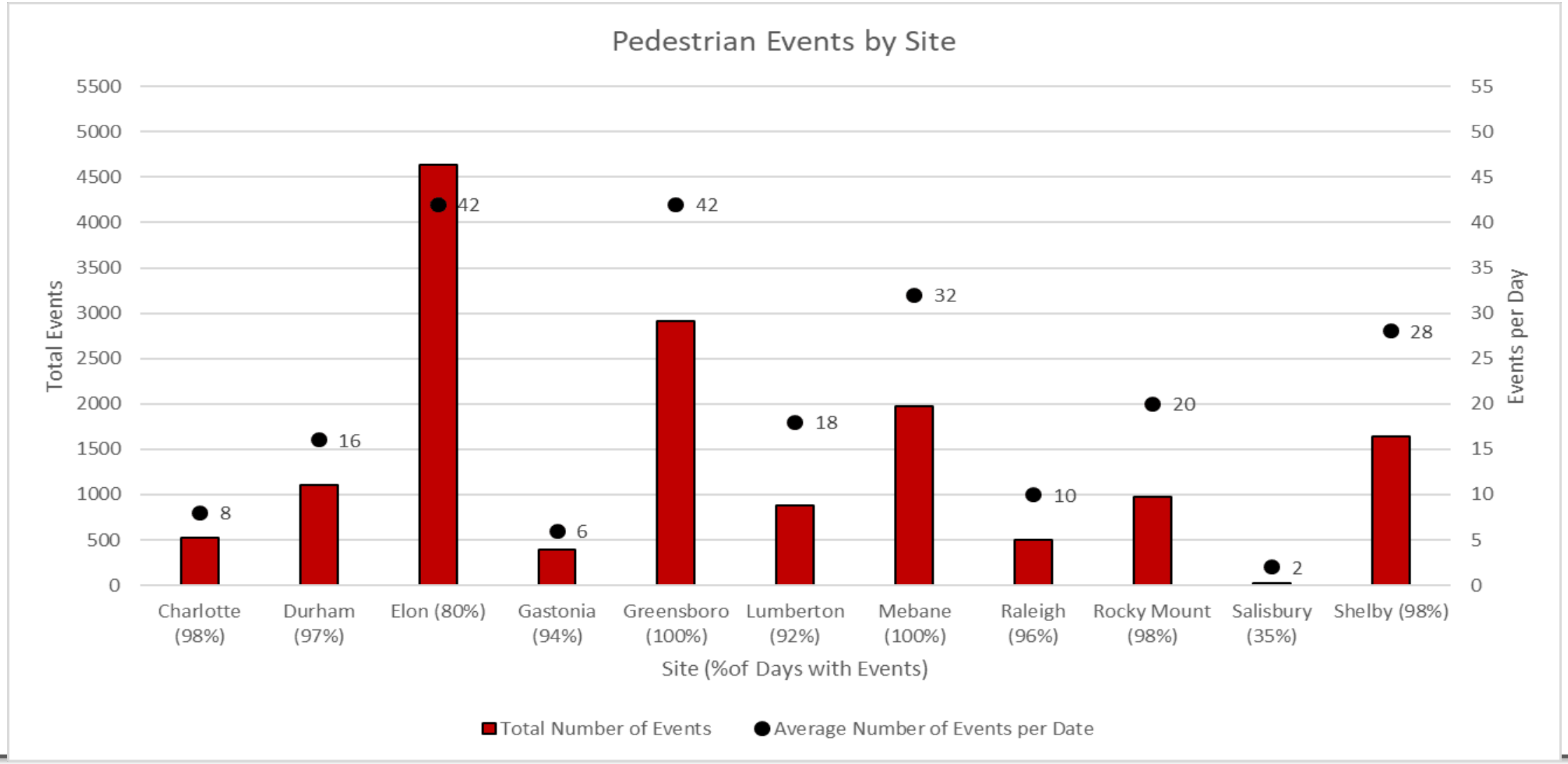
Example Surveillance



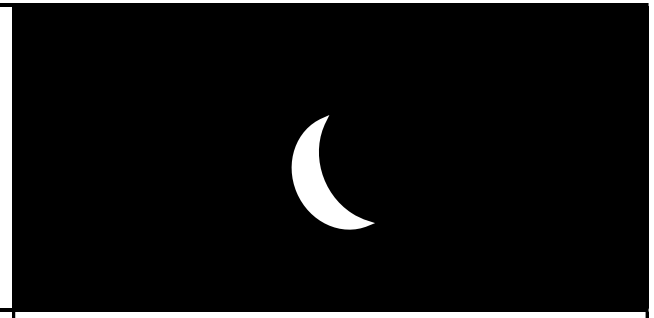
Trespassing Event Examples – Greensboro, NC #1

Trespassing Event Examples – Greensboro, NC #2

Observed Peds in Rail ROW by Location



Time-of-Day

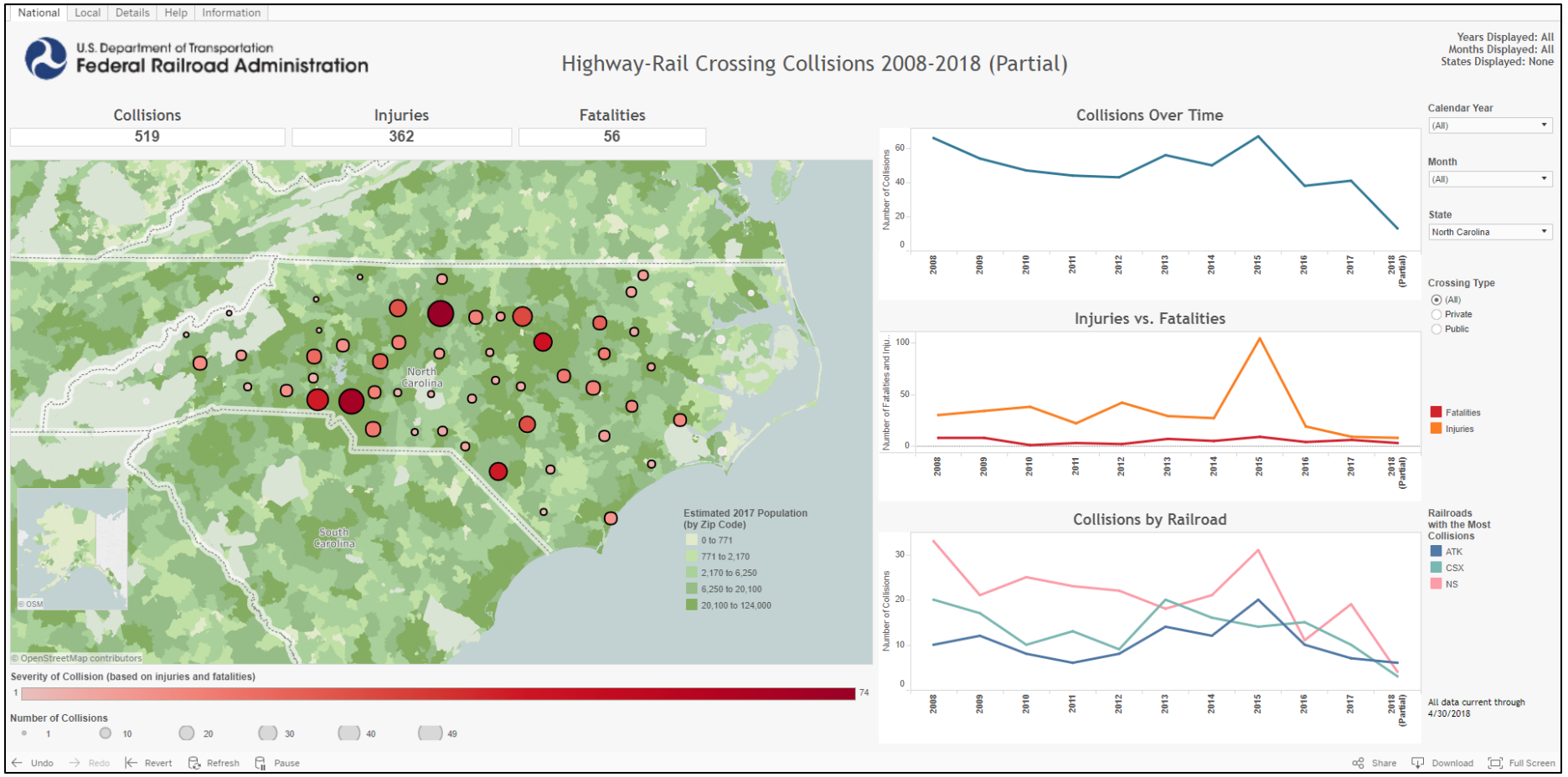
Site				
	6:00-11:00	11:00-4:00	4:00-9:00	9:00-6:00
Charlotte	26%	31%	35%	8%
Durham	22%	38%	27%	13%
Elon	8%	18%	25%	48%
Gastonia	29%	35%	20%	15%
Greensboro	31%	29%	24%	16%
Lumberton	37%	33%	19%	11%
Mebane	24%	37%	32%	7%
Raleigh	21%	47%	26%	6%
Rocky Mount	23%	32%	29%	15%
Salisbury	11%	39%	25%	25%
Shelby	22%	28%	37%	13%

Estimating the Problem

- $EAD = 55.84(PNV) + 63.03(BDLIH) - 26.69(BDR) + 7.05(BDSS) + 20.98$
  - EAD – Estimated Average Daily Events (pedestrians/day)
  - PNV – Percent w/ No Vehicle that Walk to Work
  - BDLIH – Business Density in Low Income Housing (per 1,000 people)
  - BDR – Business Density (Retail Food, Grocers, Convenience) (per 1,000 people)
  - BDSS – Business Density (Social Services) (per 1,000 people)
- This model has been shown to be within 6.3 events of the average observed during the study

Develop Visualization Tools

- Develop Visualization Tool



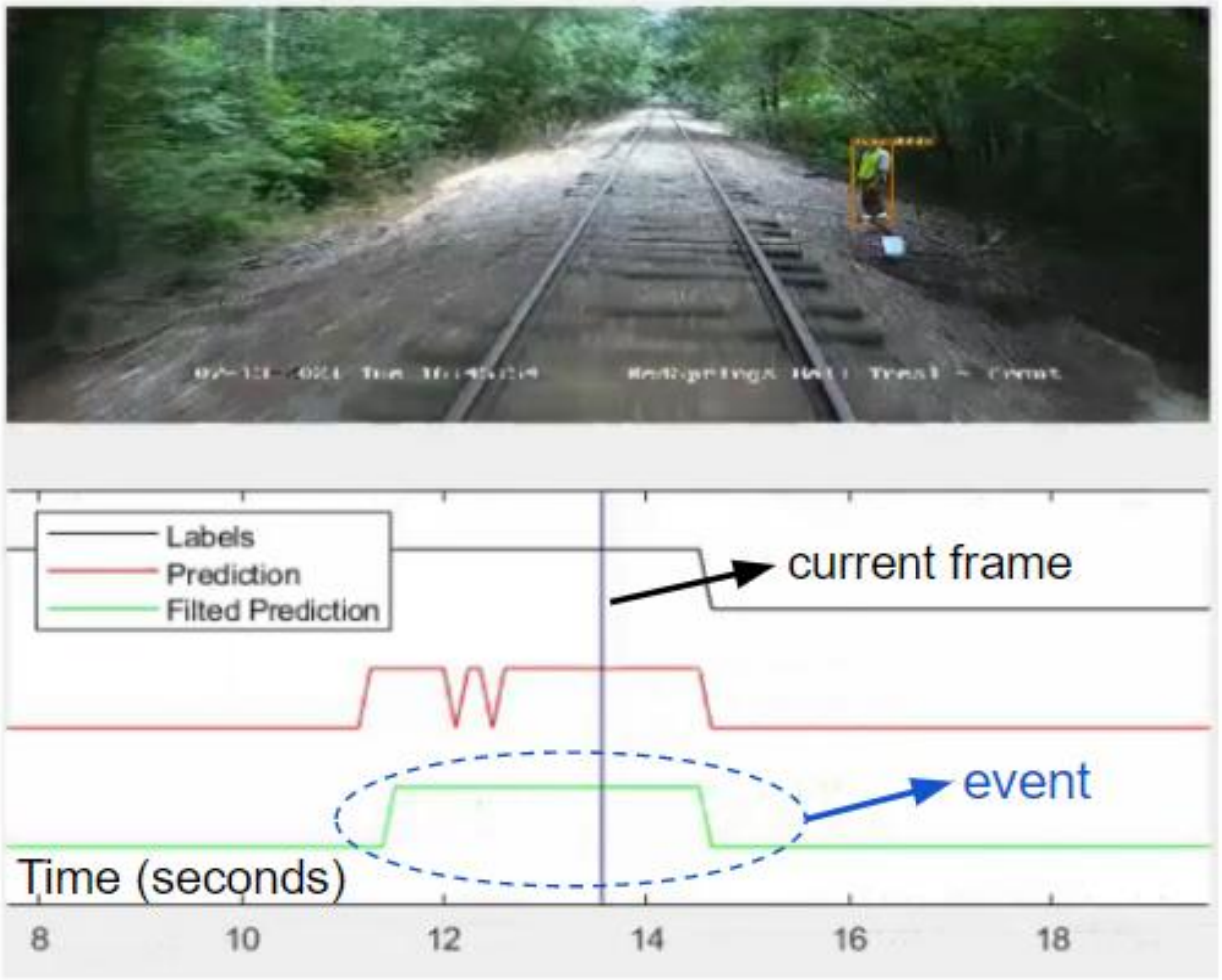
Dynamic Camera System Pilot – Star, NC

- ACW, RS&N, and BLU

Staged Events for Testing (ACW w/ High Rail)

Staged Events for Testing (RS&N w/ “Speeder)

Machine Learning Algorithm Calibration



Machine Learning Algorithm Calibration

Machine Learning Algorithm Calibration

THANK YOU FOR YOUR ATTENTION!

Grade Crossing Safety and Railroad Trespass Prevention Workshop

Day 1 Session Two

RAIL

MOVING AMERICA FORWARD

Overview of Trespass Prevention Strategies

North Carolina Grade Crossing Safety and Railroad Trespass Prevention Workshop

November 1, 2022

FRA Crossing Safety and Trespass Prevention Research Program

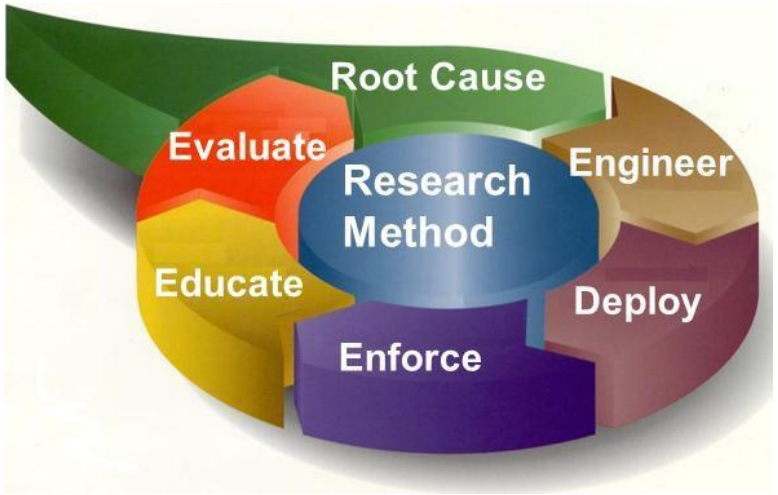
FRA's Office of RD&T conducts research to improve grade crossing (GX) safety and trespass prevention by developing and evaluating human factors and engineering solutions, funding research, and working in partnership with railroads, universities, vendors, and local governments.

Goal

- Analyze crash causation and develop safety countermeasures, programs, and guidance to reduce the number of casualties at grade crossings and along railroad rights-of-way (ROW)

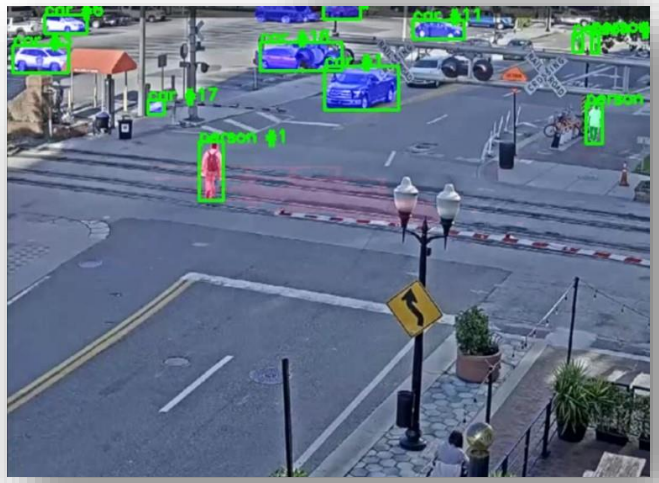
Research Method

- Research the root cause of incidents and fatalities
- Identify corrective actions
  - Engineering, Enforcement, Education
- Engage stakeholders/deploy and evaluate solutions



Rail Trespass Treatments/Countermeasures

- Detection and Warning
- Anti-trespass technologies/treatments
- Education Initiatives
- Enforcement Strategies



Detection and Warning

Fixed Systems

- PTZ cameras, includes a speaker and microphone
- Uses video motion detection as a sensor
- Live video fed into police dispatch center
- Dispatchers can control PTZs and speak to trespassers
- Sensors or Machine Learning (ML) algorithms
- Research Report (2020): https://rosap.ntl.bts.gov/view/dot/50849

Mobile (drone) Systems

- Mobile camera on a drone by the police
- Provide coverage over a significant amount of ROW
- Used to identify and track trespassers in areas of the ROW that are difficult to access by the police.
- Research Report (2020): https://rosap.ntl.bts.gov/view/dot/50848

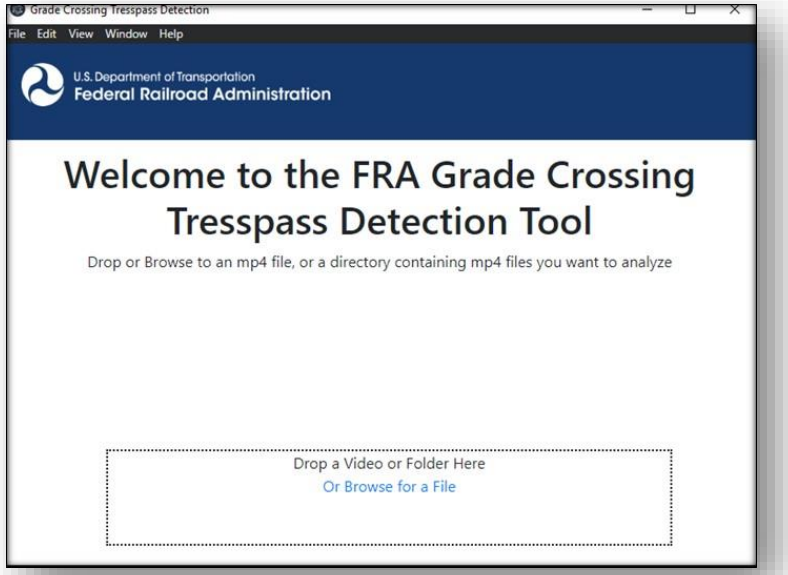
Detection and Warning

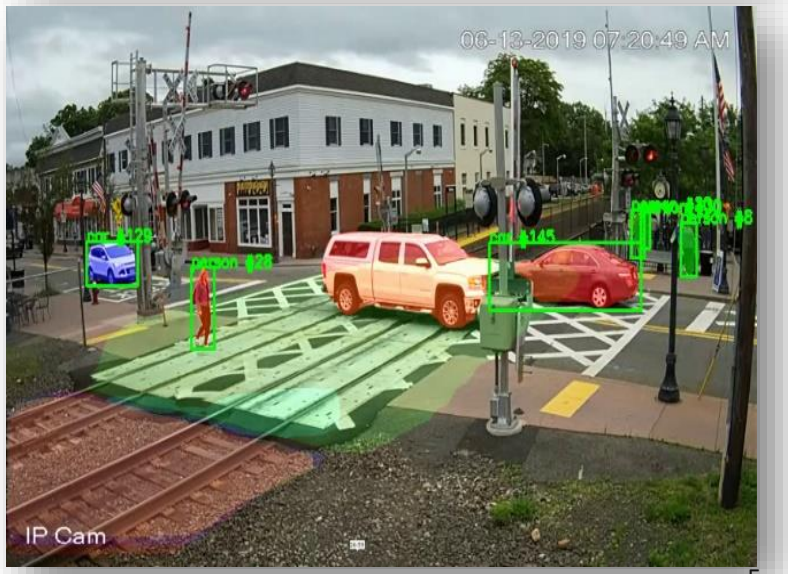
Artificial Intelligence/Machine Learning

- FRA R&D developed Artificial Intelligence–detection algorithms for automated crossing violation and trespass detection
  - Research Results(2022): https://rosap.ntl.bts.gov/view/dot/60606
  - Computer vision tool available for download at https://public.huddle.com/b/jPDLGE/index.html

- Rutgers Artificial Intelligence-Aided Railroad Trespassing Detection Tool
  - Funded by FRA and FTA grants
  - Tested in New Jersey, Virginia, North Carolina, Connecticut, Massachusetts, and Louisiana

- NC State University research for NCDOT
  - Train-mounted camera system
  - Research Report (2019): Pedestrian Incident Detection in the Rail Right-of-Way using Artificial Intelligence





Anti-Trespass Technologies/Treatments

Non-crossing Locations

- Warning Signs
- Right-of-way Fencing
  - Effect of three countermeasures against the illegal crossing of railway tracks: Fencing reduced trespassing by 94.6 percent, landscaping 91.3 percent and prohibitive signs 30.7 percent
  - High-Security Fencing for Rail Right-of-way Applications Research Report (2015): https://rosap.ntl.bts.gov/view/dot/12237
- Landscaping
- Obstruction removal to increase visibility
- Geofencing
- Grade Separation

Anti-Trespass Technologies/Treatments

At Crossings

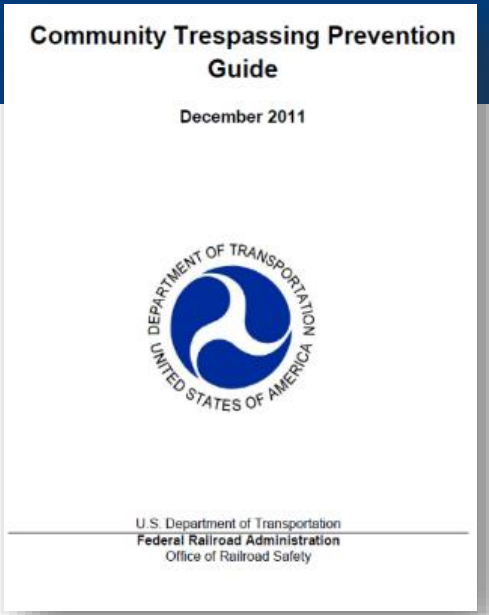
- Anti-Trespass Guard Panels
  - Anti-trespass guard panels reduced the number of pedestrians who trespassed on railroad ROW by 38 percent. (Report 2019: https://rosap.ntl.bts.gov/view/dot/41716)
- Pedestrian Gate Skirts & Channelization
  - 56 percent reduction in pedestrian violations while the gates were descending; 19 percent reduction in pedestrian violations while the gates were horizontal. (Report 2020: https://rosap.ntl.bts.gov/view/dot/53572)
- Right-of-Way Incursion Treatments
  - Pavement markings through the crossing and reflective markers and flexible delineators on both sides and in between the tracks.
  - 85 percent reduction in frequency of vehicles turning onto the tracks in initial study. (Report 2018: https://rosap.ntl.bts.gov/view/dot/37006)

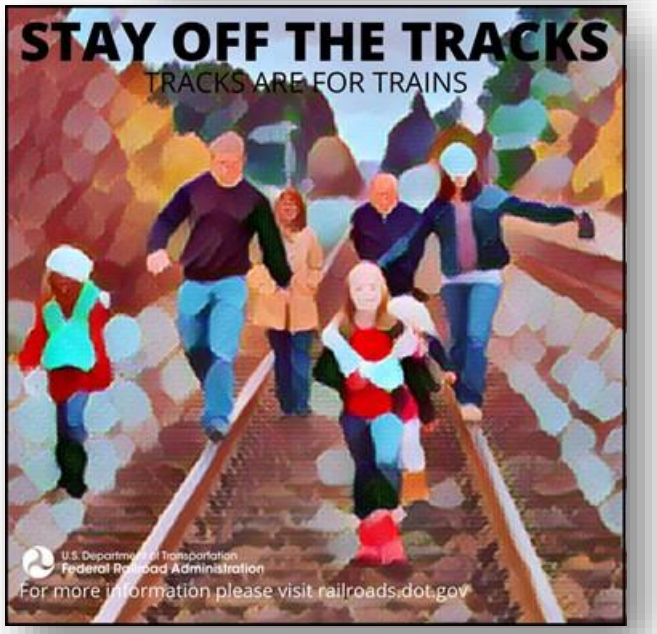
Education Initiatives

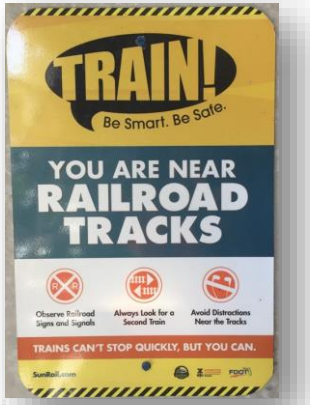
- Community-based collaboration
  - Community Trespassing Prevention Guide (CARE Model)

- Educational events
  - Physical events
  - Traditional media campaigns
  - Social media campaigns

- Signage







Enforcement Strategies

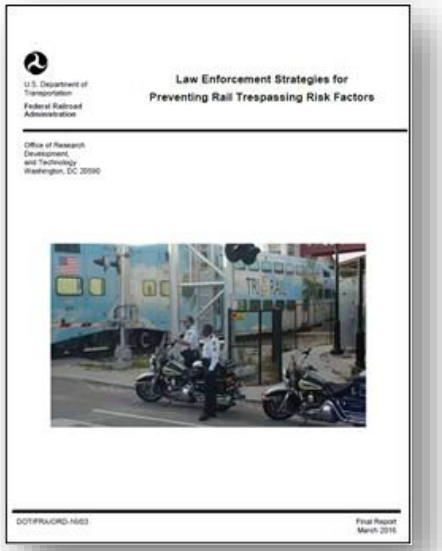
Funding local law enforcement activities intended to reduce trespassing:

- The funded agencies perform rail trespassing enforcement– related activities and report those activities and associated benefits to FRA.
- Resulted from FRA R&D Pilot Project 2018-2019, from research need identified at the 2015 FRA Trespass Workshop.

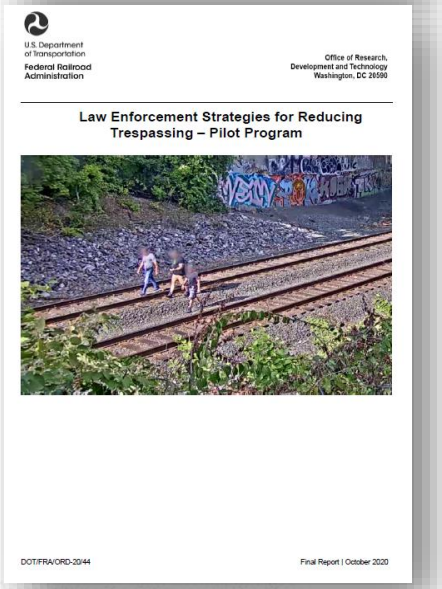
Year	Funding	# Grantees	# States	# contacts	Warning/Citations	Arrests
2018-2019 (R&D pilot)	$196,357	4	3	510	123	115
2020	$528,028	11	8	>4,000	3,500	1,200
2021*	$2,163,376	25	15	Ongoing	Ongoing	Ongoing

**2021 program included $1,956,376 for railroad trespassing enforcement and $207,000 specifically for railroad trespassing suicide prevention (announced in June 2022)*

Enforcement Strategies



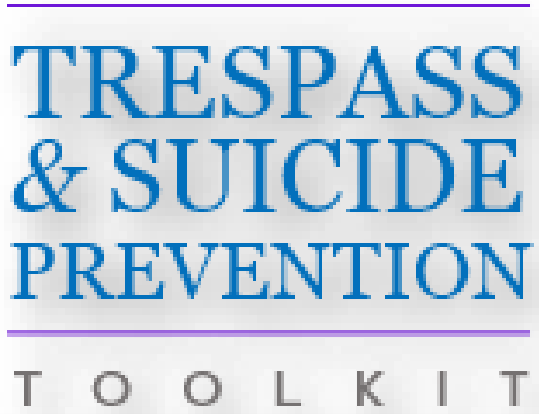
Law Enforcement Strategies for Preventing Rail Trespassing Research Report (2016): https://rosap.ntl.bts.gov/view/dot/12258



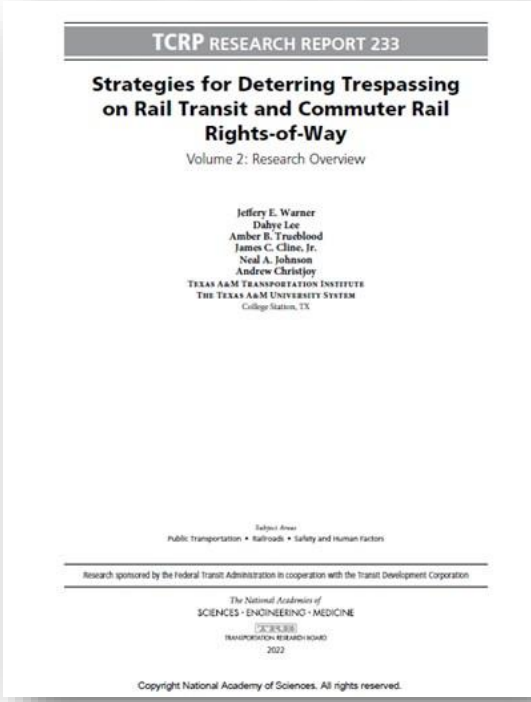
Law Enforcement Strategies for Reducing Trespassing Pilot Grant Program Results (2020): https://rosap.ntl.bts.gov/view/dot/53546

Additional Resources

FRA Trespass & Suicide Prevention Toolkit (2022): https://trespasstoolkit.fra.dot.gov/



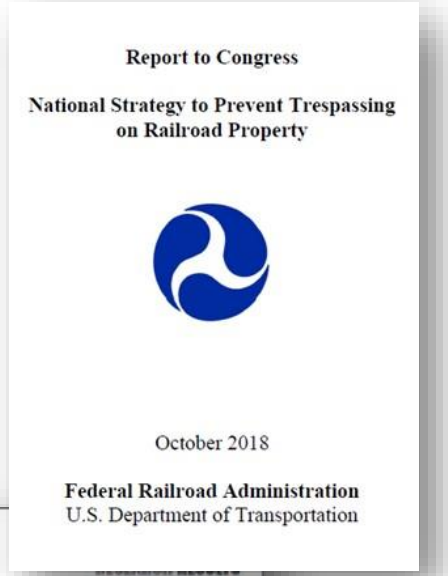
TCRP Research Report 233 (2022): Strategies for Deterring Trespassing on Rail Transit and Commuter Rail Rights-of-Way

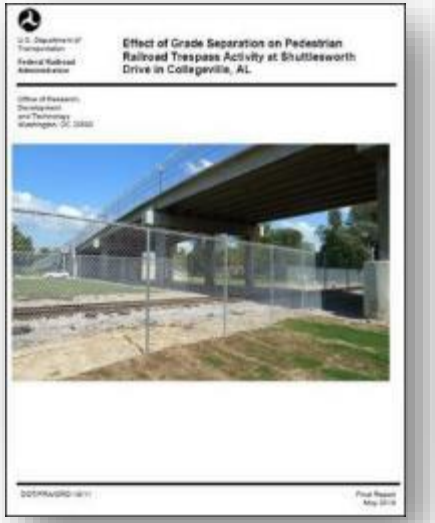


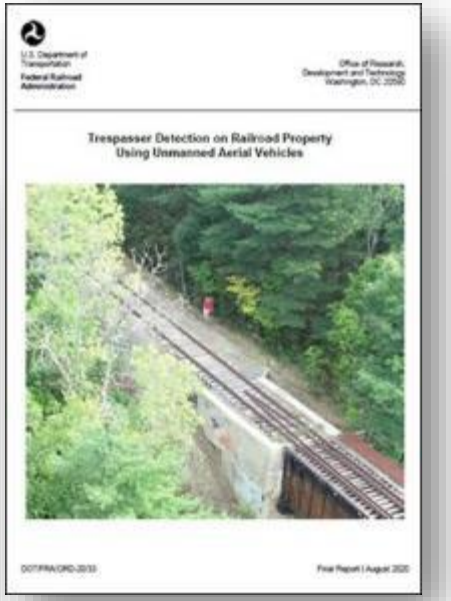
FRA References

- FRA's National Strategy for Trespass Prevention on Railroad Property (2018): https://www.fra.dot.gov/eLib/Details/L19817

- FRA Research Repository: https://railroads.dot.gov/elibrary-search







Contact

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NORTH CAROLINA
Department of Transportation

Strategies for Deterring Trespassing on Rail Rights of Way

Grade Crossing Safety and Railroad Trespass Prevention Workshop

Jahmal Pullen, PE
Engineering Coord. & Safety Manager
NCDOT – Rail Division

November 1, 2022

Connecting people, products and places safely and efficiently with customer focus, accountability and environmental sensitivity to enhance the economy and vitality of North Carolina

Overview

- Transportation Research Board
  - Intent was to document strategies to deter trespassing on transit and commuter rail rights of way
  - Develop guidebook to help evaluate potential alternatives
  - Panel started in early 2019
- Project was awarded to Texas A&M Transportation Institute (TTI)
  Jeff Warner served as TTI's project manager

Introductory Video

Promotional Video Link

Presentation Outline

- Part 1 – Project Objective and Overview
- Part 2 – Case Study Findings
- Part 3 – Countermeasure Strategies and Selection Guidance

Part 1 – Project Objective

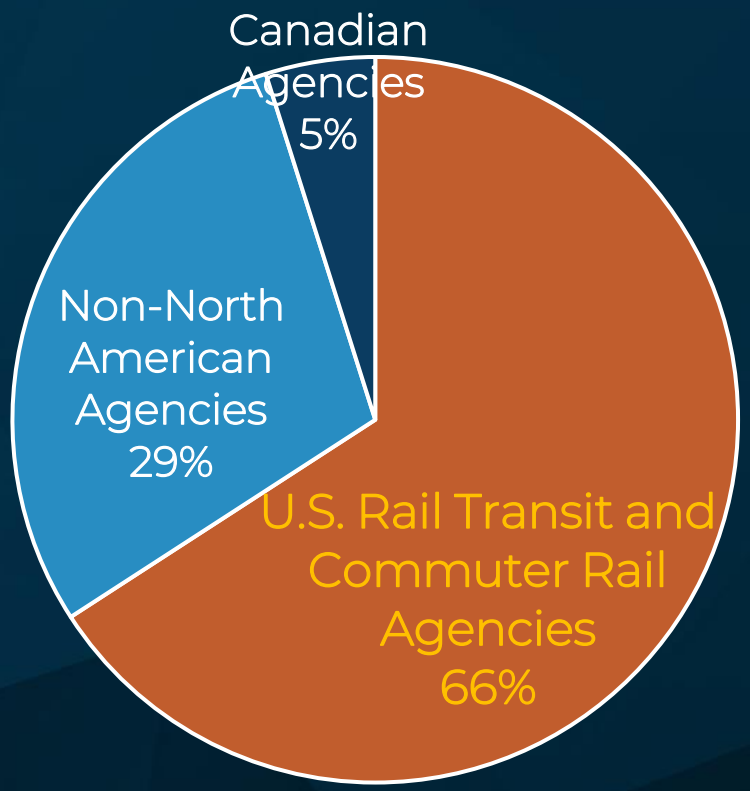
To provide guidance on strategies to deter trespassing on rail transit and commuter rail rights of way in exclusive and semi-exclusive rights-of-way, including within station areas outside designated pedestrian crossings.

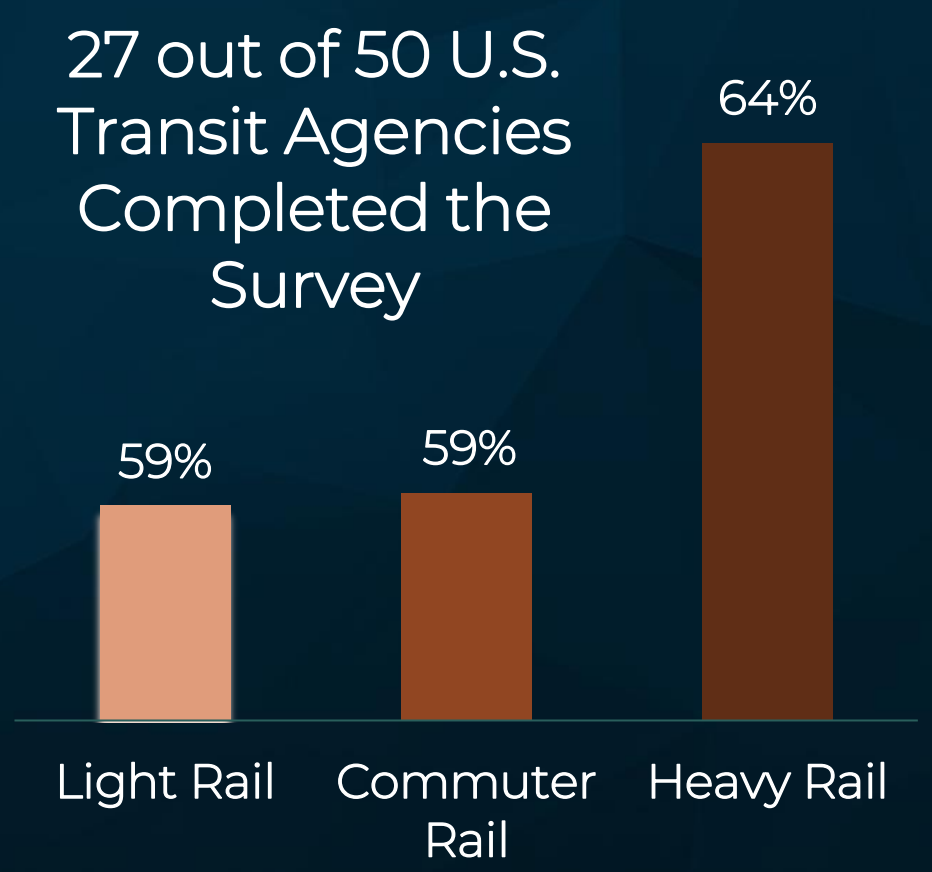
Project Activities Overview

Literature Review and Survey of Practitioners

- Literature Review & Current Practices
  - Main objectives to capture strategies to deter trespassing and document current applications of these strategies
- Survey of Practitioners
  - Main objectives to catalog practices to mitigate trespassing and understand trespassing concerns and issues

Survey Respondents





* 41 Unique Agencies or Locations Identified from the Survey Responses

Case Studies

Case Studies

U.S. Agencies

- Planned: 4 in-person case studies
- Adjusted: 5 virtual case studies

Non-North American

- Planned: 1 virtual case study
- Adjusted: 2 virtual case studies

Secondary Case Studies

- Fill gaps of understanding
- Discuss specific topics

Case Studies

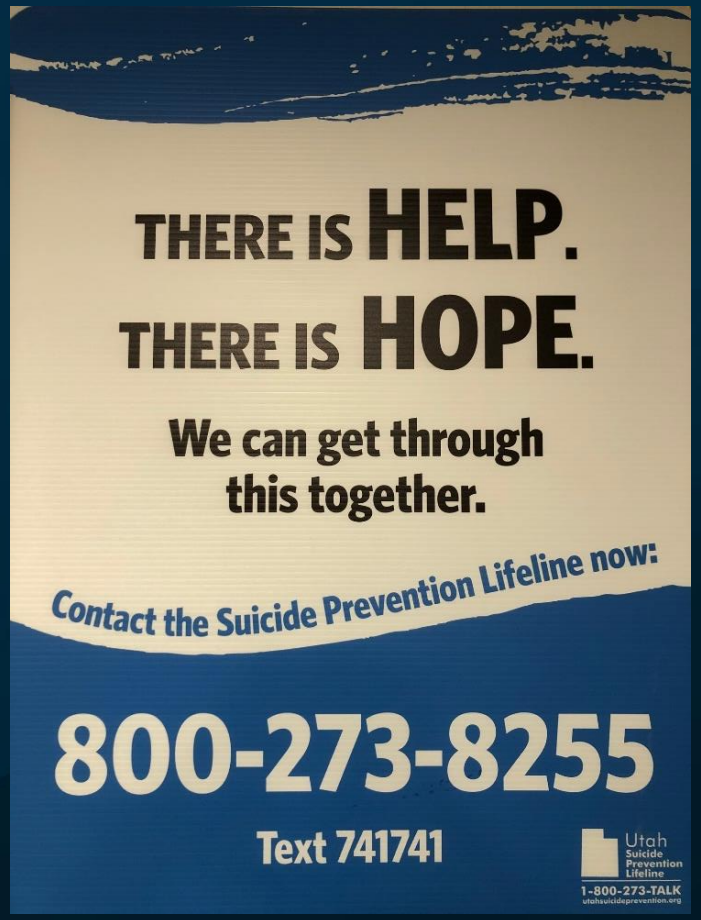
- U.S. Case Studies
    1. MTA – Baltimore, MD → Light Rail, Heavy Rail and Commuter Rail
    2. MTA Metro North – New York, NY → Commuter Rail
    3. UTA – Salt Lake City, UT → Light Rail and Commuter Rail
    4. DART – Dallas, TX → Light Rail and Commuter Rail
    5. LA Metro – Los Angeles, CA → Light Rail and Heavy Rail

- Non-North American Case Studies
    1. ProRail – The Netherlands → Commuter Rail
    2. London Underground – United Kingdom → Heavy Rail

Part 2 - Case Study Findings

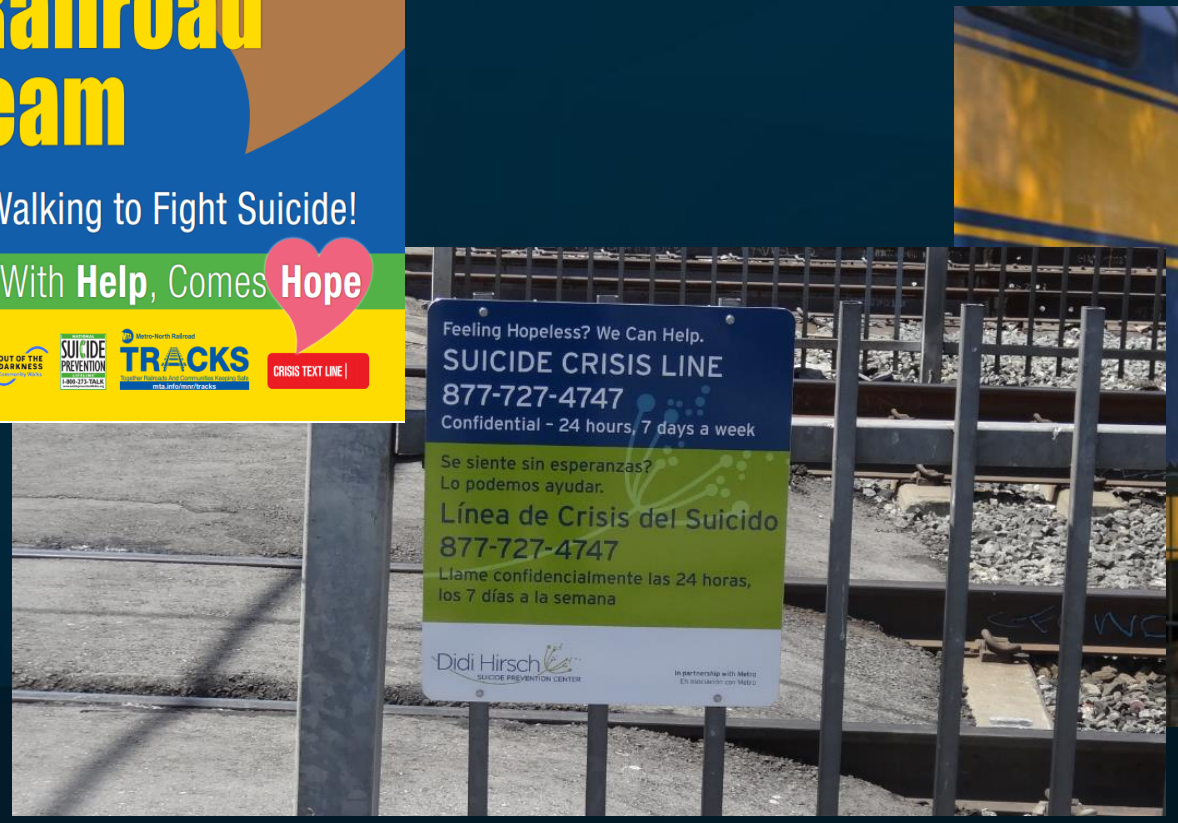
- Several new countermeasures identified during case studies not found in literature review or surveys
- False positives are a major hinderance to technology implementation
  - Several noted removal of applications due to false positives
- Much stronger belief that agencies have role in reducing suicides
- Significant effort training employees to recognize suicidal behavior

Utah – Hope Poles



Suicide Crisis Lines and Messaging

"I'm Listening"



London Underground

Thrive LDN
towards happier, healthier lives

It's OK to not feel OK

Feeling worried or stressed is normal during challenging times. However, it is really important that we take care of our mental health and wellbeing as much as possible.

This is a pack of little things you can do to keep yourself well and some useful ways to get support if you are finding it hard. Don't be afraid to ask for help if you need it.

> Be kind to yourself, find time to do something you enjoy.

> Connect with others, by phone, text, social media, write a letter or smile at your neighbours.

> Find different ways of staying active.

> Support is available to help you manage debt and money worries.

> Help is available if you are in personal difficulty or experiencing low income.

> Help is available if you are not OK.

Things can feel very hard at times. Support is available for whatever you are going through, there is hope and you are not alone.

These helplines are free and confidential:

Samaritans: 116 123
Whatever problems you are facing Samaritans are there to listen

SHOUT: Text Shout to 85258
Text service for support with any mental health concern (it will not show up on your bill)

CRUSE: 0808 808 1677
Support and advice if you are grieving or dealing with bereavement and loss of a loved one

If you find yourself in urgent financial or personal need, there is support and information available for you.

Turn2us: 0808 802 2000
Advice with accessing crisis grants, welfare benefits and where to find debt help

Shelter: 0808 800 4444 (free helpline) or 0344 515 1540 (London helpline, charges may apply) Advice after a sudden drop in income, including housing and household bills

The Trussell Trust: 0808 208 2138
Advice when facing financial difficulties, as well as helping you find your local foodbank for an emergency food parcel

If you are worried about money or need free, impartial advice, there is support available.

Debt Free London: 0800 808 5700
Call or WhatsApp message for assistance on a wide range of issues, including council tax, rent arrears, utility bills and benefit overpayments.

Christians Against Poverty: 0800 328 0006
Advice on budgeting and debt support, regardless of your faith or background.

Being active reduces stress and helps us sleep better.

If you have access to a garden or it is safe for you to visit your local park, then get some fresh air, go for at least a 20-minute walk or a run.

If getting out and moving around is not easy or possible for you, keep moving about indoors as often or as much as you can.

Having an exercise routine which you can do at home or locally outdoors is really important and will help give a positive influence on our self-esteem and self-worth.

Many of us are seeing family and friends less and not taking part in many of our usual activities.

It's important that we stay connected. Get in touch with family and friends to share your thoughts and have a chat.

If talking to a friendly stranger is easier, you can call **Samaritans** on **116 123** – a free helpline for you to talk any time you like, in your own way, about whatever's getting to you.

If you're online, the NHS website always has the latest information to keep you up to date at **nhs.uk/coronavirus**

It's OK to treat yourself to the things that make you smile and make you feel good.

Don't be hard on yourself. Make yourself a hot drink, watch a film, read a book, or try a crossword.

You may want to limit your intake of daily news as too much coverage can be overwhelming and make you stressed.

If you are online, visit **www.good-thinking.uk** for free, NHS approved digital tools to help manage anxiety, low mood, sleeping problems and stress.

Thrive LDN is a partnership between London's NHS, public services, the Mayor of London, councils, and charities to promote better mental health for everyone. We need to think and talk more about mental health and wellbeing in our neighbourhoods, our family and friendship groups and at work.

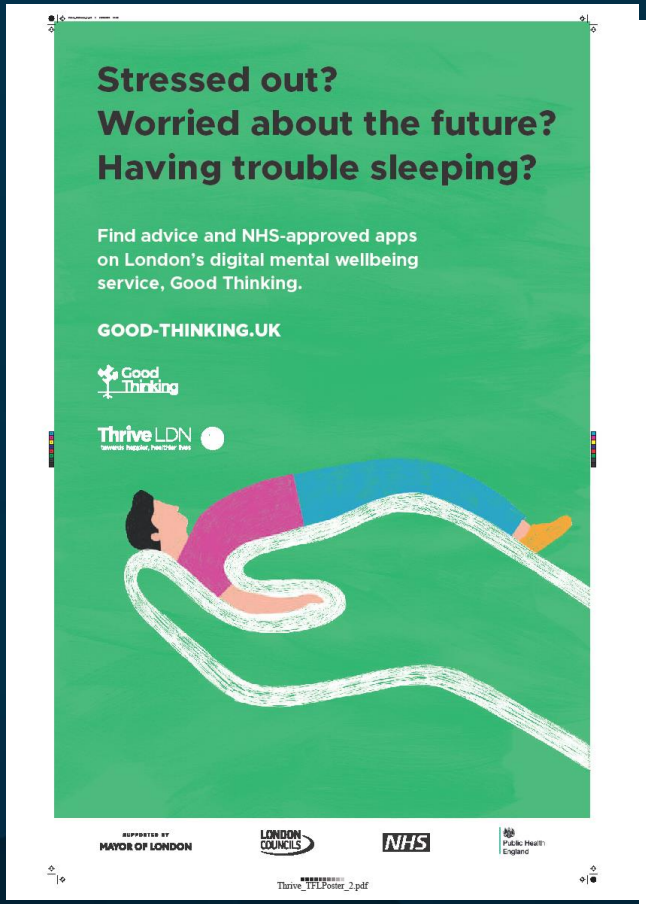
Find more Thrive LDN resources online:
www.thriveldn.co.uk/resources

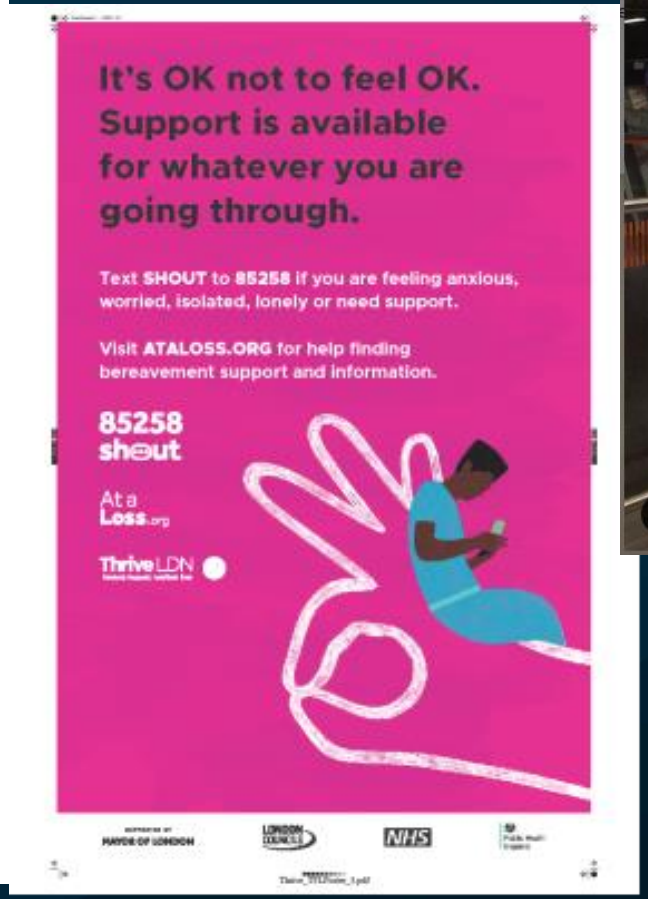
@ThriveLDN

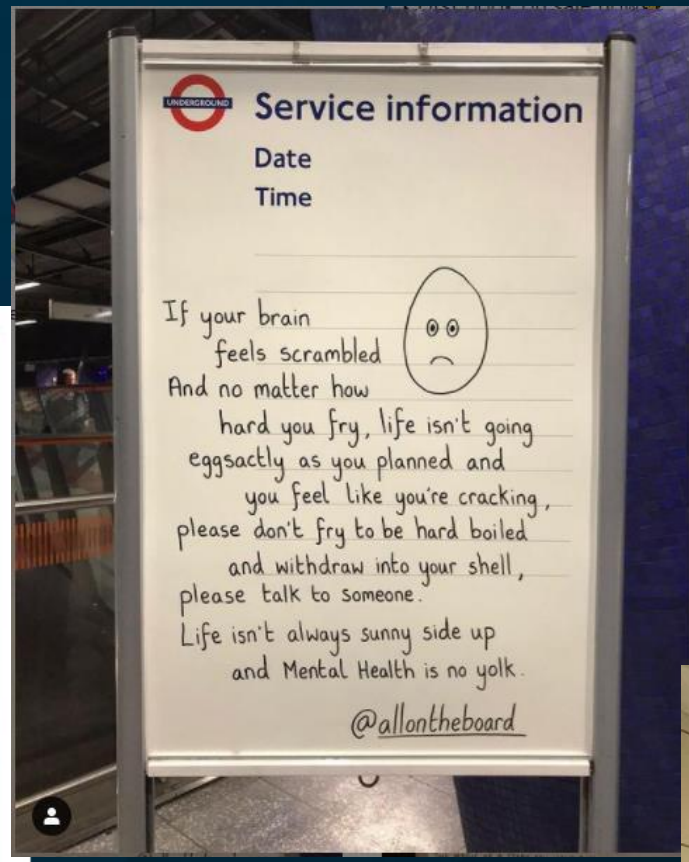
Scan me if you have a smart phone

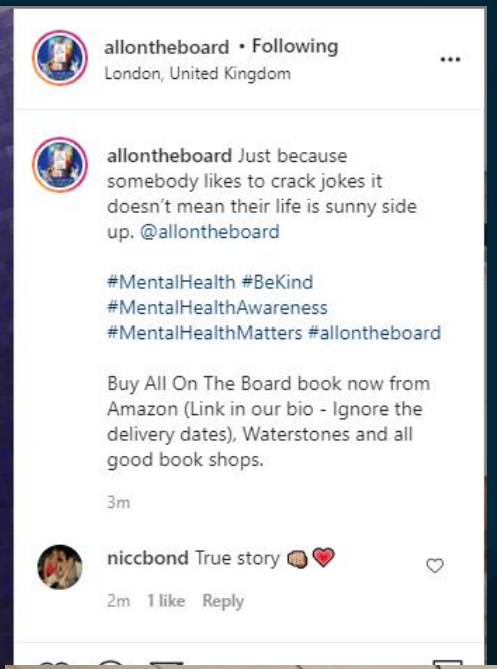
ncdot.gov

London Underground

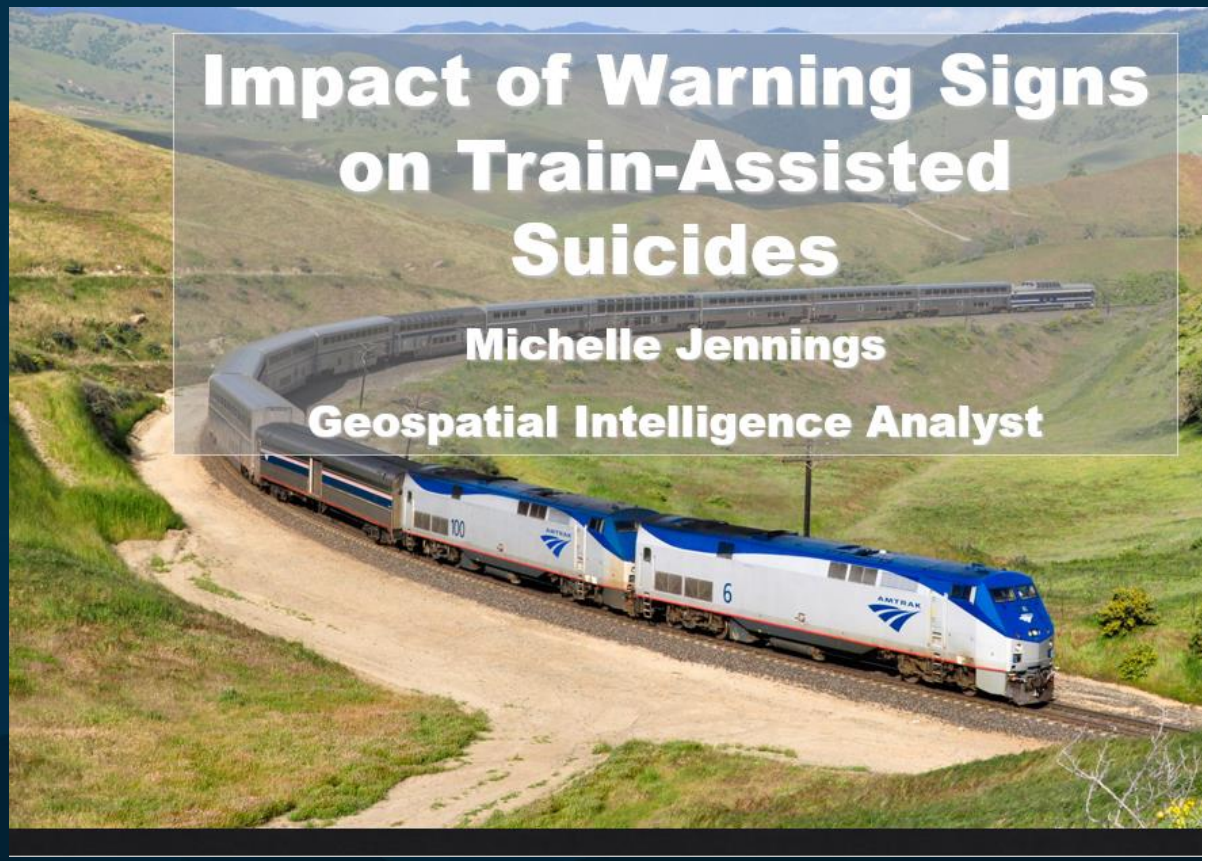


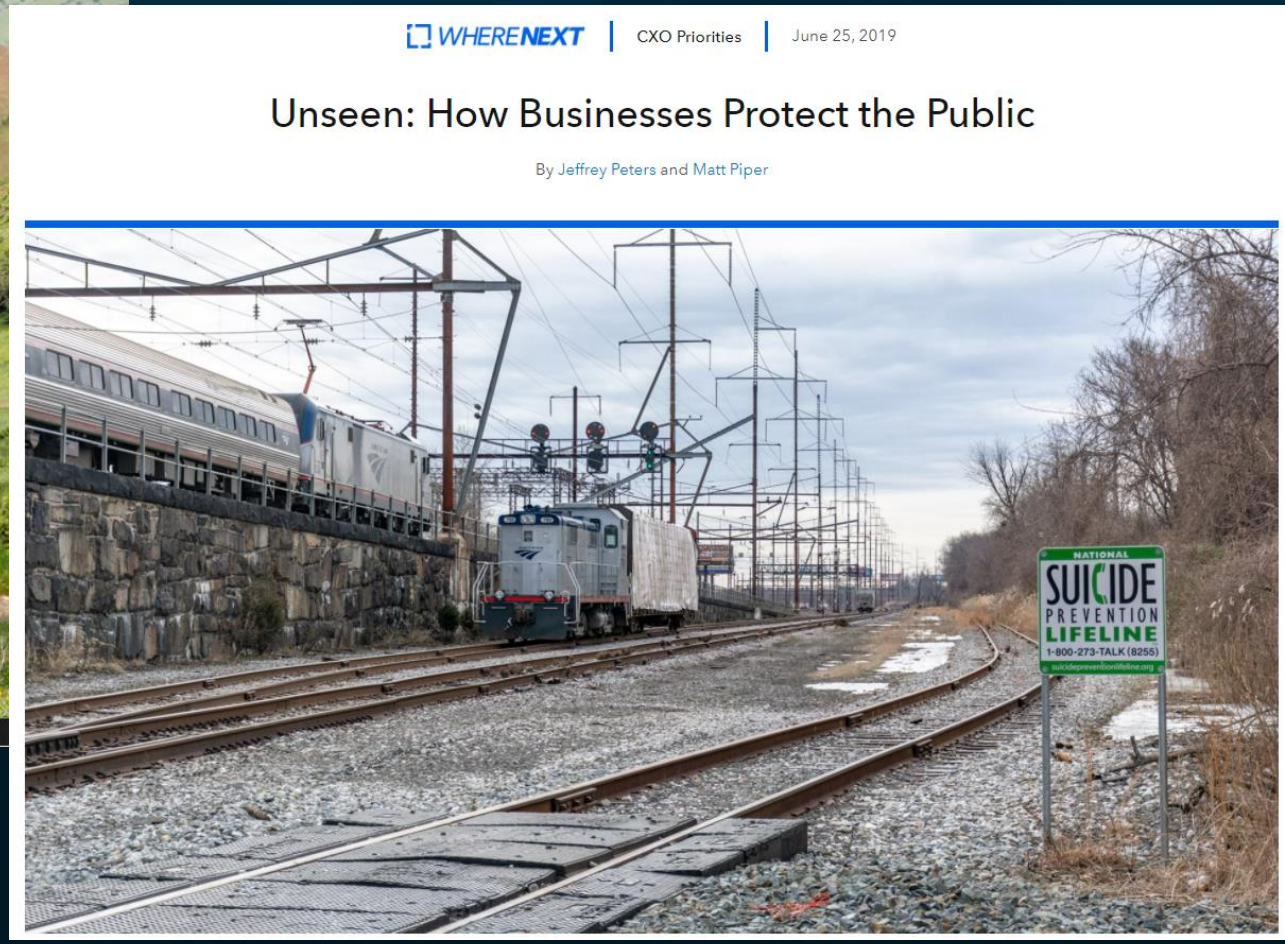






Amtrak – Data Analytics

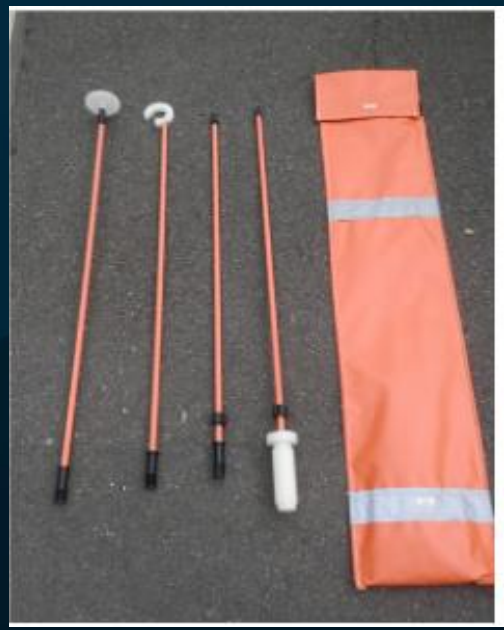




Part 3 – Countermeasure Strategies and Selection Guidance

14 Countermeasure Strategies Grouped into Three Categories:

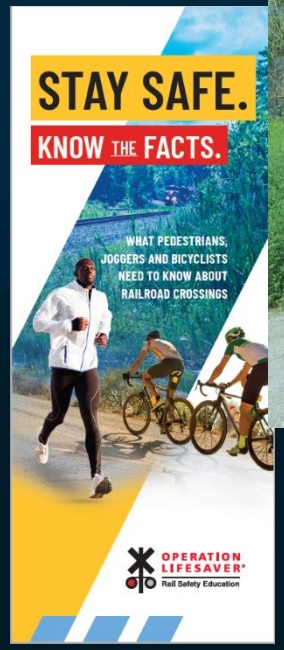
1. Engineering and Physical Measures
   - Fencing, channelization, and barriers
   - Landscaping
   - Anti-trespassing guard panels
   - Platform screen doors
   - Surveillance and detection
   - Lighting
   - Approaching train alerts
   - Track retrieval device

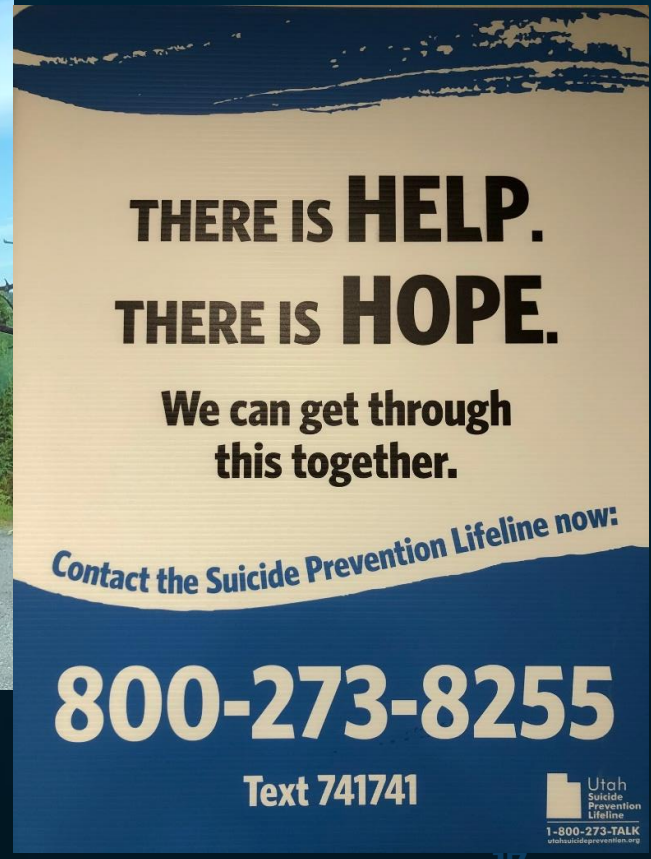


Trespassing Countermeasure Strategies

14 Countermeasure Strategies Grouped into Three Categories:

2. Education and Engagement
   - Signage
   - Community-based collaboration
   - Public and industry events/campaigns
   - Employee intervention training
   - Hope Poles
3. Enforcement
   - Law enforcement and patrol





Ease of Implementation Table

Tier 1—Strategies that are easiest and fastest to implement at low operating and capital costs
• Track retrieval device
• Signage
• Hope Poles
Tier 2—Strategies that are easiest to implement but typically involve some operating costs or coordination with outside entities (often administrative)
• Community-based collaboration
• Public and industry events/campaigns
• Employee intervention training
• Law enforcement and patrol
Tier 3—Strategies that require longer lead time and typically involve higher operating costs and/or capital costs
• Fencing, channelization, and barriers
• Landscaping
• Anti-trespass guard panels
• Lighting
Tier 4—Strategies that require complex implementation, highest costs, and complex maintenance activities
• Platform screen doors (typically considered for heavy rail only)
• Surveillance and detection
• Approaching train alerts

Countermeasure Summary Matrix

Category	Countermeasure	Rail System Type	Problem Location	Costs	Type of Trespassing Addressed	Target Root Cause	Companion Countermeasure	Ease of Implementation	Benefit-Cost Tradeoffs
Engineering and Physical Measures	Fencing, Channelization, and Barriers	Light (L), Heavy (H), Commuter (C)	• Rights-of-way • Equipment and maintenance yards • Stations and platforms	$–$$$	Trespassing (T), Suicide (S)	• Living/Loitering in Right-of-Way (ROW) • Self-Harm Intent • Shortcut/Route Convenience • Criminal Behavior • Other	• Landscaping • Anti-trespass Guard Panels • Surveillance and Detection • Approaching Train Alerts • Signage • Community-Based Collaboration • Law Enforcement and Patrol	Tier 3	• May not have issues with cutting or scaling if made with the heavy metal of smaller mesh size. • Can be installed at most of the rights-of-way, but some areas are not designed for fencing. • Regular inspection and maintenance are needed, especially for regular fencing systems.
Engineering and Physical Measures	Landscaping	L, H, C	• Rights-of-way • Stations and platforms	$	T	• Shortcut/Route Convenience • Other	• Fencing, Channelization, and Barriers	Tier 3	• Visibility can be improved with vegetation management and removal. • However, removing vegetation could increase the need to install fencing or other barriers.
Engineering and Physical Measures	Anti-trespass Guard Panels	L, H, C	• Rights-of-way • Equipment and maintenance yards • Stations and platforms	$	T	• Living/Loitering in ROW • Shortcut/Route Convenience • Criminal Behavior • Other	• Fencing, Channelization, and Barriers • Surveillance and Detection • Lighting • Signage	Tier 3	• Provides a ground-level physical barrier that can deter trespassing. • Panels could prevent railroad employees from accessing the rights-of-way or trap trespassers on the right-of-way.

Interactive Spreadsheet

Rail System Type	Problem Location	Type of Trespassing Addressed	Target Root Cause	Ease of Implementation
Commuter Rail	Equipment and maintenance yards	Suicide	Criminal Behavior	Tier 1
Heavy Rail	Non-specific	Trespassing	Living/Loitering in ROW	Tier 2
Light Rail	Rights-of-way		Lost/Dropped Items	Tier 3
	Stations and platforms		Other	Tier 4
			Self-harm Intent	
			Shortcut/Route Convenience	

Category	Countermeasure	Costs	Companion Countermeasure	Ease of Implementation
Engineering and Physical Measures	Fencing, Channelization, and Barriers	$-$$$	Landscaping;Anti-Trespass Guard Panels;Surveillance and Detection;Approaching Train Alerts;Signage;Community-based Collaboration;Law Enforcement and Patrol	Tier 3
	Landscaping	$	Fencing, Channelization, and Barriers	Tier 3
	Anti-trespass guard panels	$	Fencing, Channelization, and Barriers;Surveillance and Detection;Lighting;Signage	Tier 3
	Platform Screen Doors (PSDs)	$$$	Surveillance and Detection;Approaching Train Alerts	Tier 4
	Surveillance and Detection	$$-$$$	Fencing, Channelization, and Barriers;Anti-Trespass Guard Panels;Platform Screen Doors;Lighting;Employee Intervention Training;Hope Poles;Law Enforcement and Patrol	Tier 4
	Lighting	$	Anti-Trespass Guard Panels;Surveillance and Detection;Hope Poles	Tier 3
	Approaching Train Alerts	$$	Fencing, Channelization, and Barriers;Platform Screen Doors	Tier 4
	Track Retrieval Device	$	Signage;Community-based Collaboration;Public and Industry Events/Campaign	Tier 1
Education and Engagement	Signage	$	Fencing, Channelization, and Barriers;Anti-Trespass Guard Panels;Track Retrieval Device;Community-based Collaboration;Public and Industry Events/Campaigns;Hope Poles;Law Enforcement and Patrol	Tier 1
	Community-Based Collaboration	$	Fencing, Channelization, and Barriers;Track Retrieval Device;Signage;Public and Industry Events/Campaigns;Law Enforcement and Patrol	Tier 2
	Public and Industry Events/Campaigns	$	Track Retrieval Device;Signage;Community-based Collaboration;Law Enforcement and Patrol	Tier 2
	Employee Intervention Training	$	Surveillance and Detection	Tier 2
	Hope Poles	$	Surveillance and Detection;Lighting;Signage	Tier 1
Enforcement	Law Enforcement and Patrol	$	Fencing, Channelization, and Barriers;Surveillance and Detection;Signage;Community-based Collaboration;Public and Industry Events/Campaigns	Tier 2

Interactive Spreadsheet – Scenario A

Rail System Type	Problem Location	Type of Trespassing Addressed	Target Root Cause	Ease of Implementation
Commuter Rail	Equipment and maintenance yards	Suicide	Criminal Behavior	Tier 1
Heavy Rail	Non-specific	Trespassing	Living/Loitering in ROW	Tier 2
Light Rail	Rights-of-way		Lost/Dropped Items	Tier 3
	Stations and platforms		Other	Tier 4
			Self-harm Intent	
			Shortcut/Route Convenience	

Category	Countermeasure	Costs	Companion Countermeasure	Ease of Implementation
Engineering and Physical Measures	Fencing, Channelization, and Barriers	$-$$$	Landscaping;Anti-Trespass Guard Panels;Surveillance and Detection;Approaching Train Alerts;Signage;Community-based Collaboration;Law Enforcement and Patrol	Tier 3
	Landscaping	$	Fencing, Channelization, and Barriers	Tier 3
	Anti-trespass guard panels	$	Fencing, Channelization, and Barriers;Surveillance and Detection;Lighting;Signage	Tier 3
	Surveillance and Detection	$$-$$$	Fencing, Channelization, and Barriers;Anti-Trespass Guard Panels;Platform Screen Doors;Lighting;Employee Intervention Training;Hope Poles;Law Enforcement and Patrol	Tier 4
	Lighting	$	Anti-Trespass Guard Panels;Surveillance and Detection;Hope Poles	Tier 3
	Approaching Train Alerts	$$	Fencing, Channelization, and Barriers;Platform Screen Doors	Tier 4
Education and Engagement	Signage	$	Fencing, Channelization, and Barriers;Anti-Trespass Guard Panels;Track Retrieval Device;Community-based Collaboration;Public and Industry Events/Campaigns;Hope Poles;Law Enforcement and Patrol	Tier 1
	Community-Based Collaboration	$	Fencing, Channelization, and Barriers;Track Retrieval Device;Signage;Public and Industry Events/Campaigns;Law Enforcement and Patrol	Tier 2
	Public and Industry Events/Campaigns	$	Track Retrieval Device;Signage;Community-based Collaboration;Law Enforcement and Patrol	Tier 2
Enforcement	Law Enforcement and Patrol	$	Fencing, Channelization, and Barriers;Surveillance and Detection;Signage;Community-based Collaboration;Public and Industry Events/Campaigns	Tier 2

Final Project Products

- TCRP Research Report 233
  - Strategies for Deterring Trespassing on Rail Transit and Commuter Rail Rights-of-Way, Volume 1: Guidebook
    (https://www.trb.org/Publications/Blurbs/182672.aspx)
    - Interactive Spreadsheet
    - Video https://vimeo.com/672388271

  - Strategies for Deterring Trespassing on Rail Transit and Commuter Rail Rights-of-Way, Volume 2: Research Overview
    (https://www.trb.org/main/blurbs/182671.aspx)

Special thank you to Jeff Warner for his assistance with this presentation!

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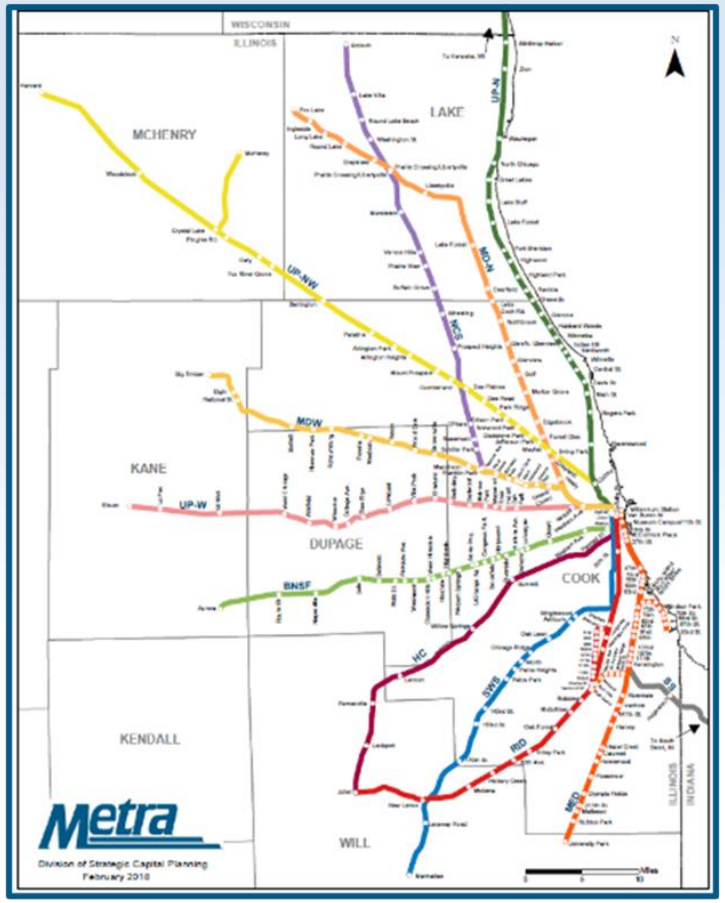
Mental Health & Suicide Awareness
Tresspasser Prevention Initiatives

November 1 - 3, 2022
FRA Grade Crossing Safety and Railroad Trespass Prevention Workshop
Raleigh, North Carolina
Presented by: Hilary E. Konczal
Chief Safety & Environmental Officer

Metra System Overview



METRA BY THE NUMBERS

- 76.1 million passenger trips in 2018
- 692 weekday trains
- 273 Saturday trains
- 181 Sunday trains
- 242 stations
- 1,155 miles of track
- 488 route miles
- 168 locomotives
- 854 diesel passenger railcars
- 186 electric propelled passenger railcars
- 847 bridges
- 565 grade crossings
- 24 rail yards
- 91,000 parking spaces
- 12 electrical substations
- 3 electrical tie stations
- 12 fuel facilities

RISE
RETURN
RECOVER

*Totals may vary due to rounding.
Note: All figures shown are in thousands of dollars.

my Metra

Operational Challenges

- Open System
- Large system
- People use railroad property as a shortcut, taking pictures, etc.
- Limited number of police officers to patrol the system
- Trains travel at speeds up to 79 mph
- It takes a train up to a mile to stop
- Metra interfaces with freight, South Shore (NICTD), and Amtrak trains
- People use trains to end their suffering

RISE
RETURN
RECOVER

*Totals may vary due to rounding.
Note: All figures shown are in thousands of dollars.

Data Collection and Analysis

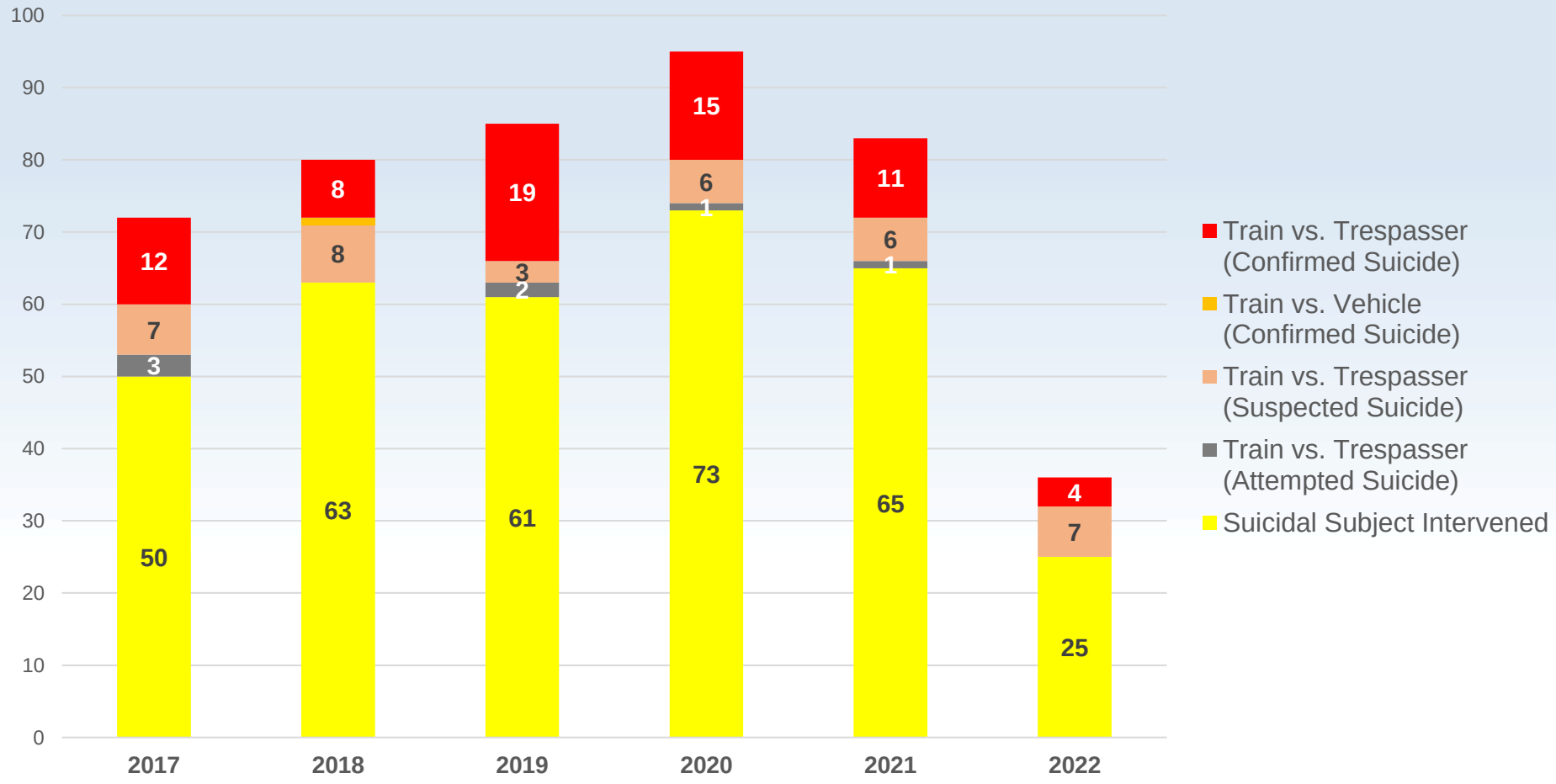
- Near Misses reported by train crews
- Police calls in response to right-of-way trespassing
- Interventions with suicidal individuals on or about Metra property
- Train collisions with vehicles & pedestrians
- Vehicle collisions with / incursions onto railroad property (crossing gate strikes, cars on the tracks, etc.)

RISE RETURN RECOVER

*Totals may vary due to rounding.
Note: All figures shown are in thousands of dollars.

my Metra

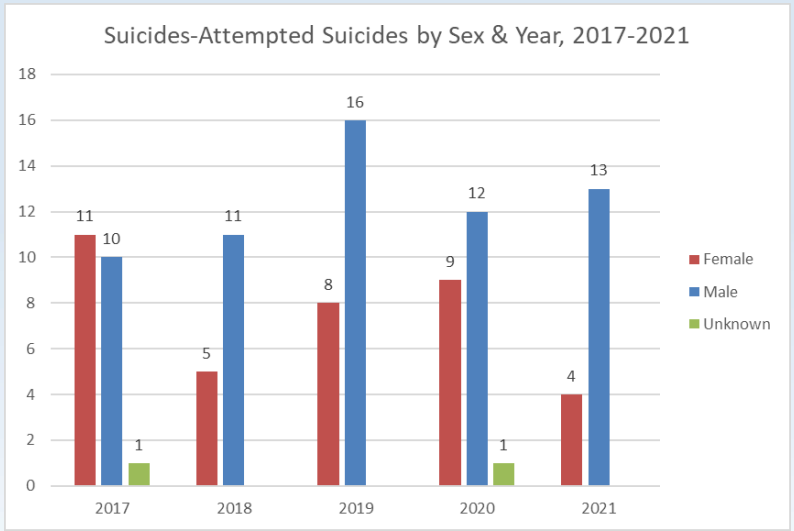
Summary Suicide Data by Event (Interventions)

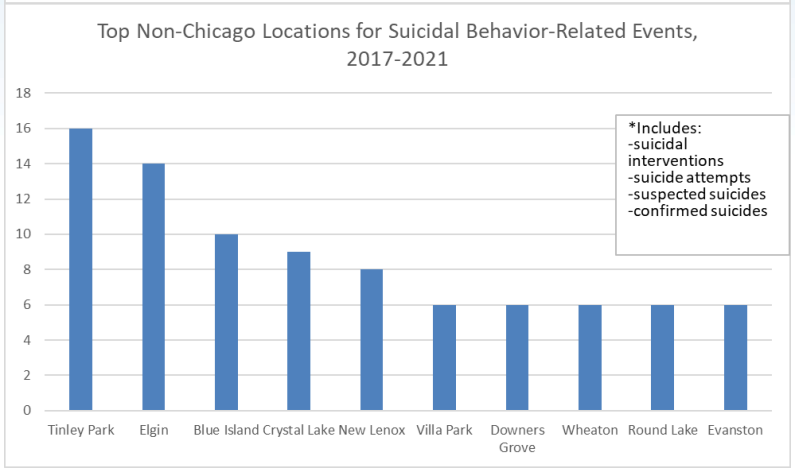


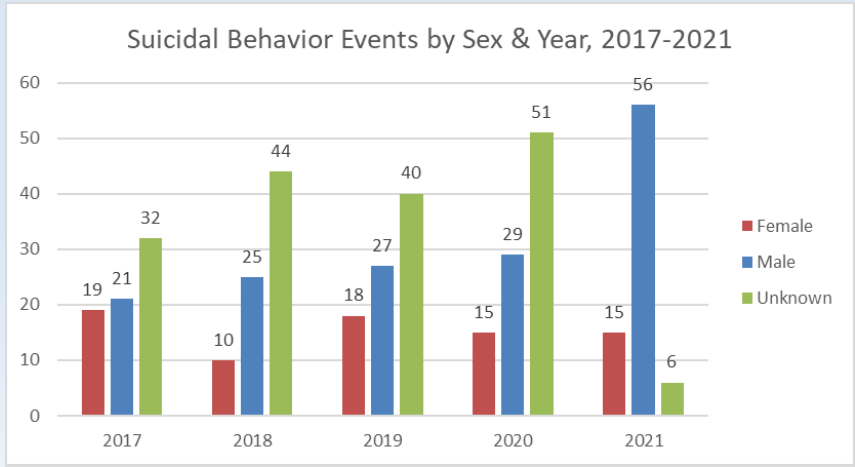
RISE
RETURN
RECOVER

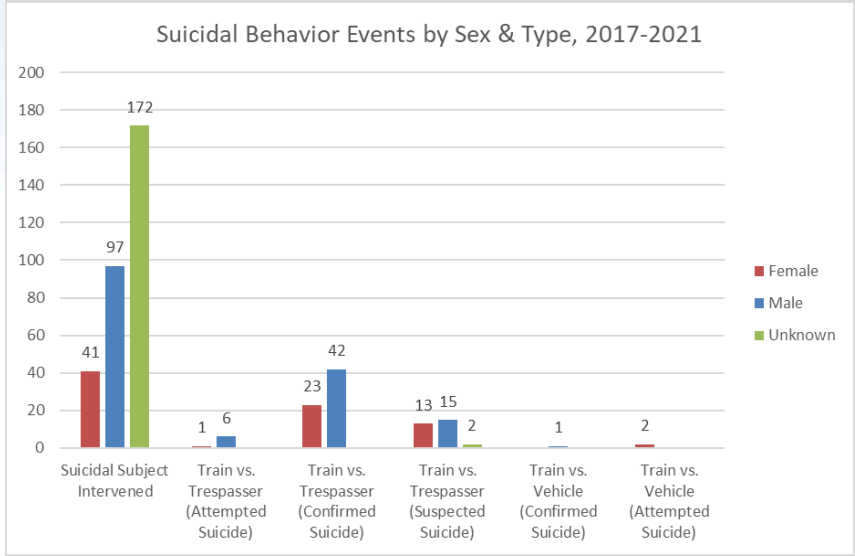
*Totals may vary due to rounding.
Note: All figures shown are in thousands of dollars.

Summary Suicide Data









RISE RETURN RECOVER

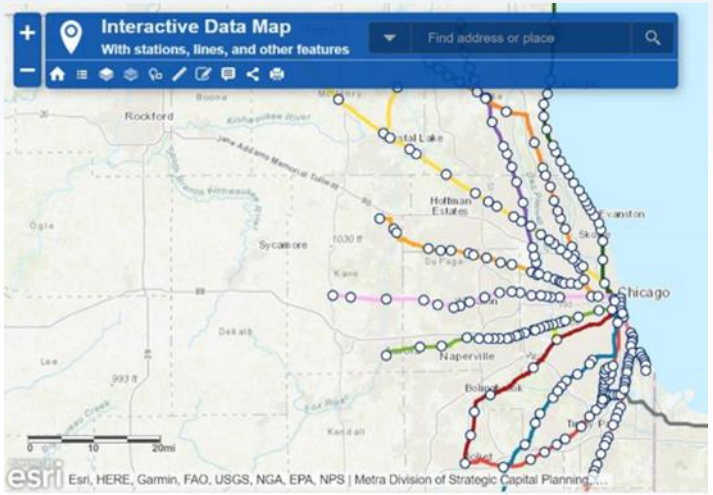
*Totals may vary due to rounding.
Note: All figures shown are in thousands of dollars.

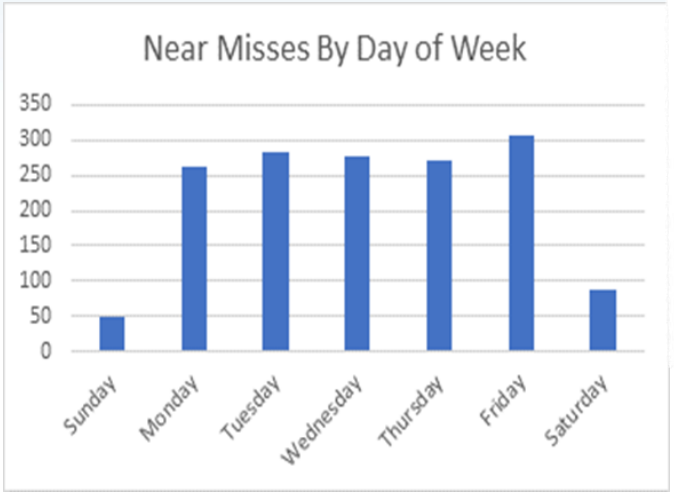
my Metra

Near Miss Reporting, FRA & University Partnership

Trespasser Notifications

- Engineers/Conductors
- Metra COPS Mobile App
- Metra Police, Local Police
- The Public
- Tracked in GIS Mapping System





RISE RETURN RECOVER

*Totals may vary due to rounding.
Note: All figures shown are in thousands of dollars.

my Metra

Public Outreach and Education

Operation Lifesaver

- Schools, Pre-K - 12
- Drivers' Education
- Community Events & Fairs
- Professional Drivers (Bus/Truck Drivers)
- First Responders (Fire/EMS/Police)
- Metra's Station Safety Blitz Program (50+ Stations a year)

See Tracks? THINK TRAIN

RISE RETURN RECOVER

my Metra

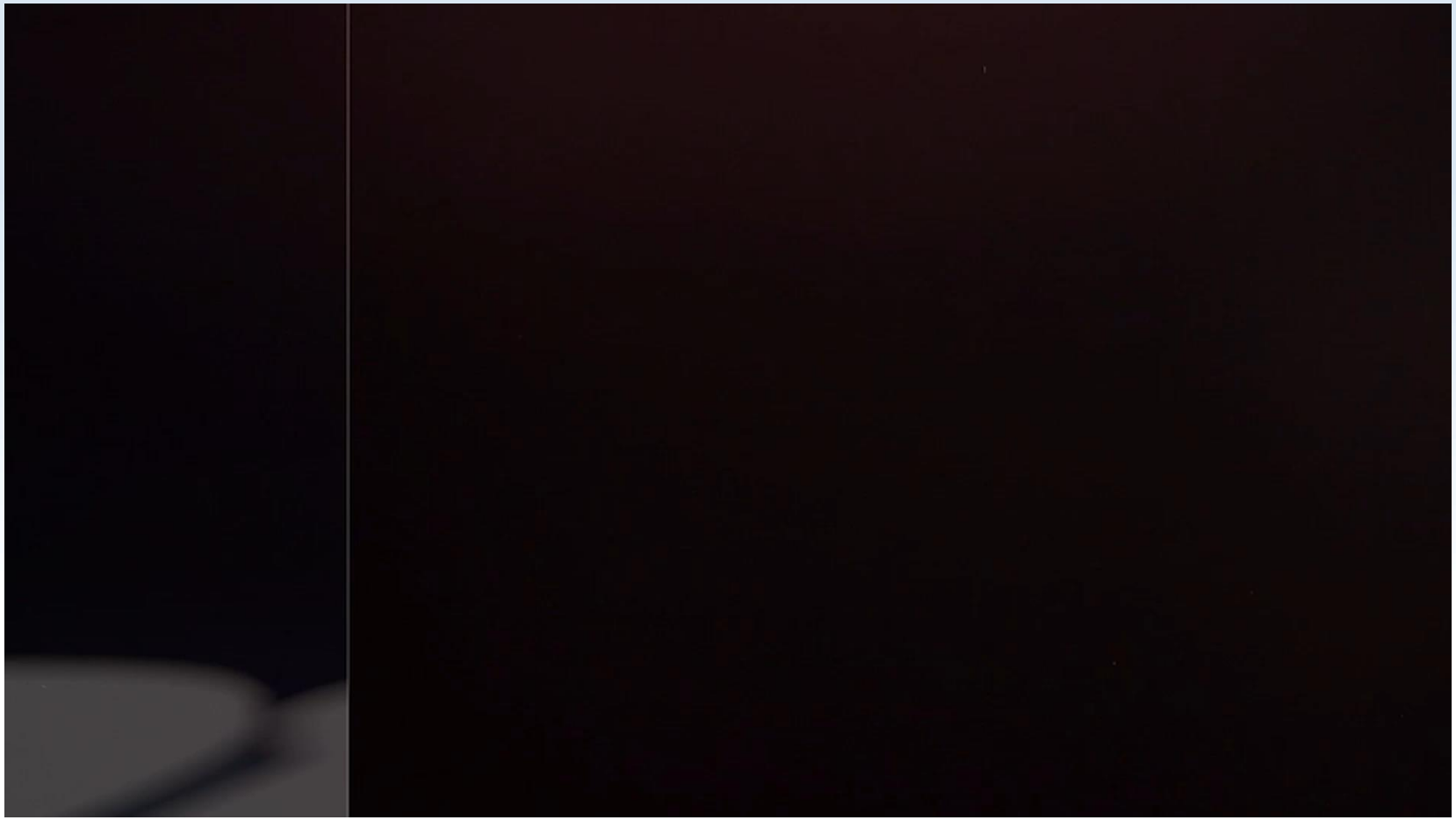
Why a Mental Health Awareness/Suicide Prevention Program

- Suicide by train accounts for 12% of all suicides (varies by country)
- Suicide by train has a higher lethality than most methods
- Over 90% of all rail-related attempts result in death
- Nearly 70% of Metra's fatalities are confirmed or suspected suicides
- Chicago has a higher percentage of train fatalities (passenger + freight) than the rest of the US (30%)
- Rail suicide is often a 'public event'
- Engineers, conductors/brakemen, onlookers, passengers, emergency responders, media, etc.

RISE
RETURN
RECOVER

my Metra

Why a Mental Health Awareness/Suicide Prevention Program



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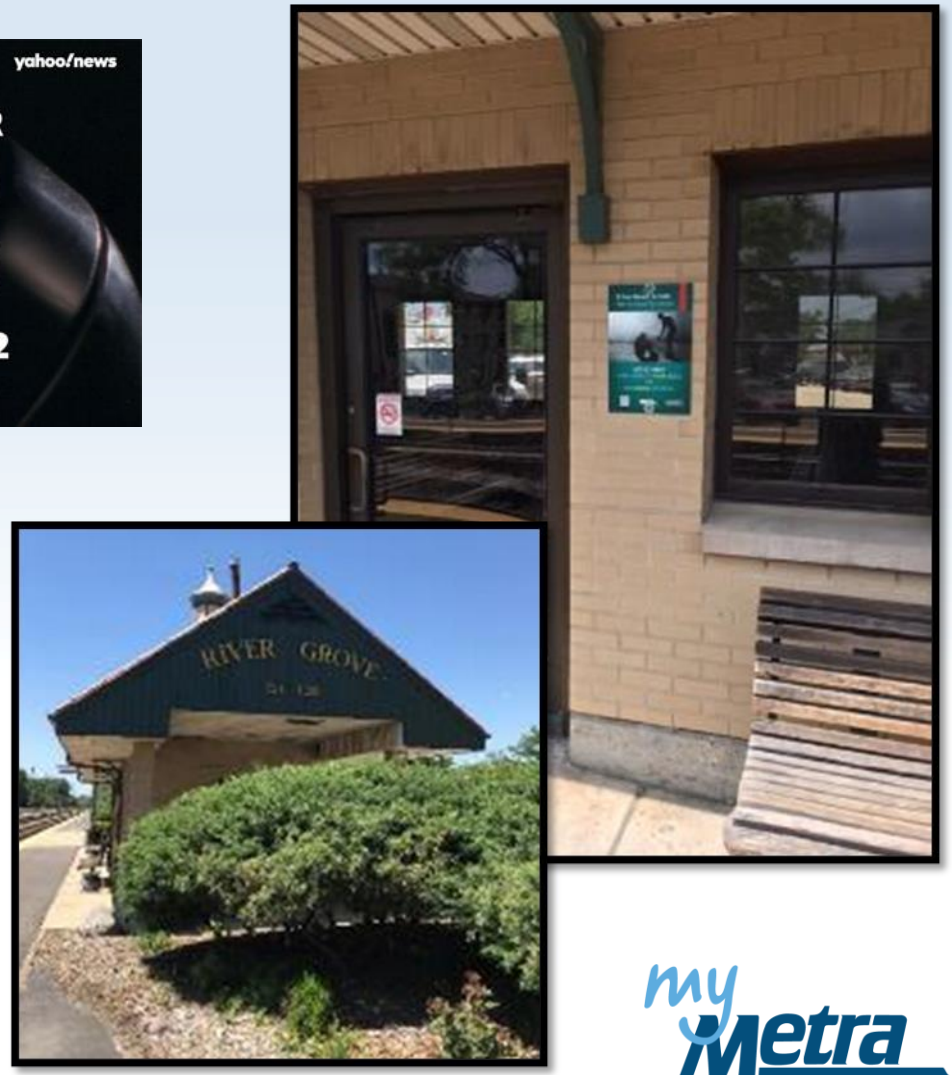
Mental Health/Suicide Awareness Signs

CRISIS TEXT LINE |

152 conversations



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Mental Health/Suicide Awareness Training for Employees

Myths and Facts About Suicide

Myth: No one can stop a suicide, it is inevitable.
Fact*:* If people in a crisis get the help they need, they will probably never be suicidal again.

Myth: Confronting a person about suicide will only make them angry and increase the risk of suicide.
Fact*:* Asking someone directly about suicidal intent lowers anxiety, opens up communication and lowers the risk of an impulsive act.

Myth: Only experts can prevent suicide.
Fact: Suicide prevention is everybody's business, and anyone can help prevent the tragedy of suicide

Myth: Teenagers have a higher risk of suicide.
Fact: Suicide doesn't discriminate. No age group is immune. Risk is highest for middle-aged adults.

Myth: Suicidal people keep their plans to themselves.
Fact: Most suicidal people communicate their intent sometime during the week preceding their attempt.

Myth: Those who talk about suicide don't do it.
Fact: People who talk about suicide may try, or even complete, an act of self-destruction.

Myth: Once a person decides to complete suicide, there is nothing anyone can do to stop them.
Fact: Suicide is the most preventable kind of death, and almost any positive action may save a life.

Suicide Clues and Warning Signs

Behavioral Clues

- Nervous/anxious appearance
- Agitation/angry appearance
- Pacing or waiting near the right-of-way
- Waiting on a platform, but never boarding
- Sitting in a parked car along right-of-way or parking lot
- Dressed in dark clothing
- Lack of belongings (backpacks, bags, purses, etc.)
- Standing on the edge of the platform in the yellow tactile area
- Same person exhibiting unusual behavior for multiple days
- For regular passengers: appearance/demeanor suddenly changes (yelling, crying, etc.)

Situational Clues

- Gender (especially male)
- Time of year (between Thanksgiving & the New Year)
- Time of day (morning and evening rush hour)
- Location (official vs. unofficial crossing points)
- Previous suicides (especially if by train → Copycats)
- Calls from municipalities (e.g., police)
- Other passengers' reports/complaints

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Q Question

Asking The Suicide Question

- **If** in doubt, don't wait, ask the question
- Maintain professionalism
  - Be genuine and caring
  - Judgment/accusations may trigger a customer complaint

- **Be** tactful and sensitive with your approach
  - Physical space
  - Tone of voice
  - Volume of voice

- **Talk** to the person alone, in a private setting
  - If appropriate, move to the vestibule

- **Remember:** How you ask the question is less important than that you ask it

- **Less Direct Approach:**
  - "Have you been unhappy lately?"
  - "Have you been very unhappy lately?"
  - "Have you been so very unhappy lately that you've been thinking about ending your life?"

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P Persuade & R Refer

P Persuade

- Listen to the problem and give them your full attention
- Remember, suicide is not the problem, only the solution to a perceived insoluble problem
- Do not rush to judgment
- Offer hope in any form
- **Then Ask:**
- "Will you let me help you get some help?"
- YOUR WILLINGNESS TO LISTEN AND TO HELP CAN REKINDLE HOPE, AND MAKE ALL THE DIFFERENCE.

R Refer

The QPR model can be used in personal or professional contexts

- In your professional role, Metra is leaving the choice of your intervention up to you.

- Suicidal people often believe they cannot be helped, so you may have to do more.

- The best referral involves connecting the person directly to professional help.
  - Call Metra Police at (312) 322-2800. Local police if the threat is imminent.

  - If the threat does not seem to be imminent and the person is an employee of Metra, call EAP

✓ DO NOT leave a suicidal person alone
✓ DO NOT treat the person as a criminal
✓ DO NOT intervene if the person starts behaving aggressively or has a weapon

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RECOVER

Sharing, Collaborating & Partnerships

Partnerships and Sharing in Best Practices

- **DuPage Railroad Safety Council**
- American Public Transportation Association (APTA)
- Commuter Rail Coalition (CRC)
- **Volpe, National Transportation Systems Center**
- **Federal Railroad Administration (FRA)**
- The Association of American Railroads (AAR)
- International Level Crossing Awareness Day (ILCAD)
- **Peer Transit Agencies**
- National Suicide Prevention Lifeline
- Crisis Text Line
- **Rutgers University**
- Cook County Department of Transportation & Highways
- Chicago Metropolitan Agency for Planning (CMAP)

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RISE RETURN RECOVER

my Metra

Thank You

Hilary E Konczal

Metra Chief Safety & Environmental Officer

Email: Hkonczal@metrarr.com

Phone: 312-322-6743

Trespassing and Suicide Prevention Through Education

Presented by: Shala Blue, PhD
Created by: Scott Gabree, PhD

Trespassing and Suicide Prevention

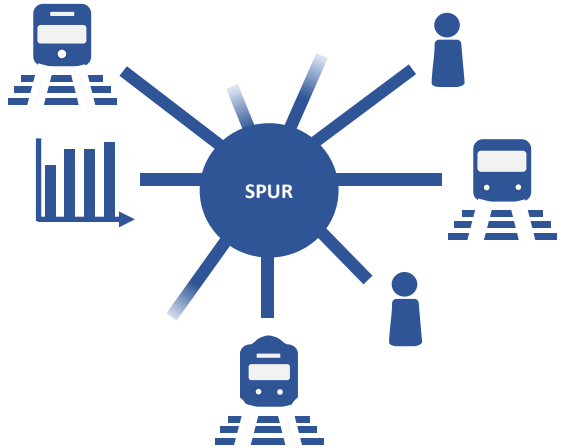
- Driven by a variety of risk factors, many out of a railroad's control
- Understanding motivation for trespassing is critical to inform prevention strategies
- Prevention likely requires a multi-faceted approach
- Education is one component of such a strategy

Trespassing and Suicide Prevention: Education

- Consider both trespassing and suicide in rail safety education
- Coordinate with international community
- Collaborate with peer railroads to share lessons learned
- Consolidate knowledge and best practices for industry stakeholders

OPERATION LIFESAVER®

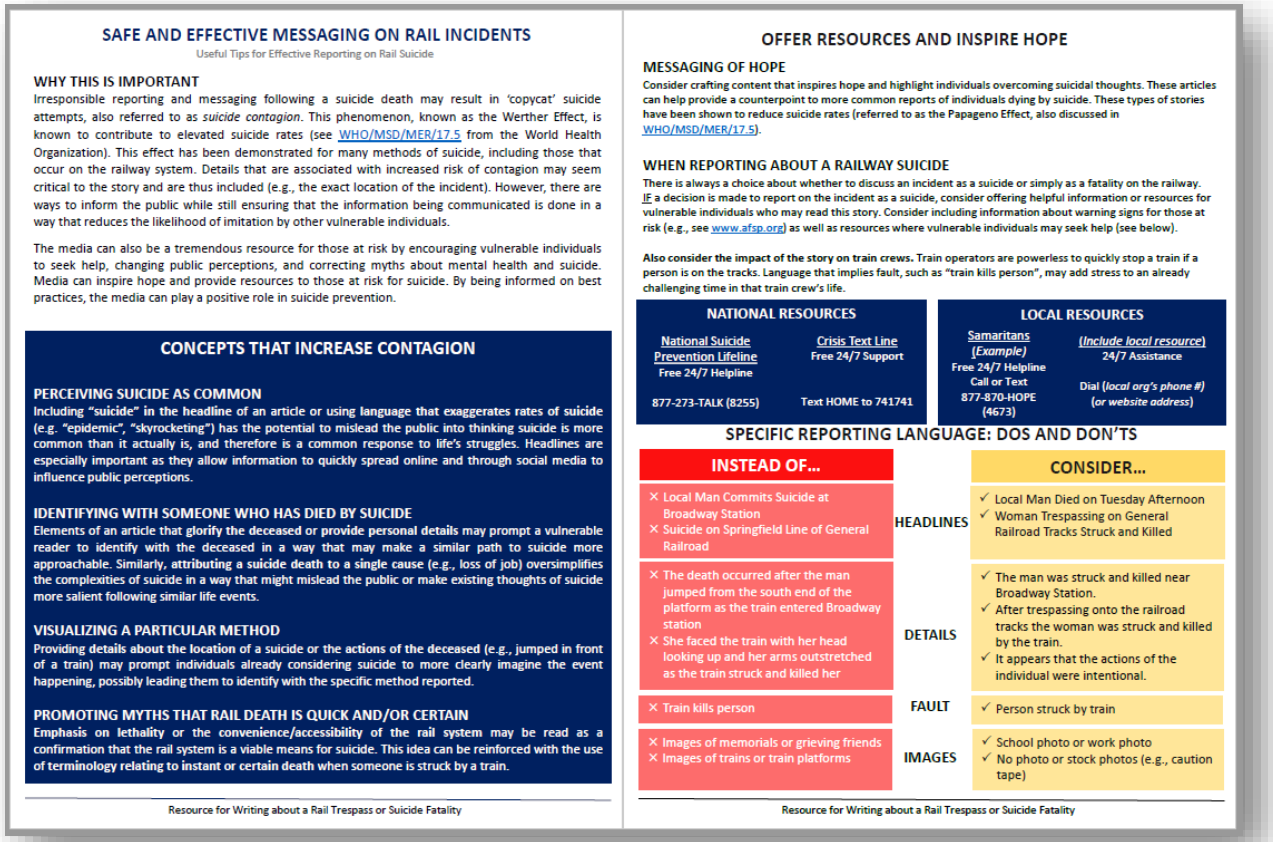
GRASP
Global Railway Alliance for Suicide Prevention



TRESPASS & SUICIDE PREVENTION TOOLKIT

Coordination with Operation Lifesaver

- FRA, through Volpe, has a long-standing relationship with OLI
- Volpe coordinated with OLI to develop a guide for messaging about rail incidents
- Volpe also works with OLI to provide subject matter expertise related to suicide prevention to OLI task forces



SAFE AND EFFECTIVE MESSAGING ON RAIL INCIDENTS

Useful Tips for Effective Reporting on Rail Suicide

WHY THIS IS IMPORTANT

Irresponsible reporting and messaging following a suicide death may result in 'copycat' suicide attempts, also referred to as *suicide contagion*. This phenomenon, known as the Werther Effect, is known to contribute to elevated suicide rates (see WHO/MSD/MER/17.5 from the World Health Organization). This effect has been demonstrated for many methods of suicide, including those that occur on the railway system. Details that are associated with increased risk of contagion may seem critical to the story and are thus included (e.g., the exact location of the incident). However, there are ways to inform the public while still ensuring that the information being communicated is done in a way that reduces the likelihood of imitation by other vulnerable individuals.

The media can also be a tremendous resource for those at risk by encouraging vulnerable individuals to seek help, changing public perceptions, and correcting myths about mental health and suicide. Media can inspire hope and provide resources to those at risk for suicide. By being informed on best practices, the media can play a positive role in suicide prevention.

CONCEPTS THAT INCREASE CONTAGION

PERCEIVING SUICIDE AS COMMON

Including "suicide" in the headline of an article or using language that exaggerates rates of suicide (e.g. "epidemic", "skyrocketing") has the potential to mislead the public into thinking suicide is more common than it actually is, and therefore is a common response to life's struggles. Headlines are especially important as they allow information to quickly spread online and through social media to influence public perceptions.

IDENTIFYING WITH SOMEONE WHO HAS DIED BY SUICIDE

Elements of an article that glorify the deceased or provide personal details may prompt a vulnerable reader to identify with the deceased in a way that may make a similar path to suicide more approachable. Similarly, attributing a suicide death to a single cause (e.g., loss of job) oversimplifies the complexities of suicide in a way that might mislead the public or make existing thoughts of suicide more salient following similar life events.

VISUALIZING A PARTICULAR METHOD

Providing details about the location of a suicide or the actions of the deceased (e.g., jumped in front of a train) may prompt individuals already considering suicide to more clearly imagine the event happening, possibly leading them to identify with the specific method reported.

PROMOTING MYTHS THAT RAIL DEATH IS QUICK AND/OR CERTAIN

Emphasis on lethality or the convenience/accessibility of the rail system may be read as a confirmation that the rail system is a viable means for suicide. This idea can be reinforced with the use of terminology relating to instant or certain death when someone is struck by a train.

Resource for Writing about a Rail Trespass or Suicide Fatality

OFFER RESOURCES AND INSPIRE HOPE

MESSAGING OF HOPE

Consider crafting content that inspires hope and highlight individuals overcoming suicidal thoughts. These articles can help provide a counterpoint to more common reports of individuals dying by suicide. These types of stories have been shown to reduce suicide rates (referred to as the Papageno Effect, also discussed in WHO/MSD/MER/17.5).

WHEN REPORTING ABOUT A RAILWAY SUICIDE

There is always a choice about whether to discuss an incident as a suicide or simply as a fatality on the railway. IF a decision is made to report on the incident as a suicide, consider offering helpful information or resources for vulnerable individuals who may read this story. Consider including information about warning signs for those at risk (e.g., see www.afsp.org) as well as resources where vulnerable individuals may seek help (see below).

Also consider the impact of the story on train crews. Train operators are powerless to quickly stop a train if a person is on the tracks. Language that implies fault, such as "train kills person", may add stress to an already challenging time in that train crew's life.

NATIONAL RESOURCES		LOCAL RESOURCES	
National Suicide Prevention Lifeline Free 24/7 Helpline 877-273-TALK (8255)	Crisis Text Line Free 24/7 Support Text HOME to 741741	Samaritans *(Example)* Free 24/7 Helpline Call or Text 877-870-HOPE (4673)	*(Include local resource)* 24/7 Assistance Dial *(local org's phone #)* *(or website address)*

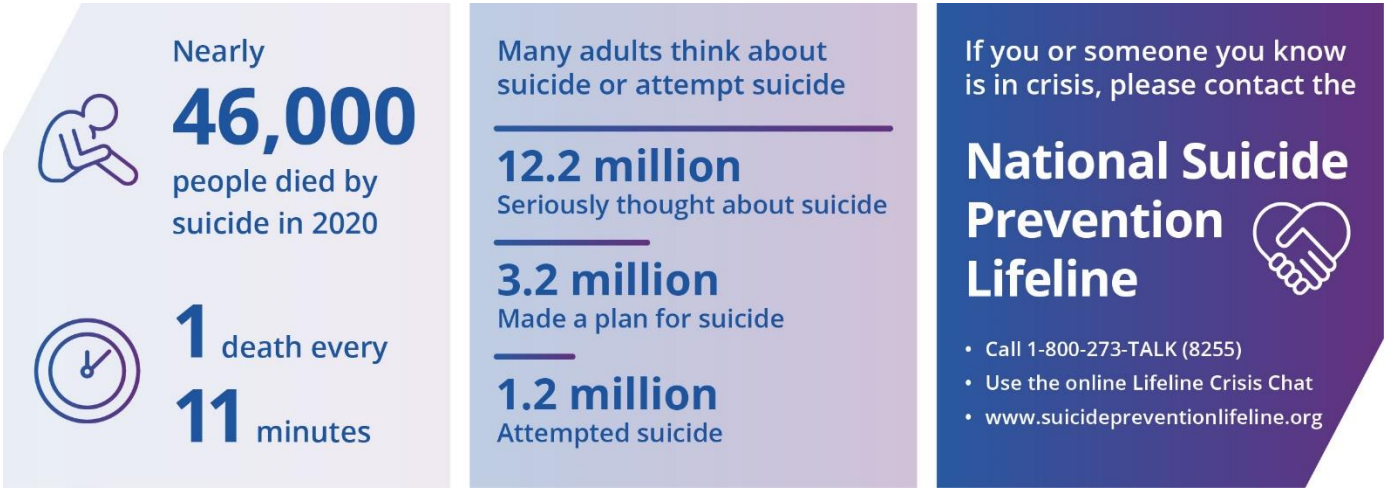
SPECIFIC REPORTING LANGUAGE: DOS AND DON'TS

INSTEAD OF...		CONSIDER...
× Local Man Commits Suicide at Broadway Station × Suicide on Springfield Line of General Railroad	HEADLINES	✓ Local Man Died on Tuesday Afternoon ✓ Woman Trespassing on General Railroad Tracks Struck and Killed
× The death occurred after the man jumped from the south end of the platform as the train entered Broadway station × She faced the train with her head looking up and her arms outstretched as the train struck and killed her	DETAILS	✓ The man was struck and killed near Broadway Station. ✓ After trespassing onto the railroad tracks the woman was struck and killed by the train. ✓ It appears that the actions of the individual were intentional.
× Train kills person	FAULT	✓ Person struck by train
× Images of memorials or grieving friends × Images of trains or train platforms	IMAGES	✓ School photo or work photo ✓ No photo or stock photos (e.g., caution tape)

Resource for Writing about a Rail Trespass or Suicide Fatality

Coordination with Operation Lifesaver

- De-emphasize lethality
- De-emphasize quick death
- Focus on expected behaviors when possible

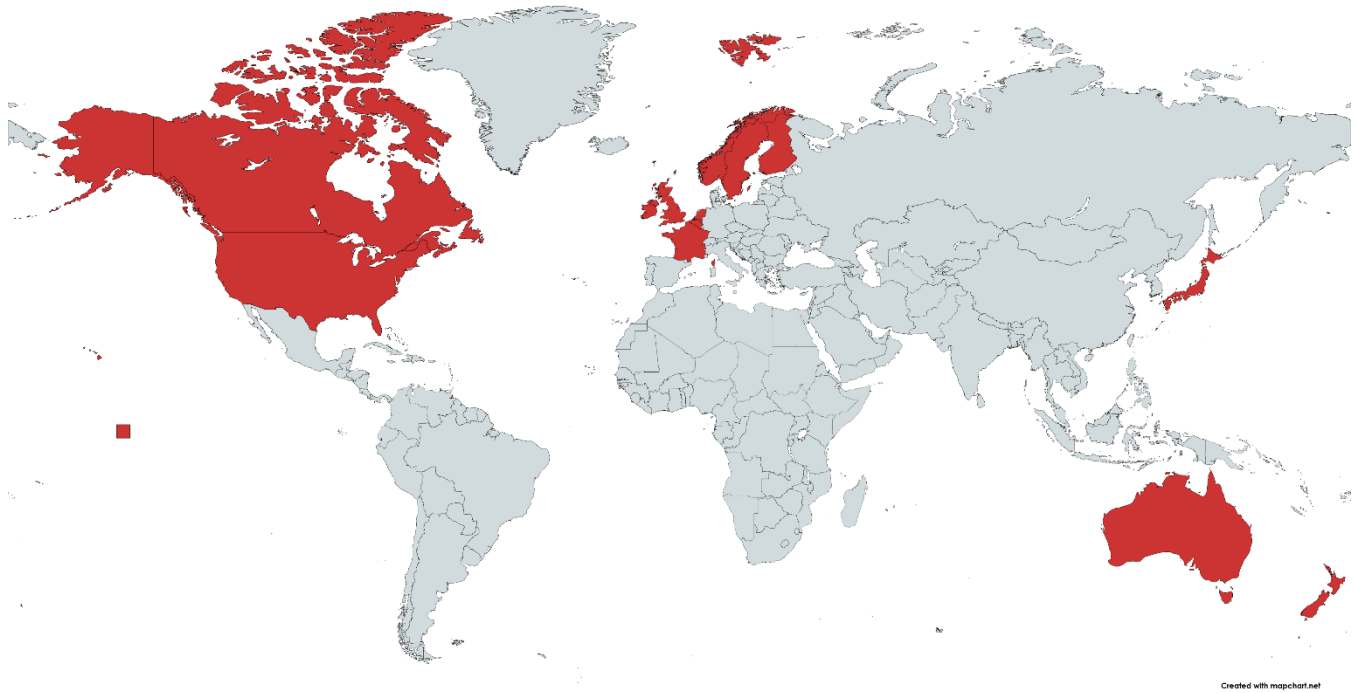


Global Railway Alliance for Suicide Prevention (GRASP)

- Founded in 2014 as a partnership between FRA, AAR, and Volpe
- We seek a way to share with one another and learn from others around the world

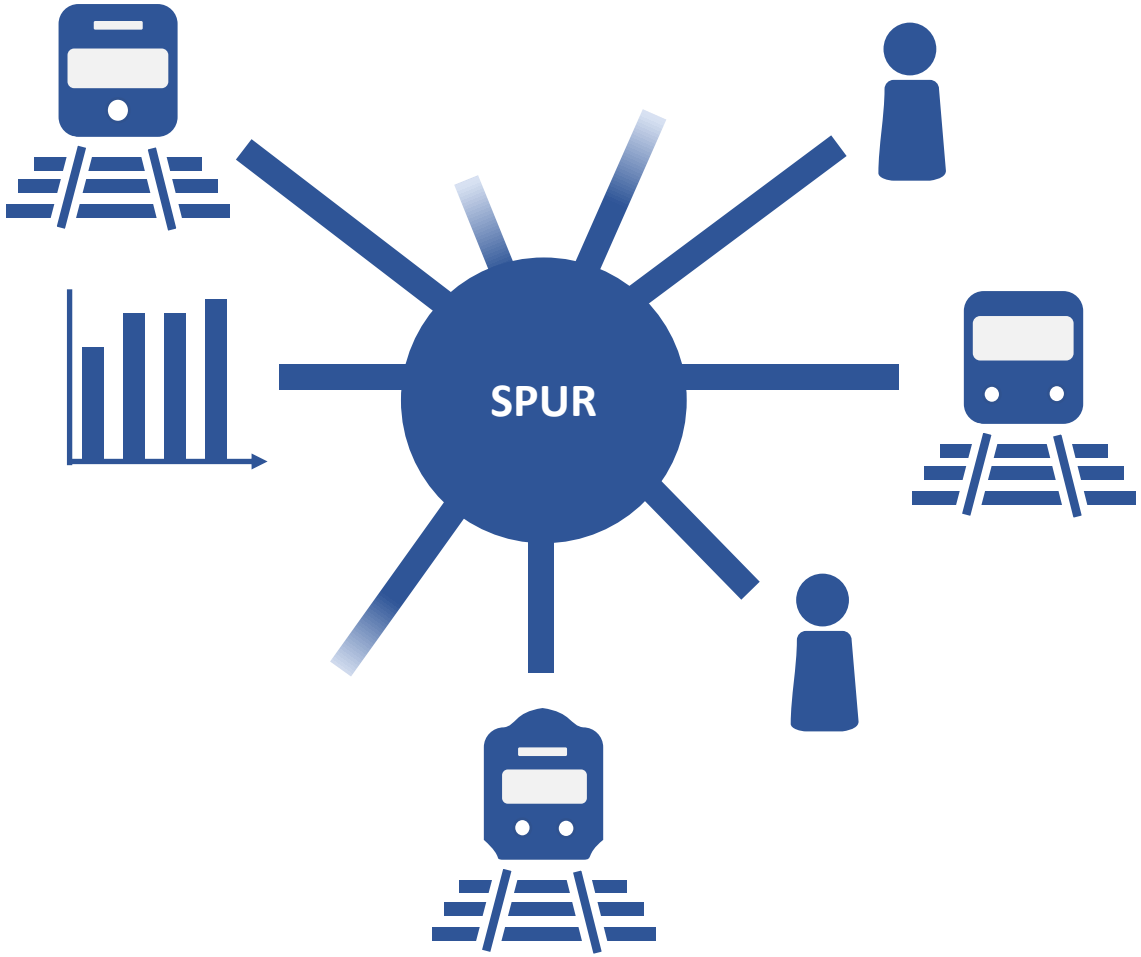
GRASP

- Participation from over 10 countries
- A way to gather information from international experts, but also to share best practices from the U.S. with international colleagues



Suicide Prevention for U.S. Rail (SPUR)

- Working group for commuter rail carriers to discuss rail suicide and trespass prevention
- Started in Fall 2021
- Quarterly meetings



Suicide Prevention for U.S. Rail (SPUR)

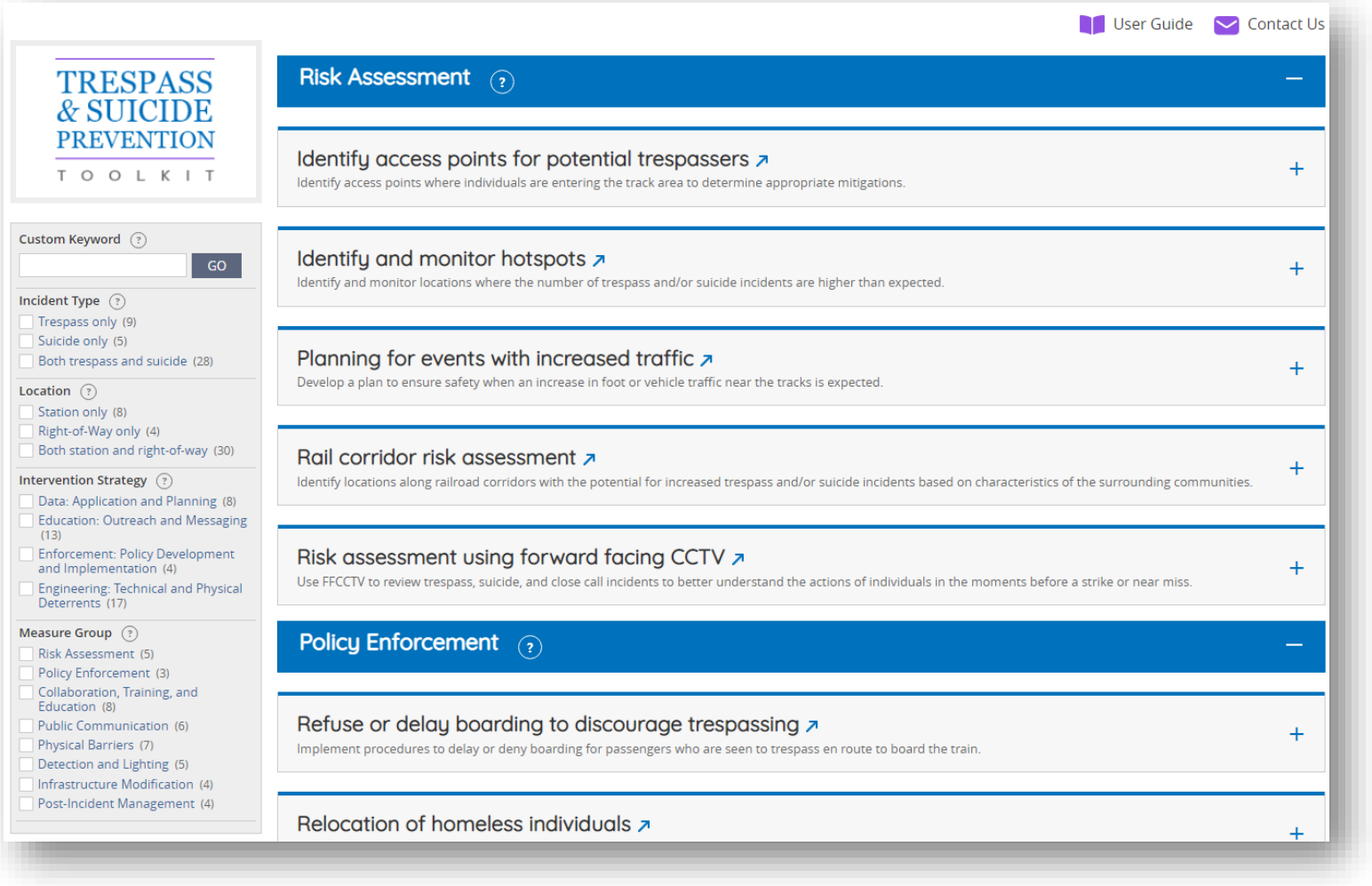
- First topic-focused meeting discussed programs to train employees to recognize warning signs for suicide (QPR Program)
- Upcoming meeting topics include:
  - Establishing effective partnerships with outside groups
  - Using advanced technologies to prevent trespass & suicide

QPR

CRISIS TEXT LINE

Trespass and Suicide Prevention (TSP) Toolkit

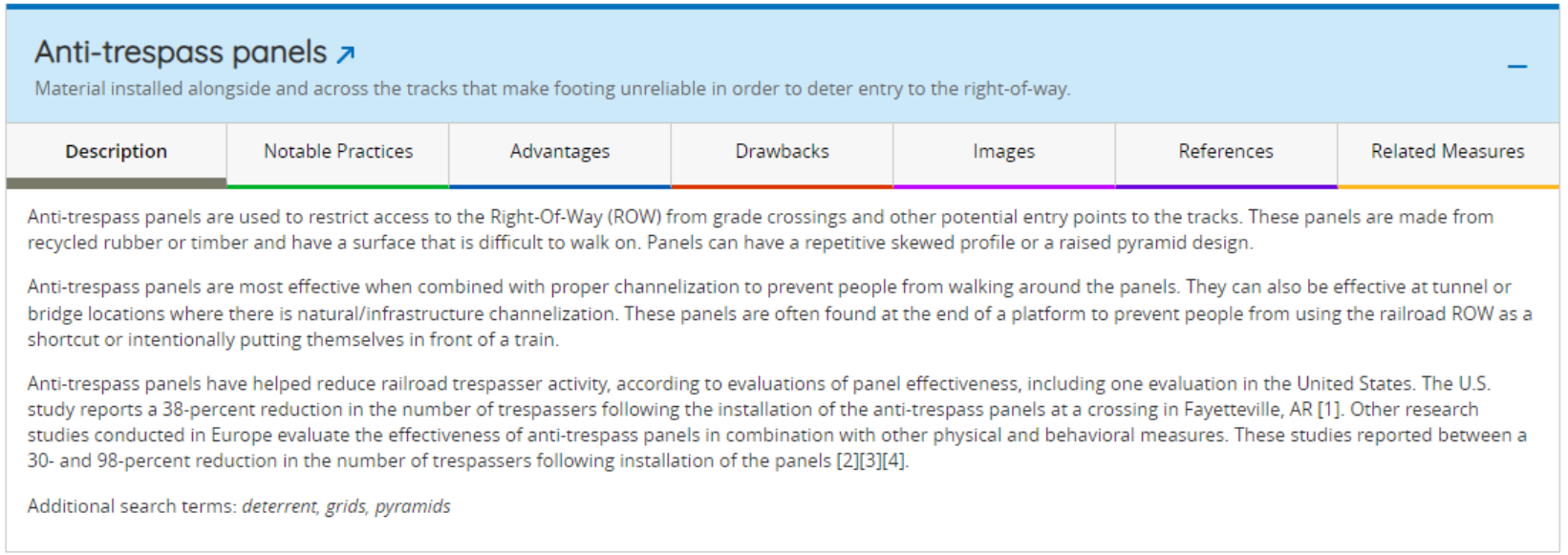
- Identify relevant and effective strategies
- Consider improvements to your current practices
- Help identify partners
- Stay informed with up-to-date research to know which strategies may be the best fit for your situation



https://trespasstoolkit.fra.dot.gov/

Trespass and Suicide Prevention (TSP) Toolkit

- Description
- Notable Practices
- Advantages
- Drawbacks
- Images
- References
- Related Measures



Anti-trespass panels ↗

Material installed alongside and across the tracks that make footing unreliable in order to deter entry to the right-of-way.

Description | Notable Practices | Advantages | Drawbacks | Images | References | Related Measures

Anti-trespass panels are used to restrict access to the Right-Of-Way (ROW) from grade crossings and other potential entry points to the tracks. These panels are made from recycled rubber or timber and have a surface that is difficult to walk on. Panels can have a repetitive skewed profile or a raised pyramid design.

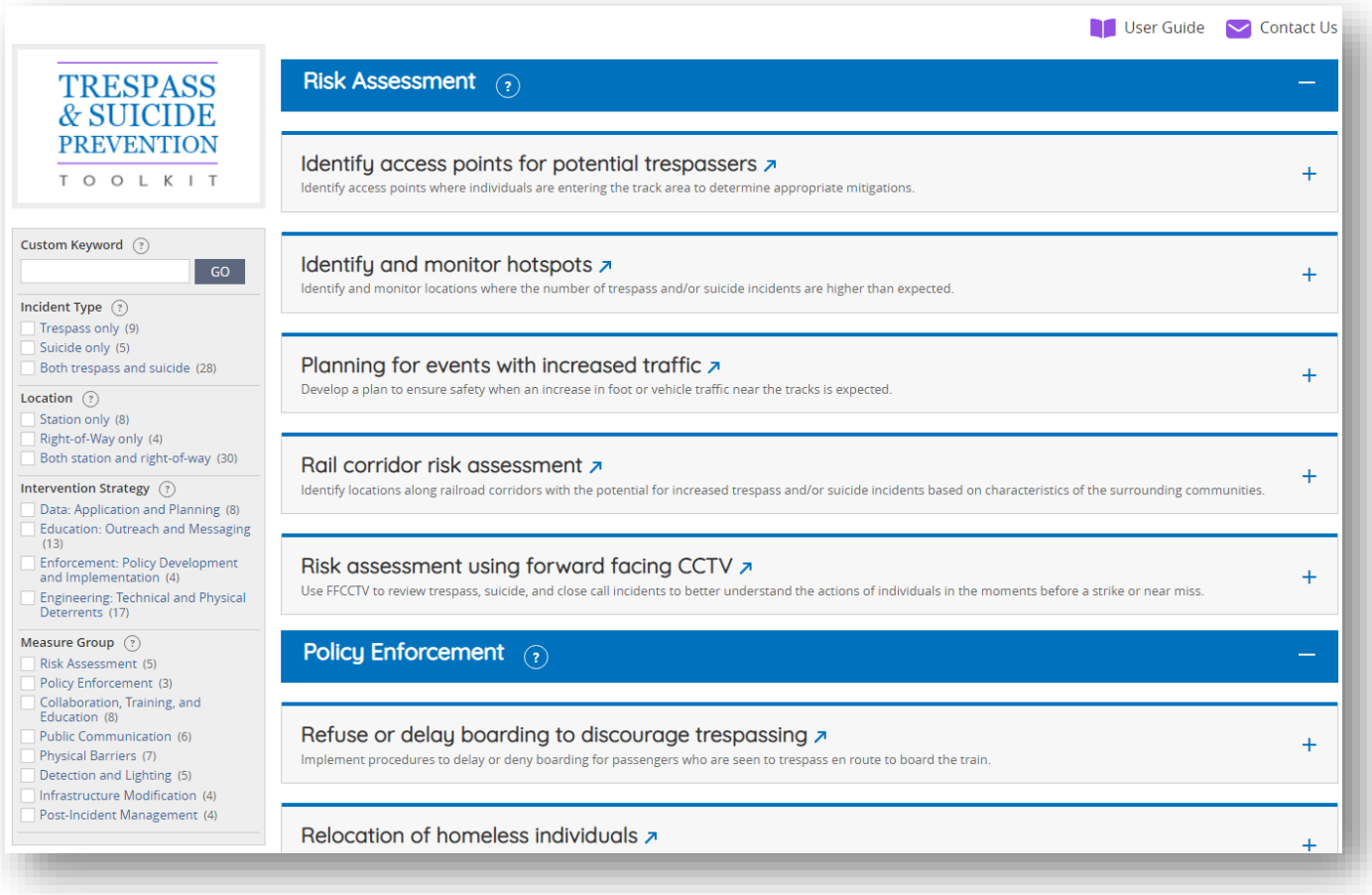
Anti-trespass panels are most effective when combined with proper channelization to prevent people from walking around the panels. They can also be effective at tunnel or bridge locations where there is natural/infrastructure channelization. These panels are often found at the end of a platform to prevent people from using the railroad ROW as a shortcut or intentionally putting themselves in front of a train.

Anti-trespass panels have helped reduce railroad trespasser activity, according to evaluations of panel effectiveness, including one evaluation in the United States. The U.S. study reports a 38-percent reduction in the number of trespassers following the installation of the anti-trespass panels at a crossing in Fayetteville, AR [1]. Other research studies conducted in Europe evaluate the effectiveness of anti-trespass panels in combination with other physical and behavioral measures. These studies reported between a 30- and 98-percent reduction in the number of trespassers following installation of the panels [2][3][4].

Additional search terms: *deterrent, grids, pyramids*

TSP Toolkit: Intervention Strategy

- Data
  - Understand the problem
- Engineering
  - Restrict access to right-of-way (ROW)
  - Detect access to ROW
- Education
  - Collaboration with partners
  - Educate staff/ridership
- Enforcement
  - Identify those at risk



TSP Toolkit: Intervention Strategy

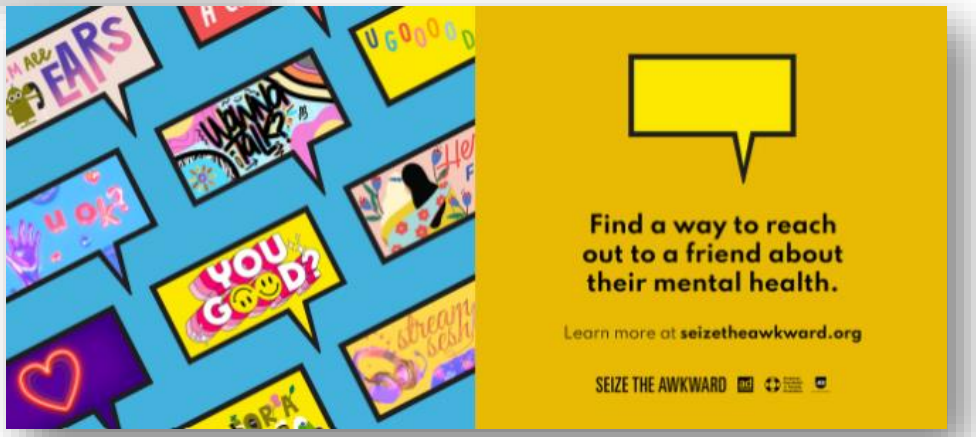
- Data
  - Understand the problem
- Engineering
  - Restrict access to ROW
  - Detect access to ROW
- Education
  - **Collaboration with partners**
  - Educate staff/ridership
- Enforcement
  - Identify those at risk

988 SUICIDE & CRISIS LIFELINE

NATIONAL ACTION ALLIANCE FOR SUICIDE PREVENTION

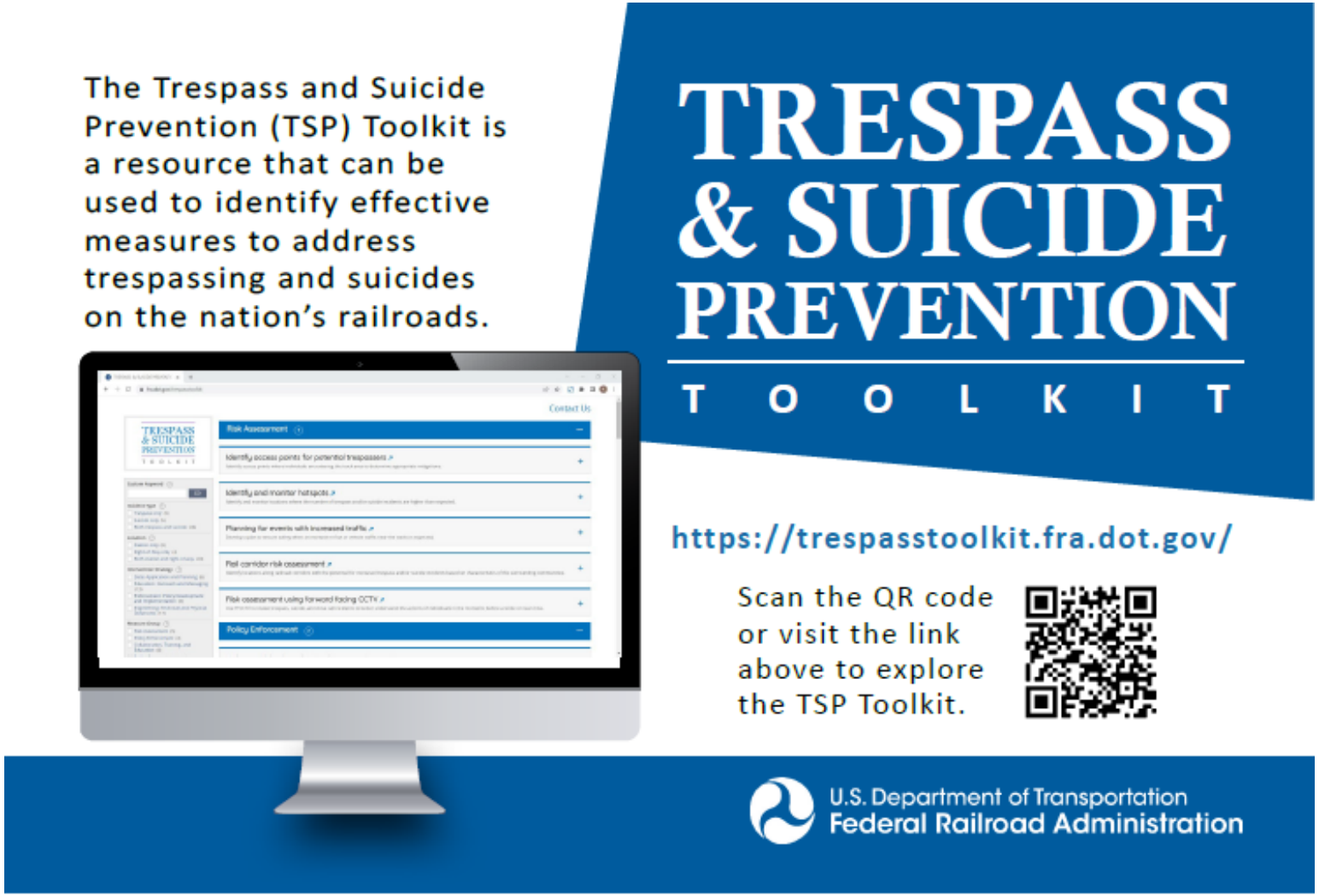
TSP Toolkit: Intervention Strategy

- Data
  - Understand the problem
- Engineering
  - Restrict access to ROW
  - Detect access to ROW
- **Education**
  - Collaboration with partners
  - **Educate staff/ridership**
- Enforcement
  - Identify those at risk



Trespass and Suicide Prevention Toolkit

- Material to be updated with first major updating still to come
- Seeking input from users about how to make this tool most helpful



https://trespasstoolkit.fra.dot.gov/

QUESTIONS?

Contact Us

Federal Railroad Administration
1200 New Jersey Avenue, SE
Washington, DC 20590

Connect with us at **USDOTFRA**

Shala Blue, PhD
Federal Railroad Administration
Email: shala.blue@dot.gov

Scott H. Gabree, PhD
US DOT Volpe Center
Phone: 617-494-2530
Email: scott.gabree@dot.gov

U.S. Department of Transportation
Federal Railroad Administration

Grade Crossing Safety and Railroad Trespass Prevention Workshop

Day 1 Session Three

Greensboro Police Department

ATV Team

What is GPD's ATV Team?

All-Terrain Vehicle Team (ATV) consisting of ten sworn officers who utilize ATV's for:

1. Patrol/Special Events
2. Search & Rescue
3. Education

Why is it relevant?

- The ATV Team is utilized to help reduce illegal/dangerous railway encounters. The focus of the mission is EDUCATION, not enforcement!
- Since starting the program, Greensboro has noticed a significant decrease in accidents and fatal encounters, on or near railroad property.
- The ATV Units have proven to be a very effective tool at not only accessing the problem areas quickly and easily, but also at maximizing positive police encounters as well.

Positive Police Encounters?

- Over the last decade or so, throughout the country, everyday police encounters have become more and more heavily criticized and that criticism has led to a distrust in police, which in turn promotes an unhealthy society as a whole.
- In order to combat that distrust, officers have had to re-evaluate when, where, why and how they go about their everyday public encounters.
- As a profession, law enforcement has had to accept that we can no longer arrest our way out of every problem.
- In many cases, we have found that if we take a few extra minutes to address the root cause of the issue and offer some sort of positive reinforcement the outcome may be more effective and less confrontational.

But how do we get there?

- Greensboro utilizes the uniqueness of the ATV's to act as an Ice Breaker / De-escalation Tool when it comes to dealing with the public.
- An Officer approaching on an ATV is not viewed in the same light (initially) as one approaching in a patrol car.
- Officers use that uniqueness to their advantage when approaching a trespasser on railroad property and quickly engages them in polite but direct conversation geared toward re-educating the individual.
- The conversation almost always starts with questions from the trespasser about the ATV's which is quickly segued into Rail Safety Education by the officer.
- The end result is a positive interaction with a member of the public who has gained useful knowledge that has the potential to save their or another person's life and it is done in a way that leaves both parties satisfied.
- 1.) Positive police encounter
- 2.) Trespasser or member of the public educated and/or re-directed to a safer crossing location or walking path
- 3.) No criminal process needed to achieve the desired result, which is preventing future pedestrian/train encounters
- 4.) Both parties leave satisfied

How long has Greensboro used ATVs?

- Around 2016 Greensboro recognized a need for educating the public on rail safety issues after a number of preventable injuries and/or deaths occurred on rail lines within the city.
- The Greensboro Police Department, along with other city officials, started working with NCDOT and Railway personnel to help identify the problem.
- A small geographical footprint was later identified as a high traffic area where a significant number of close or fatal encounters occurred over a short period of time.

Initial Strategy

- “We have a problem. Go fix it”.
- The ATV Team was tasked with patrolling the problem areas based on their ability to maneuver freely and quickly within the confined footprint.
- The Team had already developed somewhat of a positive reputation for diffusing confrontational situations, quickly and easily, due to their experience and unique mode of transportation.
- The ATV’s have proven to be an “Ice Breaker” when dealing with the public. That allows officers to transition seamlessly into police matters after only a few minutes of small talk.

What we discovered!

- As we began to patrol the identified problem areas, we realized that the issues were more complex than we originally suspected.
- Yes, we had frequent trespassers but they were not all homeless individuals dealing with mental health issues like we initially anticipated.
- We discovered a large majority of our trespassers were merely everyday individuals making poor decisions.
- Local residents using illegal crossings to access specific locations (grocery stores, pharmacies, bars/restaurants, public transportation locations, etc.) and others were merely taking shortcuts to just save time. One of the biggest surprises we encountered were individuals and/or large groups of people taking photographs on railroad property, especially in our downtown district.
- Interestingly enough, we found that most trespassers encountered were completely unaware that they were putting themselves in danger or that their actions were in fact criminal.

Additional Issues

- We also realized there were other issues that we had never anticipated that also needed to be addressed, such as homeless encampments on or next to railroad property.
- Dangerous debris that was observed on or in close proximity to the tracks that needed to be cleaned up and removed.
- Improper signage or missing signage, warning the public of the dangers of trespassing on railroad property.
- And then there are people who just don't pay attention and end up on the tracks and in harms way without even meaning to do so.

What to tackle first!

- Initially, we started with addressing Trespassers and re-educating them on the proper crossing locations and dangers involved in trespassing.
- Simultaneously, we began to work with our railway partners to address signage issues and clean up harmful debris. In some cases we had to work with local businesses or private land owners to do the same.
- Local businesses/private land owners were asked to put up fencing to discourage illegal crossing to their facility or property and many were requested to remove or clean up debris that was finding its way onto the tracks from their locations.
- NOTE: As time went on and many of the issues were corrected, we were able to focus almost exclusively on EDUCATION and less on maintenance.

Problems Identified/Corrective Action Taken

- Trespassers: Locate, Educate, and Re-direct
- Photographers: Locate, Educate, and Re-direct
- Homeless Camps: Locate, Educate, and Relocate (when possible)
- Signage Issues: Identify what is needed and notify appropriate agencies
- Debris: Identify problem & work with land owner, city, or railroad to correct.
- Clueless People: Educate, Educate, Educate, then PRAY!

Examples

Issues addressed

Live interactions


STOP
HERE WHEN
FLASHING
TO REPORT CROSSING SIGNAL MALFUNCTION
OR OTHER EMERGENCY
CALL 1-800-946-4744
NORFOLK SOUTHERN RAILWAY CO.
ROAD NAME: S. ELM ST
CROSSING ID: 722 374A
MILE POST: 284.1
POLICE

Educational Materials

Homeless Encampments

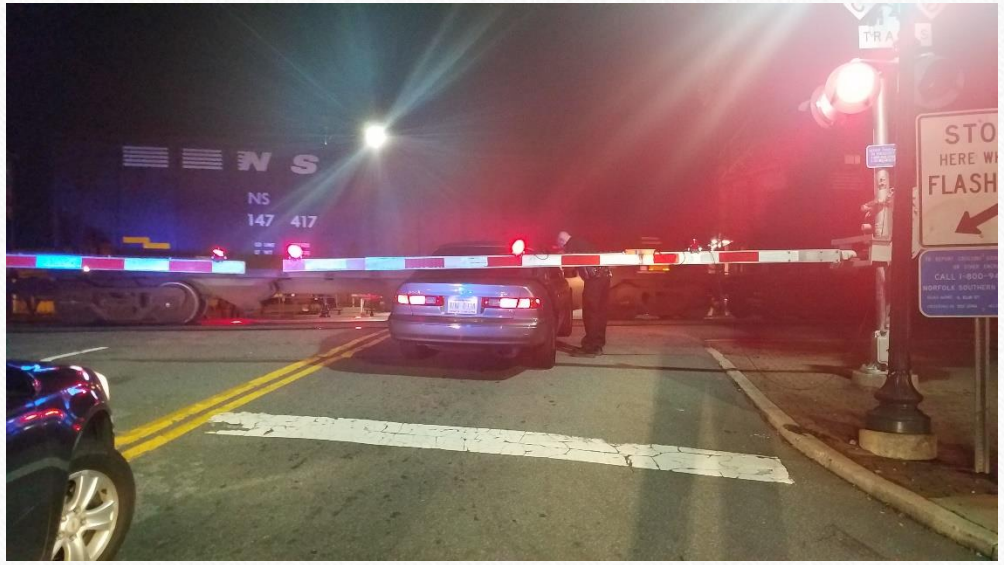
Homeless Encampments

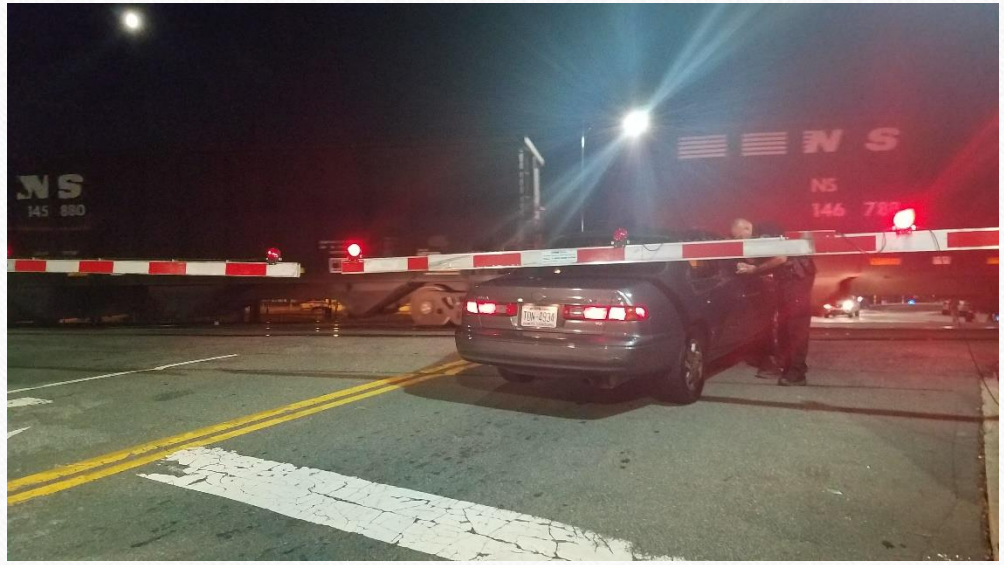
Homeless Encampments

Signage Issues

Debris Issues

Caught between the stop arms





Say Cheese!

Taking pictures on the tracks

Dianne Personett
PHOTOGRAPHY

home about investment galleries raves contact blog


CROSS ROAD
3
TRACKS
dianne personett
photography

More Photo Opportunities

Greensboro Public Murals and how to find them?

Google

best greensboro street artwork

https://ncatregister.com › theCULTURE

5 'selfie' murals to visit in GSO | The A&T Register

Oct 20, 2020 — 1. The **Downtown 'Greensboro'** mural. The newest **art** installation by local **artist** Gina Elizabeth Franco has been named the **Greensboro** 'selfie' ...

https://www.tripadvisor.com › Attraction_Review-g608...

Kotis Street Art (Greensboro) - All You Need to Know ...

Kotis **Street Art** has over 100 public **art** murals throughout **Greensboro**. There is a downloadable tour guide on the website that helps visitors plan their tour ...

★★★★★ Rating: 5 · 2 reviews

https://nsjonline.com › article › 2022/05 › outdoor-art-...

Outdoor art gives Greensboro street cred

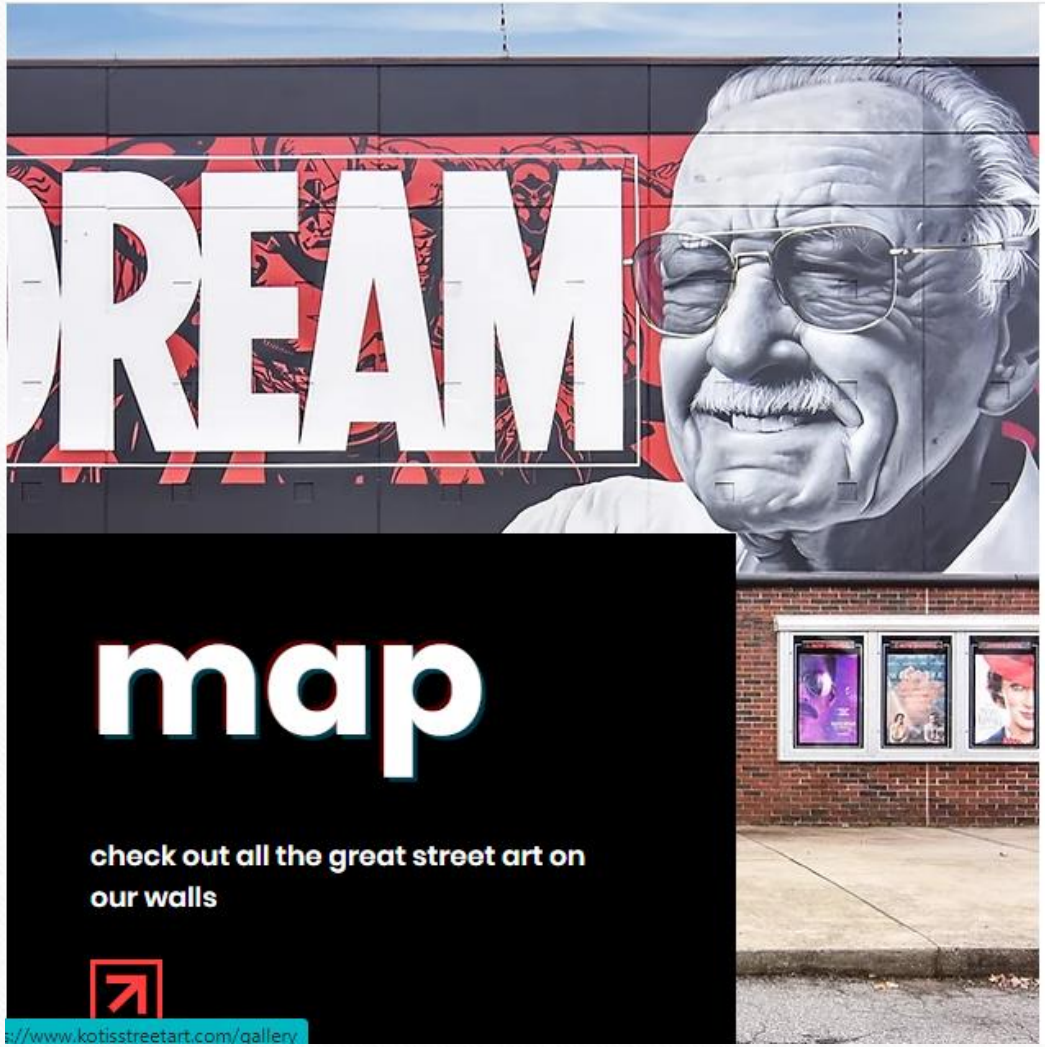
May 22, 2022 — Over 300 **street art** installations by over 70 **artists** have covered spaces in the Gate City ... **GREENSBORO** — One cannot travel through **Greensboro** ...

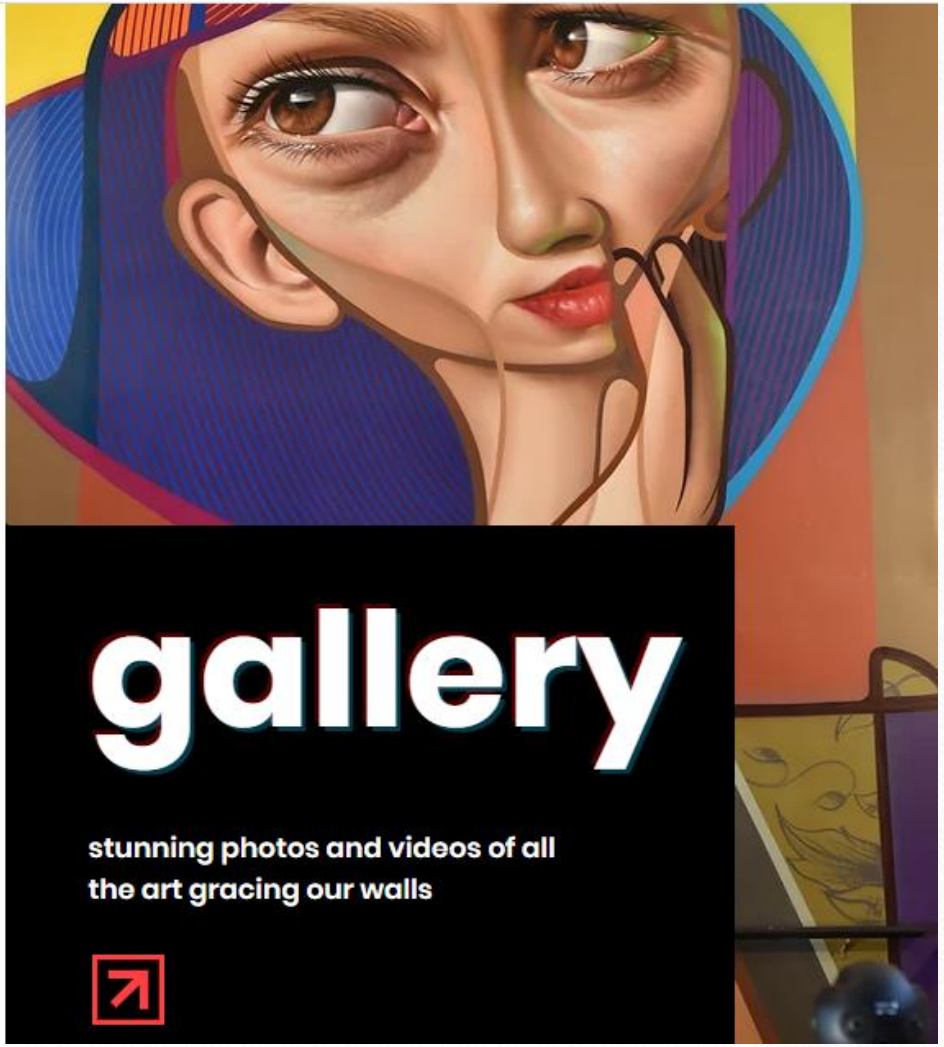
https://triadmomsonmain.com › my-blog › greensboro-...

Greensboro Street Art Scavenger Hunt - Triad Moms on Main

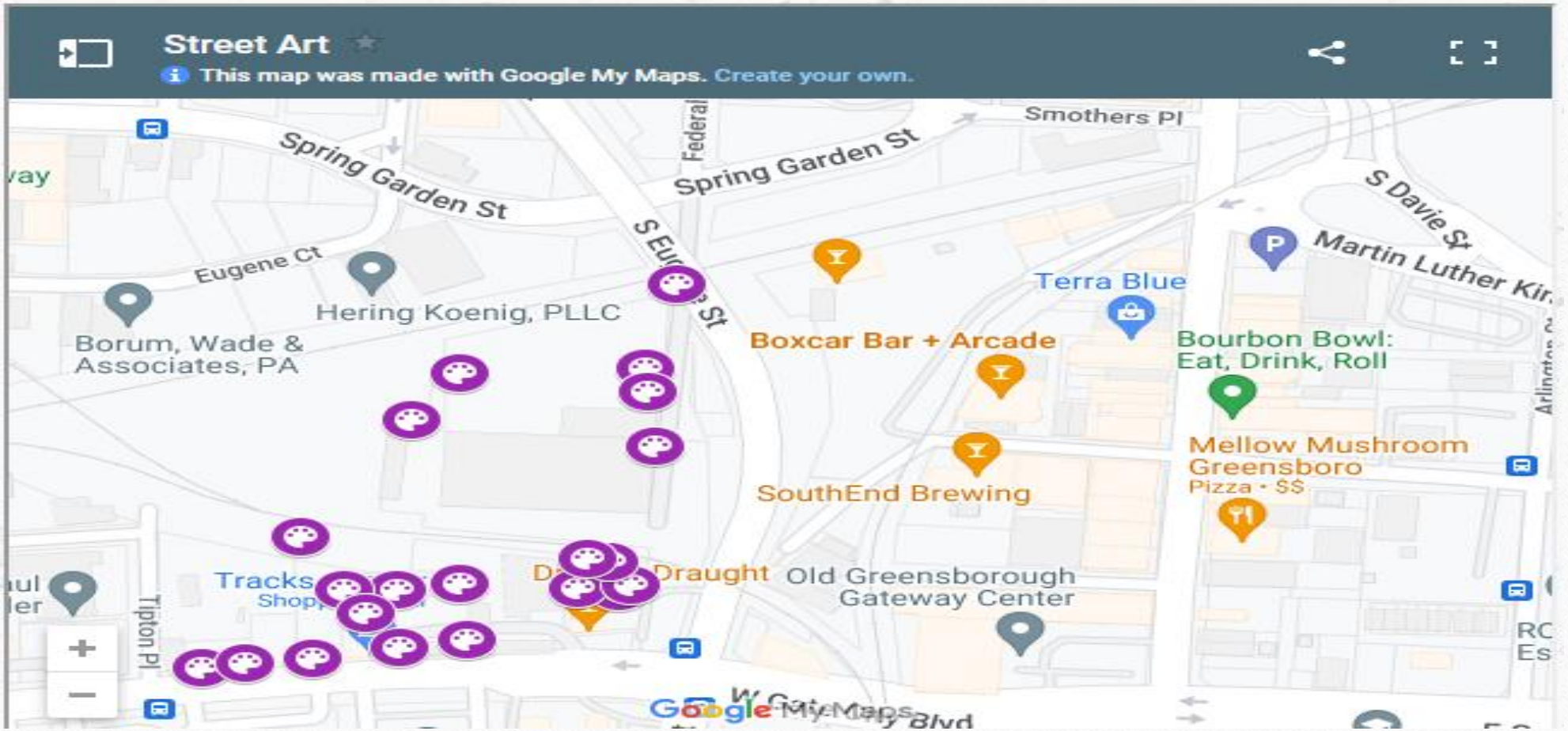
Jun 11, 2021 — Or just someone with a sense of humor and adventure? The Wizard of Oz-inspired murals around **Greensboro** are pretty cool and well worth the hunt.

kotisstreetart.com





our interactive street art map



Log In

apply for outdoor gallery

outdoor gallery map gallery

our artists

aches

Ireland

a-a-ron

Colorado, USA

belin

Spain

dale grimshaw

England

bustart

Switzerland

insane51

Greece

adnate

Australia

bella phame

Portugal

does

The Netherlands


JFL
KOE


JENS


©JEKS.NC
JEKS


DREAM


RED


JERS

Near Downtown Bar District
(Gate City Blvd/South Elm Eugene St)

Others Taking Notice!

Spectrum News article

9/27/22

Greensboro police lead the way in railroad trespassing and safety education

BY NOELLE LASHLEY | GREENSBORO
PUBLISHED 7:01 PM ET SEP. 07, 2022

GREENSBORO, N.C. — A North Carolina city is using education, rather than enforcement, to lead the way in railroad trespassing and safety awareness.

What You Need To Know

- The Greensboro Police Department is using education, rather than enforcement, to lead the way in railroad trespassing and safety education
- Officers with the department's ATV railroad trespass initiative conduct patrols, share educational materials with passersby and explain how to safely interact with train tracks when they see someone trespassing
- Officers and Greensboro City Council members said many people don't realize that the only safe, legal place to get across the tracks is an authorized pathway or crossing

The Greensboro Police Department's ATV railroad trespass initiative focuses on a three-mile stretch of track downtown.

N.C. State named that area as one of the top railway trespassing zones in the state. As part of the initiative, GPD officers like Cpl. Deon Carter conduct patrols, stand near crossings with their ATVs, share educational materials with passersby and explain how to safely interact with the tracks when they see someone trespassing.

The N.C. Department of Transportation said 40% of all railway incidents in Guilford County happened in the three-mile stretch of track when GPD's focused railway patrols started in 2016. In 2021, NCDOT said there were no incidents in the patrol focus area.

"Just to see the reduction in foot traffic is great and ... we're happy that we played a major role in that," Carter said.

"Just to see the reduction in foot traffic is great and ... we're happy that we played a major role in that," Carter said.

Greensboro City Council at-large member Marikay Abuzuaiter said those results show that education is a key component of keeping people safe and reducing railroad tresspassing incidents.

"I will tell you when I go out with the ATV team, and we ask people, I would say 90% to 95% of the people do not realize that they cannot cross except where the arms are, or where the actual crossing is," Abuzuaiter said. "It's been an educational program. It's been what I believe to be a very successful program."

According to a release from the The Federal Railroad Administration, almost $2 million in grants will be given out in 2022 to support trespassing education programs across the country. Carter said the $120,000 Greensboro is expected to receive will help with equipment needs, educational materials and additional patrols.

LOOK BOTH WAYS

BY: NOELLE LASHLEY

SPECTRUM NEWS

Recap

- Identify the Problem and problem area
- Devise a plan with the understanding that you may encounter other issues that also need addressing
- Work with ALL available and willing partners to solve the problem (NCDOT, Railway officials, City/County officials, etc.)
- Utilize alternative methods to solve the issue (if possible), like Officers on ATV's and Educating vs Arresting to achieve your desired goal.
- Be: 1.) Patient 2.) Persistent 3.) Flexible


QUESTIONS
COMMENTS
CONCERNS
PROBLEMS
COMPLAINTS

Investigating Public's Perceptions and Motivations for Railroad Trespassing: Social Media Data Mining and A Public Survey

Yuting (Tina) Chen, PhD

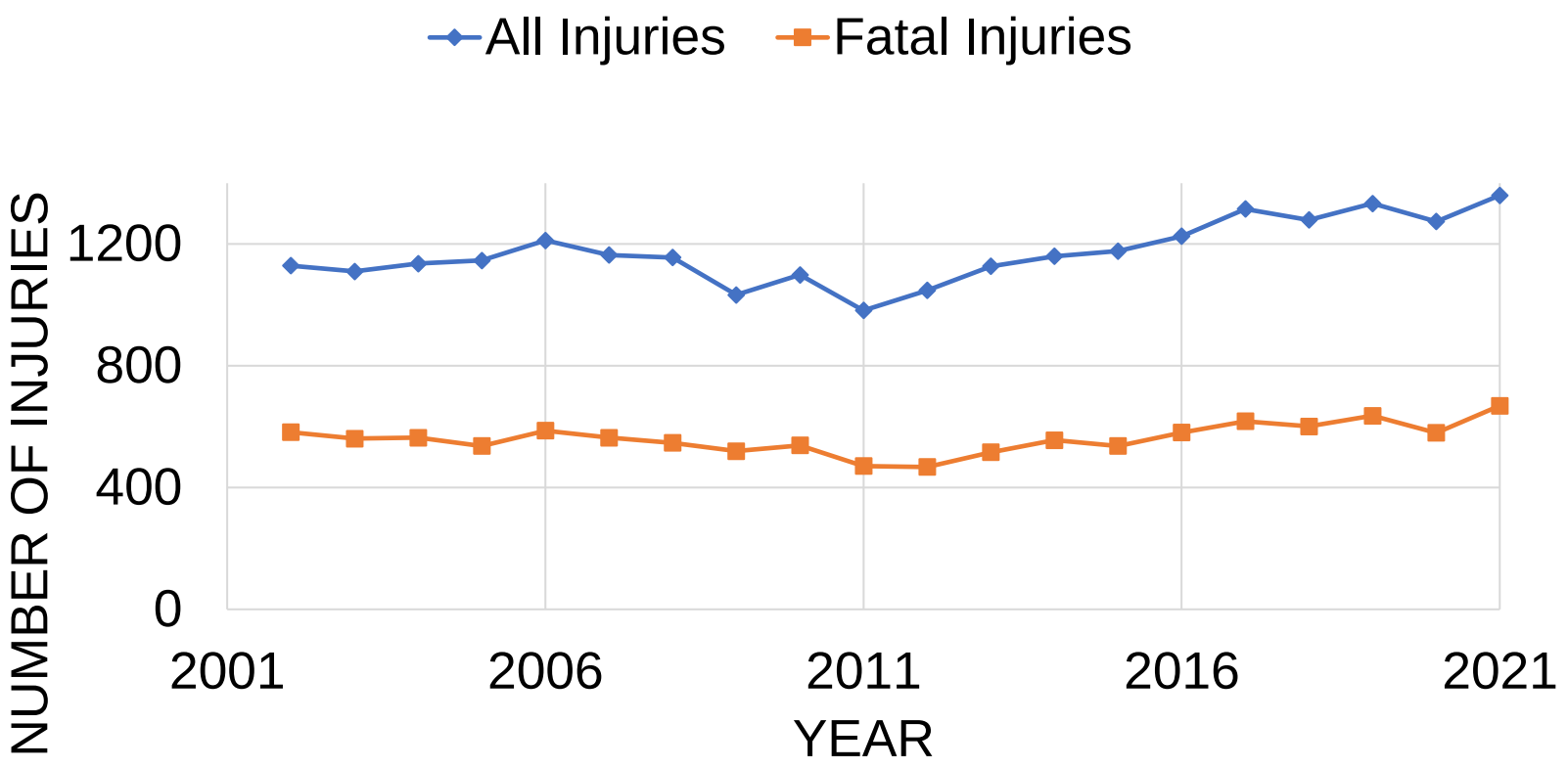
Assistant Professor

Engineering Technology and Construction Management

University of North Carolina at Charlotte

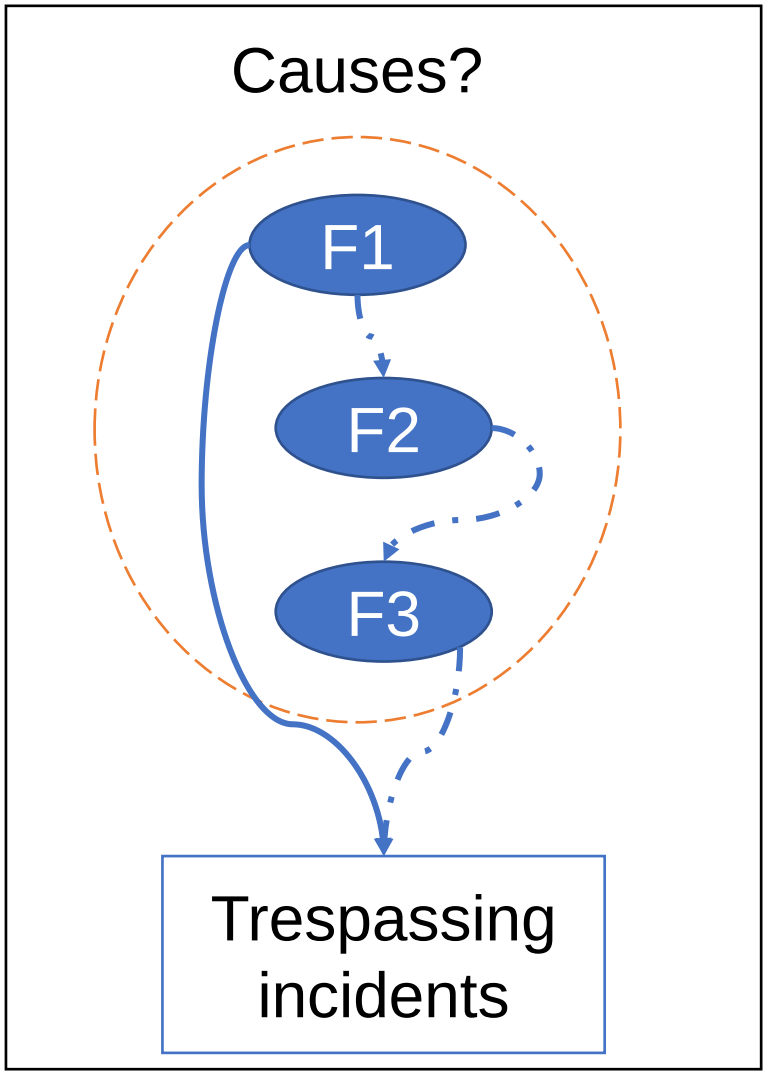
11-01-2022

Trespassing Injuries Over Last Twenty Years



Note: numbers in the figure include pedestrian, workers, and vehicle trespassing

Research Questions?



Study 1

Investigating Public Perceptions via Social Media Data Mining-Twitter

Study 2

Survey Publics' Motivations for Railroad Trespassing & Language Bias When Using "Trespassing"

Study 1:
Investigating Public Perceptions via Social Media Data Mining-Twitter

Yuting Chen, Wenwen Dou, & Shrabani Ghosh

UNC-Charlotte

Data Collection

- January 2017 to May 2022
- 93,239 tweets, 37,816 unique tweets, 55,423 retweets
- Thirteen key words:

○ #NoTrespassing	○ #RailTransport	○ railroad trespasser
○ #railsafety	○ #Railroaders	○ rail track trespassing
○ #StopTrespassing	○ railroad trespassing	○ rail track trespasser
○ #TracksAreForTrains	○ #StayOffTheTracks	
○ #RailroadSafety	○ #TracksAreForTrains	

Data Analysis Techniques

Topic modelling

Emotion analysis

Organization tags

Geographical hashtag analysis

Topics Discussed on Twitter

No.	Topic Examples	Count
1	Derailment	488
2	Teach children railroad safety	463
3	Didn’t see train coming	195
4	September safety week	152
5	Stay off the tracks	115
6	Railroad trespassing-year high	58
7	Support railroad safety	53
8	Trespassing incidents-serious injured	28
9	Remove headphones	17
10	Private property, no trespassing	13

Topics Discussed on Twitter

- Topic: teach children railroad safety

When your kids are enjoying playing outdoors, be sure to teach them to stay away and off railroad tracks. Teach #RailSafety help them make safe decisions near trains and tracks. #KeepKidsSafe #TeachRailSafety #SaveLivesTell5
Teach your children not to play on railroad tracks. Teach them to practice #RailSafety. Help them make good decisions near railroad tracks and trains. Be a #RailSafetyRoleModel #RailSafetyEducation to #SaveLives
Please,teach your children to practice #RailSafety and stay off and away from railroad tracks. It's trespassing and can be deadly. #StopTrackTragedies #StayOff #StayAway #StayAlive

- Topic: stay off the tracks

Don't let your life end like this. #stayoffthetracks
#stayoffthetracks to stay safe and avoid delays to thousands of passengers.
#StayOffTheTracks Everyone loses if you choose to step on the track.

Topics Discussed on Twitter

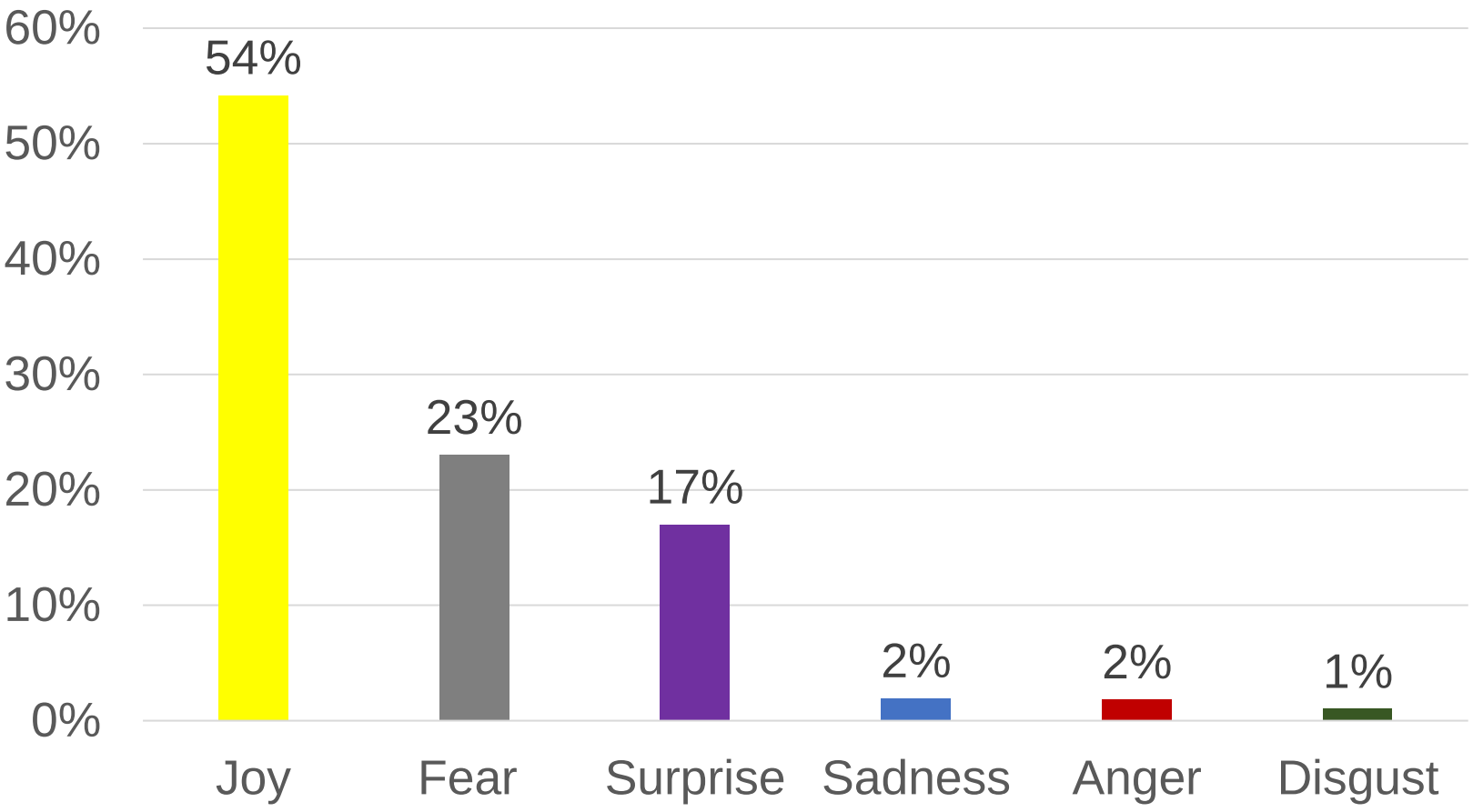
- Topic : trespassing incidents-serious injured

Each year more than 2,200 North Americans are killed or seriously injured in rail crossing and trespassing incidents. As part of Rail Safety Week Watson Goepel supports CN as they spread the rail safety message across Canada. #RailSafety #transportationlaw
Hundreds of so-called 'trespassers' have been run over on Canada's railways. The Transportation Safety Board has only investigated two | The Star #TSB #RailSafety #Vancouver #trespassing #death #cdnpoli #snrtg
Over 100 Canadians are seriously injured or killed in preventable railway crossing or trespassing incidents every year. Learn more about #RailSafety to help #StopTrackTragedies

- Topic: remove headphones

Don't let distraction be the end of you. Remove your headphones near railway tracks #StayOffTheTracks @VIA_Rail
Cell phones + headphones = deadly combination near the tracks. Please, remove your headphones! #StayOffTheTracks
Don't let that song lead you onto the tracks. Pay attention & remove your headphones! #StayOffTheTracks @CN_Comm

Emotions Represented by The Twitter Data



Tweet Example for Each Emotion

Joy

You are welcome. I am truly grateful for great friends such as of who help teach and promote railsafety with my artwork. :writing_hand: :thumbs_up:

Fear

Just wanna thank god the train didn't smack me . prayers go out to the family of the model :fearful_face: #stayoffthetracks

Surprise

Just announced: "US railroads had the lowest train accident rate on record in 2016, according to data from Surprise ." #railsafety #latest

Tweet Example for Each Emotion

Sadness

Tragic for everyone concerned, but be aware tracksarefortrains

Anger

railsafety reminder: the dangers at railway crossings are real... always pay attention! #seetracksthink

Disgust

Shame on, for making light of illegal and dangerous railroad trespassing. #railsafety

Organizations

Organization Name	Hashtag Count	Mention Count	Total
SafetyFirst	407	0	407
Amtrak	356	49	405
UICrail	217	0	217
Ukrail*	174	0	174
CommunityRail*	169	70	239
USDOT-FRA	126	1	127
NTSB	76	15	91
USDOT	75	9	84

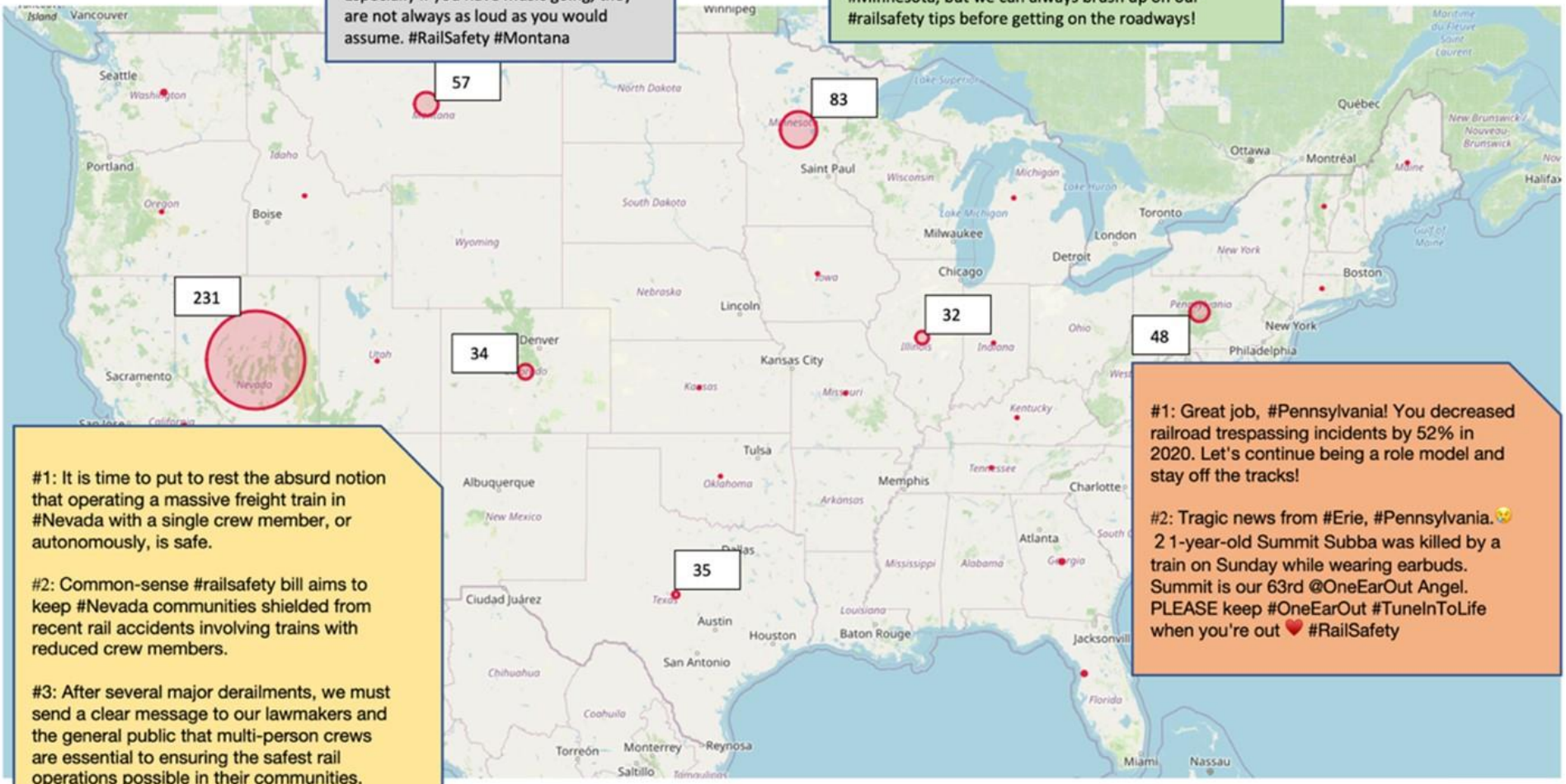
*: rails in UK

#1: Never take photos on railroad tracks! It's dangerous and illegal. #Montana practice #railsafety.

#2: Always be aware of #trains! Especially if you have music going, they are not always as loud as you would assume. #RailSafety #Montana

#1: In #Minnesota, @BNSFRailway employee accidents. crossing collisions down 80% from last year. #railsafety #MNleg

#2: #winter may be something we're used to in #Minnesota, but we can always brush up on our #railsafety tips before getting on the roadways!



#1: It is time to put to rest the absurd notion that operating a massive freight train in #Nevada with a single crew member, or autonomously, is safe.

#2: Common-sense #railsafety bill aims to keep #Nevada communities shielded from recent rail accidents involving trains with reduced crew members.

#3: After several major derailments, we must send a clear message to our lawmakers and the general public that multi-person crews are essential to ensuring the safest rail operations possible in their communities.

#1: Great job, #Pennsylvania! You decreased railroad trespassing incidents by 52% in 2020. Let's continue being a role model and stay off the tracks!

#2: Tragic news from #Erie, #Pennsylvania.😢 2 1-year-old Summit Subba was killed by a train on Sunday while wearing earbuds. Summit is our 63rd @OneEarOut Angel. PLEASE keep #OneEarOut #TuneInToLife when you're out ❤️ #RailSafety

Study 2:
Survey Publics' Motivations for Railroad Trespassing & Language Bias When Using "Trespassing"

Yuting Chen, Roger Smock, Wenwen Dou, & Neha Pawar

Data Collection

- Surveys:
  - Neutral language (NL) version https://uncc.qualtrics.com/jfe/form/SV_2ggi7f1g1BgdlvE
  - Biased language (BL) version

  https://uncc.qualtrics.com/jfe/form/SV_cI3MMgeEKXb8Nsq
- Survey collection:
  - Qualtrics, LinkedIn, and Emails
- No. of surveys:
  - 150 NL, and 150 BL (target)
  - 16 NL, and 52 BL (collected as of Oct. 28, 2022)

Surveys

Part 1: 18 questions (NL and BL survey are the same)

9. Do you live close to rail tracks? (Yes No)

10. Do you think trains are noisy?
    A: Yes
    B: No
    C: Not sure about that

11. How far away do you think you can hear a train when it is approaching you?
    A. 100 feet or less away
    B. About 300 feet away (the length of a football field)
    C. At least ½ mile away
    D. A mile or more away

12. Have you ever crossed rail tracks for shortcuts? (Yes No)

13. If you have ever crossed rail tracks for shortcuts, what are your purposes? (Please select all apply)
    A: Way to (from) work
    B: Way to (from) school
    C: To a train, bus
    D: Walks, walking dogs
    E: Shopping
    F: Going to the town/city center
    G: Access to garden plots
    H: Hiking
    I: Visiting neighbors
    J: Going to a restaurant
    K: Going to a hospital
    L: Visiting a cemetery
    M: Living place for homeless people
    N: Other_____

14. If you have ever crossed rail tracks for shortcuts, what are your motivations for crossing? (Please select all apply)
    A: Shortening a trip
    B: Habit
    C: Everyone goes through there
    D: An official crossing is far away or inconvenient
    E. The nearest official crossing is also a busy highway
    E: Other_____

15. If you have ever crossed rail tracks for shortcuts, did you think or feel it was a dangerous act?
    A: I did not think it was dangerous
    B: I think it was a little dangerous, but I could easily hear a train coming
    C. I think it was dangerous, but I looked both ways and hurried across
    D: I don't remember because it was long time ago

Surveys

Part 2: 4 accident stories, BL survey uses “trespass” or “trespasser” when describing the stories, while NL survey uses neutral language, e.g., “cross the rail track”, rather than trespass.

HAINES CITY — The Polk County Sheriff's Office is conducting a death investigation of 11-year-old Yazmin White after the girl was hit by a passenger train on Wednesday afternoon in Haines City.

The incident occurred at approximately 4:45 p.m. at the intersection of U.S. 17/92 and Bates Road in unincorporated Haines City.

PCSO's preliminary investigation has concluded that White was leaving Carmelita's Restaurant at 2670 US 17/92 in Haines City and was walking through nearby woods. White attempted to cross directly over the railroad tracks when she was struck by the southbound Amtrak passenger train heading toward Winter Haven.

The train, which was transporting 12 passenger cars and two engines, was going approximately 68 mph. The conductor observed White trying to cross the tracks and repeatedly sounded the train's horn and applied the brakes.

The conductor said White made no indication that she was aware that the train was coming and was looking down at her phone as she walked. Evidence collected at the scene indicated White was wearing headphones at the time of the accident and was declared dead at the scene.

No charges are pending.

Questions:

- Is the person who died a victim or criminal?
- Regarding your answer, briefly describe how you feel about your answer and why

Preliminary Results

NL-16 Surveys

- Male 11, female 3
- Age 21 to 40, mean: 28
- Education
  - Some college, or associates degree, 4
  - Bachelors degree, 7
  - Graduate or professional degree, 3
- City area: 10, rural area: 4
- Taken railroad safety training: 0 yes, 14 no.

Show results from Qualtrics

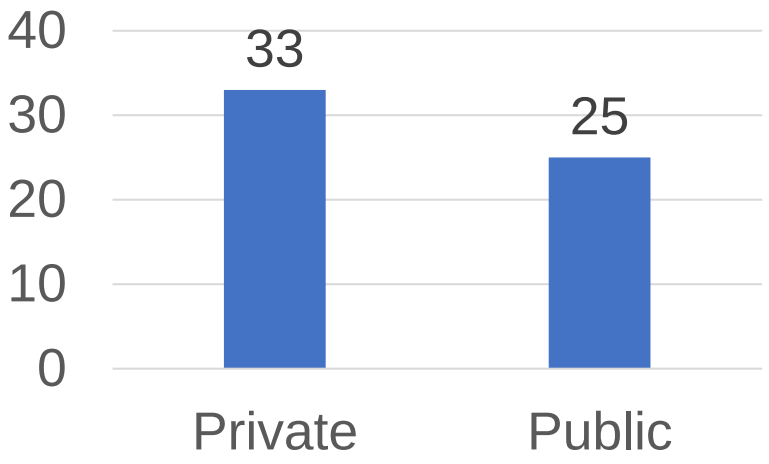
BL-52 Surveys

- Male 33, female 13
- Age 18 to 58, mean: 34
- Education
  - High school graduate (includes equivalency), 2
  - Some college, or associates degree, 5
  - Bachelors degree, 9
  - Graduate or professional degree, 30
- City area: 37, rural area: 9
- Taken railroad safety training: 7 yes, 39 no.

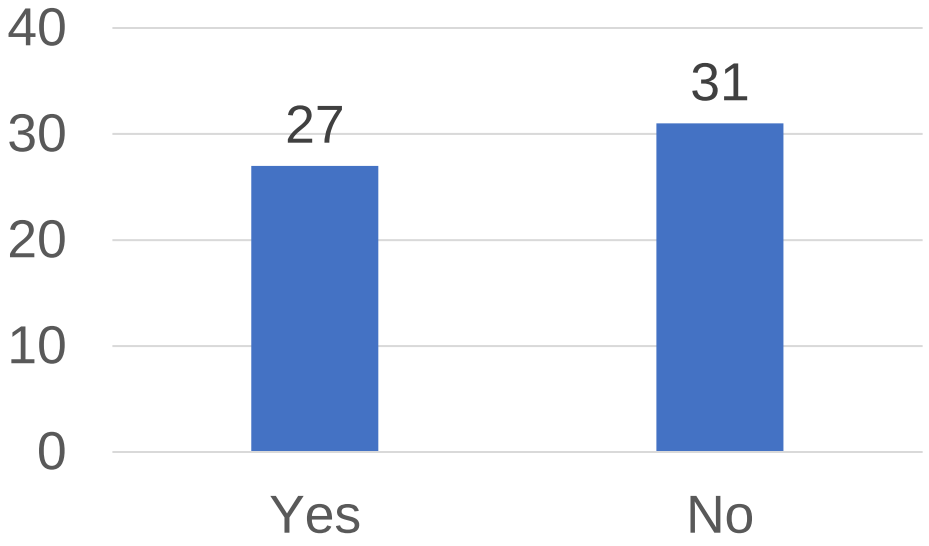
Show results from Qualtrics

Preliminary Results-NL & BL

7. Do you think railroad property in US is private property or public property?"



8. Before you take this survey, do you know walking around train cars when a train is stopped, crossing rail tracks for recreational purposes (e.g., taking photos on rail tracks), or crossing rail tracks for shortcuts (e.g., for shopping or hiking), is illegal in US?



Story 3 (NL vs. BL)

- Is the girl who died in the accident a victim or criminal?
- Regarding your answer, briefly describe how you feel about your answer and why.

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The incident occurred at approximately 4:45 p.m. at the intersection of U.S. 17/92 and Bates Road in unincorporated Haines City.

PCSO's preliminary investigation has concluded that White was leaving Carmelita's Restaurant at 2670 US 17/92 in Haines City and was walking through nearby woods. White attempted to cross directly over the railroad tracks when she was struck by the southbound Amtrak passenger train heading toward Winter Haven.

The train, which was transporting 12 passenger cars and two engines, was going approximately 68 mph. The conductor observed White trying to cross the tracks and repeatedly sounded the train's horn and applied the brakes.

The conductor said White made no indication that she was aware that the train was coming and was looking down at her phone as she walked. Evidence collected at the scene indicated White was wearing headphones at the time of the accident and was declared dead at the scene.

No charges are pending.

Questions:

- Is the person who died a victim or criminal?
- Regarding your answer, briefly describe how you feel about your answer and why

Preliminary Results

NL-16 Surveys

- 4 chose “victim”
- 4 chose “criminal”
- 1 neither
- 3 *“The girl died due to negligence”, “It was her fault for not paying attention”, and “Criminal seems to be an odd word to call the injured/killed. It again seems to be her fault for not being careful…*”

BL-52 Surveys

- 14 chose “victim”
- 14 chose “criminal”
- 6 chose both

Preliminary Results

NL-16 Surveys

“No criminal intent. If the amtrak was going 68mph - what was the length of time between seeing White and the collision. Are train horns sufficiently loud?”

“White did not commit any criminal act - however I would like to know at what distance and over what length of time White was visible to the conductor.”

“This girl was certainly too young to realize what she was doing was wrong. Children also generally don't know when something is "dangerous". Unfortunately, her youthful ignorance killed her.”

“I believe she was in the wrong for wearing headphones while crossing a possibly dangerous area. Itâ€™s the same as if someone got into a wreck while driving because they were wearing headphones”

BL-52 Surveys

“As I said, the story mentions that she was trespassing at the time of death, so I believe that she would be considered a criminal at the time.”

“This girl's injuries likely occurred due to a lack of education regarding the potential danger of crossing the railroad tracks. Risky decisions are common among this age group, and this is why education on the dangers associated with crossing train tracks is needed. “

“In the story, the injured party was described as trespassing. But did the injured party know they were trespassing? Were signs and fence present to notify the person? Are pedestrian bridges or tunnels an option in the area? “

Questions?

ychen106@uncc.edu

Acknowledgement: this research was funded by SDS Seed Grant at UNCC

IN THE INTEREST OF SAFETY

MARGARET CANNELL
STATE COORDINATOR, NCOL

GRADE CROSSING SAFETY & RAILROAD TRESPASS PREVENTION WORKSHOP

OPERATION LIFESAVER®
Rail Safety Education

NATIONAL STATISTICS

Highway/Rail Grade Crossing Collisions

- 2,145 Collisions
- 234 Fatalities
- 669 Injuries

Ranked by State

- Texas
- California
- Georgia

NC currently ranks 15th

(Source: FRA, 2021)

NATIONAL STATISTICS

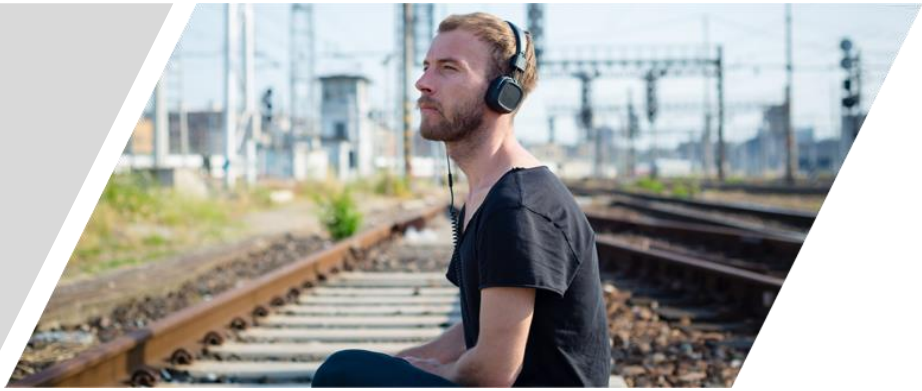
Trespassing Casualties

- 1,121 Casualties
- 599 Fatalities
- 522 Injuries

Ranked by State

- California
- Texas
- Florida

NC currently ranks 15th



(Source: FRA, 2021)

RAIL INVESTIGATION SAFETY COURSE

RAILROAD INVESTIGATION AND SAFETY COURSE (RISC) STATS

104

New RISC Instructors

- 23 training classes
- 14 virtual classes

2,819

First Responders

173

Total Classes

RISC received Police Officer Standards and Training (POST) Accreditation in 16 states: Arizona, California, Colorado, Georgia, Indiana, Kansas, Louisiana, Minnesota, Mississippi, Missouri, Nebraska, New Mexico, North Dakota, Oklahoma, Tennessee and Texas.

2021 RISC Class locations

2021 RISC Instructor locations

(Source: OLI 2021 Annual Report

OL OUTREACH AND VOLUNTEERS

IN 2021, DESPITE A WORLDWIDE PANDEMIC THAT RESULTED IN BUSINESS AND SCHOOL CLOSINGS AS WELL AS EVENT CANCELLATIONS, OUTREACH RESULTS INCLUDED:

564,298
People reached across the U.S.
+122% from 2020

8,312
Virtual and in-person presentations, training classes and events
+77% from 2020

202
New Operation Lifesaver Authorized Volunteers (OLAVs)
+30% from 2020

JOIN OUR RAIL SAFETY MISSION!

Learn more about becoming an Operation Lifesaver Authorized Volunteer:

OLI.ORG/SAFETY-NEAR-TRAINS/VOLUNTEER

(Source: OLI 2021 Annual Report

OL NATIONAL RAIL SAFETY WEEK

THE WEEK OF SEPTEMBER 20-26, OPERATION LIFESAVER, INC. (OLI) PARTNERED WITH OPERATION LIFESAVER CANADA AND THE MEXICAN ASSOCIATION OF RAILROADS AS WELL AS STATE PROGRAMS AND PARTNERS ACROSS THE NATION MARKING THE 5TH ANNUAL OBSERVANCE OF RAIL SAFETY WEEK (RSW) IN NORTH AMERICA.

The annual observance of RSW is a concentrated effort to raise awareness about the importance of rail safety and empower the general public to keep themselves safe near railroad crossings and along railroad rights-of-way. RSW in 2021 was observed via both in-person events and virtually. Each day during Rail Safety Week focuses on a theme and specific audiences.

SCHEDULE: 9/20-9/26

MON	#StopTrack Tragedies	News Media, Government Officials, OLI Partners, General Public
TUE	Operation Clear Track	Law Enforcement and First Responders
WED	Crossing Safety	General Public, Farmers, New Drivers, Outdoor Enthusiasts, People Experiencing Homelessness
THU	Transit Safety Thursday & Professional Driver Safety	Transit and Commuter Riders, Professional Drivers, School Bus Drivers
FRI	Wear Red for Rail Safety	All Audiences
SAT	Trespass Prevention	General Public, Pedestrians, Cyclists, Joggers, Outdoor Enthusiasts, College Students, People Experiencing Homelessness
SUN	No Photo/Video/Selfie is Worth the Risk	Photographers (Professional & Amateur)

(Source: OLI 2021 Annual Report

OL SAFETY PARTNERS

BOARD REPRESENTATIVES

ADDITIONAL FUNDING PARTNERS

RAIL SAFETY PARTNERS

Thank you to our rail safety partners for sharing the rail safety message, including 4-H, American Farm Bureau Federation, the National FFA Organization, Operation Lifesaver Canada, Mexican Association of Railroads, Railway Engineering-Maintenance Suppliers Association, Inc., TRANSCAER® (Transportation Community Awareness Emergency Response) and many more.

TO LEARN MORE ABOUT PARTNERING WITH OLI, REACH OUT TO EXECUTIVE DIRECTOR RACHEL MALEH.

(Source: OLI 2021 Annual Report

OL GRANTS TO MEMBER PROGRAMS

OLI AWARDED $600K IN COMPETITIVE RAIL SAFETY PUBLIC GRANTS FROM FEDERAL AND PRIVATE PARTNERS

In 2021, we awarded **more than $600,000** in competitive grant funding to OL state programs and transit agencies in 22 states through partnerships with the **Federal Railroad Administration (FRA), Federal Highway Administration (FHWA),** the **Federal Transit Administration (FTA)** and OLI's private funder, the **Posner Foundation of Pittsburgh.**

A total of **$200,317** in competitive grant funding from the **Federal Railroad Administration (FRA)** was awarded by OLI to **12 state Operation Lifesaver programs** for a variety of rail crossing safety and trespass prevention public education projects in **Alabama, California, Georgia, Indiana, New Jersey, New York, North Carolina, North Dakota, Oregon, South Carolina, South Dakota and Tennessee.** The grant awards funded creative community outreach and education projects in the states, many in conjunction with Rail Safety Week.

Additional competitive grant proposals for public awareness projects in four more states, **Missouri, Ohio, Pennsylvania and Texas,** as well as the balance of funding for **New Jersey's** grant project were funded through **$45K** in grants from the **Posner Foundation of Pittsburgh.**

(Source: OLI 2021 Annual Report

OPERATION LIFESAVER, INC. MATERIALS CREATED IN 2021

SHIFT WORKERS PSA

Audience: shift workers – people whose jobs include evening, night, and early morning work hours. https://vimeo.com/653752289

MATURE DRIVERS PSA

Audience: mature drivers – drivers aged 50 and over. https://vimeo.com/654204970

DISTRACTED STUDENT PSA

Audience: distracted students – post-secondary students attending colleges and universities that include or are near railroad tracks. https://vimeo.com/654382324

FARM MACHINERY PSA

Audience: farmers and farm machinery operators. https://vimeo.com/604334011

FARM SAFETY LESSON PLAN

Two new farm safety lesson plans were created for youth agricultural classes and clubs.

FARM SAFETY STICKERS

The English and Spanish farm safety stickers remind farm machinery operators to See Tracks? Think Train!

(Source: OLI 2021 Annual Report

TRESPASSING PSAS – “SELFIE”

TRESPASSING PSAS – “SHORTCUT”

EMERGENCY NOTIFICATION SYSTEM (ENS)

AN OLDIE, BUT A GOODIE

THANK YOU

OPERATION LIFESAVER®

Rail Safety Education

U.S. Department of Transportation
Federal Railroad Administration

Grade Crossing Safety and Railroad Trespass Prevention Workshop

DMS Rail Safety Message and Law Enforcement Partnerships

Rob Stapleton | Raleigh, North Carolina | November 1-3. 2022

CTS Engineering


COATL0806EB-CCTV
Streams
COATL806EB9
95 South
Miami
SEE TRACKS?
THINK TRAIN
TRI RAIL
09/20/2021 11:19:33


US-17 N of Collins Rd
ATLANTIC SELF STORAGE
RAIL SAFETY
SEE TRACKS?
THINK TRAIN
SPEED
LIMIT
45
09/23/2021 15:50:31


RAIL ROAD CROSSING
STATE TROOPER
COMMERCIAL VEHICLE ENFORCEMENT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Rob Stapleton | 850-682-2847 | rstapleton@ctseinc.com

CTS Engineering

Grade Crossing Safety and Railroad Trespass Prevention Workshop

Day 1 Session Four

MODELING THE EFFECTS OF RAIL NOISE PROPAGATION ON PEDESTRIANS IN NORTH CAROLINA RAILROAD ENVIRONMENTS

Dr. Rongfang (Rachel) Liu
UPS Endowed Professor
Director of Transportation Institute

FRA: Grade Crossing and Railroad Trespass Prevention Workshop

Raleigh North Carolina

November 1, 2022

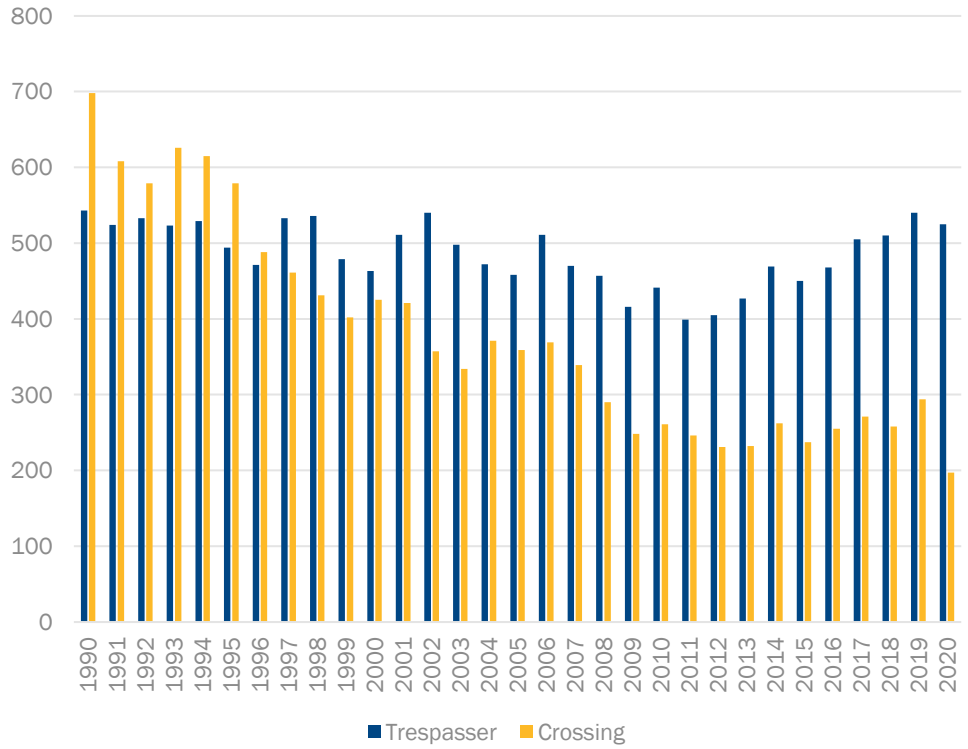
North Carolina Agricultural and Technical State University

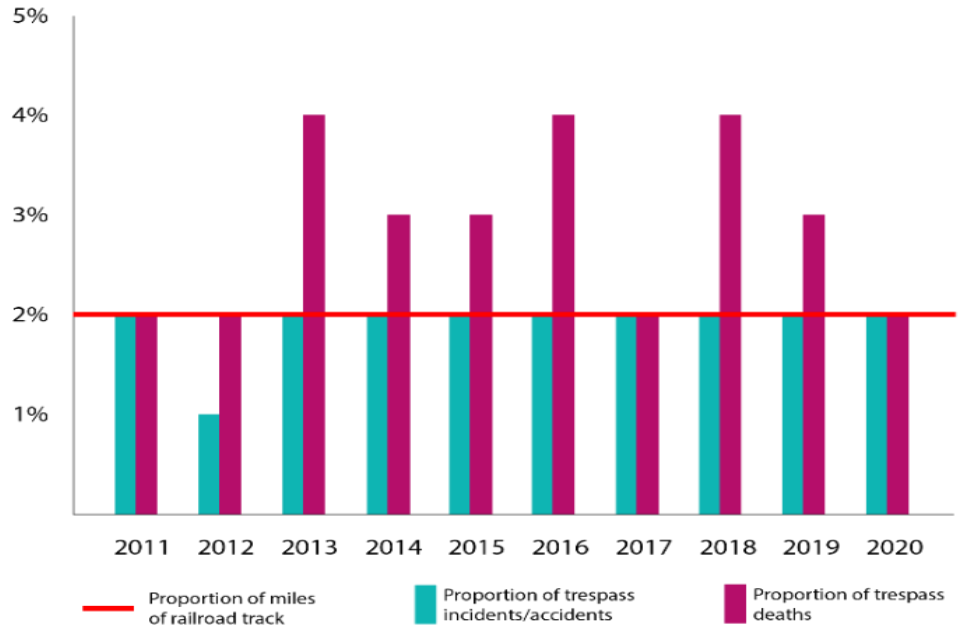
OVERVIEW

- Background
- Scope
- Major Milestones
- Initial Discoveries
- Planned Actions

TRENDING: RAILROAD

CURRENT STATISTICS:





RESEARCH SCOPE

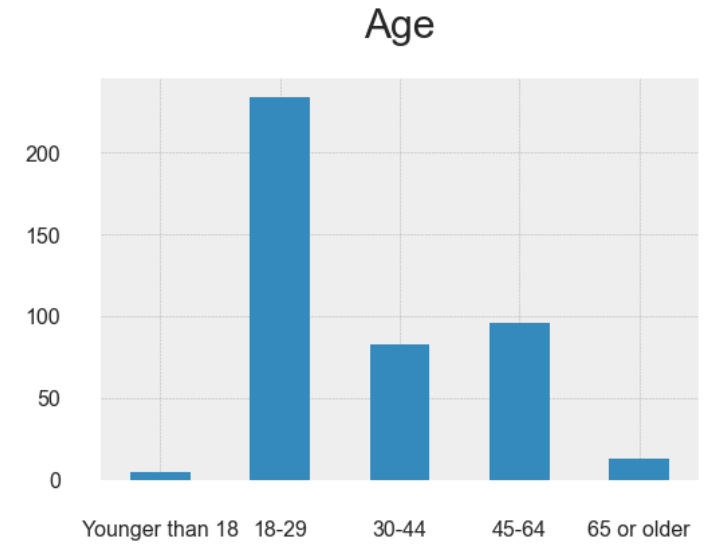
1. Review Literature;
2. Survey Rail Safety Perceptions;
3. Identify Factors Affecting Rail Noise Propagation;
4. Develop Research Methodology
5. Collect Noise Environmental Data
6. Model Rail Noise Propagation
7. Compile a List of High-Risk Environments
8. Produce Final Report

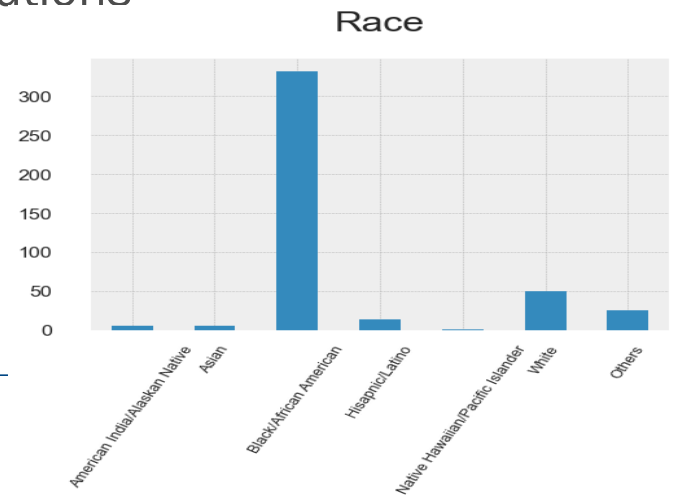
LITERATURE REVIEW

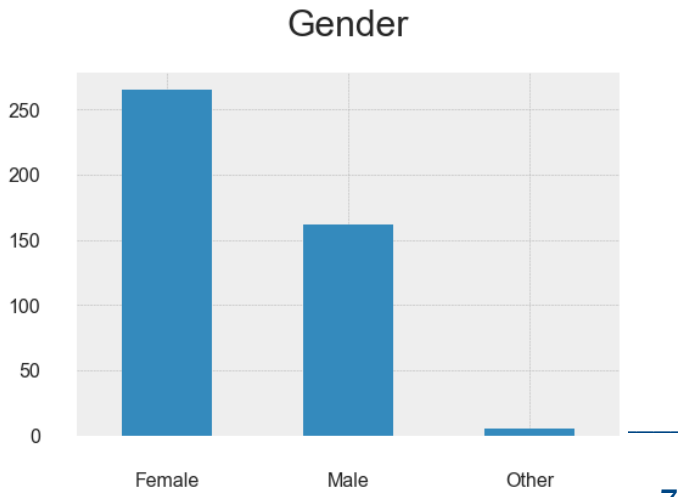
- Define Trespassing
- Trespassing Data by Different Railroad Types
- Evolution of Railroad Noise and Its Impact
- Emergency Warning Devices
- Trespassing Hot Spots
- Best Practice to Reduce Trespassing Behavior

SURVEY OF RAIL SAFETY PERCEPTIONS

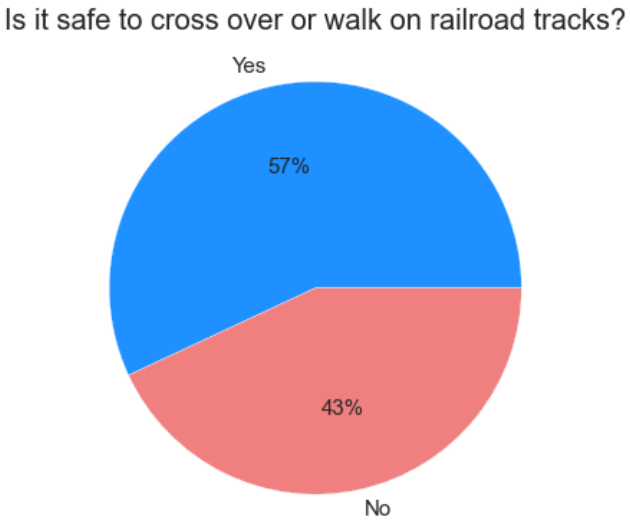
- Survey Questionnaire:
  - Social Economic and Demographic Characteristics;
  - Safety Perceptions of Railroad
  - Trespassing Behavior
  - Potential Causes of Railroad Trespassing
  - Effectiveness of Potential Solutions
- Pilot Testing

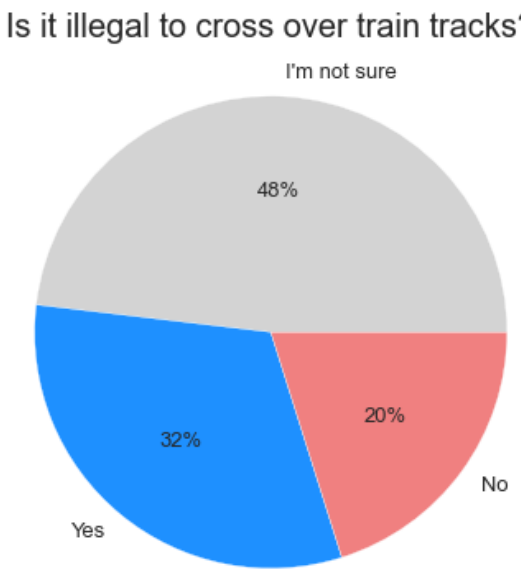


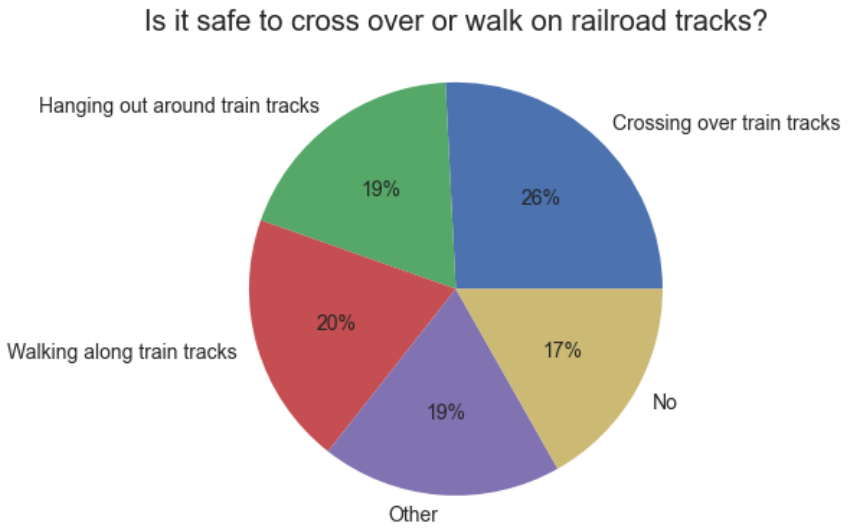




SAFETY PERCEPTION OF RAILROAD

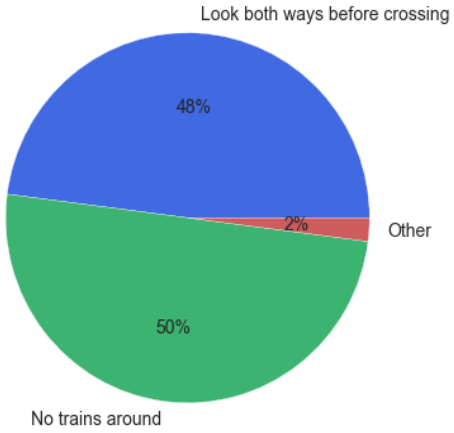




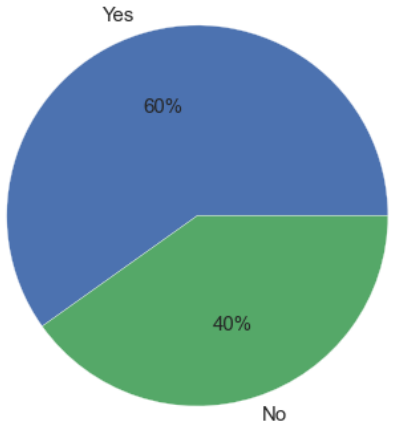


CORRELATION BETWEEN RAILROAD SAFETY AND OPERATING CHARACTERISTICS

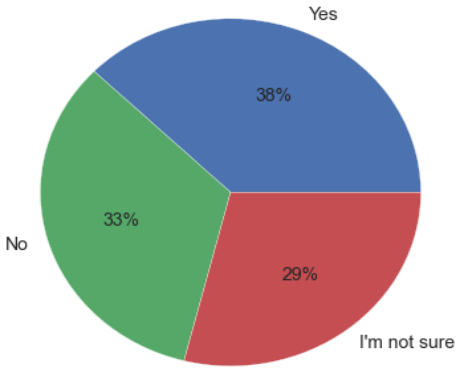
Why do you think it is safe to cross rail road tracks?



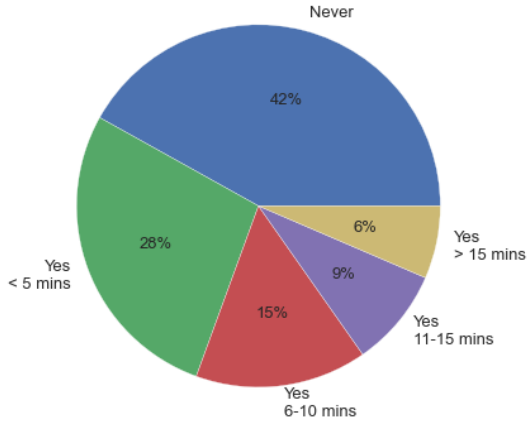
Do you think that pedestrians on the tracks have enough time to move to safety after they SEE a train



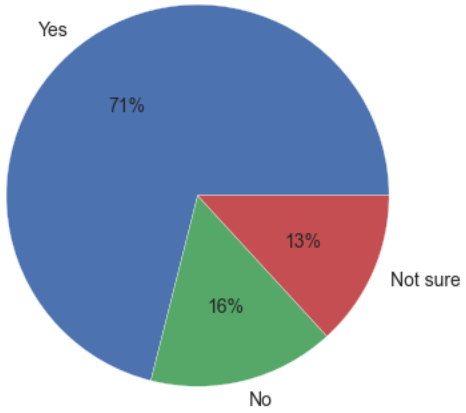
Do you believe trains always run on a set, regular schedule?



Would you cross train tracks on foot where it is not a designated crossing? (If you save..)



Do you think that train wheels and engines make enough noise to be heard by pedestrians on the tracks?



PLANNED ACTIONS

- Wrap Up Literature Review
- Conduct Survey
- Collect Field Data
- Develop Noise Propagation Model

KEY CONTACTS

- Roger Smock
- Curtis Bradley
- Dr. Rongfang (Rachel) Liu: rrliu@ncat.edu, 336-285-3299
- Nick Allen: NRAllen@ncat.edu, 336-285-3314

Exploring Grade Crossing and Trespassing Issues Through the Rutgers MBS Externship Exchange Program

R. Michael White
Global Information Systems, LLC

Overview

MBS Externship Exchange Director and Advisor

- **Christie Nelson, Ph.D.**

Externship Advisor

- **Brian Petrus, PHR, MBA**

Mentors

- **John Betak, Ph.D, Collaborative Solutions**
- **R. Michael White, Global Information Systems**

Student Teams

- **2-5 students per team**
- **MBS graduate students and undergraduate honors students**
- **Drawn from many disciplines including data analytics, engineering, business, public policy, etc.**

Externship Exchange Program

QUICK FACTS

more than

25

CONCENTRATIONS & MAJORS

- Analytics & Data Science
- Biotechnology
- Engineering
- Sustainability
- Food Science
- Drug Discovery
- UX Design
- Personal Care Science
- Cybersecurity

& many more....

APPROXIMATELY

152,000

Training hours to date

1090

Students to date

Company Mentor Investment (min)

1 Semester

Company Mentor Time Investment

30-60 mins per week

Financial Compensation

Unpaid

MORE THAN

105

PARTNER ORGANIZATIONS AND COUNTING...

citi VENTURES · NJ TRANSIT The Way To Go. · BAYER · PSEG · Ingredion · COLGATE-PALMOLIVE · BMI · INFRAGISTICS

*Data as of Spring 2022

Mentoring

Students presented with possible topics

- Grade Crossing Safety
- Trespassing

Background on railroads and chosen topics

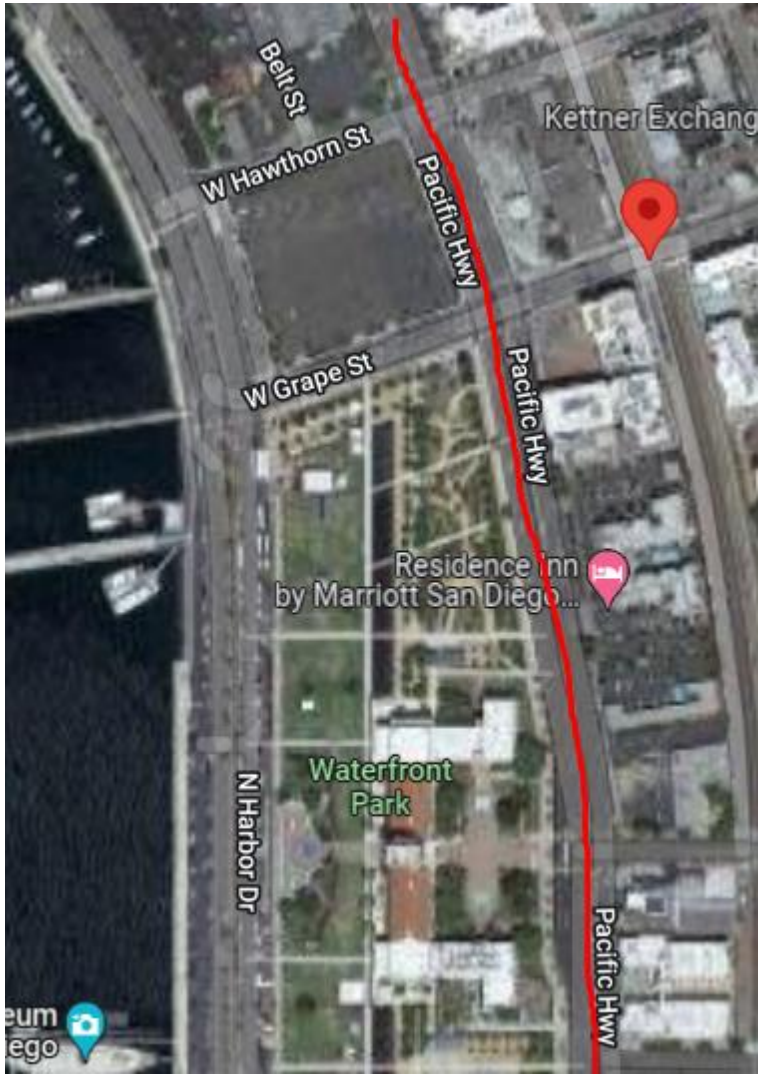
2: Problem Statement and Key Goals

- How can we **predict a one year probability of a vehicle accident** at a given grade crossing in the state of NJ using FRA collision probability data along with physical, socio-economic and crime datasets?

- Identify **strongest predictor attributes** to enable implementation of additional safety precautions and remedial actions by relevant federal and state stakeholders

Pedestrian Count and Trespassing Risk

- Being in downtown San Diego, the risk for trespassing is quite high.
  - As discussed previously: close proximity to Little Italy, Waterfront Park, and other seaside tourist attractions increases foot traffic.
  - From [3], San Diego Regional Bike and Pedestrian Counters, the average pedestrian and bicyclist count per day on Pacific Highway was approximately 211 per day, from 11/16/2021 to 4/10/2022. *(note this may be slightly lower than in Summer months)*



[3] SANDAG. "San Diego Regional Bike and Pedestrian Counts." *Data.eco*, SANDAG, https://data.eco-counter.com/ParcPublic/?id=681#.

Developing a Centralized National Decision Support System to Assess Railroad Trespassing Risk

Problem

- Railroad property trespassing is the leading cause of rail-related deaths in the U.S
- More fatalities and injuries due to railroad trespassing than motor vehicle collisions with trains at highway-rail grade crossings
- Trespassers utilize paths of shortest distance and/or perceived acceptable risks.
- NARN, NGCI, FRA Trespass and Suicide Dashboard and GX Dash!

Goals

- Identify known and new data sources and technology
  - Identify analytical tools to effectively analyze trespasser data
- identify trespasser hot spots
  - identify risk factors that lead to trespassing
  - risks, accidents and other relevant risk management tasks
  - spatial analysis of adjacent residential, commercial and industrial buildings and barriers to access
- mitigate trespasser intrusions
  - alternative trespassing mitigation strategies
  - additional safety measures or public awareness campaigns
  - diminish the likelihood of death, injury or vandalism on railroad property.

Develop Trespasser Shortest Path GIS Model

- Points of origin and destination
  - Origins: residential housing, schools, ATMs
  - Destinations: retail businesses, restaurants, bars and so on.
  - Origins and destinations are assigned a population capacity
  - Population Capacity drives overall frequency of travel between them
  - origins and destinations may be swapped, not necessarily using the same paths
- Barriers to travel
  - Barriers to travel assigned weights relative to difficulty to negotiate
- Identification of shortest cost routes
  - Data and GIS tools used to identify paths (e.g., Steiner Tree)
  - Use risk model to determine ranking relative to other paths
  - Manipulate underlying data to represent changes in barriers (costs) to determine best methods to reduce or eliminate trespassing
- Data visualizations for FRA and railroad managements

Mentoring

Students presented with possible topics

Grade Crossing Safety

Trespassing

Background on railroads and specific topic

Research

Guidance

Periodic Updates

3: Project Concept Map

What causes grade crossing accidents?

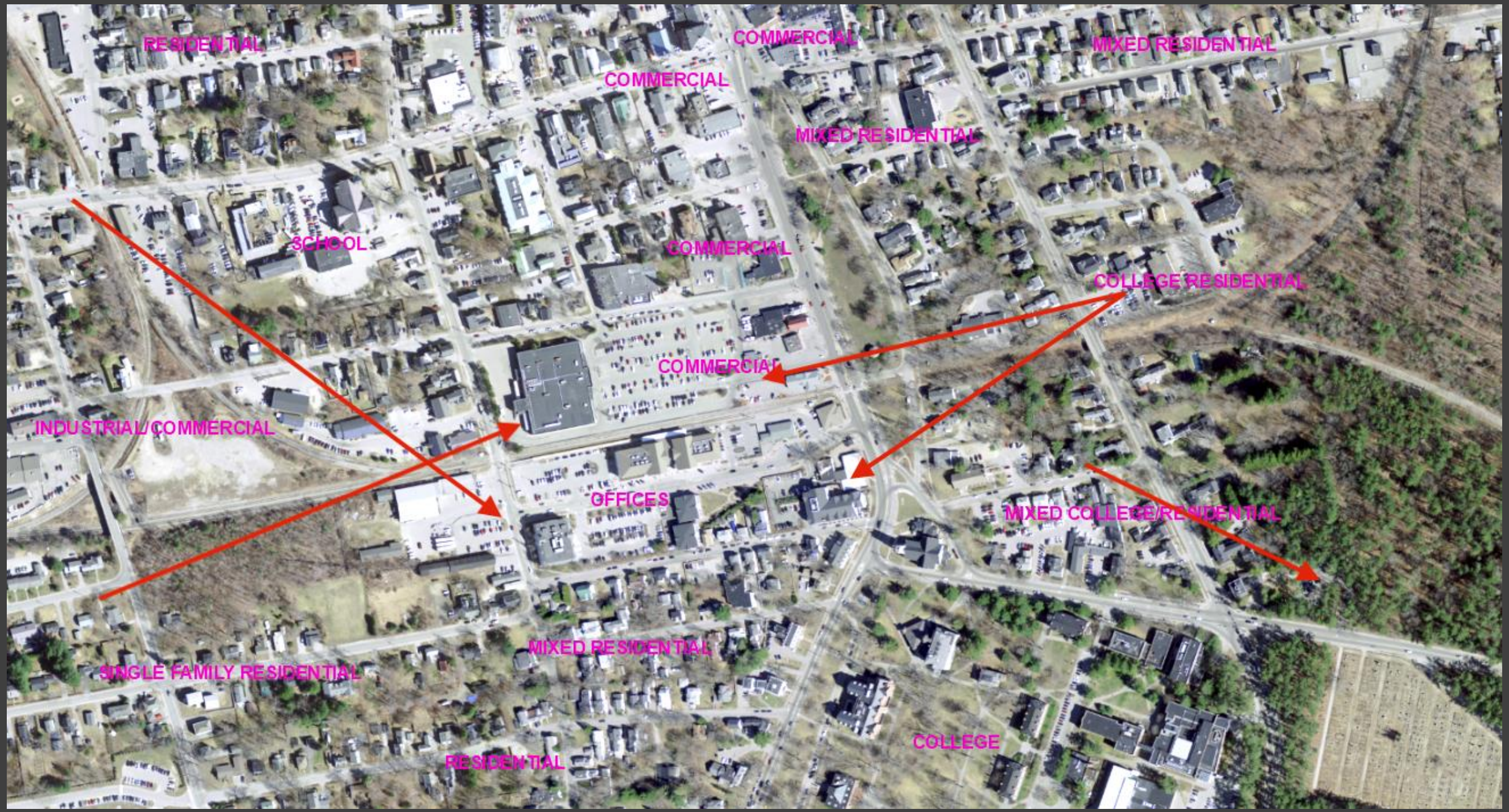
- Vehicles & Pedestrians
  - Distracted
  - Ignore signs
  - Not cautious

Without changing behavior, how can we prevent accidents?

- Technology in U.S.
- Technology Abroad

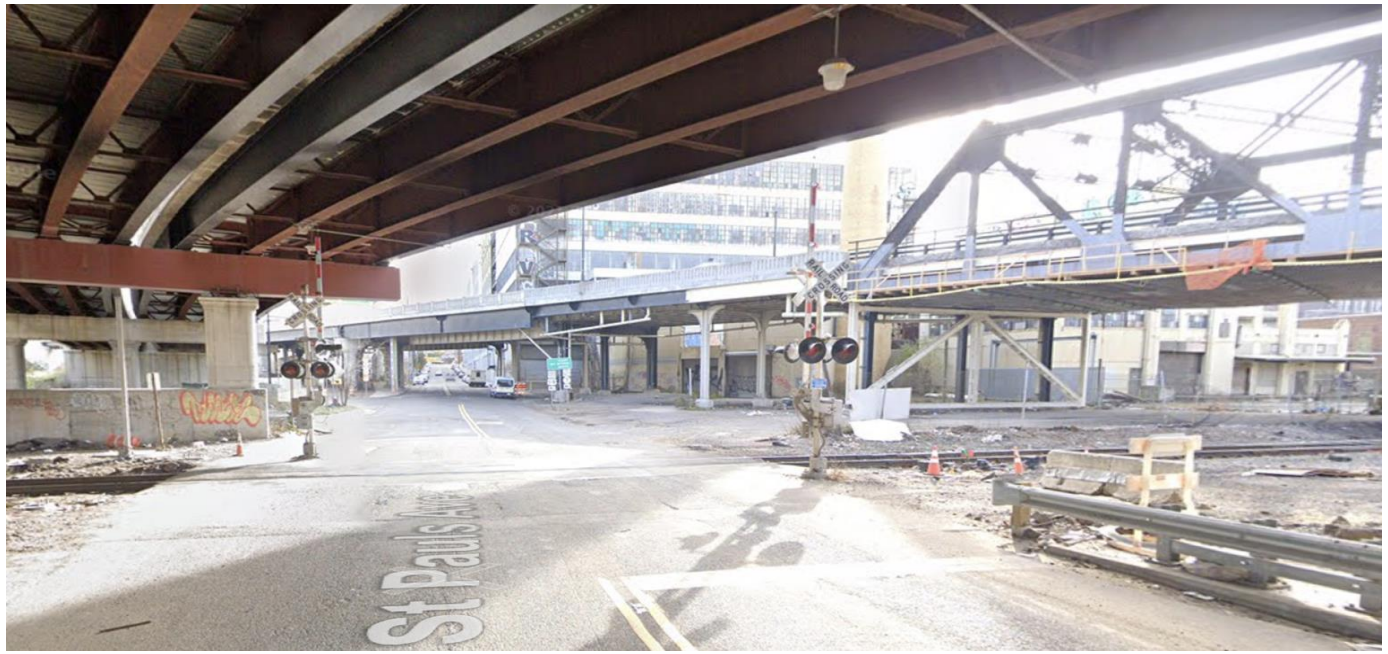
- Radars
- Cameras
- AI
- Fiber optics
- Lasers

- Efficacy
- Cost
- Maintenance
- Drawbacks


RESIDENTIAL
COMMERCIAL
COMMERCIAL
MIXED RESIDENTIAL
MIXED RESIDENTIAL
SCHOOL
COMMERCIAL
COLLEGE RESIDENTIAL
COMMERCIAL
INDUSTRIAL/COMMERCIAL
OFFICES
MIXED COLLEGE/RESIDENTIAL
MIXED RESIDENTIAL
SINGLE FAMILY RESIDENTIAL
COLLEGE
RESIDENTIAL

Hudson County - Background

- Founded in 1840 as New Jersey's gateway to NY.
- Hudson County is a commuter heavy area that is under heavy amounts of construction and is prone to high levels of traffic.
- Construction adds another layer of distractions for drivers
- Grade crossings under bridges can be very dark and drivers already uneasy because of road conditions and potential weather.



Mentoring

Students presented with possible topics

Grade Crossing Safety

Trespassing

Background on railroads and specific topic

Research

Guidance

Periodic Updates

Deliverables

Presentations

Reports

Predicting Probability of Vehicle Accidents at Grade Crossings in NJ

Introduction

- Approx. 2000 railroad accidents occurring each year, about 30% **were due to vehicle accidents at crossings and are often fatal.**
- Focus on v**ehicle incidents** occurring at grade crossings **in the state of NJ**

Problem Statement

- **Predicting one year probability of a vehicle accident** at a given grade crossing in NJ
- Our goal is to assess the contributing risk attributes including crime and social factors

Key Attributes

- Significant **non-physical** and **physical** attributes include:
  - % Cleared for Burglary & Auto Theft, Robbery Rate
  - Presence of Signal, # of track movements, # Flashing Light Pairs

Model Results

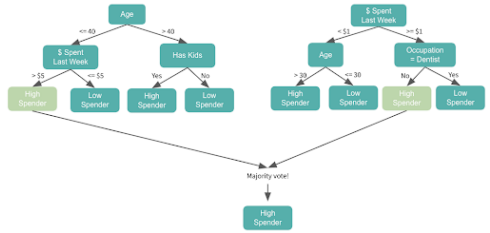
Model Name	Positive Predictive Value/Precision	Negative Predictive Value	Recall
Logistic Model w/ All Attributes	0.92	0.86	0.62
Decision Tree w/ All Attributes	0.92	0.97	0.91

- Baseline LR model **strong on precision**
- Tree-based models with **much better Recall Score**

Methods

- Logistic regression model to predict binary risk
- Tree-based algorithms including Decision Tree and Random Forest

python™



Insights and Takeaways

- **Surface length** reaffirmed for significance
- Crime, Socioeconomic, and Physical crossing attributes also impact crossing safety

4: Results - Smart Tech Suggestions

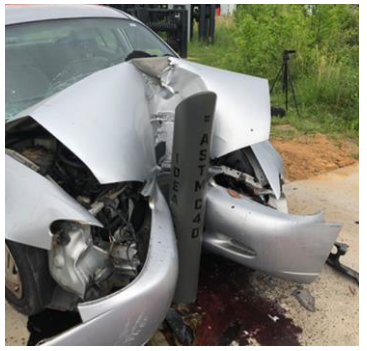
Problems

- Vulnerable gas lines next to railroads.

- Lack of delineation within nearby roads. Unclear road signage.

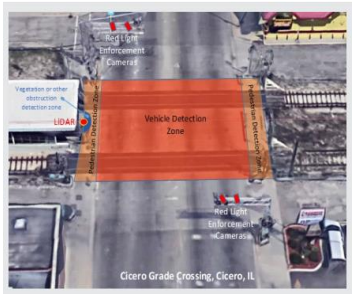
- Improvements to current protection and detection capabilities needed.

Smart-Tech Solutions



- Bollards next to vulnerable gas lines to prevent collisions.

- Flexible Traffic Separator Devices installed at grade crossings.

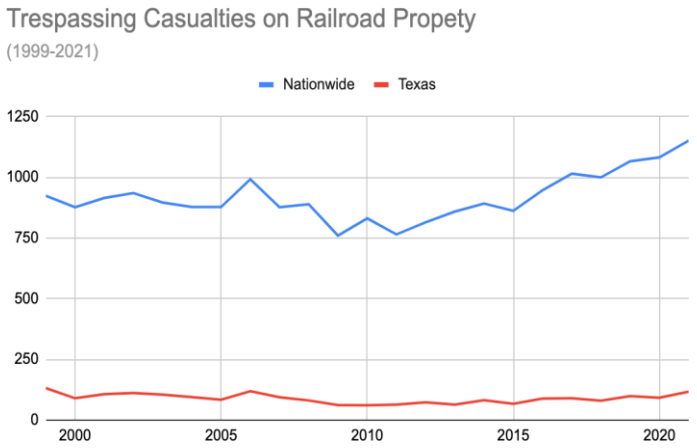


- LiDAR-based grade crossings imaging system and Arduino-Integrated Radar Based System.

Trespassing Incidents on Railroad Property

Het Bhagat, Ifeoluwani Jacob, Aakash Sukhadia, Chloe Lee, Alexandra Peltyszyn
Dr. Christie Nelson, Brian Petrus, Dr. John Betak, Michael White
Collaborative Solutions LLC

Introduction

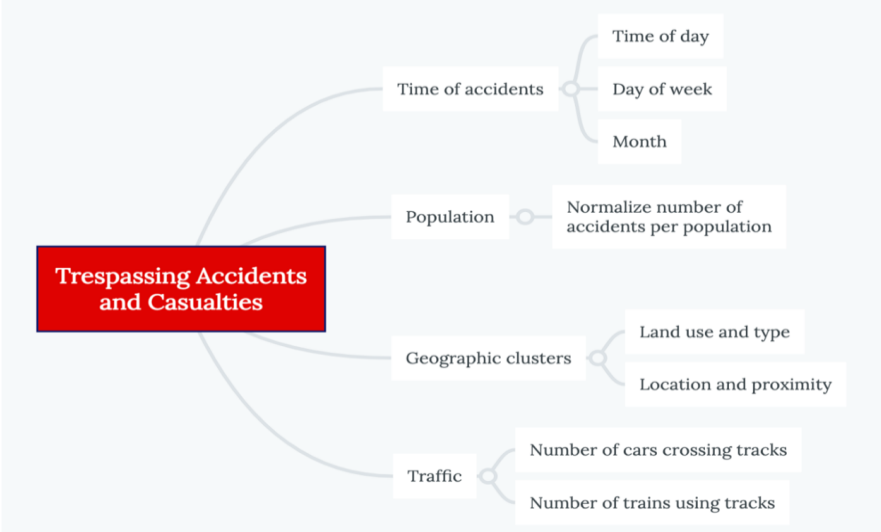


National and Texas-wide trends of increasing casualties

Problem Statement and Goal

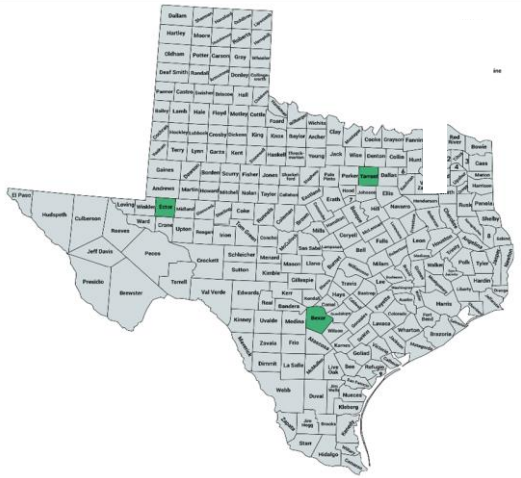
- **Problem**: Number of casualties due to trespassing on railroad property in Texas is increasing
- **Goal**: Find trends and patterns for the trespasser incidents and utilize software tools to integrate multiple datasets about the areas surrounding train tracks

Concept Map

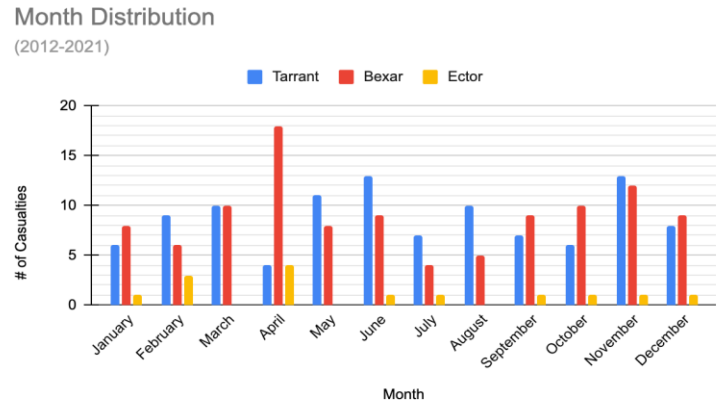


Methods

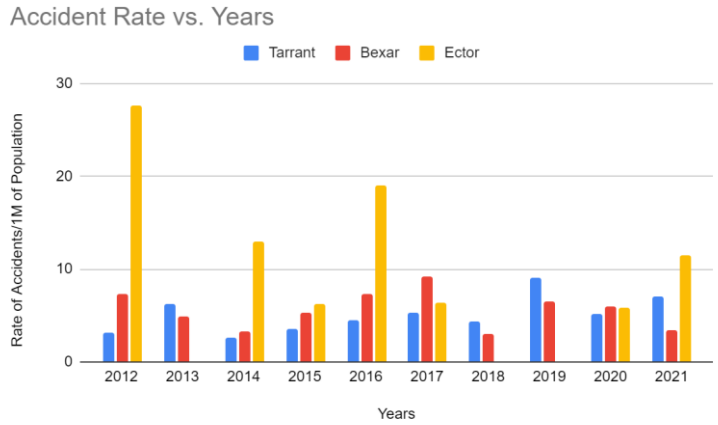
Analyze month of year, day of week, and time of day in three counties -- 1 rural and 2 urban



Results



Late spring and early summer months had most casualties



Ector County (rural) had highest number of accidents per one million of population

Preliminary Model Performance Evaluation

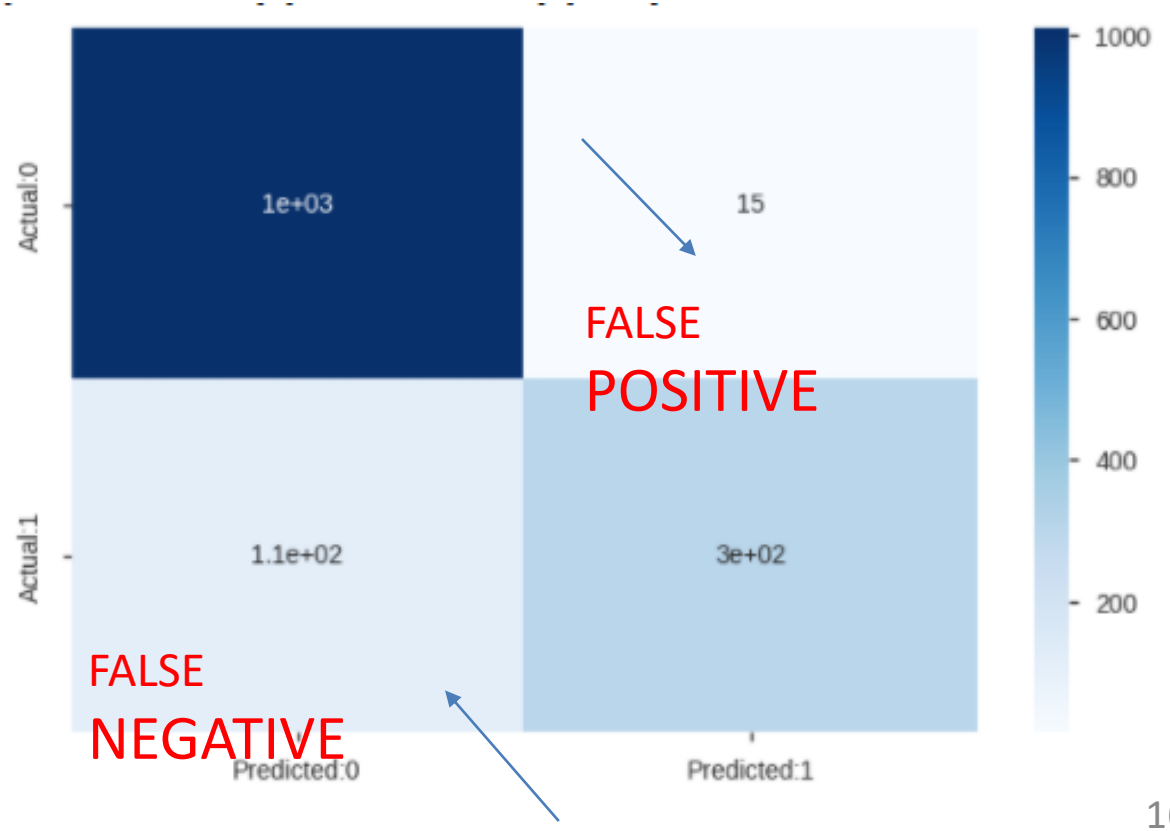
- We went through the following model execution and feature selection process as follows:
  - Once the dataset was finalized, a total of 102 attributes remained in the model to predict accident probabilities
  - Based on advisor feedback, a logistic regression model was trained on the dataset from 2018-2020 with 2021 data serving as the test sample
  - 3% threshold was used for PREDCOLLS encoding

- **Model was selected with an Accuracy ratio of 0.91 and a Recall score of 0.73 as seen below**

- **Model has AUC of .856, better than random model**

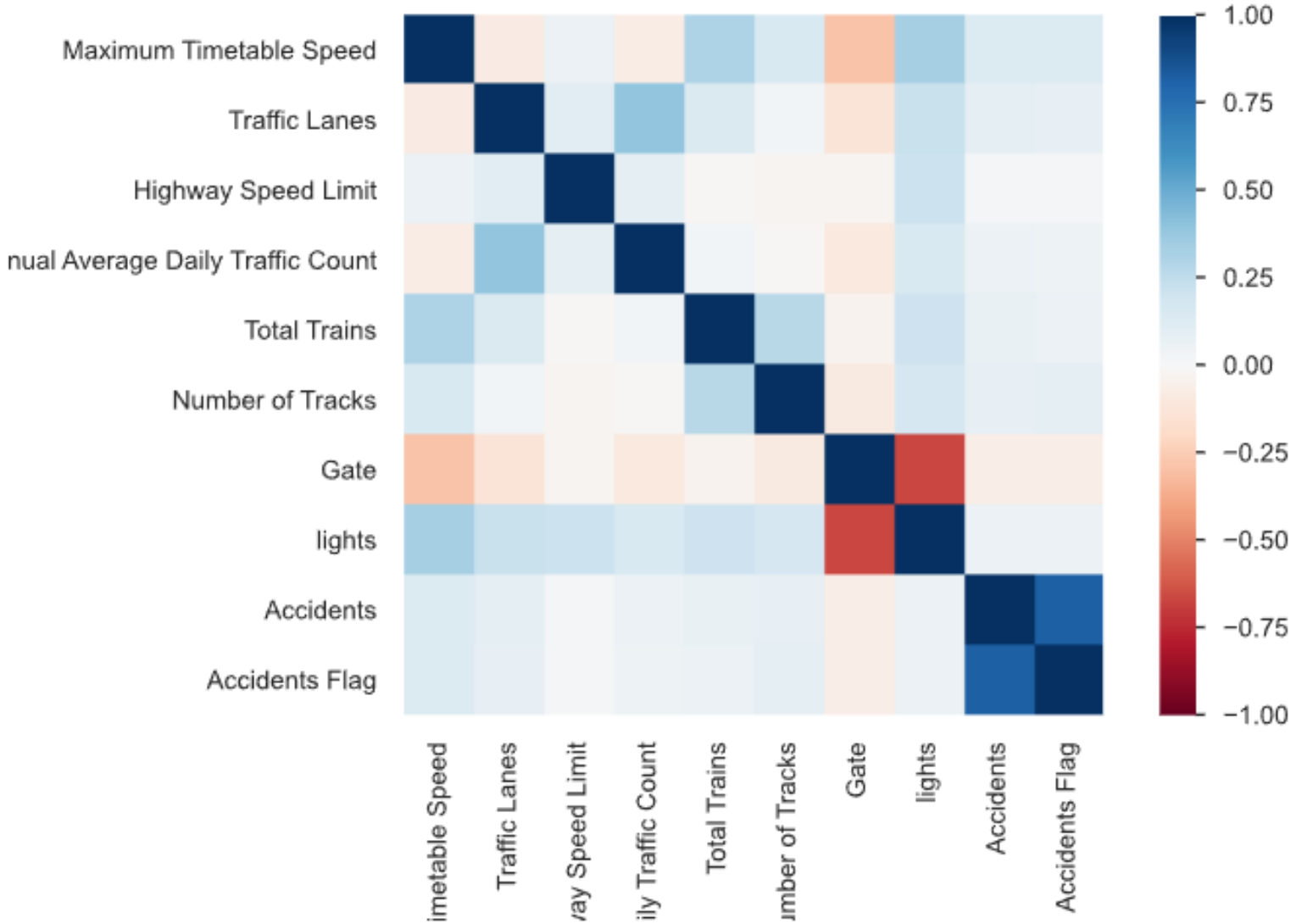
The details for confusion matrix for Model 1 is =

	precision	recall	f1-score	support
0	0.90	0.99	0.94	1025
1	0.95	0.73	0.82	412
accuracy			0.91	1437
macro avg	0.93	0.86	0.88	1437
weighted avg	0.91	0.91	0.91	1437



Exploratory Data Analysis

Collaborative Solutions LLC



- Correlation graph between numerical variables

Final Comparative Model Results

Tree-based models perform best on key metrics

Model Name	Positive Predictive Value/Precision	Negative Predictive Value	Recall
Logistic Model w/ All Attributes	**0.92**	0.86	**0.62**
Decision Tree w/ All Attributes	0.92	0.97	0.91
Decision Tree w/ Reduced Attributes	**0.84**	0.97	**0.93**
Random Forest w/ Reduced Attributes	**0.90**	0.93	**0.81**
XGBoost w/ Reduced Attributes	0.94	0.87	0.64

*** Reduced Attribute set does not include speed and traffic attributes ***

Si

Current Semester Focus

- Three Teams
  - Analyze other potential risk factors (eg, land use, socioeconomic)
  - Develop model for quantifying visual distractions at crossings
  - Examine various accident prediction models
- Currently Focused on Crossings
  - There are correlations between trespassing and grade crossings
  - 70% of trespassing incidents occur within 1000’ of a grade crossing
- Longer-Term Goal
  - Can models be developed or enhanced which account for other risk factors?
  - We expect multi-semester efforts

Future Plans

- Continue Accident Prediction Model Research
  - Develop risk model incorporating geographic, socioeconomic and other factors
- Continue Trespasser Topics
  - Explore shortest/least cost path
  - Develop risk model
- Analyze Selected Crossings
  - Focus on angle of crossing, view obstructions, distractions

Partnering

- Opportunities for
  - Railroads
  - Regulators
  - Academia
- Benefits both students and partners
  - Share industry knowledge
  - Practical application of analytical tools
- Leverage resources through collaboration

For More Information

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tel 888-666-4218
fax 888-666-4024

NOVOAGLOBAL
CREATING SAFER COMMUNITIES

TODAY

Technology

- Solutions
- Fixed/Portable

Orlando

- Railroad stop violation

Brightline

- Railroad block the box
- Real time alarm
  - Red light
  - Block the box
  - Red block the box
- Video-Sec

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CREATING SAFER COMMUNITIES

TECHNOLOGY

NOVOAGLOBAL
CREATING SAFER COMMUNITIES

CURRENT APPLICATION TYPES

School Zone Speed

Speed

Red Light

Stop Sign

Cross Walk, Bike Lane

LPR

Video Monitoring

Oversize

Rail Crossing

Gridlock

All applications are integrated in the same cloud-based user interface

D-ARMOR

FIXED
< 50 LB

P-ARMOR

PORTABLE
RUNS WEEKS
WITH ONE CHARGE

- A single, self-contained, non-intrusive unit
- Wireless or wired connection
- AC power connection or Battery Operated
- Effortless relocation

NOVOAGLOBAL
CREATING SAFER COMMUNITIES

ORLANDO PROJECT

NOVOAGLOBAL
CREATING SAFER COMMUNITIES

WHAT ARE THE RESULTS?

VOLPE short-term report	•15.4% reduction
VOLPE long-term report	•17.2% reduction

UNIQUE PARTNERSHIP

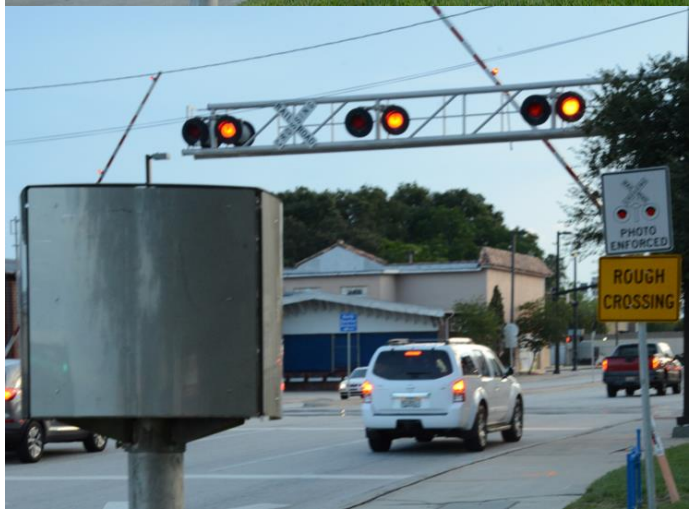
Orlando Stops

City of Orlando

NovoaGlobal, Inc.

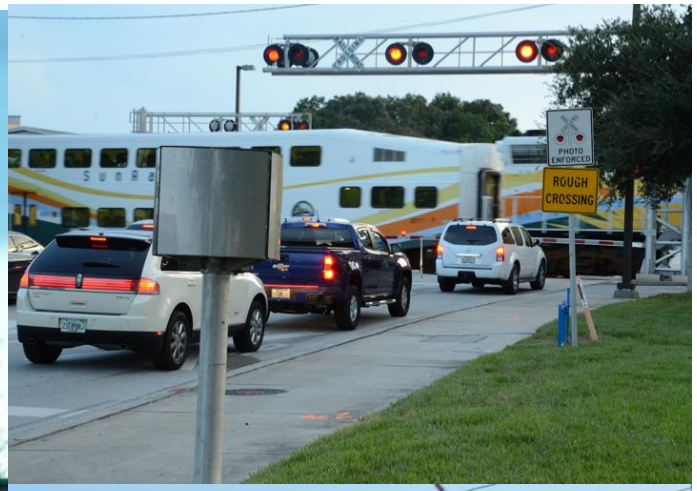
Federal Railroad Administration

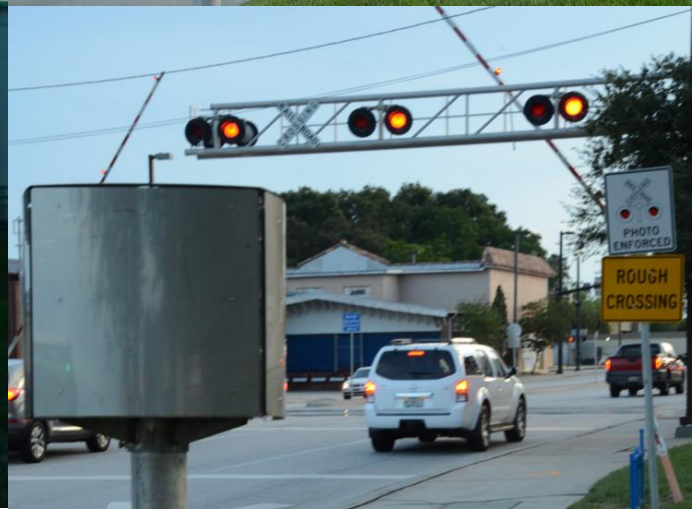
Sunrail



NOVOAGLOBAL
CREATING SAFER COMMUNITIES

ORLANDO PROJECT





NOVOAGLOBAL
CREATING SAFER COMMUNITIES

EDUCATION

This program has been initiated to increase roadway safety and to reduce accidents, injuries and fatalities.

WARNING NOTICE OF RAILROAD CROSSING VIOLATION

Orlando STOPS Program
400 S. Orange Ave.
Orlando, Florida 32801-4990

Plate Number: N951NN
Password: 8136
View your violation at
www.ZeroFatality.com

ORLANDO STOPS
RAILROAD CROSSING SAFETY INITIATIVE

CRISTINA AGCANAS
14226 NOTTINGHAM WAY CIR
ORLANDO, FL 32828-7802

0094000000000023

THIS IS NOT A NOTICE OF VIOLATION. YOU ARE NOT REQUIRED TO PAY A FINE, GO TO COURT OR RESPOND IN ANY WAY. In the future, please exercise caution when approaching an active railroad crossing. The City of Orlando cares about your safety.

Your vehicle was recorded traveling through the active rail crossing at:

Location:	Princeton St WB @ Alden Rd		
Date:	08/22/2016	Time:	07:42:43
Plate Number:	N951NN	Vehicle Make:	HOND
Red Time:	2.2		

This warning letter is part of an educational effort led by the City of Orlando and the Federal Railroad Administration along with SunRail to advise you of a serious potential safety issue. The pictures on this notice taken by our railroad crossing security camera show a vehicle registered to you that appears to have violated F.S. 316.1575 and/or 316.1576.

According to national statistics, 96% of all rail-related fatalities and injuries occur at highway rail-grade crossings or while trespassing on railroad property, and most of these collisions can be prevented. According to Florida Statutes, a vehicle must:

- Stop at least 15 feet from a rail crossing when signal lights are activated;
- Not proceed through, around, or under any crossing gate or barrier while the gate or barrier is closed or is being opened or closed; and
- Not enter the crossing without sufficient space or undercarriage clearance to drive completely through the crossing without stopping.

As motorists, we need to always be prepared to stop at the railroad crossing; slow down, look both ways, listen; obey warning devices; and check that you have enough room on the other side of the tracks for your vehicle to cross safely. Finally, you should never race a train, and never stop on tracks. Through the City of Orlando, Orlando STOPS Railroad Crossing Safety Initiative campaign, in collaboration with the U.S. Department of Transportation Federal Railroad Administration, SunRail and Sensys America, Inc, we are working to increase awareness of this serious potential safety hazard.

At your earliest convenience, we would appreciate your assistance by participating in a brief survey, which we will use to further evaluate the effectiveness of this pilot program and improve safety at railroad crossings. Please take a moment to complete the survey that is available on line at:

https://www.surveymonkey.com/r/orlandostopsrailroad

Thank you for your attention to this matter.

Sincerely,

ORLANDO STOPS
The City of Orlando cares about your safety.

VIEW YOUR VIOLATION ONLINE:
You may view your violation images and video online and pay your fine at
www.ZeroFatality.com
Please enter Plate Number and Password provided below to enter the secure web site.

Plate Number:	N951NN
Password:	8136
Due Date:	10/29/2016
Amount Due:	

SENSYS AMERICA

Sensys America, Inc. is proud to provide our **RailRoad-Safe** system to improve the safety of our citizens. www.ZeroFatality.com is powered by Sensys America, Inc. www.sensysamerica.net

This program has been initiated to increase roadway safety and to reduce accidents, injuries and fatalities.

WARNING NOTICE OF RAILROAD CROSSING VIOLATION

Orlando STOPS Program
400 S. Orange Ave.
Orlando, Florida 32801-4990

Plate Number: RII663
Password: 6886
View your violation at
www.ZeroFatality.com

ORLANDO STOPS
RAILROAD CROSSING SAFETY INITIATIVE

RICHARD HUTCH
1801 PALM LN
ORLANDO, FL 32803-1535

0094000000000031

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Your vehicle was recorded traveling through the active rail crossing at:

Location:	Princeton St WB @ Alden Rd		
Date:	08/22/2016	Time:	07:42:45
Plate Number:	RII663	Vehicle Make:	HOND
Red Time:	3.7		

This warning letter is part of an educational effort led by the City of Orlando and the Federal Railroad Administration along with SunRail to advise you of a serious potential safety issue. The pictures on this notice taken by our railroad crossing security camera show a vehicle registered to you that appears to have violated F.S. 316.1575 and/or 316.1576.

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https://www.surveymonkey.com/r/orlandostopsrailroad

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Sincerely,

ORLANDO STOPS
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VIEW YOUR VIOLATION ONLINE:
You may view your violation images and video online and pay your fine at
www.ZeroFatality.com
Please enter Plate Number and Password provided below to enter the secure web site.

Plate Number:	RII663
Password:	6886
Due Date:	10/29/2016
Amount Due:	

SENSYS AMERICA

Sensys America, Inc. is proud to provide our **RailRoad-Safe** system to improve the safety of our citizens. www.ZeroFatality.com is powered by Sensys America, Inc. www.sensysamerica.net

NOVOAGLOBAL
CREATING SAFER COMMUNITIES

NOVOAGLOBAL
CREATING SAFER COMMUNITIES

BRIGHTLINE

NOVOAGLOBAL
CREATING SAFER COMMUNITIES

WHAT ARE THE RESULTS?

Collisions Before Installation	21 accidents
Collisions After Installation	2 accidents

NOVOAGLOBAL
CREATING SAFER COMMUNITIES

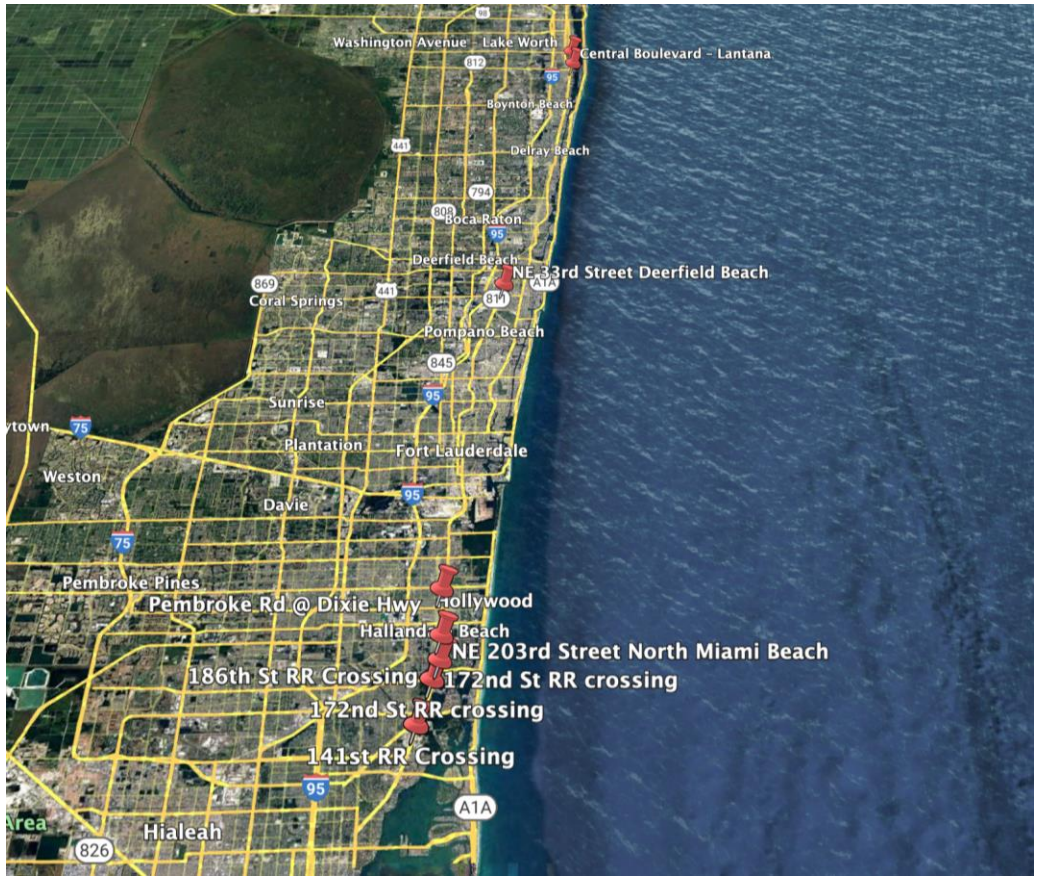
AND THE DETAILS?

LOCATION	ADDRESS	Collisions Before Installation	Collisions After Installation
FLBLRR01	172nd Street Railroad	3 (0+3)	0
FLBLRR02	141st Street Railroad Crossing	9 (5+4)	2 (1+1)
FLBLRR03	Central Blvd Railroad	4 (0+4)	0
FLBLRR04	Pembroke Rd Railroad	1 (0+1)	0
FLBLRR05	26th St NE Wilton Manors	1 (1+0)	0
FLBLRR06	Washington Ave Lake Worth	3 (1+2)	0

Data from 2018
No traffic during Covid until Nov 2021
Camera installation started Nov 2021

NOVOAGLOBAL
CREATING SAFER COMMUNITIES

BRIGHTLINE



NOVOAGLOBAL
CREATING SAFER COMMUNITIES

This program has been initiated to increase roadway safety and to reduce accidents, injuries and fatalities.

WARNING NOTICE OF RAILROAD CROSSING VIOLATION

Automated Enforcement Division
PO Box 593095
Orlando, FL 32839-3095

Plate Number: CVYI43
Password: r9qLvjNJ
View your violation at
www.ZeroFatality.com

Florida East Coast RAILWAY

1025000000006220

HARRY FAITELSON
3370 NE 190TH ST APT 802
AVENTURA, FL 33180-0000

THIS IS NOT A NOTICE OF VIOLATION. YOU ARE NOT REQUIRED TO PAY A PENALTY, GO TO COURT OR RESPOND IN ANY WAY. In the future, please exercise caution when approaching an active railroad

Your vehicle was recorded traveling through the active rail crossing at:

Location:	141st Street Railroad Crossing		
Date:	01/02/2022	Time:	14:47:43
Plate Number:	CVYI43	Vehicle Make:	LEXS
Red Time:	62.1		

This warning letter is part of an educational effort led by Brightline Trains LLC, Florida East Coast Railway Police, and NovoaGlobal to advise you of a serious potential safety issue. The pictures on this notice taken by our railroad crossing security camera show a vehicle registered to you that appears to have violated F.S. 316.1575 and/or 316.1576.
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At your earliest convenience, we would appreciate your assistance by participating in a brief survey, which we will use to further evaluate the effectiveness of this pilot program and improve safety at railroad crossings. Please take a moment to complete the survey that is available on line at:

https://zerofatality.com/railroadsafety/

Thank you for your attention to this matter.

Sincerely,

Florida East Coast Railway Police

The FECR and Brightline cares about your safety.

This program has been funded by Brightline.

Florida East Coast Railway
brightline

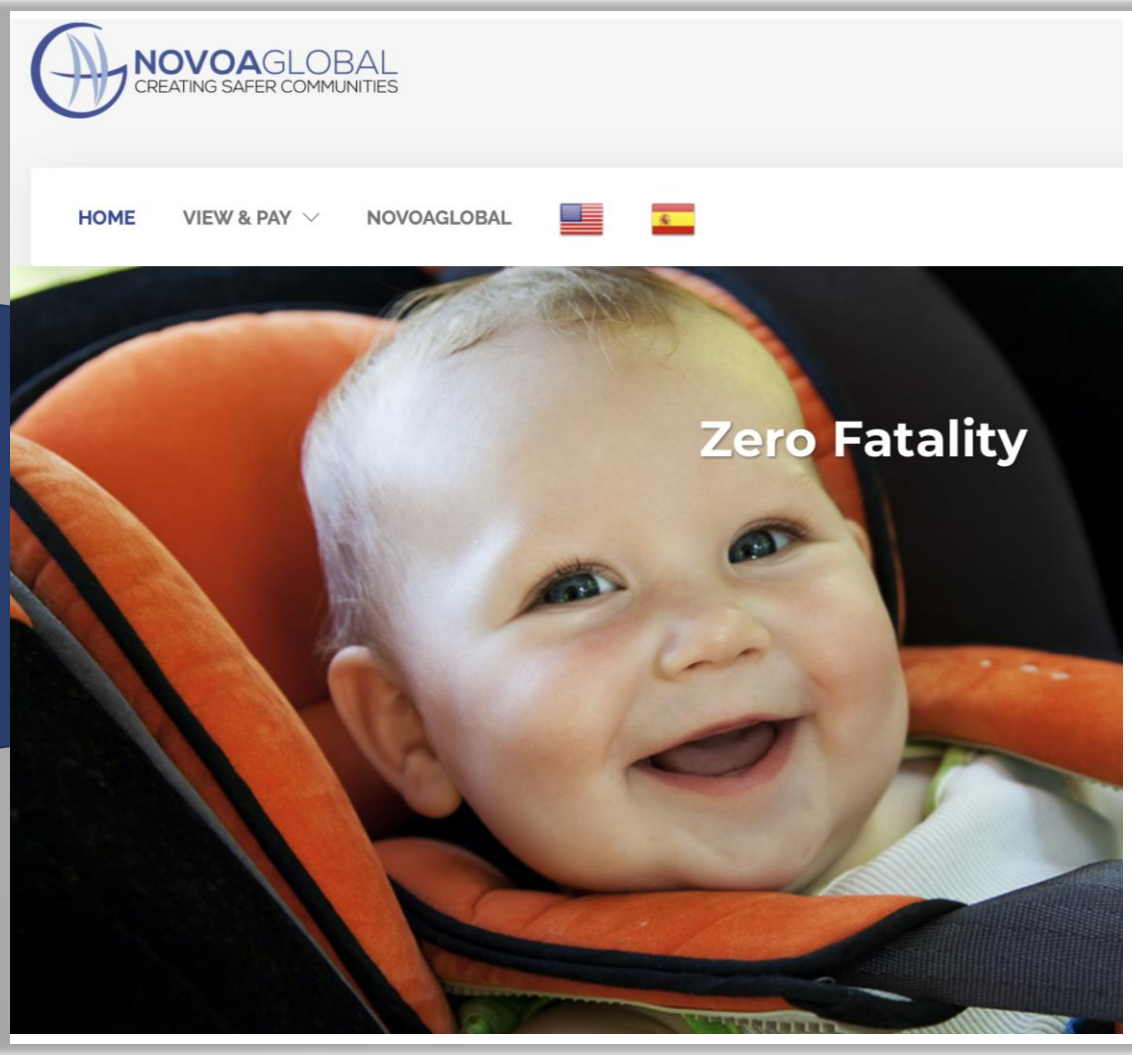
VIEW YOUR VIOLATION ONLINE:
You may view your images and video online at:
www.ZeroFatality.com
Please enter Plate Number and Password provided below to enter the secure web site.

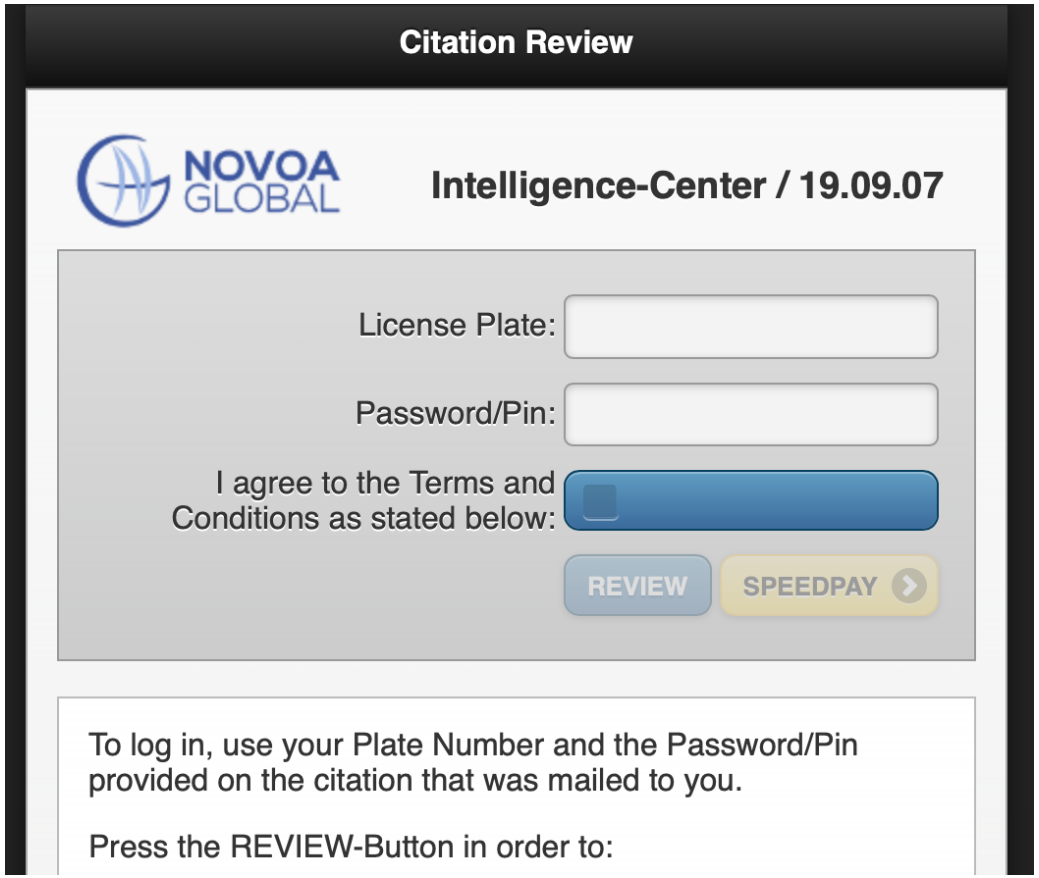
Plate Number:	CVYI43
Password:	r9qLvjNJ

NovoaGlobal, Inc. is proud to provide our **RailRoad-Safe** system to improve the safety of our citizens. www.ZeroFatality.com is powered by NovoaGlobal, Inc. www.NovoaGlobal.com

NOVOAGLOBAL
Creating Safer Communities

ZEROFATALITY.COM





NOVOAGLOBAL
CREATING SAFER COMMUNITIES

NOVOA GLOBAL **I-C™ Citation Review**

Carlos Löfstedt (calo)

Important Information

Please take the Survey

Unique Partnership Towards Vision Zero

Citation Identification

Citation Number: 1025000000006220

Offense Code: Rr

Offense Description: Rail-Road Crossing

Payment Information

Date	Description	Amount	Reference
01/07/2022	Rail-Road Crossing	0.00	
03/08/2022 / 60	Due Date / Terms I Total Amount	0.00	

No Online Payment possible when Citation is already paid.

Capture Information

A	SPEED: 12.53	DIST: 57	TIME: 1641152863.433	CNT: 139
B	SPEED: -	DIST: -	TIME: 1641152865.933	CNT: 180
A→B	SPEED: [↓9.62 ↑13.20]	MIN SPD: 0.00	TIME: 2.500	:
QC:2 [Default]	STATUS: OK	STOP POS: 21.39	AVG_SPD: 12.2	CNT: 330

Location: FLBLRR02 Location Name: FLBLRR02 Address: 141st Street Railroad Crossing
Violation Time: 01/02/2022 2.47.43 PM Speed: 12.5 Signal-Light Time: 70.1 Lane: 1 Class: 18 Violation Type: Rr

License Plate

Overview 1

Overview 2

SHOW VIDEO [1]

1st Notice - 01/07/2022

Safety Survey

This survey is completely anonymous and does not require personal data - such as name,adress,email, phone number, etc.

clofstedt.sa@gmail.com (not shared) Switch account

* Required

Please help us to keep you safe!

Please complete the following survey about railroad crossing safety. Answer these questions as they relate to the date and railroad crossing referenced on the letter. Your answers will not affect your personal driving record. The aggregate survey responses may be released to other governmental agencies in summary form. Your responses are confidential.

This project is funded by Brightline and is provided in cooperation with Florida East Coast Railway Police and technology provider NovoaGlobal®.

brightline Florida East Coast Railway NOVOAGLOBAL CREATING SAFER COMMUNITIES

1.How often do you encounter this particular railroad crossing while driving vehicle? *

NovoaGlobal, Inc.
Hello! I'm your personal aid. Drop me a line whenever you have questions.

WHAT IS NEW

Orlando

- Capture violations when the arm was going down only
- DVR for criminal investigation

Brightline

- Capturing and sending warnings when the arm goes up
- Capturing and sending warnings when the vehicle is blocking
- Real time alert when a vehicle is standing on the track
- Real time alert when the light is on for too long time

New pilot idea with Brightline

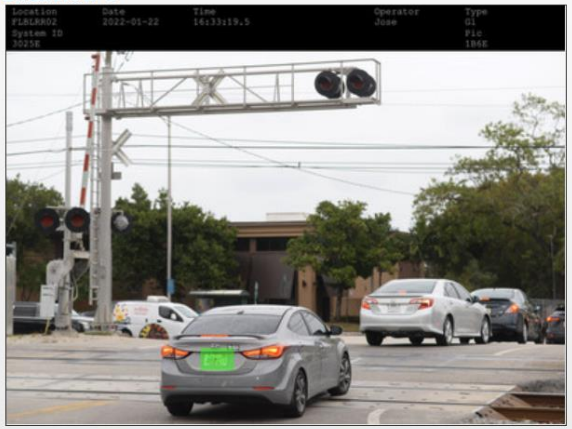
- To have DVR for criminal cases and even to studies crashes
- Real time alarm of vehicles on the track
- Real time alarm of the light being on for too long
- LPR

RAILROAD BLOCK

RAILROAD BLOCK

License Plate

Overview 1



Overview 2

This program has been initiated to increase roadway safety and to reduce accidents, injuries and fatalities.

WARNING NOTICE OF RAILROAD CROSSING VIOLATION

Automated Enforcement Division
PO Box 593095
Orlando, FL 32839-3095

Plate Number: JARZ73
Password: nYQAAa3p
View your violation at
www.ZeroFatality.com

Florida East Coast RAILWAY

1025000000007285

GEIOVANNI ALZATE
10750 PARIS ST
HOLLYWOOD, FL 33026-4818

THIS IS NOT A NOTICE OF VIOLATION. YOU ARE NOT REQUIRED TO PAY A PENALTY, GO TO COURT OR RESPOND IN ANY WAY. In the future, please exercise caution when approaching an active railroad

Your vehicle was recorded traveling through the active rail crossing at:

Location: 141st Street Railroad Crossing
Date: 01/22/2022 Time: 16:33:19
Plate Number: JARZ73 Vehicle Make: HYUN
Red Time:

This warning letter is part of an educational effort led by Brightline Trains LLC, Florida East Coast Railway Police, and NovoaGlobal to advise you of a serious potential safety issue. The pictures on this notice taken by our railroad crossing security camera show a vehicle registered to you that appears to have violated F.S. 316.1575 and/or 316.1576.
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https://zerofatality.com/railroadsafety/

Thank you for your attention to this matter.

Sincerely,

Florida East Coast Railway Police

The FECR and Brightline cares about your safety.

This program has been funded by Brightline.

VIEW YOUR VIOLATION ONLINE:
You may view your images and video online at:
www.ZeroFatality.com
Please enter Plate Number and Password provided below to enter the secure web site.

Plate Number: JARZ73
Password: nYQAAa3p

NovoaGlobal, Inc. is proud to provide our **RailRoad-Safe** system to improve the safety of our citizens. www.ZeroFatality.com is powered by NovoaGlobal, Inc. www.NovoaGlobal.com

Florida East Coast Railway
brightline

NOVOAGLOBAL Creating Safer Communities

NOVOAGLOBAL
CREATING SAFER COMMUNITIES

NOVOAGLOBAL
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REAL TIME ALARM

NOVOAGLOBAL
CREATING SAFER COMMUNITIES

RAILROAD BLOCK

NOVOA GLOBAL **I-C™ LPR Results**

Carlos Löfstedt (calo)

Search-List: DOWNLOAD Choose File No fil…osen UPLOAD

Hits per Page: 100

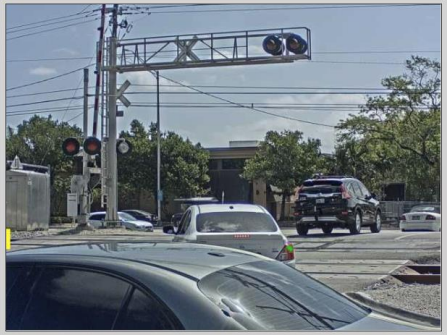
LIVE VIEW, UPDATED: *04/21/2022 12.01.05 PM* CLEAR FILTER HISTORY SEARCH

Location ID	Time	Hit	Lane	State	Plate		
flbl*						Alarm Sound: Off	
FLBLRR02	04/21/2022 11.14.56 AM		0		BLOCKED		90 - 26
FLBLRR02	04/21/2022 10.49.37 AM		0		BLOCKED		90 - 22
FLBLRR01	04/21/2022 10.33.53 AM		0		RED-TIME		90 - 8
FLBLRR02	04/21/2022 10.12.37 AM		0		BLOCKED		90 - 27
FLBLRR02	04/21/2022 9.01.45 AM		0		BLOCKED		90 - 21
FLBLRR02	04/21/2022 8.27.35 AM		0		BLOCKED		90 - 27
FLBLRR01	04/21/2022 5.50.35 AM		0		RED-TIME		90 - 14
FLBLRR01	04/21/2022 5.25.03 AM		0		RED-TIME		90 - 8
FLBLRR01	04/21/2022 5.13.32 AM		0		RED-TIME		90 - 18
FLBLRR01	04/21/2022 4.17.58 AM		0		RED-TIME		90 - 13
FLBLRR02	04/21/2022 4.12.19 AM		0		RED-TIME		90 - 12

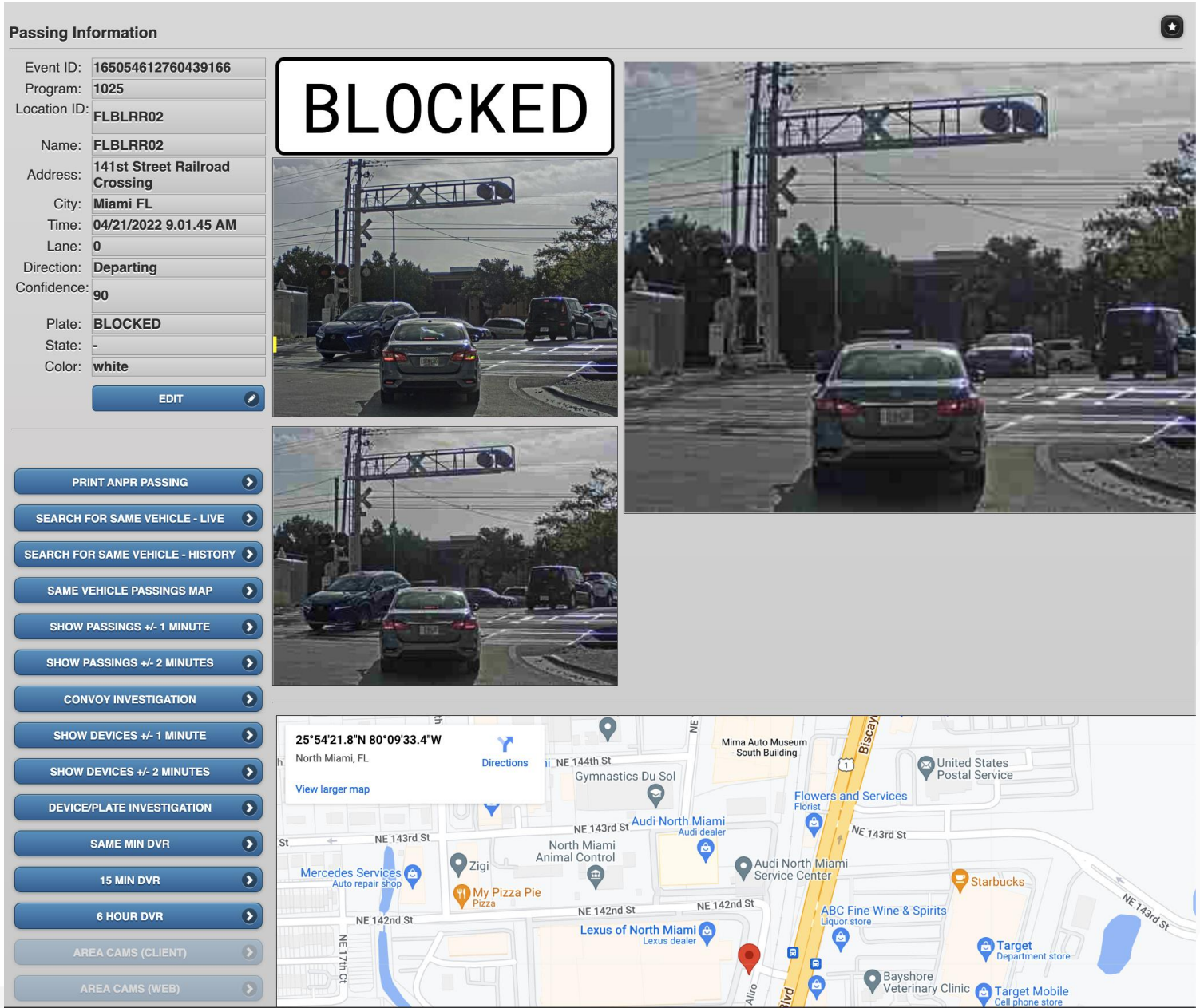
Return to top of list

Program:	1025
Location ID:	FLBLRR02
Name:	FLBLRR02
Address:	141st Street Railroad Crossing
City:	Miami FL
Time:	04/21/2022 11.14.56 AM
Lane:	0
Direction:	Departing
Confidence:	90
State:	-
Color:	

BLOCKED



RAILROAD BLOCK

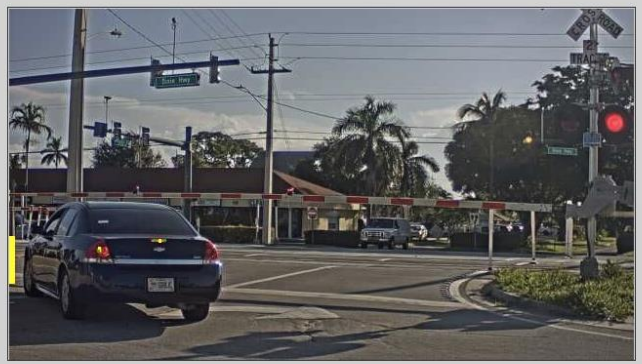


NOVOAGLOBAL
CREATING SAFER COMMUNITIES

RAILROAD RED BLOCK

RED-BLK 0

RED-BLK 0



RED-BLK 0

NOVOAGLOBAL
CREATING SAFER COMMUNITIES

REDLIGHT TIME ALARM

FLBLRR03	06/10/2022 2.56.00 AM	0	RED 165		90 - 9
FLBLRR03	06/10/2022 2.46.00 AM	0	RED 155		90 - 18
FLBLRR03	06/10/2022 2.36.00 AM	0	RED 145		90 - 8
FLBLRR03	06/10/2022 2.26.00 AM	0	RED 135		90 - 8
FLBLRR03	06/10/2022 2.15.50 AM	0	RED 125		90 - 4
FLBLRR03	06/10/2022 2.05.40 AM	0	RED 115		90 - 9
FLBLRR03	06/10/2022 1.55.40 AM	0	RED 105		90 - 4
FLBLRR03	06/10/2022 1.45.30 AM	0	RED 95		90 - 43
FLBLRR03	06/10/2022 1.35.30 AM	0	RED 85		90 - 4
FLBLRR03	06/10/2022 1.25.30 AM	0	RED 75		90 - 4
FLBLRR03	06/10/2022 1.15.30 AM	0	RED 65		90 - 9
FLBLRR03	06/10/2022 1.05.30 AM	0	RED 55		90 - 9
FLBLRR03	06/10/2022 12.55.30 AM	0	RED 45		90 - 9
FLBLRR03	06/10/2022 12.45.30 AM	0	RED 35		90 - 8
FLBLRR03	06/10/2022 12.35.30 AM	0	RED 25		90 - 8
FLBLRR03	06/10/2022 12.25.30 AM	0	RED 15		90 - 3
FLBLRR03	06/10/2022 12.15.30 AM	0	RED 5		90 - 8

NOVOAGLOBAL
CREATING SAFER COMMUNITIES

REDLIGHT TIME ALARM

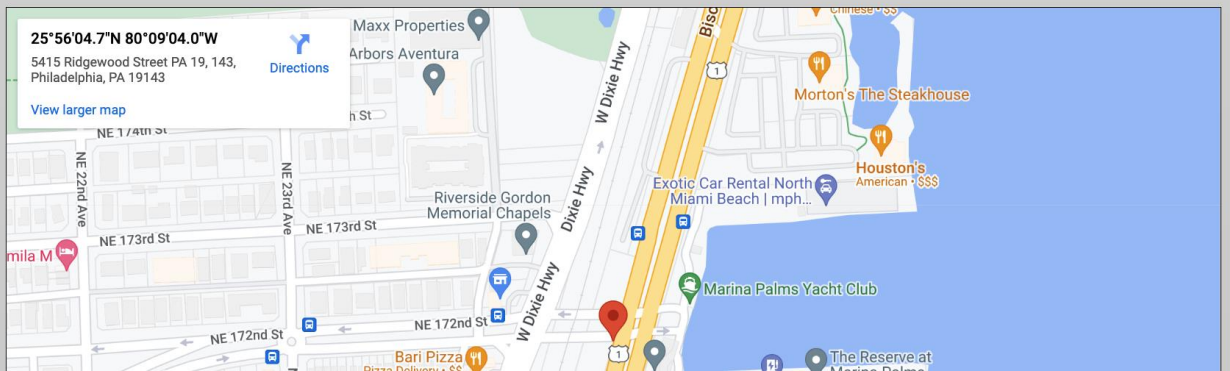
Passing Information

Event ID:	165052909274047174
Program:	1025
Location ID:	FLBLRR01
Name:	FLBLRR01
Address:	172nd Street Railroad
City:	Miami, FL
Time:	04/21/2022 4.17.58 AM
Lane:	0
Direction:	Departing
Confidence:	90
Plate:	RED-TIME
State:	-
Color:	green

EDIT

PRINT ANPR PASSING
SEARCH FOR SAME VEHICLE - LIVE
SEARCH FOR SAME VEHICLE - HISTORY
SAME VEHICLE PASSINGS MAP
SHOW PASSINGS +/- 1 MINUTE
SHOW PASSINGS +/- 2 MINUTES
CONVOY INVESTIGATION
SHOW DEVICES +/- 1 MINUTE
SHOW DEVICES +/- 2 MINUTES
DEVICE/PLATE INVESTIGATION
SAME MIN DVR
15 MIN DVR
6 HOUR DVR
AREA CAMS (CLIENT)
AREA CAMS (WEB)

RED-TIME



NOVOAGLOBAL
CREATING SAFER COMMUNITIES

VIDEO-SEC


F96-6

I would like to pass along the appreciation of the Tacoma Police Department Homicide Unit for the assistance you and your company provided during this homicide investigation.

On September 5th, 2022 a homicide occurred in the City of Tacoma where one victim was shot multiple times and the suspect fled in a vehicle. Detectives were able to narrow down a vehicle make and model, but were unable to locate a visible license plate for the vehicle. After backtracking the vehicle's movements prior to the incident, Detectives believed the vehicle had passed an active traffic enforcement camera approximately two miles north of the incident.

With the assistance of NOVOA Global, Inc and Darlene Hinds, Detectives located the suspect vehicle license plate, which was captured by the traffic enforcement camera. The information gained by the traffic enforcement camera directly assisted in Detectives identifying the suspect in this incident, and led to the suspect's arrest on October 7th, 2022.

The assistance provided by NOVOA Global, Inc and Darlene Hinds aided in the successful investigation, and timely arrest of the suspect.

On behalf of the Tacoma Police Department Homicide Unit I would like to extend my great appreciation for the assistance.

City of Tacoma
Police Department

Date: 10/25/2022

Darlene E. Hinds
Senior Program Manager
NOVOA Global, Inc

RE: Tacoma Police Department Homicide Investigation September 2022

Mrs. Hinds,

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On behalf of the Tacoma Police Department Homicide Unit I would like to extend my great appreciation for the assistance.

Respectfully,

Detective Jeff Maahs
Tacoma Police Department
Criminal Investigations Division
Homicide Unit.

www.novoaglobal.com
info@novoaglobal.com
tel 888-666-4218
fax 888-666-4024


Safe
HOUSE

Educational Aid

Safe HOUSE

Eliza Conley-Lepene

Creator, Founder, CEO, President

Cathy Moore

Vice President

Karen Whitten

Treasurer

Phoebe Caron

Secretary

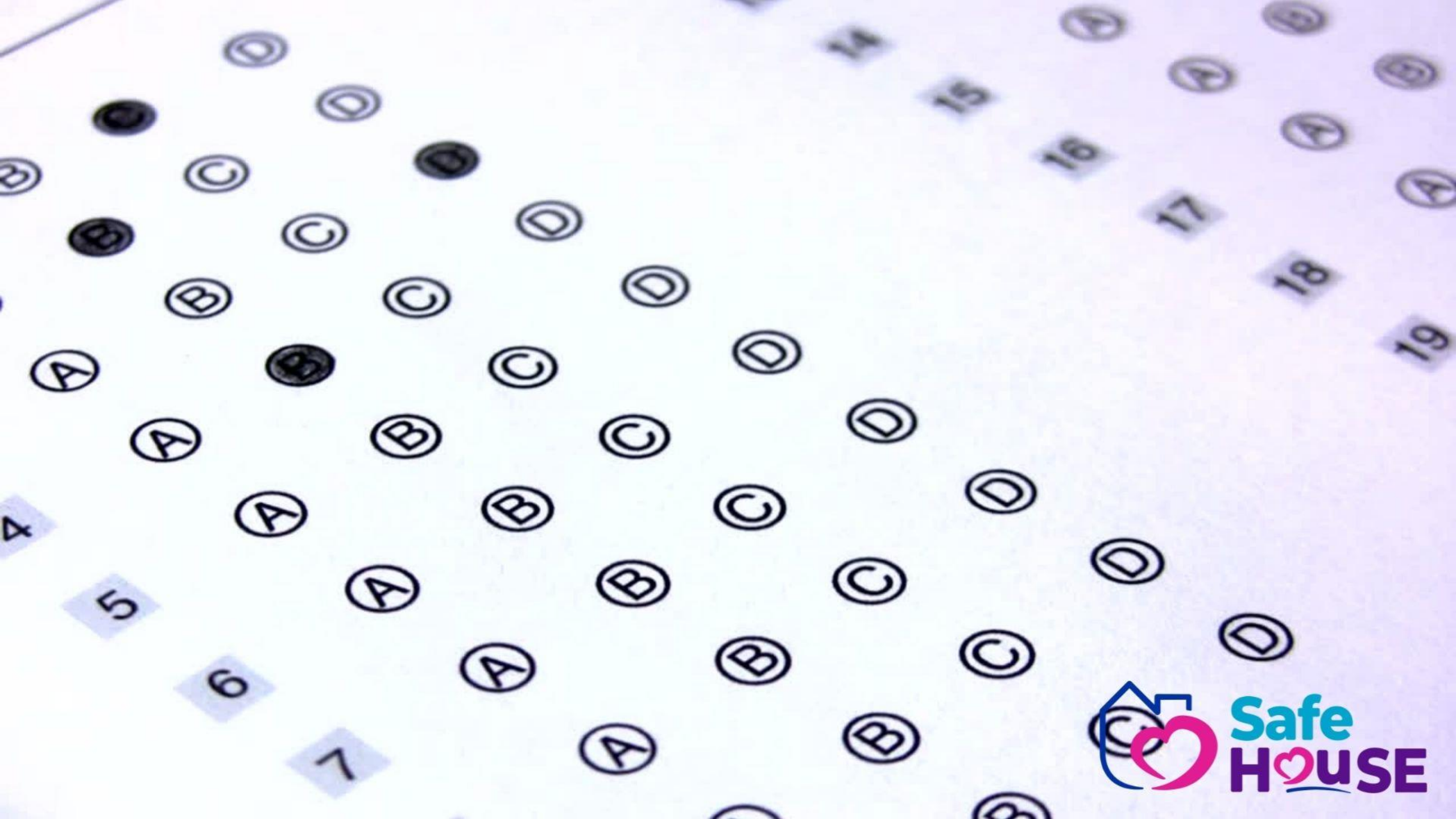
Shayna Gervais

Fundraising Chair

Case Manaager Intern

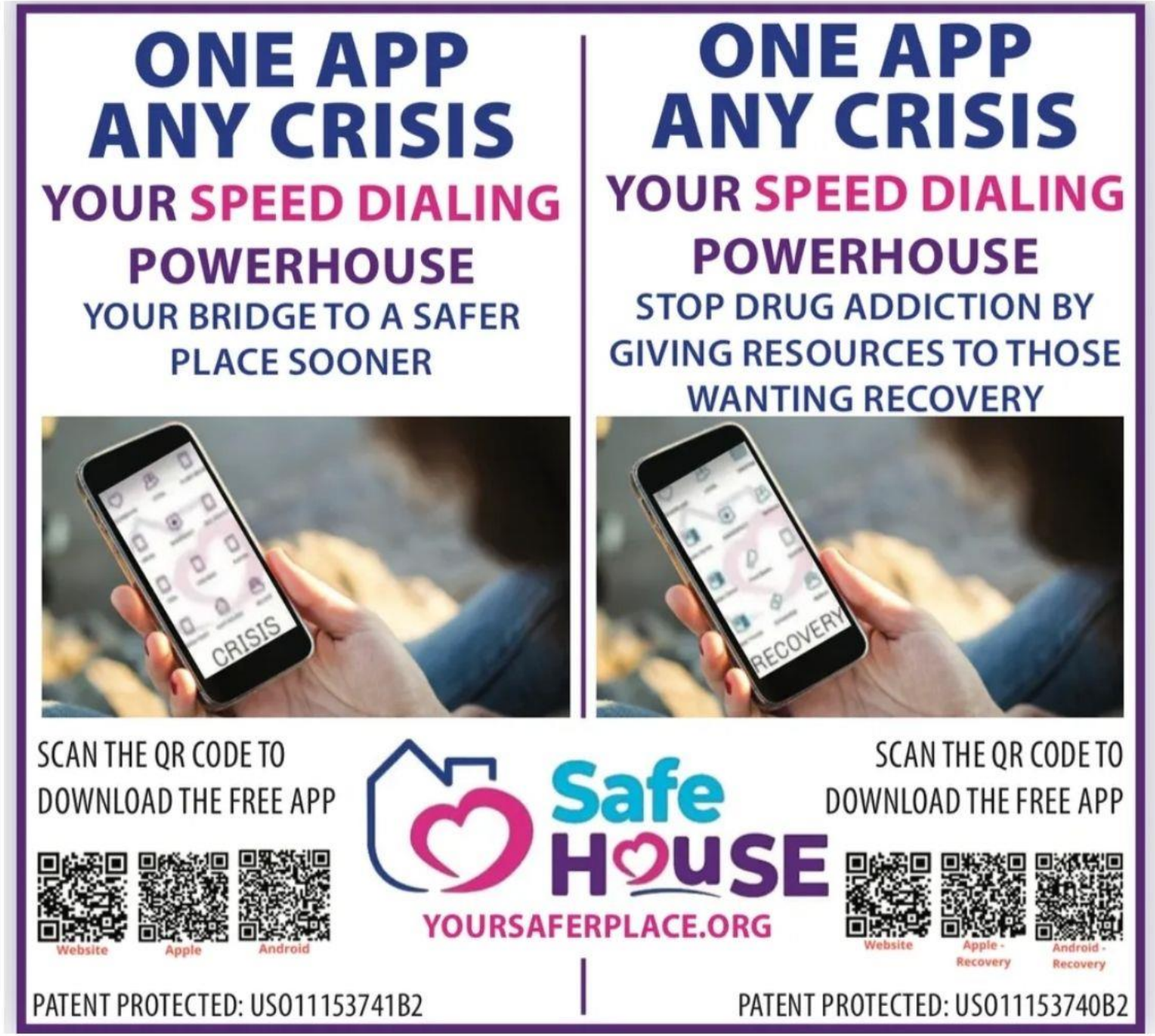
Administrative Assistant

Dental Assistant


Safe
HOUSE


Legal Aid
Elder Abuse
Addiction
Suicide
Eating Disorders
Rehab
Sexual Violence
Meetings
Food Banks
Domestic Violence
Native Resources
Detox
Miltary Resources
Elder Abuse
Human Trafficking
Homelessness
Batterers Intervention
Bullying
Safe HOUSE

How it works…


ONE APP
ANY CRISIS
YOUR SPEED DIALING
POWERHOUSE
YOUR BRIDGE TO A SAFER
PLACE SOONER
CRISIS
SCAN THE QR CODE TO
DOWNLOAD THE FREE APP
Website
Apple
Android
PATENT PROTECTED: US011153741B2
ONE APP
ANY CRISIS
YOUR SPEED DIALING
POWERHOUSE
STOP DRUG ADDICTION BY
GIVING RESOURCES TO THOSE
WANTING RECOVERY
RECOVERY
SCAN THE QR CODE TO
DOWNLOAD THE FREE APP
Website
Apple -
Recovery
Android -
Recovery
PATENT PROTECTED: US011153740B2
Safe
HOUSE
YOURSAFERPLACE.ORG

Safe House

MILITARY
LEGAL
ELDER ABUSE
ABUSE
EMERGENCY
SEX ASSAULT
STUDENT
NATIVE
SUICIDE
HUMAN TRAFF
SAFE HOUSES
BELIEVE

CRISIS

CLOSE

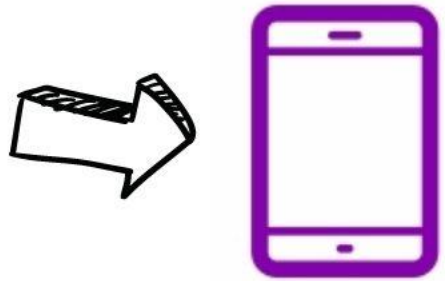
RECOVERY

COUNSELING
LEGAL
MEETINGS
DETOX CENTER
EMERGENCY
BATTERERS
REHAB CENTER
FOOD BANKS
SUICIDE
SOBER HOUSES
EATING DISO...
BELIEVE

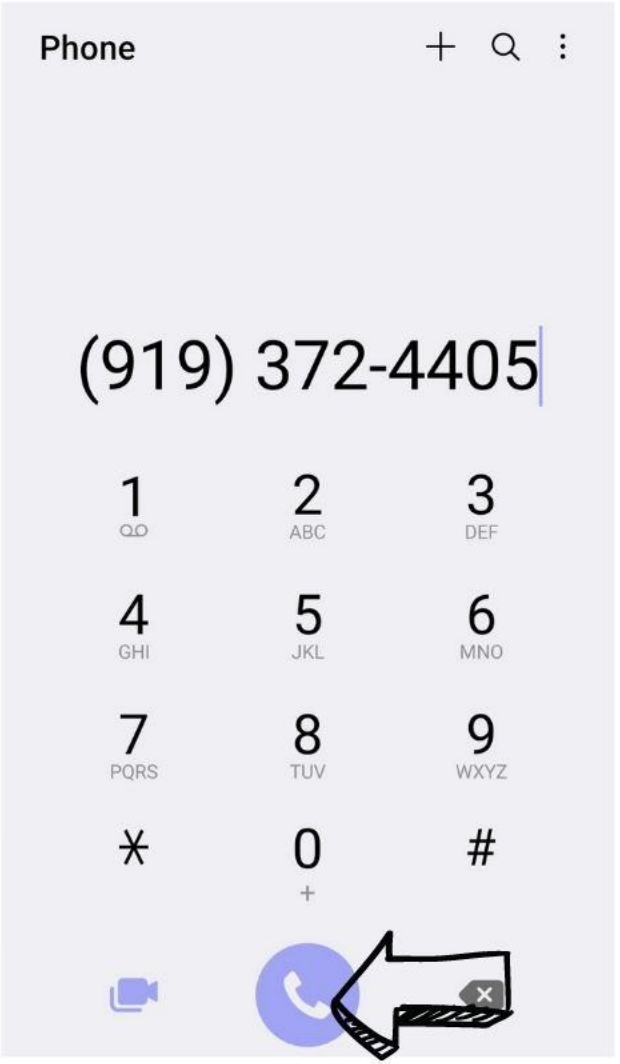
RECOVERY

CLOSE

Safe HOUSE



SUICIDE



WAKE

The Jason Foundation

JFI at Triangle Springs Hospital


9:41am
3G
Incoming
Call
Answer
Decline


Safe
HOUSE


Today's
Crisis/DV
Response
Maine
Suicide
Hotline
Safe
HOUSE


Safe
HOUSE


Safe
HOUSE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HOUSE


Safe
HOUSE
your safer place sooner

Grade Crossing Safety and Railroad Trespass Prevention Workshop

Day 2 Session One

ZERO IS OUR GOAL

A SAFE SYSTEM IS HOW WE GET THERE

Section 130 Program Overview

Esther Strawder

Office of Safety

U.S. Department of Transportation

Federal Highway Administration

Agenda

- Rail Highway Crossing Program & Changes in BIL
- Federal Funding
- Federal Aid Program Administration
- Agency Roles and Coordination
- Resources

Disclaimer

Except for any statutes or regulations cited, the contents of this presentation do not have the force and effect of law and are not meant to bind the States or the public in any way. This presentation is intended only to provide information regarding existing requirements under the law or agency policies.

Overview of RHCP and Changes in BIL

Enacted as the Infrastructure Investment and Jobs Act (IIJA) (Pub. L. 117-58, also known as the "Bipartisan Infrastructure Law").

Overview – What is "Section 130"?

- Section 130 a.k.a. "Rail-Highway Crossings Program"
- Title 23 of the United States Code, Section 130, was created by Congress in 1987 to provide funds for the "Elimination of Hazards" at public railway-highway crossings

RHCP BIL Funding

Railway-Highway Crossings Program (RHCP)

	FAST Act (extension)	Bipartisan Infrastructure Law (BIL)				
Fiscal year (FY)	2021	2022	2023	2024	2025	2026
Contract authority	$245 M	$245 M	$245 M	$245 M	$245 M	$245 M

- Total: $1.47B (includes Fast Act extension funds)
- Maintains FAST Act level funding
- Increases Federal share to 100%

Source: [Bipartisan Infrastructure Law - Railway-Highway Crossings Program (RHCP) Fact Sheet | Federal Highway Administration (dot.gov)]

Enhances RHCP Resources and Flexibility

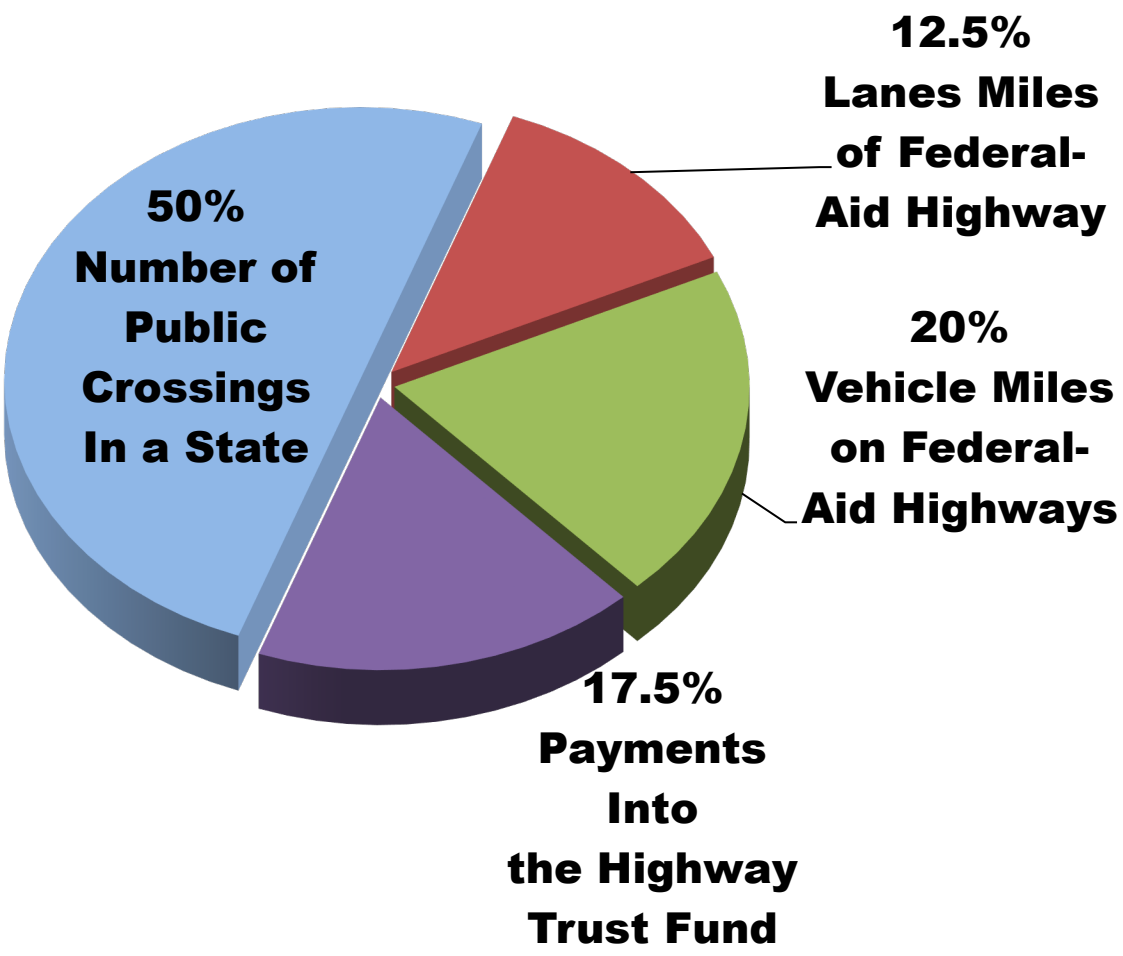
- Increases Federal share to 100% [23 U.S.C. 130(f)(3)]
- Eliminates 50% Provision for Protective Devices [BIL Section 11108(a)(2)]
- Increases Data Compilation and Analysis [23 U.S.C. 130(k)]
- Increases Crossing Closure Local Incentive [23 U.S.C. 130(i)(3)(B)]

Federal Funding

Section 130 Funding

- Section 130 funds are set-aside from a State's HSIP funds
- Funds are apportioned to States by formula
- Minimum of 0.5% to each State
- Obligation Period is the Fiscal Year + 3 Years

Funding Distribution Formula for a State Per:23 USC 130(e)(1)



Funding Apportionments

For FY 2021 the largest amounts are:

Funding Eligibility

- Section 130 funds **CAN** be used at:
- Any public railway-highway grade crossing
- Bike/Ped Crossings, including separate public bike paths and public pedestrian trails in addition to sidewalks adjacent to a public roadway
- Crossings blocked by idling trains

Eligible Activities

- Section 130 funds **CAN** be used for:
- Preliminary Engineering, Design, Right-of-Way and Construction Costs
- Matching funds for a local agency on State funded projects per 23 U.S.C. 130(h)
- Incentive payments to local agencies to close a public crossing per 23 U.S.C. 130(i)
- Data collection for State reporting requirements, up to 8% of a State's apportionment per 23 U.S.C. 130(g)
- Developing a State Action Plan

Eligibility

Section 130 funds can **NOT** be used for:

- Pedestrian trespassing **away** from a grade crossing such as fencing along a railroad right-of-way
- New grade crossing on a new railway or roadway
- Automated enforcement such as cameras
- Quiet zones
- Crossings on light-rail, streetcar, or trolley lines

Section 130 Program Administration

Program Administration

- The Section 130 Program is a reimbursable funding program (not a federal grant) by FHWA. The funds and program are administered by the State DOTs
  - States prioritize and select the projects
  - States oversee the design and construction
- FHWA Division Office in each State has a primary contact for Section 130

State-Administered Programs

Per 23 CFR 924.9(a)(4)(ii)

State-specific, data-driven processes that:

(A) consider the relative risk of public grade crossings based on a hazard index formula,

(B) include onsite inspection, and

(C) emphasize standard signing and markings at all public crossings

States utilize various processes to select and prioritize projects

Reporting Requirements

- Per 23 USC 130(g), each State shall submit a report to FHWA each year on the progress being made to implement Section 130 and the effectiveness of the improvements
- Report is submitted annually by August 31 along with a State's annual HSIP report

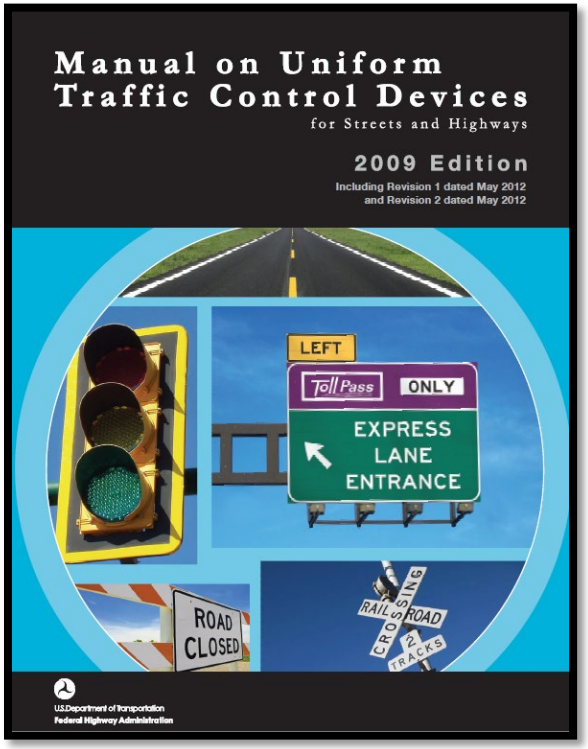
Agency Roles

Who Does What?

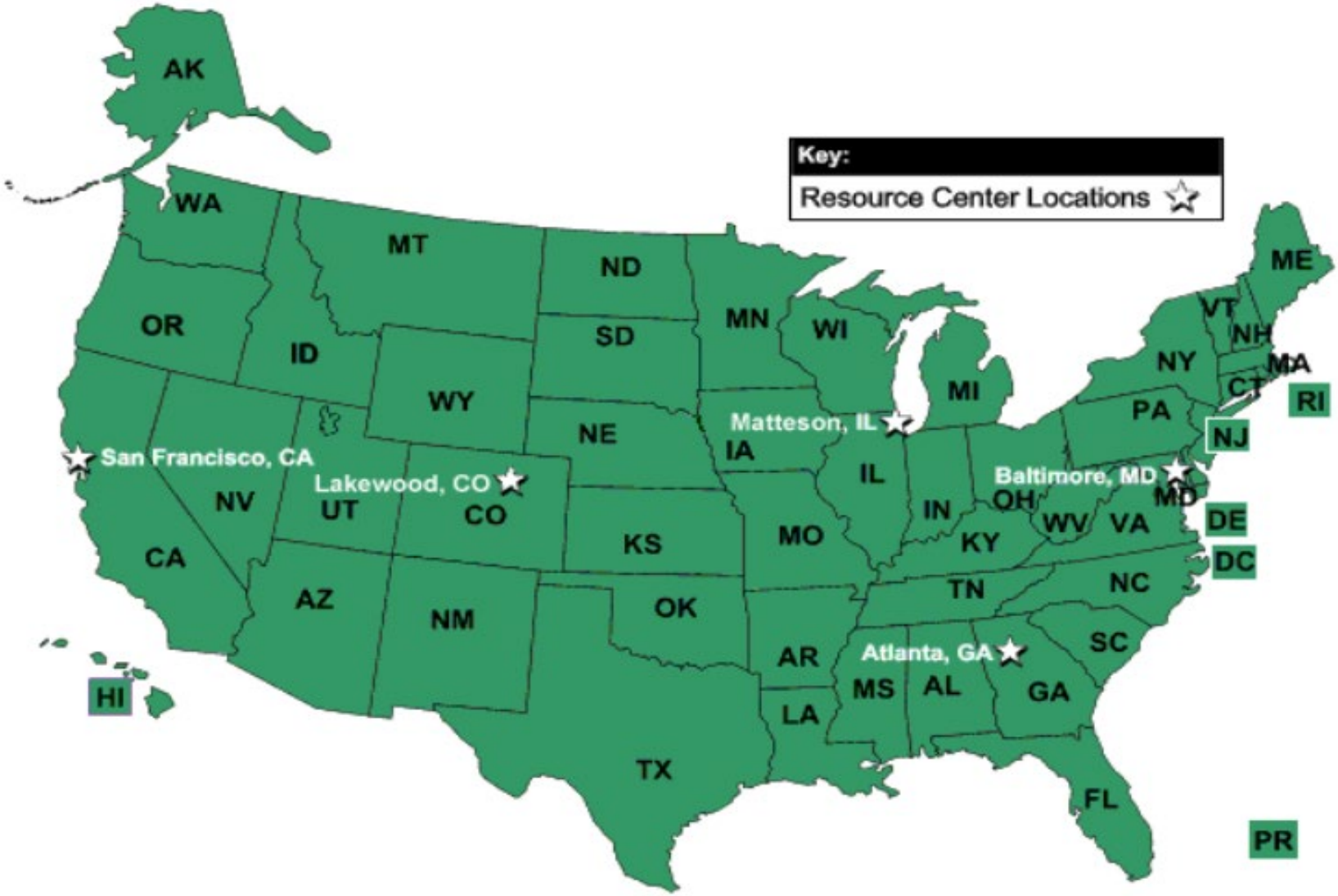
FHWA	FRA
Regulates public road agencies	Regulates the railroad
Oversees and administers the Section 130 program with State DOTs	Regulates grade crossing and trespassing safety issues with railroads
Oversees public grade crossings and grade separation safety issues	Oversees public and private grade crossing and grade separation issues
Publishes the MUTCD Section 8	Oversees the national crossing inventory

MUTCD Part 8

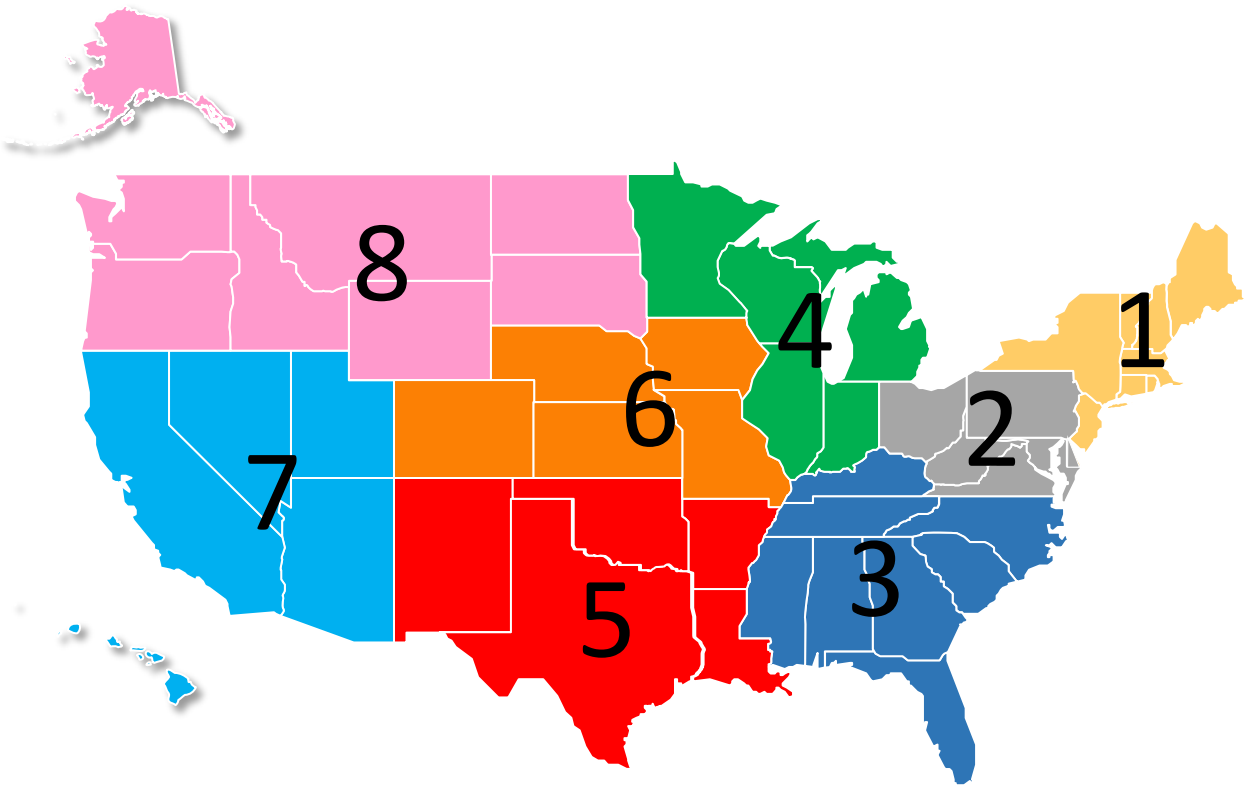
- Traffic Control for Railroad and Light Rail Transit Grade Crossings
- MUTCD Update coming May 2023
- FR for minimum Retro reflectivity standards for MUTCD
  - https://mutcd.fhwa.dot.gov/kno_2009r1r2r3.htm



FHWA Field Division Offices



FRA District Specialists



DISTRICT CROSSING AND TRESPASS SPECIALISTS

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2. Lou Frangella (Acting)
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7. Dale Davidson
   Dale.Davidson@dot.gov
8. Tammy Wagner
   Tammy.Wagner@dot.gov

Resources

- FHWA-FRA Joint Webinar Series Recordings
  https://safety.fhwa.dot.gov/hsip/xings/

- RHCP Guidance
  - https://safety.fhwa.dot.gov/hsip/xings/docs/BIL_RHCP_QandA_Guidance_FINAL.pdf
  - https://safety.fhwa.dot.gov/hsip/xings/docs/BIL_RHCP_Reporting_Guidance_FINAL.pdf

Joint Webinars

- Quarterly FHWA & FRA sponsored
- Discuss highway-rail grade crossing issues, tools and strategies to enhance safety
- Previous webinar recordings available
- Next Joint Webinar:
  - Feb 2023(date TBD)

FHWA Grants

- Federal Grants Status
  - CARSI 2 awarded $59M to projects in CA, FL, NY, and PA
    - USDOT Announces $59 Million in Grant Awards to Improve Safety at Highway-Railway Crossings in Four States | FHWA
  - Safe Streets for All Grant Program closed in September
    - Safe Streets and Roads for All (SS4A) Grant Program | US Department of Transportation
  - Reconnecting Communities Pilot closed in October
    - Reconnecting Communities Pilot Program – Planning Grants and Capital Construction Grants | US Department of Transportation

https://safety.fhwa.dot.gov/hsip/xings/

Thank you!

Esther Strawder

Section 130 Program Manager
FHWA Office of Safety Programs

Esther.Strawder@dot.gov

NORTH CAROLINA
Department of Transportation

Grade Crossings and Trespassing U-5768 – NC 49 (University City Boulevard) & Back Creek Church Road - Charlotte

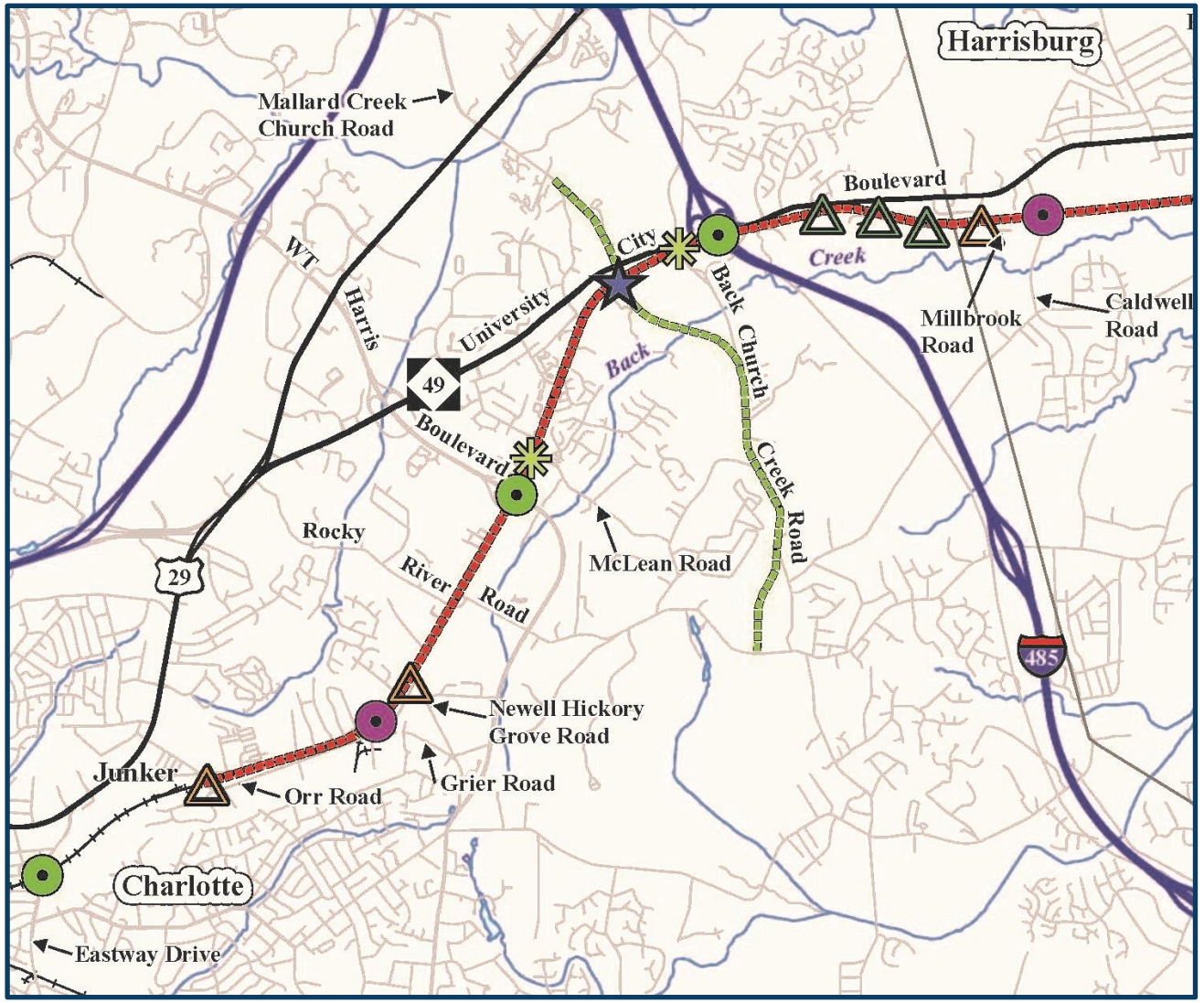
Brian Gackstetter
Senior Project Engineer – Rail Division

November 2, 2022

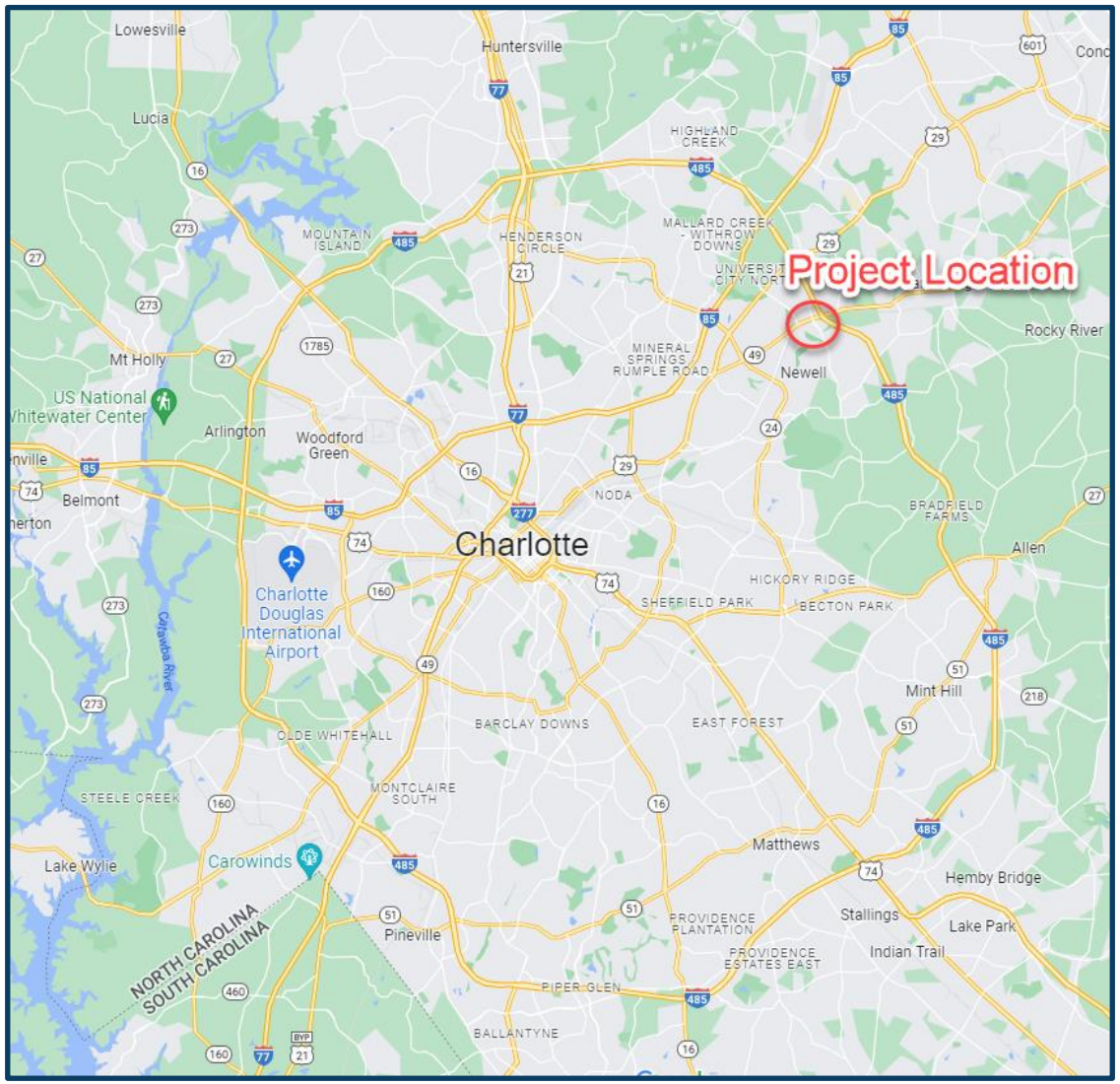
Connecting people, products and places safely and efficiently with customer focus, accountability and environmental sensitivity to enhance the economy and vitality of North Carolina

Piedmont Improvement Project - Mecklenburg County

- Constructed 2 grade separations at Mallard Creek Church Road and Grier Road
- Added second track to control point Junker.
- Closed 3 private crossings and constructed new roadway to Caldwell Road in Cabarrus County.
- Closed 1 public at-grade crossing.

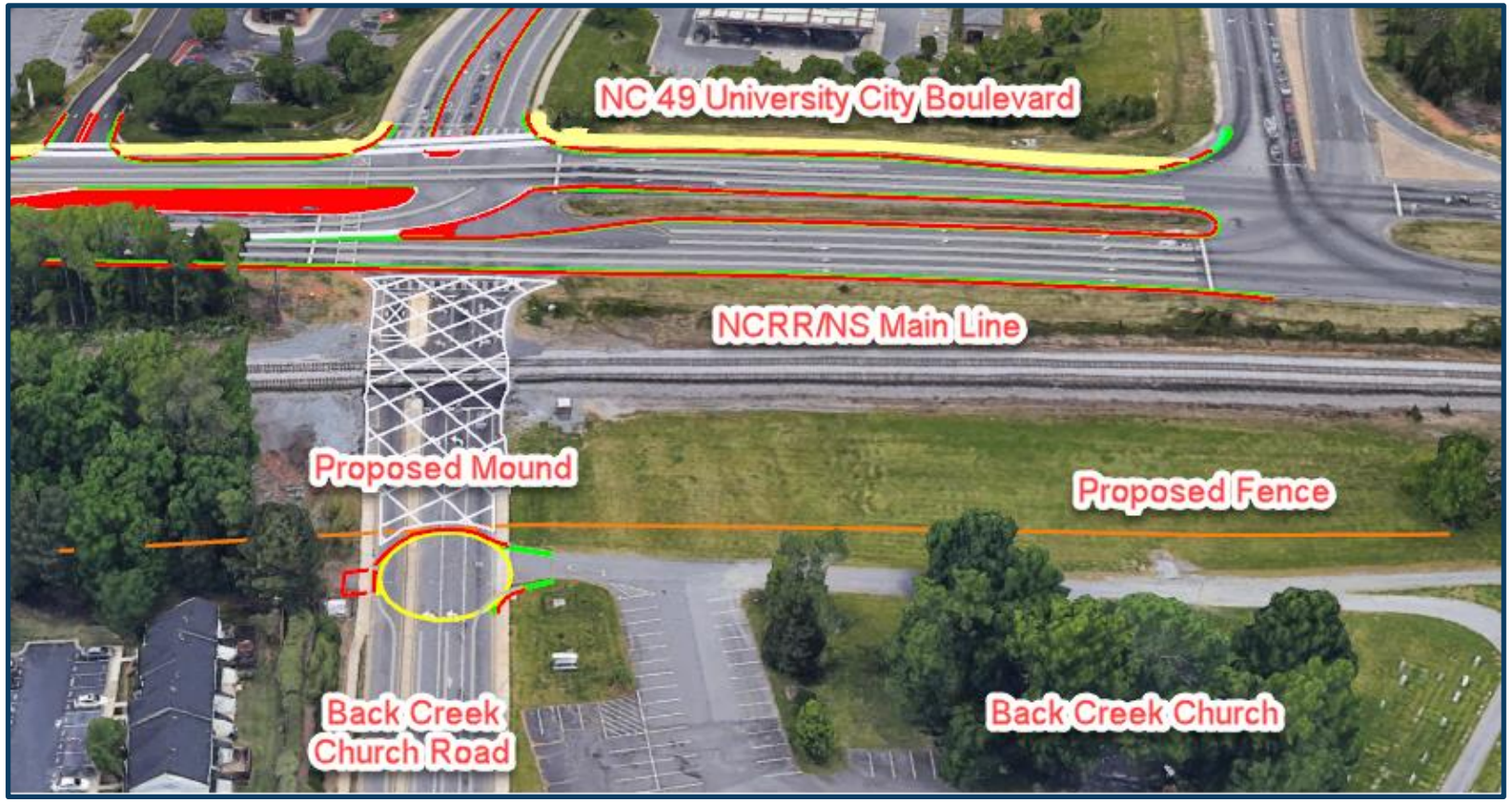


Project Location Map



NC 49 & Back Creek Church Road

- This at-grade crossing will close a part of this project per an agreement between NCDOT and the City of Charlotte
- There will be the use of a mound and fencing to deter trespassing
- And existing fence exists as a part of the controlled access of I-485 to the west of the existing crossing.



Back Creek Church Road to Sams Lane

- There is an existing earthen mound that abuts the townhomes.
- Large drainage ditch between the tracks and the mound.
- Steep railroad embankments lined with ballast

Back Creek Church Road to Sams Lane

Sams Lane to Mallard Creek Church Road

- Continuation of the earthen mound adjacent to the townhomes.
- Continuation of the drainage ditch between the tracks and the mound.
- Steep railroad embankment.

Sams Lane to Mallard Creek Church Road

Old Concord Road to Mallard Creek Church Road

- Significant trespassing issues between the townhomes and the shopping center.
- Many near misses.
- Railroad embankment not as steep but requires some effort.
- Installation of fencing within the railroad corridor along Old Concord Road.

Old Concord Road to Mallard Creek Church Road

Craighead Road Trespassing Fencing

Contact Us

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919-707-4131

@NCDOT

NCDOT

NCDOTcommunications

@NCDOT

ncdotcom

ncdot_comm

Thank you!

Thank You

Questions

Grade Crossing Safety and Railroad Trespass Prevention Workshop

Day 2 Session Two

RAIL

MOVING AMERICA FORWARD

Session 2: Highway Design

Facilitator: Randy Brown

NORTH CAROLINA
Department of Transportation









NCDOT Traffic Separation Study Process

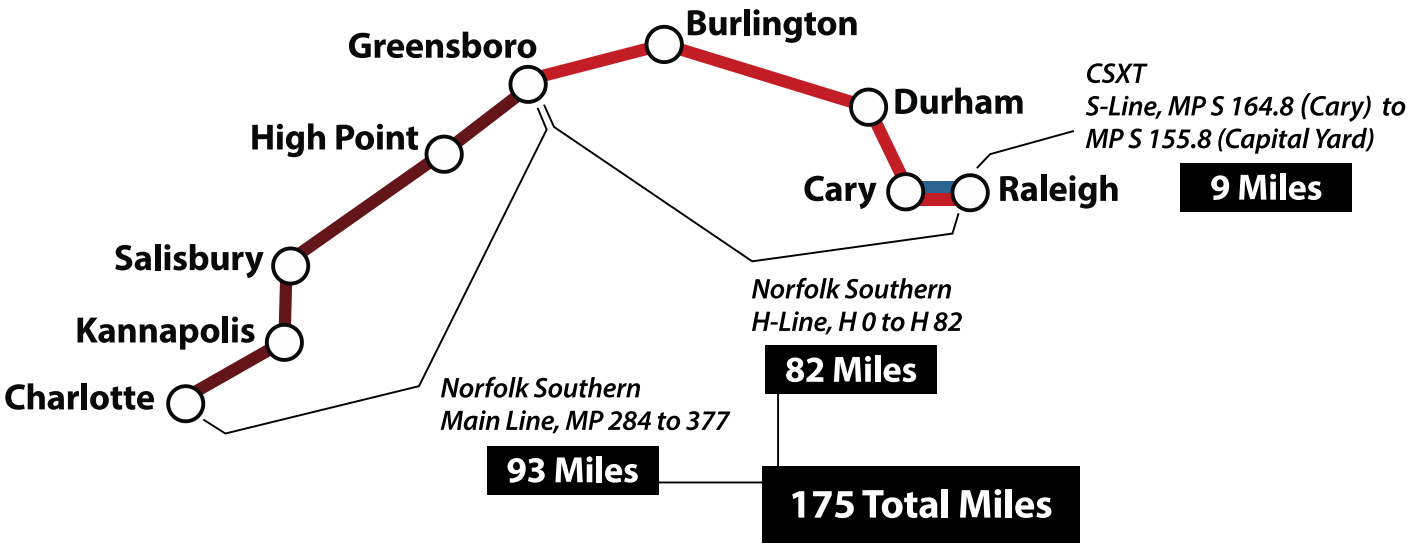
Grade Crossing Safety & Trespass Prevention Workshop

Jahmal Pullen, PE
Engineering Coordination & Safety Manager
NCDOT Rail Division
jmpullen@ncdot.gov

November 2, 2022

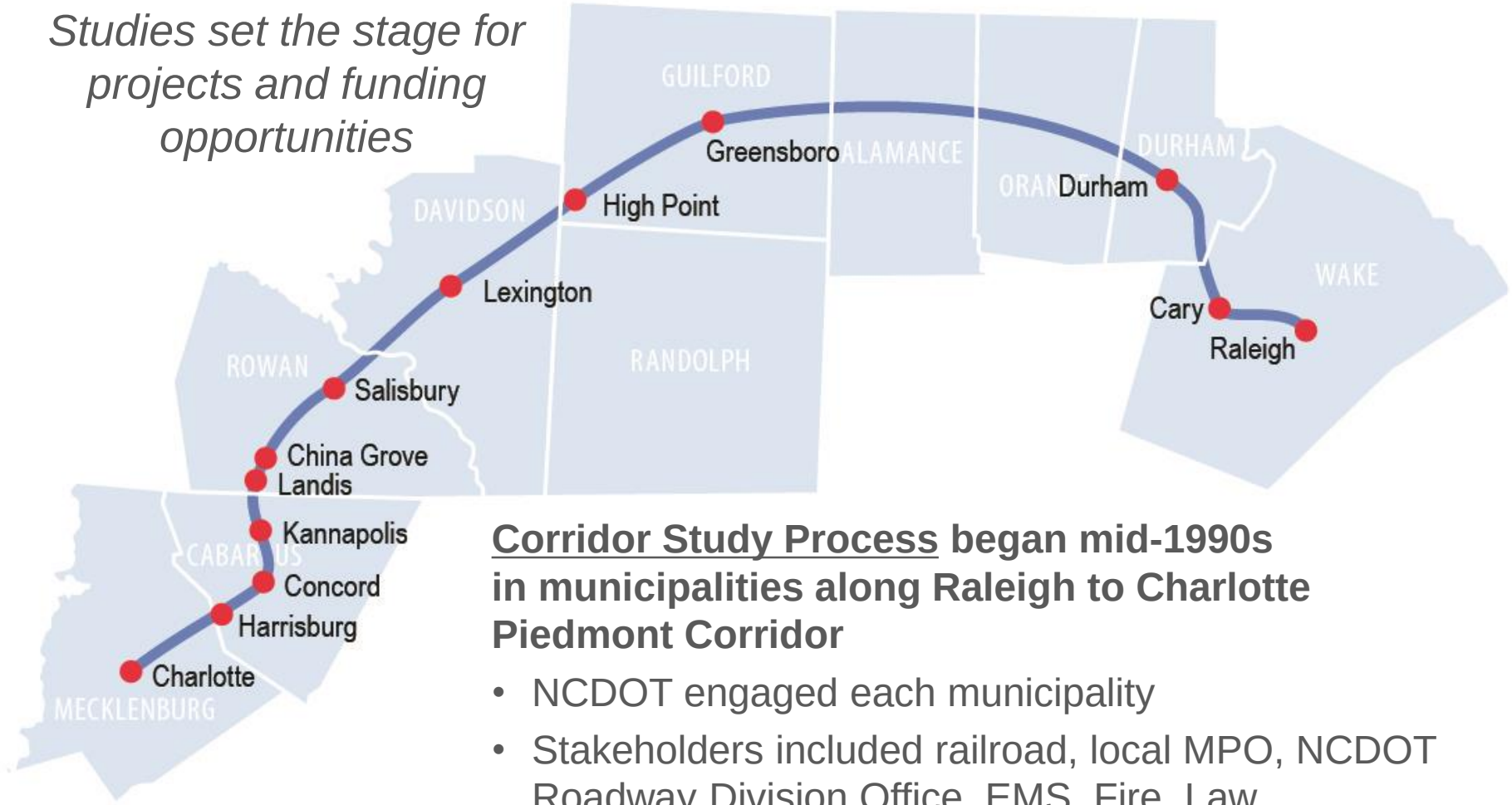
The Piedmont Corridor – Connects North Carolina's Largest Cities

- North Carolina Railroad Company (NCRR) owns the corridor
- Norfolk Southern is the freight operator and maintains the railroad
- Twelve daily passenger trains
  - NC By Train Service *(Piedmont) and* Amtrak Service (*Carolinian, Crescent*)
- Part of the federally-designated Southeast Corridor



Piedmont Corridor Studies

Studies set the stage for projects and funding opportunities



<u>Corridor Study Process</u> began mid-1990s in municipalities along Raleigh to Charlotte Piedmont Corridor

- NCDOT engaged each municipality
- Stakeholders included railroad, local MPO, NCDOT Roadway Division Office, EMS, Fire, Law Enforcement, School System

Piedmont Corridor Studies

Developed near, mid and long-term recommendations for at-grade crossings on the Corridor

- Began implementing near and mid-term improvements with Section 130 funding
- Completed the **Sealed Corridor Program** and **North Carolina Railroad Improvement Program**

- More expensive – typically grade separations/crossing consolidations
- Prioritized projects and began looking for funding for the **Piedmont Improvement Program**

American Recovery and Reinvestment Act

First MAJOR funding opportunity for Long-term Priorities

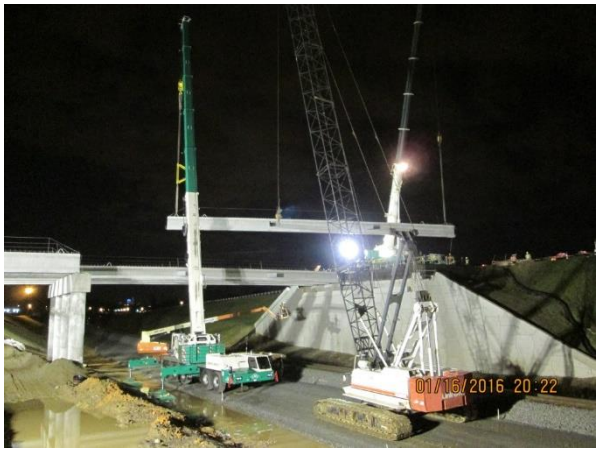
- Applied for ARRA funding in 2009 for Piedmont Corridor
- Collaboration achieved through corridor studies – vital part of successful application for funds
- Rail Division was awarded $520M for the Piedmont Improvement Program (PIP)

PIP Infrastructure Improvements

- **27** miles of second main track
- **5** new double crossover control points
  - **20** new tangential geometry turnouts
  - **60 mph** vs. 45 mph diverging speed
  - Improved ride quality
- **5** miles of passing sidings
- **30** new railroad signal installations
- Curve improvements
- Approximately **12** miles of roadway construction
- **5** railroad bridge improvements
- **12** new roadway grade separations
- **23** public and **16** private at-grade crossings closed


02/04/2015


08/16/2016 10:49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Piedmont Improvement Program Outcome

- Increased passenger service between Raleigh and Charlotte from 2 to 4 daily round trips
- Corridor ridership increased 96% from 2009-2019
- A fifth round trip (fourth *Piedmont* roundtrip) made possible by the improvements is planned for 2025

Current NCDOT Funding Process

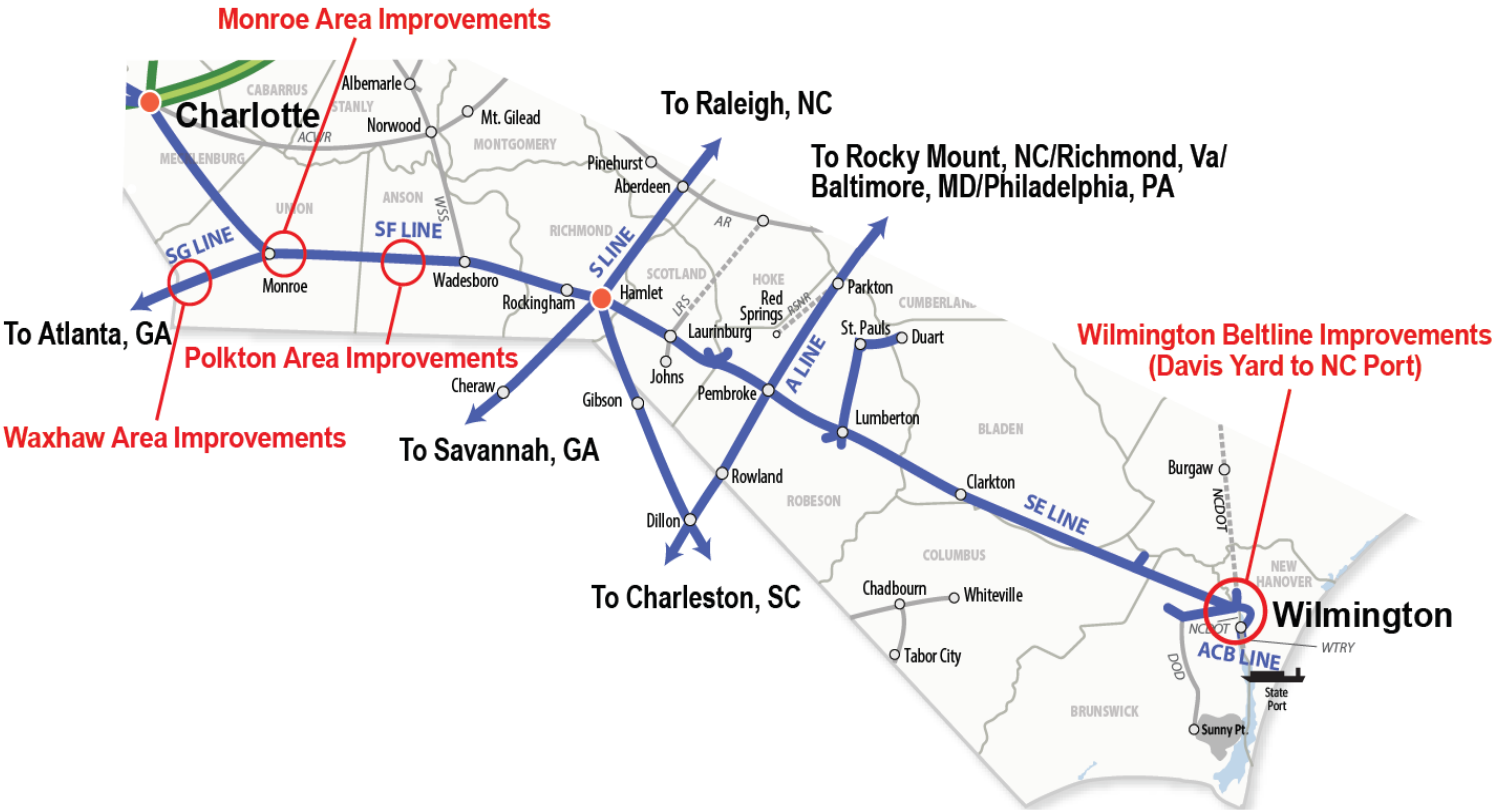
Past process for state-funded projects based on the area of the state and the type of project

Three-tiered funding approach: **Strategic Transportation Investments**

- **Statewide, Regional and Division**
- Data-driven project selection process
- Now multi-modal gets a share of pie
- Two of the data inputs are **cost benefit** and **safety**
  - Grade separation projects score well
  - Several grade separations projects funded were developed through the *corridor study process*
- **State funds can be leveraged as federal fund matches**

Charlotte to Wilmington Freight Corridor

- Applied for grant for Charlotte to Wilmington – strategic freight corridor
  - Wilmington crossing study completed six years ago
- Awarded $34M CRISI grant



Raleigh to Richmond Corridor

- 162 mile-long
- Awarded $58M CRISI grant to progress 30% design
- Crossing corridor studies in Wake Forest and Henderson helped set the stage

Takeaways

Long-range planning is essential

Obtain buy-in on recommendations from stakeholders

Chip away at smaller projects

Position larger projects for funding opportunities

Questions?

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jmpullen@ncdot.gov
919-707-4102

Crossing Safety and Railroad Trespass Prevention Workshop – Crossing Safety Case Study in Kings Mountain, NC

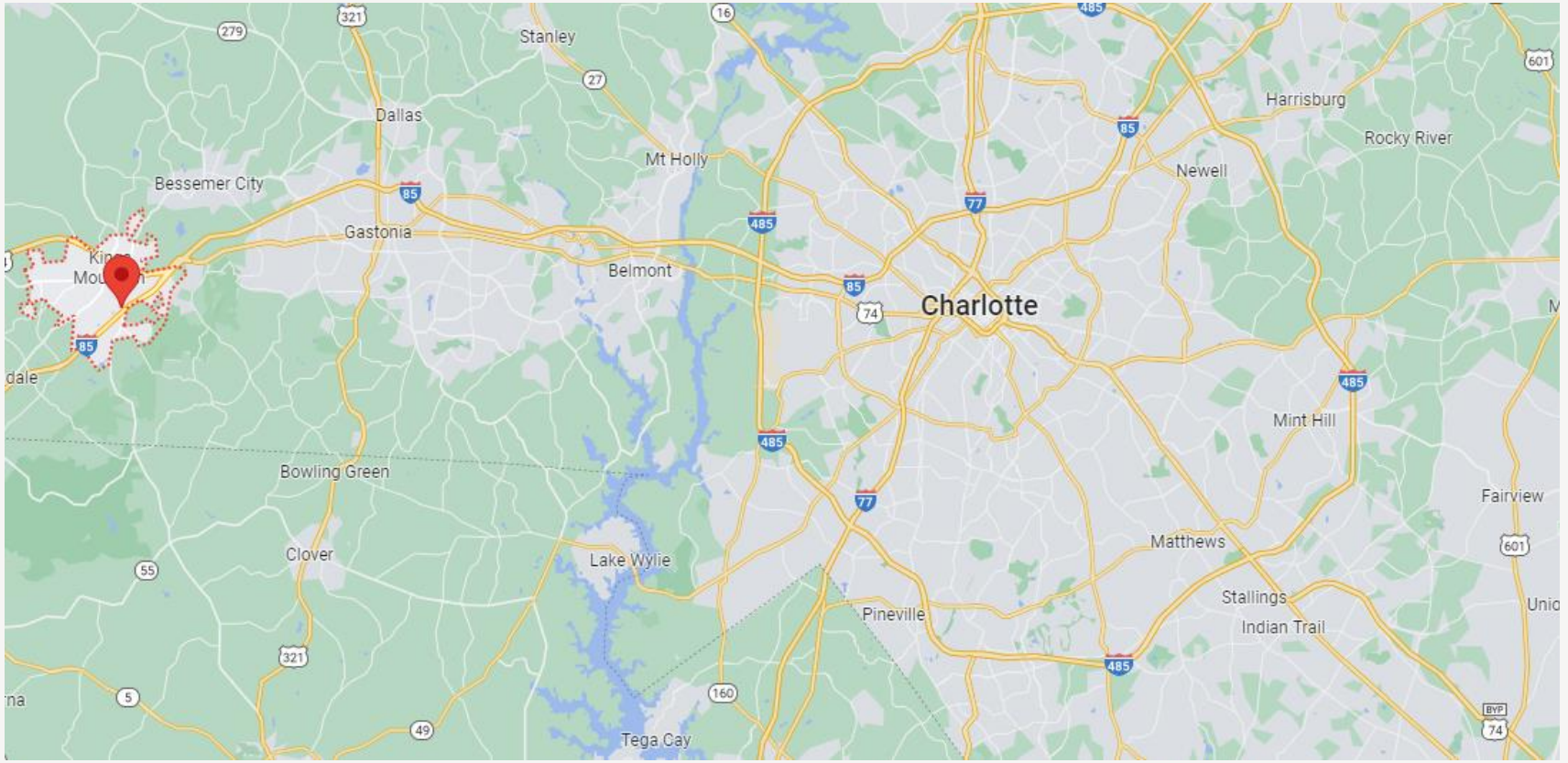
Melissa Toth, PE

November 2022

Kings Mountain, NC

West of Charlotte, Gastonia

North of SC state line



ATKINS

Member of the SNC-Lavalin Group

Downtown Kings Mountain, NC

Oak (closed), Gold and Mountain Streets

- At-grade crossing
- Closed crossing

ATKINS

Member of the SNC-Lavalin Group

Crossing collisions

Oak Street 716262M – Closed in 2012

5/04/2012	truck/freight train
3/15/2012	truck/freight train
3/14/2008	truck/freight train
7/20/2007	truck/freight train
9/18/2006	truck/freight train
5/14/2004	truck/freight train
3/12/1980	auto/light locomotive
7/10/1978	truck/freight train
8/21/1977	auto/light locomotive
6/3/1976	truck/freight train

ATKINS
Member of the SNC-Lavalin Group

Crossing collisions

Gold Street 716261F

6/14/2011	truck/freight train
1/04/2011	truck/passenger train
1/30/1987	truck/freight train
7/29/1986	auto/light locomotive


THERMO KING
2
TRACKS

ATKINS

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ATKINS
Member of the SNC-Lavalin Group

Mountain Street

ATKINS
Member of the SNC-Lavalin Group

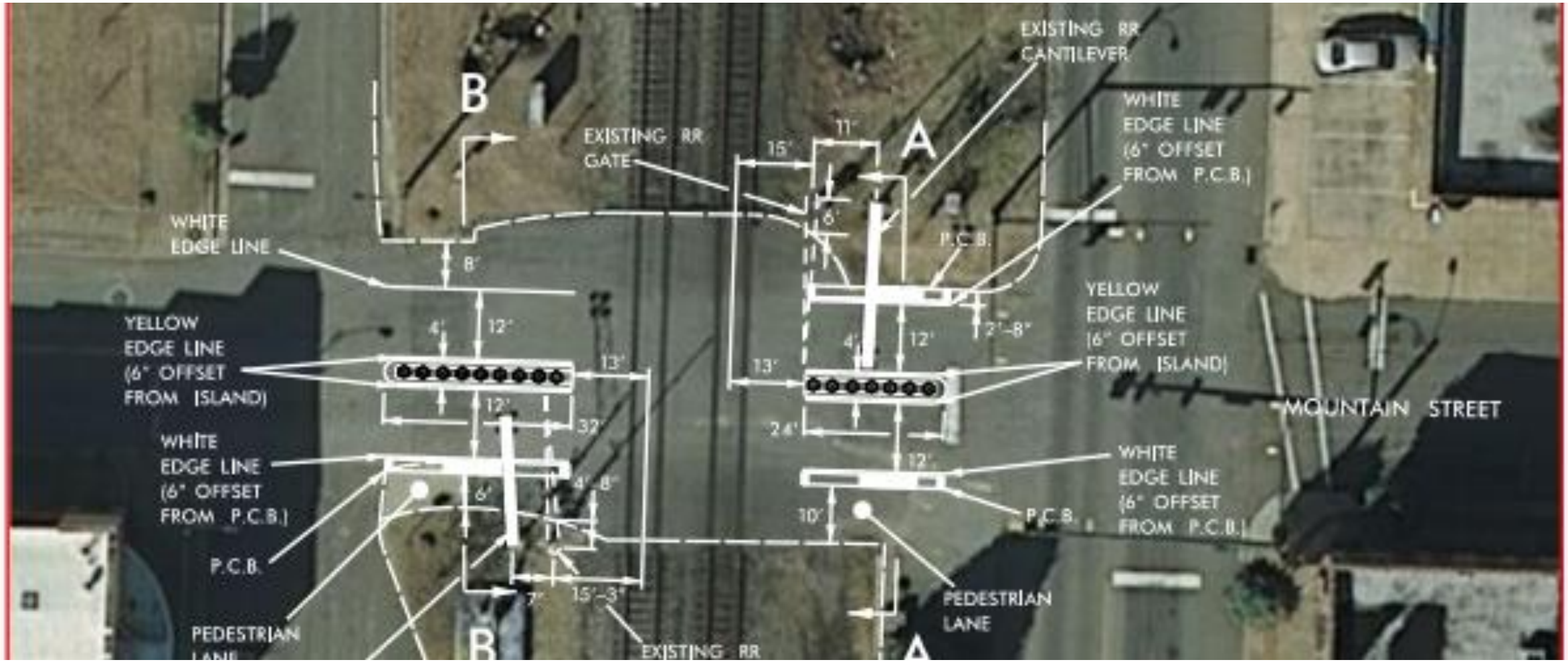
Gold Street

ATKINS
Member of the SNC-Lavalin Group

Gold Street

ATKINS
Member of the SNC-Lavalin Group

ATKINS
Member of the SNC-Lavalin Group



Mountain Street Concept

Construction

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Member of the SNC-Lavalin Group

After construction

ATKINS
Member of the SNC-Lavalin Group

After construction

ATKINS
Member of the SNC-Lavalin Group

After construction

ATKINS
Member of the SNC-Lavalin Group

Aesthetics

ATKINS
Member of the SNC-Lavalin Group

Pedestrians

ATKINS
Member of the SNC-Lavalin Group

Crossing collisions

Gold Street 716261F

7/30/2021	truck/freight train
6/14/2011	truck/freight train
1/04/2011	truck/passenger train
1/30/1987	truck/freight train
7/29/1986	auto/light locomotive

Our values are the essence of our company's identity.
They represent how we act, speak and behave together,
and how we engage with our clients and stakeholders.

SAFETY	*We put safety at the heart of everything we do, to safeguard people, assets and the environment.*
INTEGRITY	*We do the right thing, no matter what, and are accountable for our actions.*
COLLABORATION	*We work together and embrace each other's unique contribution to deliver amazing results for all.*
INNOVATION	*We redefine engineering by thinking boldly, proudly and differently.*

FRA Grade Crossing Safety & Railroad Trespass Prevention Workshop

Design of Pre-Signals at Grade Crossings

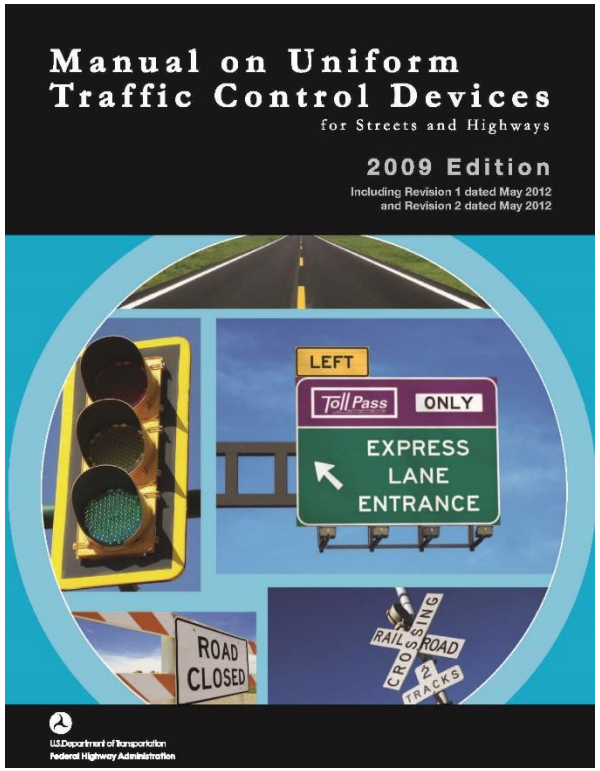
Raleigh, NC November 2, 2022

benesch

Pre-Signal Design and Operation

benesch

Pre-Signal Design and Operation



The 2009 Edition of the MUTCD is the current manual

Significant changes to Part 8 (Railroads) are coming with the new 11th Edition

benesch

Pre-Signal Design and Operation

MUTCD 11th Edition – Proposed Section 8D.12

Pre-Signals at or Near Grade Crossings

Guidance:

If a grade crossing is located in close proximity to an intersection controlled by a traffic control signal and the clear storage distance is less than the design vehicle length, the use of pre-signals to control traffic approaching the grade crossing in the direction towards the intersection should be considered.

Pre-Signal Design and Operation

MUTCD 11th Edition – Proposed Section 8D.12

Pre-Signals at or Near Grade Crossings

Guidance:

If a grade crossing equipped with flashing-light signals, but without automatic gates, is located within 200 feet of an intersection controlled by a traffic control signal, a pre-signal should be provided.

benesch

Pre-Signal Design and Operation

MUTCD 11th Edition – Proposed Section 8D.12

Pre-Signals at or Near Grade Crossings

Guidance:

A separate pre-signal face for the left-turn lane and/or right-turn lane should be provided in addition to the pre-signal signal faces provided for the through movement.

benesch

Pre-Signal Design and Operation

MUTCD 11th Edition – Proposed Section 8D.12

Pre-Signals at or Near Grade Crossings

Guidance:

Consideration should be given to using visibility-limited signal faces at the intersection for the downstream signal faces that control the approach that is equipped with pre-signals.

benesch

Pre-Signal Design and Operation

MUTCD 11th Edition – Proposed Section 8D.12

Pre-Signals at or Near Grade Crossings

Support:

Because the signal faces at a pre-signal do not always display the same signal indications as the downstream signalized intersection, the approach to the pre-signal is considered to be a separate approach from the approach to the downstream signalized intersection.

Pre-Signal Design and Operation

MUTCD 11th Edition – Proposed Section 8D.12

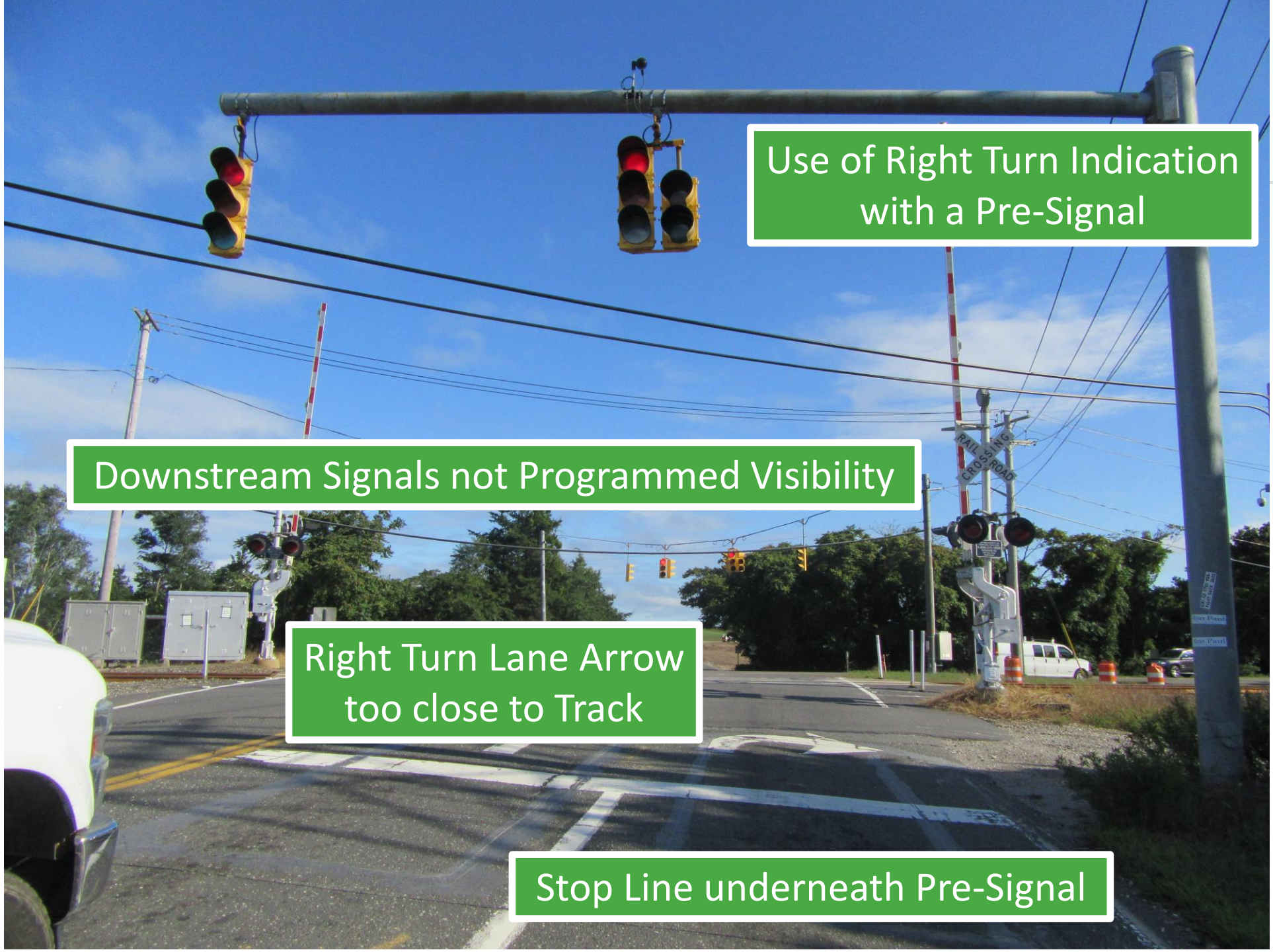
Pre-Signals at or Near Grade Crossings

Support:

Because the signal faces at a pre-signal do not always display the same signal indications as the downstream signalized intersection, the approach to the pre-signal is considered to be a separate approach from the approach to the downstream signalized intersection.

Greater than 60' may lead to confusion where to stop

benesch


Use of Right Turn Indication with a Pre-Signal
Downstream Signals not Programmed Visibility
Right Turn Lane Arrow too close to Track
Stop Line underneath Pre-Signal
RAIL ROAD CROSSING

benesch

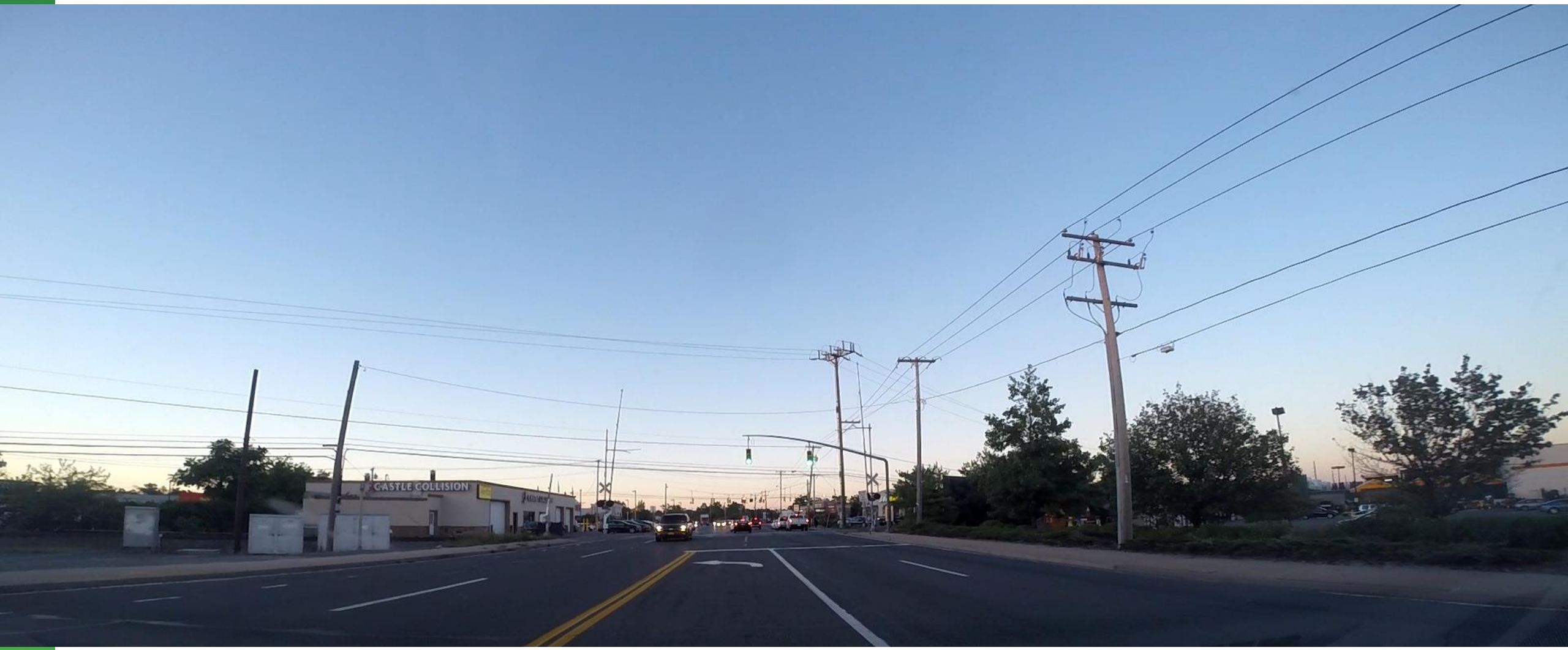

STATE LAW
DO NOT
STOP
ON
TRACKS
R X R

on

Not a Pre-Signal
These are the Primary Signals
for the Downstream Intersection

benesch

Pre-Signal Design and Operation



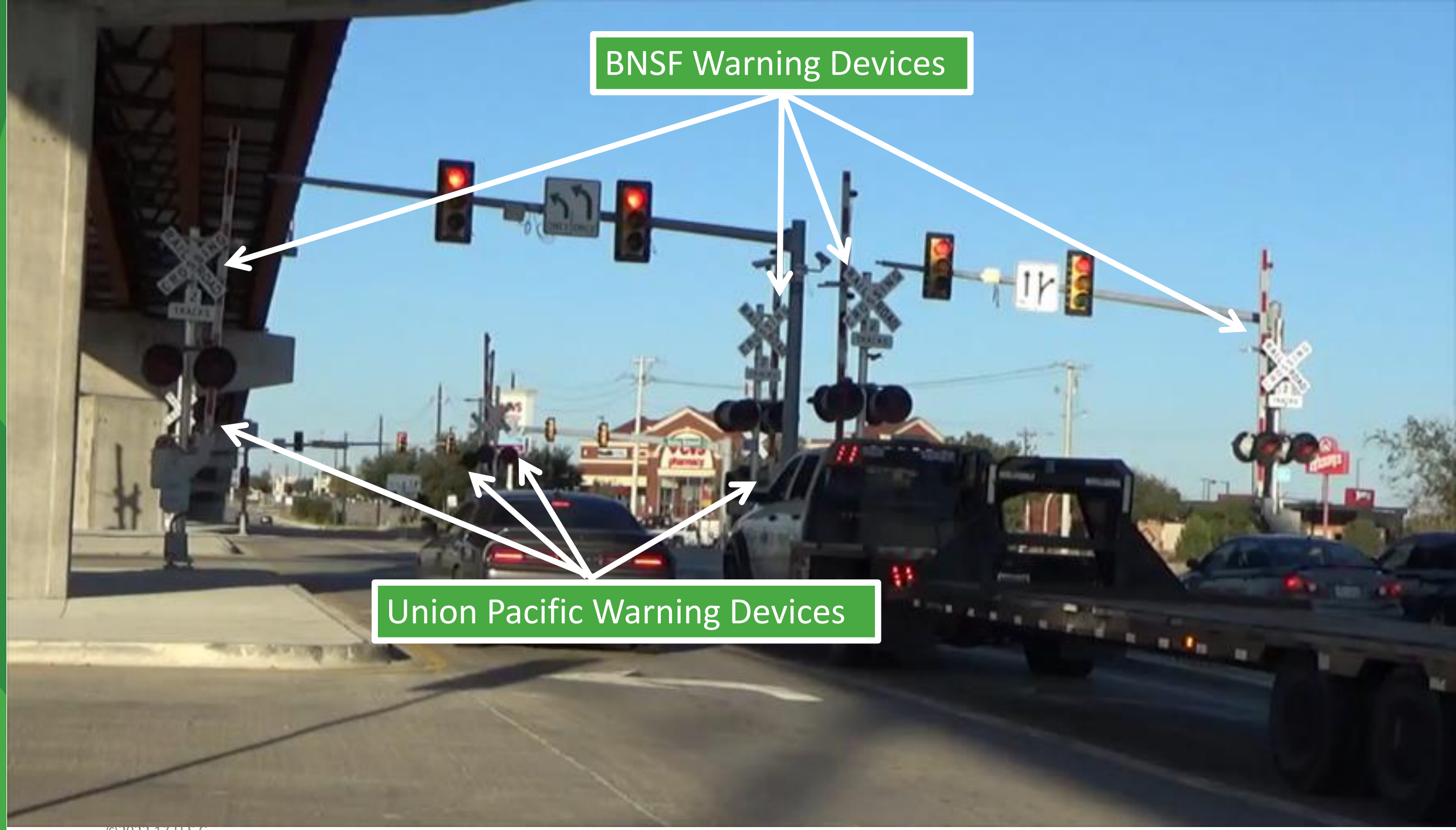
benesch

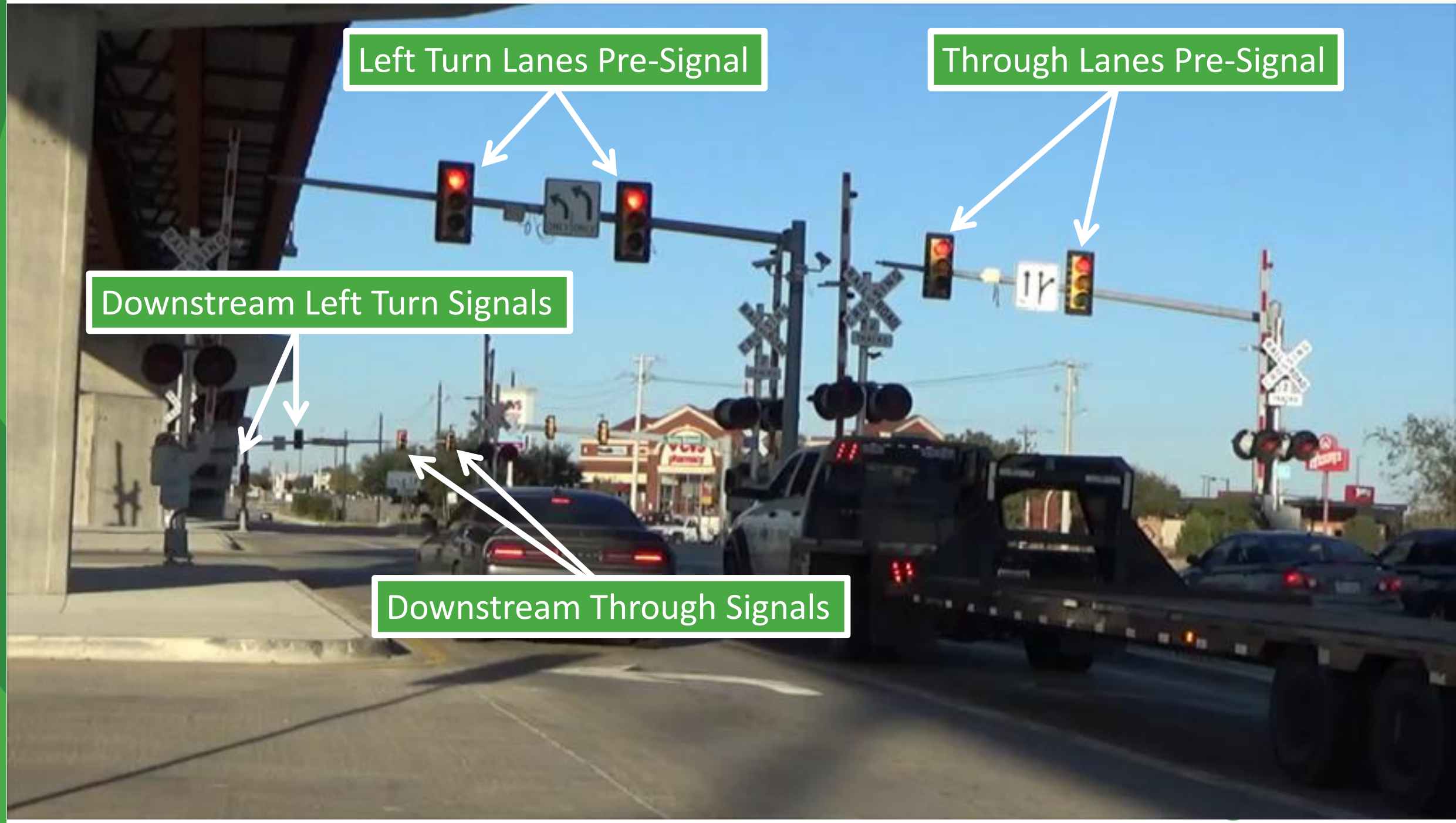

STATE LAW
DO NOT
STOP
ON
TRACKS
Jeep
FDB-4228
SGH
J.M.C.

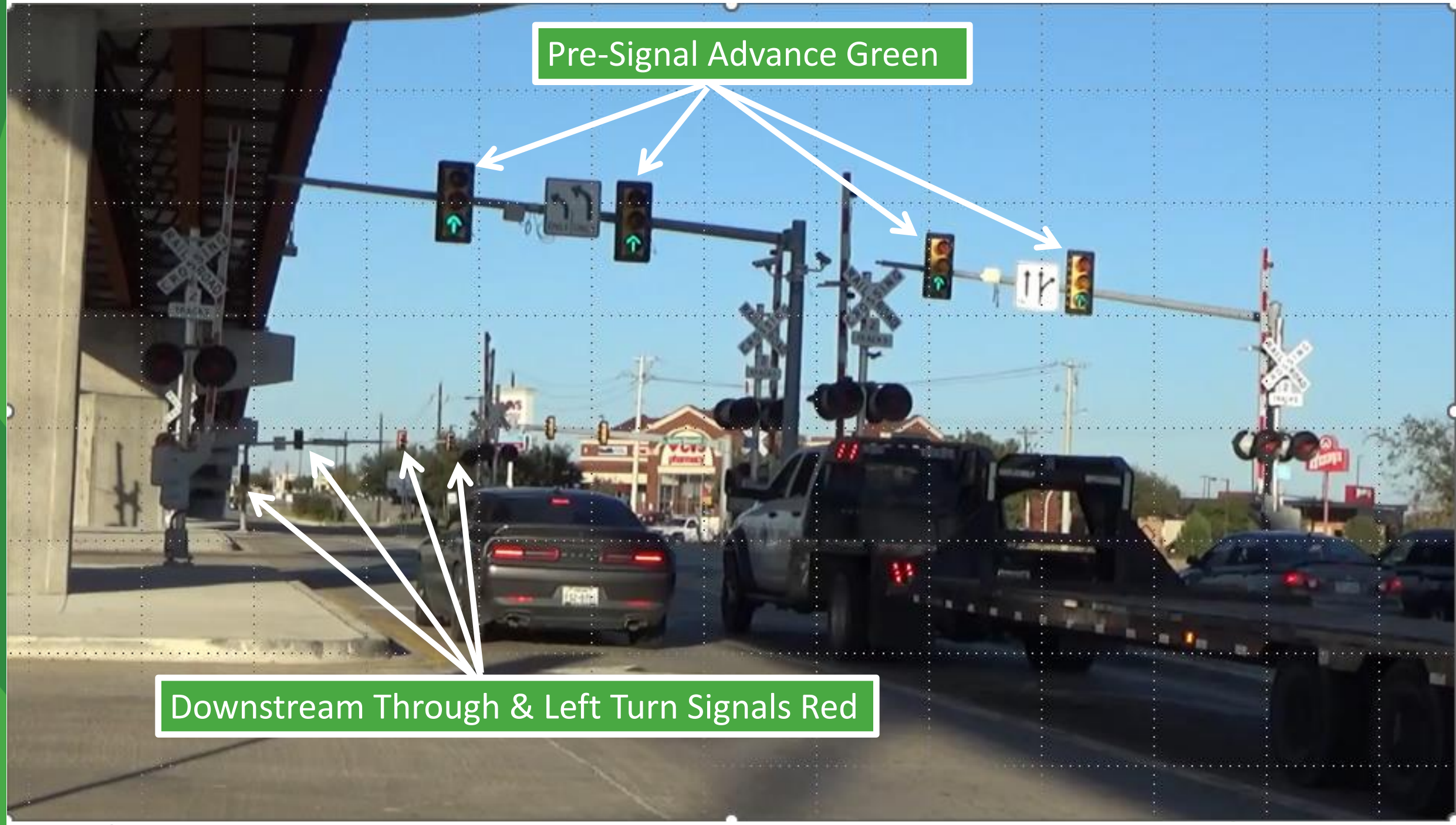
Pre-Signal Design and Operation

Bailey-Boswell Road
Complex Crossing Pre-Signal
2 Railroads
Interconnected Warning Systems
Extensive School Bus Use
50 Second Rule Limitations

benesch




Left Turn Lanes Pre-Signal
Through Lanes Pre-Signal
Downstream Left Turn Signals
Downstream Through Signals


Pre-Signal Advance Green
Downstream Through & Left Turn Signals Red

Pre-Signals & Downstream Signals Green

Pre-Signals Yellow, Downstream Signals Green

End of Green Clearance, Pre-Signals Red, Downstream Signals Yellow

Pre-Signals

Things to Consider:

- Use of pre-signals for long clear storage distances must carefully consider driver expectancy for stopping traffic well in advance of the normal stopping point for the intersection, as well as the inherent inefficiency of pre-signal operation
- Use of pre-signals must carefully consider the location of the signal indications (downstream or upstream)

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Pre-Signals

Things to Consider:

- Additional signing and turning restrictions are required
- Visibility-limited signal faces should be installed for the downstream signal indications beyond the pre-signal
- The pre-signal indications should be progressively timed with the downstream signal to permit the design vehicle to clear the CSD prior to the display of the red indication for each cycle

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Pre-Signals

Limited Effectiveness?

- **The use of a pre-signal alone does not replace the need for a proper track clearance interval without significant operating requirements.**
- Motorists feel entitled to make a right turn on red.
- Many motorists only view a pre-signal as “near-side” signal faces and still pull up to the intersection.

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Pre-Signals

Limited Effectiveness?

- **Many road authorities will not agree to the use of a pre-signal because of the operating limitations it places on traffic flow at the intersection.**

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Questions??

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Contact

Grade Crossing Engineering – Fort Worth Office

817-415-2990

Rick Campbell 817-751-0058

rcampbell@benesch.com

benesch

Thank You

Questions

Grade Crossing Safety and Railroad Trespass Prevention Workshop

Day 2 Session Three

GRADE CROSSING INSPECTIONS AND SURVEYS WITH THE DRONE-ENABLED CROSSING-I SYSTEM

Pasi Lautala, P.E., rail expert

Colin Brooks, Crossing-i development lead

Rick Dobson, UAS deployment & analysis

Additional research staff support: Chris Cook (UAS data analysis), Michael Billmire (web portal dev), Dave Nelson (rail industry expertise), *Senior advisor*: Robert Shuchman (50 years remote sensing research experience)

MTRI, Inc.

Crossing-i R R System

Rail Transportation Program
Michigan Tech Transportation Institute • Michigan Technological University

Michigan Technological University
1885

PROBLEM BEING SOLVED

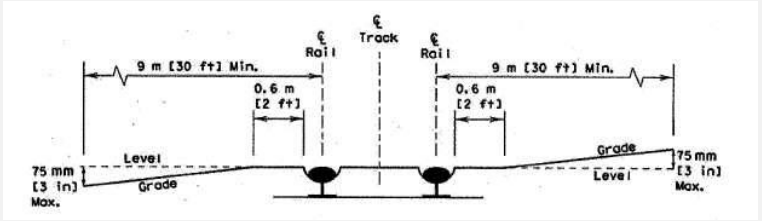
- Loss of life and of property occur too frequently at rail crossings due to insufficient inspections and risk-identification
- 130,000 public and 209,000 total crossings in the U.S.
  - 200+ annual fatalities
  - 2000+ annual injuries

3/7/2017 Biloxi, 4 deaths, 38 injuries (50 total onboard, retirees)

10/16/21 Thackerville, OK: Amtrak train strikes semi-truck car hauler stuck on tracks; 5 injured

BEFORE MEASUREMENTS: DEFINE REQUIREMENTS

- Defined the requirements to measure grade crossings
  - Crossing profile measurement requirements: Based on AASHTO's "A Policy on Geometric Design and Streets" (Green Book) – 0.89% max grade for 30ft from ends of ties (3 inches over 28 ft; 75mm over 8.4m)
    - Rate of change critical to find locally problematic areas
  - Sight line requirements: Railroad-Highway Grade Crossing Handbook by the FHWA



Critical areas for 3D measurement of vertical highway profiles at grade crossings – 0.89% grade over 30' (9.1m) – AASHTO Green Book

	Case B: Departure from stop	Case A: Moving vehicle							
	Vehicle speed (mph)								
Train speed (mph)	0	10	20	30	40	50	60	70	80
	Distance along railroad from crossing, d_T (feet)								
10	240	146	106	99	100	105	111	118	126
20	480	293	212	198	200	209	222	236	252
30	721	439	318	297	300	314	333	355	378
40	961	585	424	396	401	419	444	473	504
50	1201	732	530	494	501	524	555	591	630
60	1441	878	636	593	601	628	666	709	756
70	1681	1024	742	692	701	733	777	828	882
80	1921	1171	848	791	801	838	888	946	1008
90	2162	1317	954	890	901	943	999	1064	1134
	Distance along highway from crossing, d_H (feet)								
		69	135	220	324	447	589	751	931

Table 32 Railroad-Highway Grade Crossing Handbook – helps determine distances needed for data collection along highways & railways

HANG-UP DETECTION VEHICLE STANDARDS

- Eck and Kang, 1991, update Clawson 2002, checked against current standards
- They also state that vehicles with ground clearance down to 2 inches have been observed
- Recommend use of 40 foot wheel base with 4 inch clearance (12.2m x 0.10m)
- We produce school bus, motorcoach RV, & low-boy trailer by default; can do any other

Table 4.1 – Design Vehicle Dimensions

Design Vehicles	Wheelbase (ft)	Overhang (ft)		Ground clearance (in)		
		Front	Rear	Wheelbase	Front	Rear
Single Unit Trucks –						
Single Unit Beverage Truck	24	--	10	6	--	8
Articulated Beverage Truck	30	--	--	10	--	--
Rear-Load Garbage Truck	20	--	12.5	12	--	14
Aerial Fire Truck	20	7	12	9	11	10
Pumper Fire Truck	22	8	10	7	8	10
Buses -						
Mini-Bus	15	--	16	10	--	8
School Bus	23	--	13	7	--	11
Single Unit Transit Bus	25	18	--	8	6	--
Articulated Transit Bus	22 / 26	--	10	10 / 10	--	9
Motorcoach	27	7.6	10	7	10	8
Trucks -						
Low-Boy Trailers < 53 ft	38	--	--	5	--	--
Double-Drop Trailer	40	--	--	6	--	--
Car Carrier Trailer	40	--	14	4	--	6
Belly Dump Trailer	40	--	--	11	--	--
Recreational Vehicles -						
Passenger Vehicle and Trailer – Private Use	20	--	13	5	--	5
Passenger Vehicle and Trailer – Commercial Use	27 (24 to hitch)	--	13	7	--	7
Recreation Vehicle	27	7.8	16	7	6	8

Clawson, Amy Lorraine, "Establishing design vehicles for the hang-up problem" (2002)

SIGHT DISTANCE

- Requirements from the 2018 Green Book are the same as 2011.

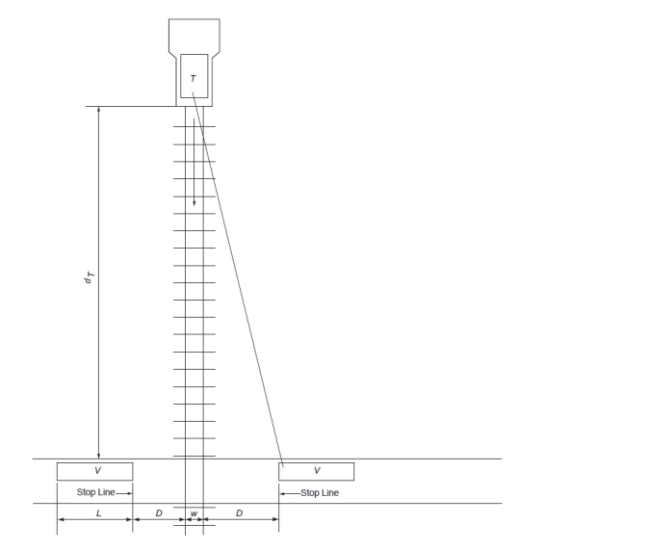


Figure 9-77. Case B: Departure of Vehicle from Stopped Position to Cross Single Railroad Track

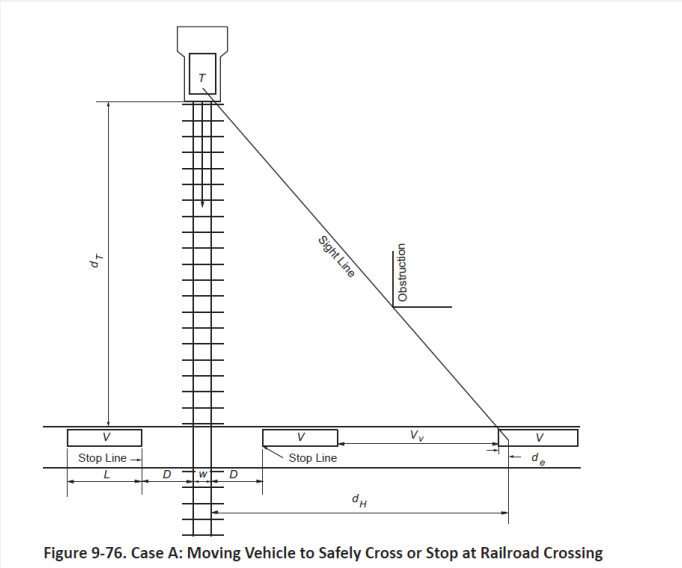


Figure 9-76. Case A: Moving Vehicle to Safely Cross or Stop at Railroad Crossing

Need to consider vehicles starting from stopped position (left) or already moving vehicles (right)

* We calculate site line adequacy for approaching vehicles *

TECHNOLOGY SOLUTION: CROSSING-I

- We have developed a unique, drone based technology to reduce life threatening accidents at railroad crossings.
- Developed under USDOT SBIR Phase I & II funding - partnership between MTU and MTRI Inc.
- Now being made commercially available

Michigan Technological University 1885

MTRI, Inc.

Photogrammetry
High resolution photogrammetry and 3D model construction

Automation
Automated imagery analysis to identify hazards

Low Clearance
Identify hang-up risk by vehicle type

Sight Line
Identify sight line risk and potential obstacles

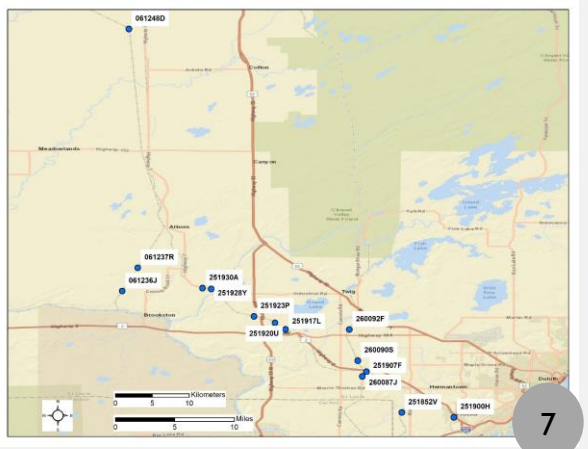
Inventory
Photo documentation of crossing and sign infrastructure.

Portal
Cloud application to access reports and imagery

https://mtriinc.com/rail-crossing-assessment/

TECHNOLOGY SOLUTION: CROSSING-I

- Crossing-i demonstrated in 34 crossings (five states), 2019-2021 (SBIR I & II funding)
  - MnDOT, WISDOT, MDOT, INDOT, ICC
  - Crossing survey planning & execution methods are well established & efficient
- MnDOT, St. Louis County (MN), Ohio Rail Development Commission (ORDC) partners for 2022-2023 projects
  - Collected 12 crossings near Duluth last week, Oct. 26 & 27, 2022



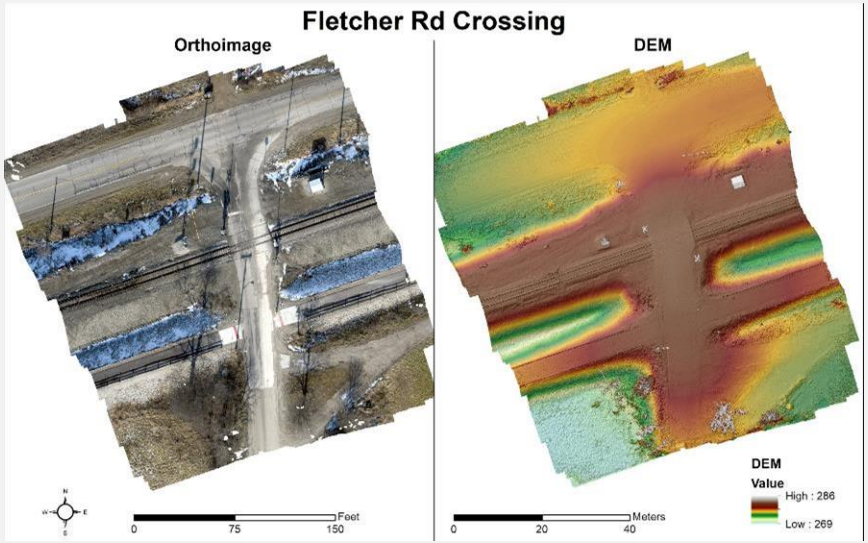
DRONE-ENABLED DATA COLLECTIONS

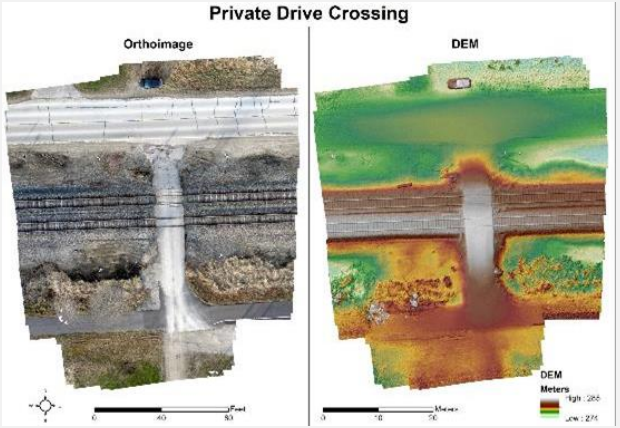
- Completed data collections for crossing assessments for SBIR funding
  - Completing up to 6 crossings per day, more possible (depends on proximity of crossings, FAA rules for flight operations)
    - Submitted whitepaper to FAA on 10/31/2022 to enable Beyond Visual Line of Sight (BVLOS) operations for grade crossing assessment via drone
  - Crossing data typically collected within 1 hour with some crossings collected in 30 minutes.
- Data collection workflow
  1. Place ground control targets
     - 4 at the crossing for humped crossing
     - 2 further away from crossing for visual sight lines
       - Specific distance from crossing is determined by AASHTO Green Book calculations for sight line triangles
  2. Fly larger UAS with high-res imaging for humped crossing analysis
  3. Fly smaller DJI Mavic 2 Pro for visual sight lines analysis; can do all with larger UAS
  4. Retrieve ground control targets

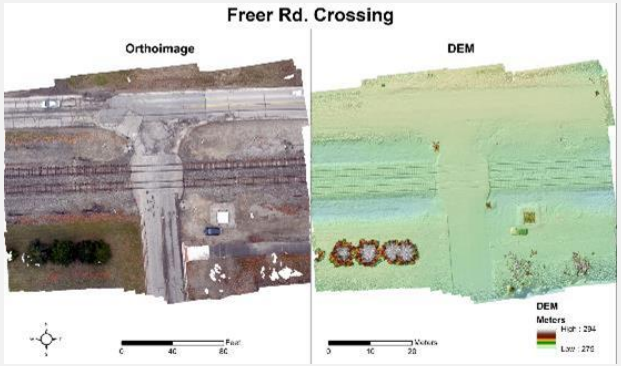
HIGH RESOLUTION IMAGES:
USED FOR 3D DATA GENERATION WITH PHOTOGRAMMETRY

- Collected via drone, with flight plans
  - Higher-resolution for crossing profiles
  - Moderate resolution for larger site line analysis areas

HIGH RESOLUTION IMAGES & ORTHO OUTPUTS, INCLUDING DEMS







442ND ST, HARRIS, MN – 082750K

U. S. DOT CROSSING INVENTORY FORM

DEPARTMENT OF TRANSPORTATION
FEDERAL RAILROAD ADMINISTRATION
OMB No. 2130-0017

Instructions for the initial reporting of the following types of new or previously unreported crossings: For public highway-rail grade crossings, complete the entire inventory Form. For private highway-rail grade crossings, complete the Header, Parts I and II, and the Submission Information section. For public pathway grade crossings (including pedestrian station grade crossings), complete the Header, Parts I and II, and the Submission Information section. For Private pathway grade crossings, complete the Header, Parts I and II, and the Submission Information section. For grade-separated highway-rail or pathway crossings (including pedestrian station crossings), complete the Header, Part I, and the Submission Information section. For changes to existing data, complete the Header, Part I Items 1-3, and the Submission Information section, in addition to the updated data fields. Note: For private crossings only, Part I Item 20 and Part III Item 2.K are required unless otherwise noted. An asterisk * denotes an optional field.

A. Revision Date (MM/DD/YYYY)	B. Reporting Agency	C. Reason for Update (Select only one)	D. DOT Crossing Inventory Number
02 / 20 / 2018	☒ Railroad ☐ Transit ☐ State ☐ Other	☒ Change in Data ☐ New Crossing ☐ Closed ☐ No Train Traffic ☐ Quiet Zone Update ☐ Re-Open ☐ Date Change Only ☐ Change in Primary Operating RR ☐ Admin. Correction	082750K

Part I: Location and Classification Information

1. Primary Operating Railroad	2. State	3. County
St. Croix Valley Railroad Company (SCXY)	MINNESOTA	CHISAGO

4. City / Municipality	5. Street/Road Name & Block Number	6. Highway Type & No.
☐ In ☒ Near HARRIS	442ND ST (Street/Road Name) * (Block Number)	MUN 13

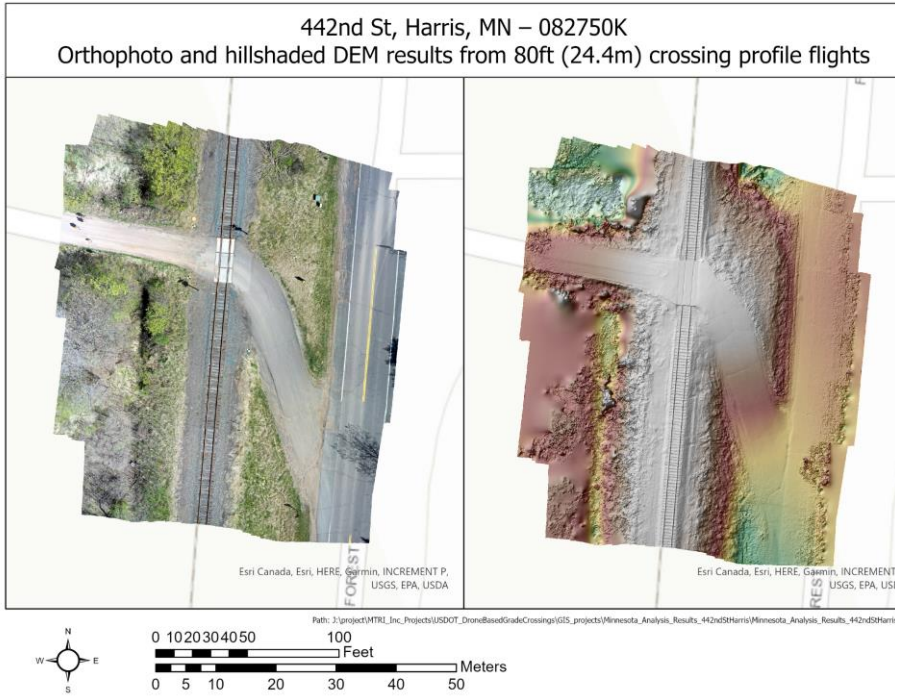
7. Do Other Railroads Operate a Separate Track at Crossing?	8. Do Other Railroads Operate Over Your Track at Crossing?
☐ Yes ☒ No If Yes, Specify RR	☐ Yes ☒ No If Yes, Specify RR

9. Railroad Division or Region	10. Railroad Subdivision or District	11. Branch or Line Name	12. RR Milepost
☐ None MINNESOTA	☐ None SCXY RR	☐ None HINCK-FOREST LK	0046.09 (prefix) (nnnn.nnn) (suffix)

13. Line Segment *	14. Nearest RR Timetable Station *	15. Parent RR (If applicable)	16. Crossing Owner (If applicable)
0214	NORTH BRANCH	☐ N/A SCXY	☐ N/A SCXY

17. Crossing Type	18. Crossing Purpose	19. Crossing Position	20. Public Access (If Private Crossing)	21. Type of Train		22. Average Passenger Train Count Per Day
☒ Public ☐ Private	☒ Highway ☐ Pathway, Ped. ☐ Station, Ped.	☒ At Grade ☐ RR Under ☐ RR Over	☐ Yes ☐ No	☒ Freight ☐ Intercity Passenger ☐ Commuter	☐ Transit ☐ Shared Use Transit ☐ Tourist/Other	☐ Less Than One Per Day ☐ Number Per Day 0

442ND ST. ORTHOS & DEMS

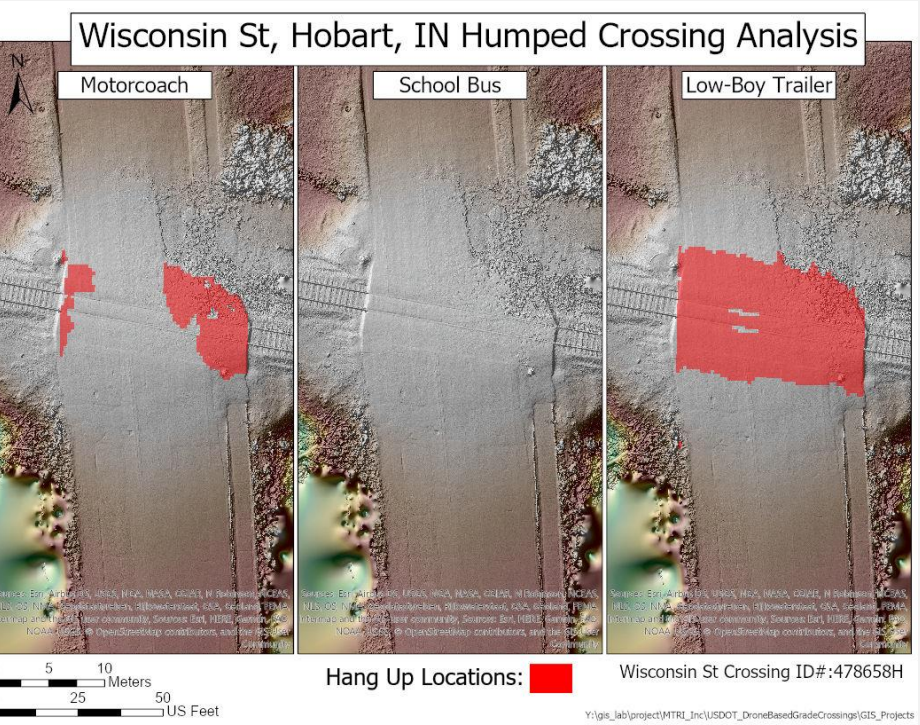


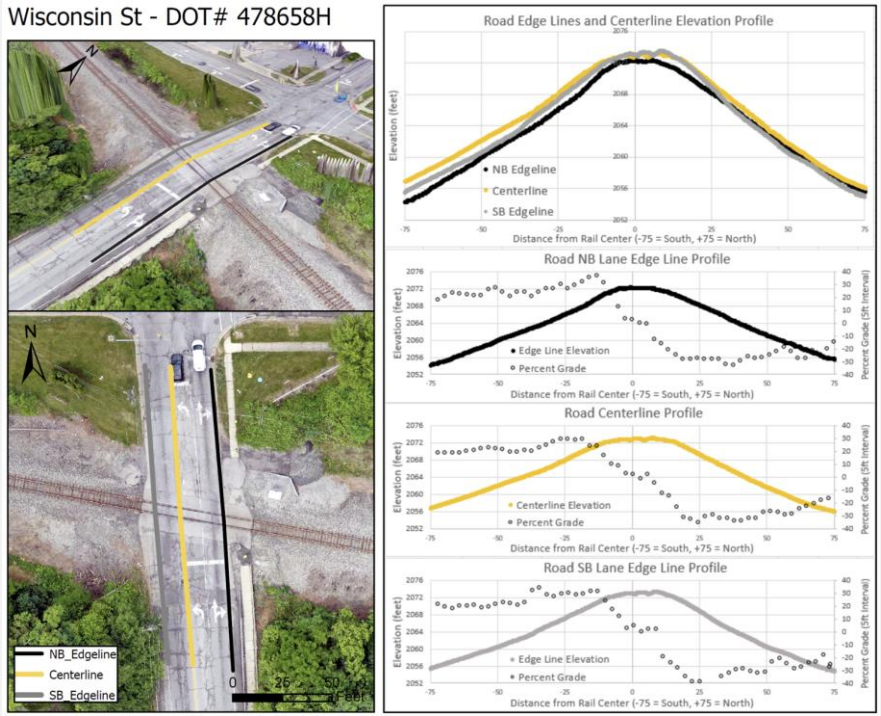
Crossing profile ortho resolution = 4.9mm pixel GSD (0.19”),

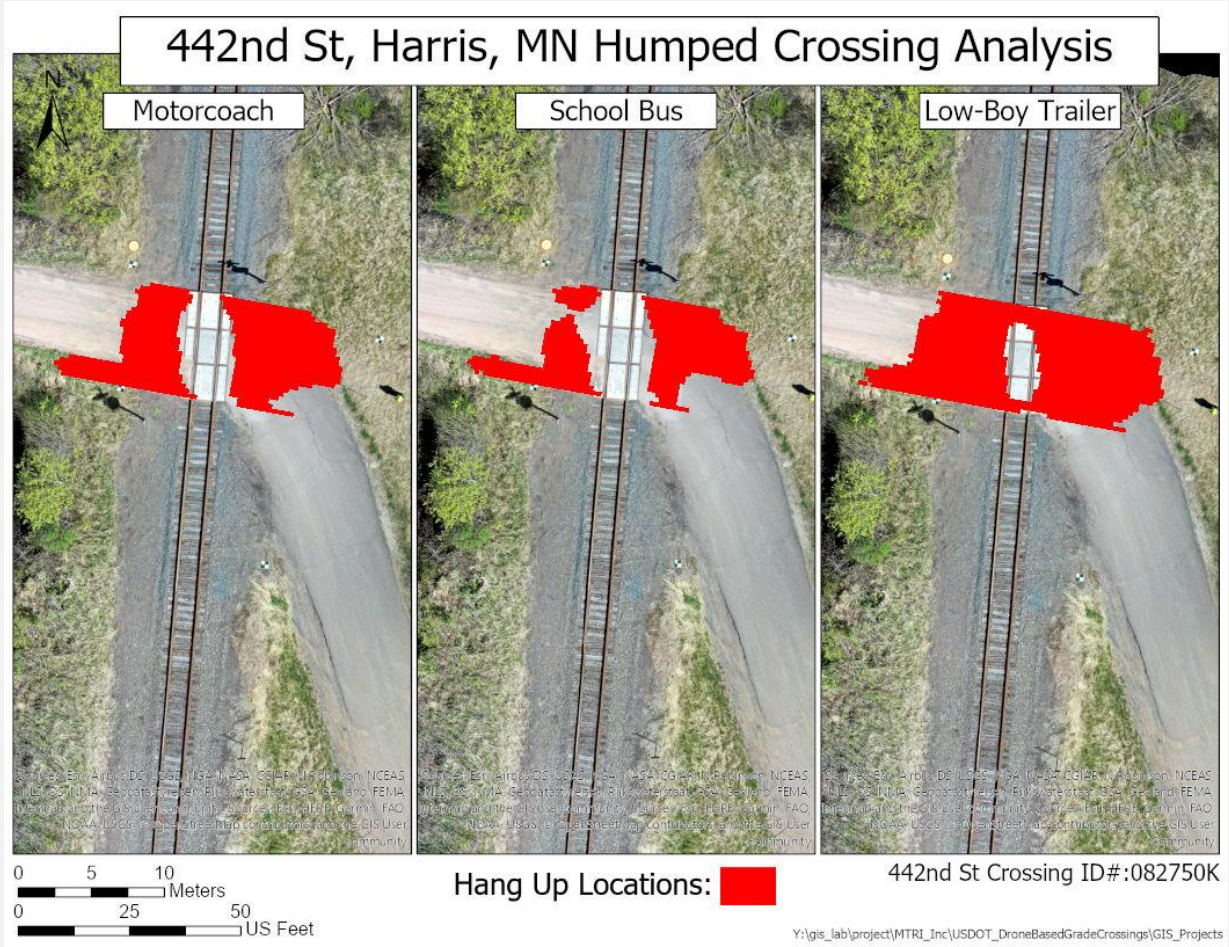
Crossing profile ortho resolution = 14.4mm pixel GSD (0.57”),

TECHNOLOGY SOLUTION – "HUMPED" CROSSINGS

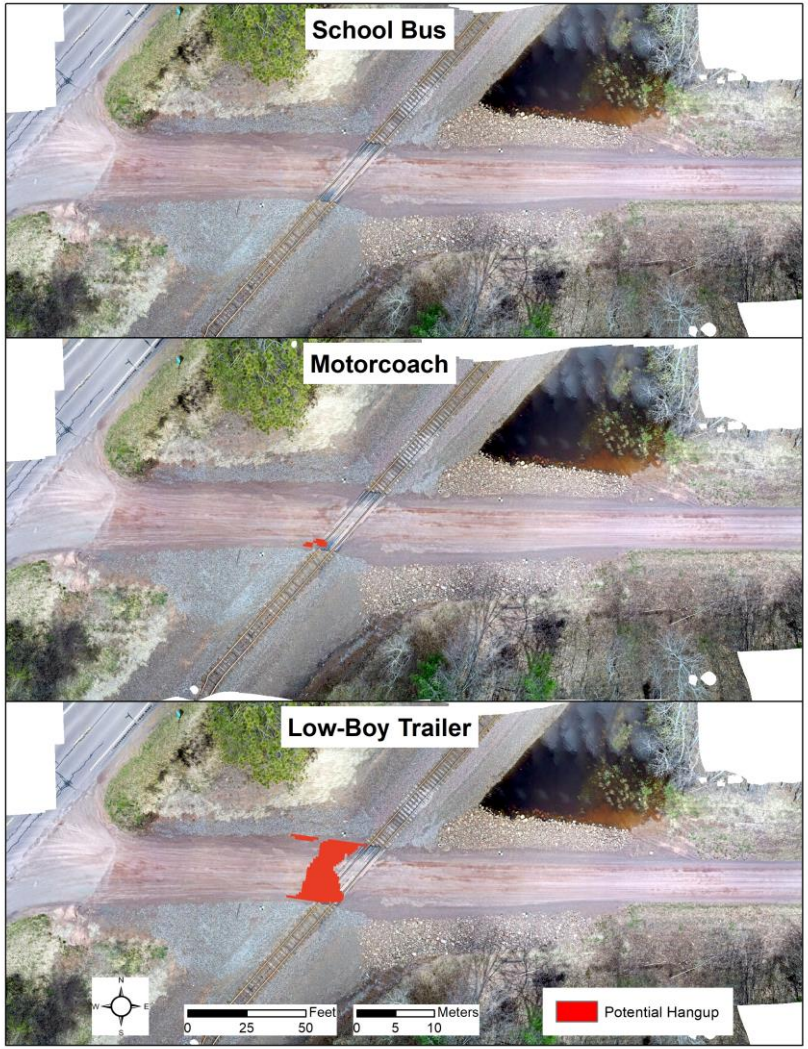
Automated Profile Assessment Tool – specifies specific hangup locations for multiple vehicle types

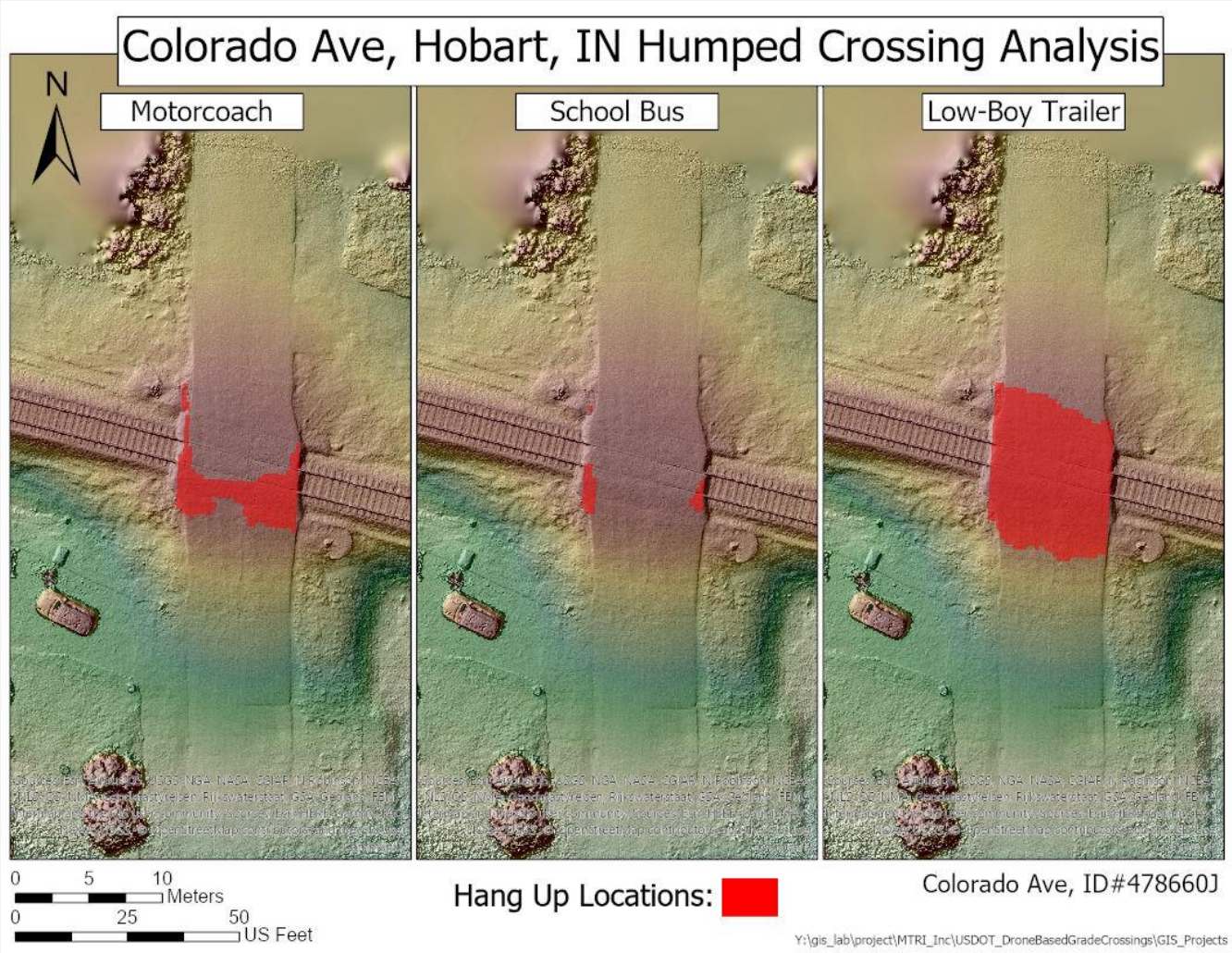





442nd St, Harris, MN Humped Crossing Analysis
Motorcoach
School Bus
Low-Boy Trailer
0 5 10
Meters
0 25 50
US Feet
Hang Up Locations:
442nd St Crossing ID#:082750K
Y:\gis_lab\project\MTRI_Inc\USDOT_DroneBasedGradeCrossings\GIS_Projects

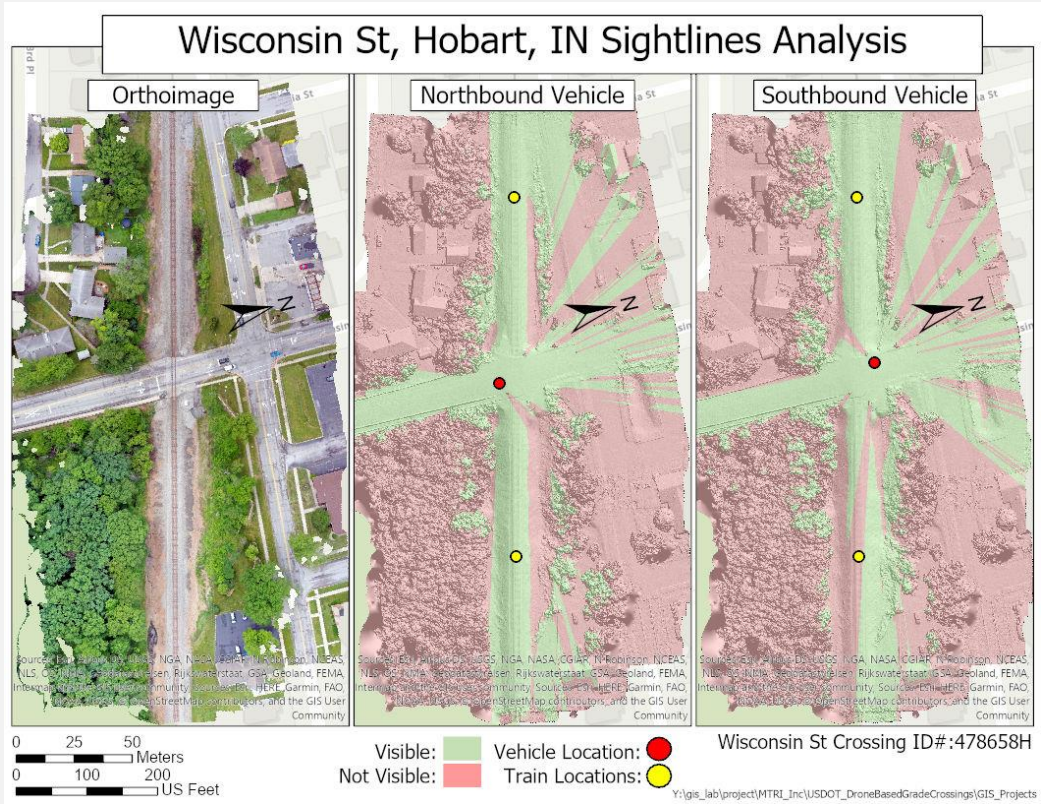
MN HUMPED CROSSING ANALYSIS RESULTS EXAMPLE




Colorado Ave, Hobart, IN Humped Crossing Analysis
N
Motorcoach
School Bus
Low-Boy Trailer
0 5 10
Meters
0 25 50
US Feet
Hang Up Locations:
Colorado Ave, ID#478660J
Y:\gis_lab\project\MTRI_Inc\USDOT_DroneBasedGradeCrossings\GIS_Projects

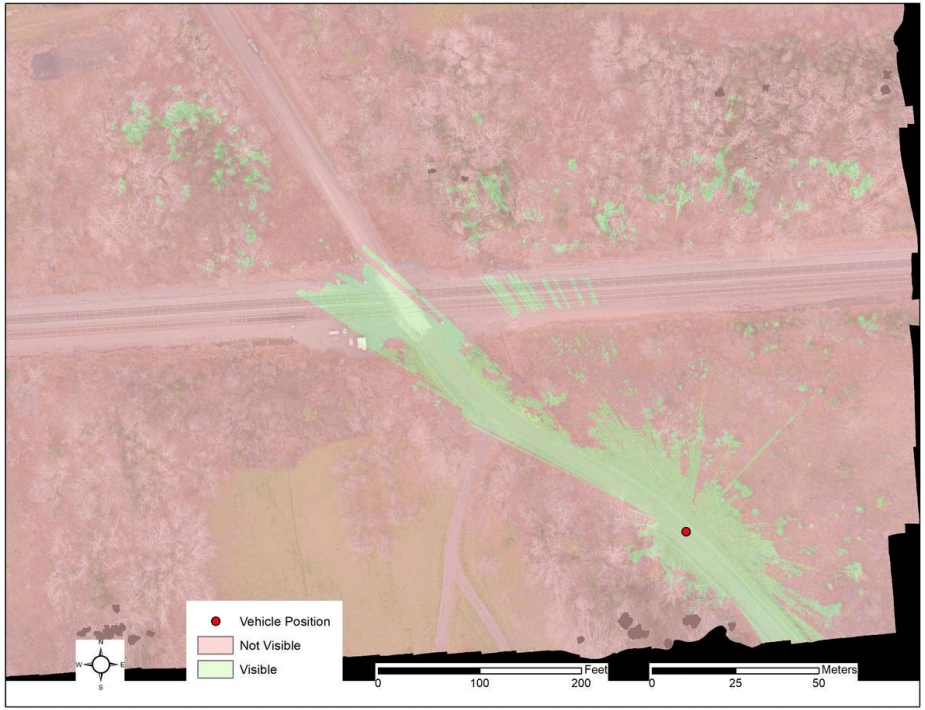
TECHNOLOGY SOLUTION – VISUAL SIGHT LINES

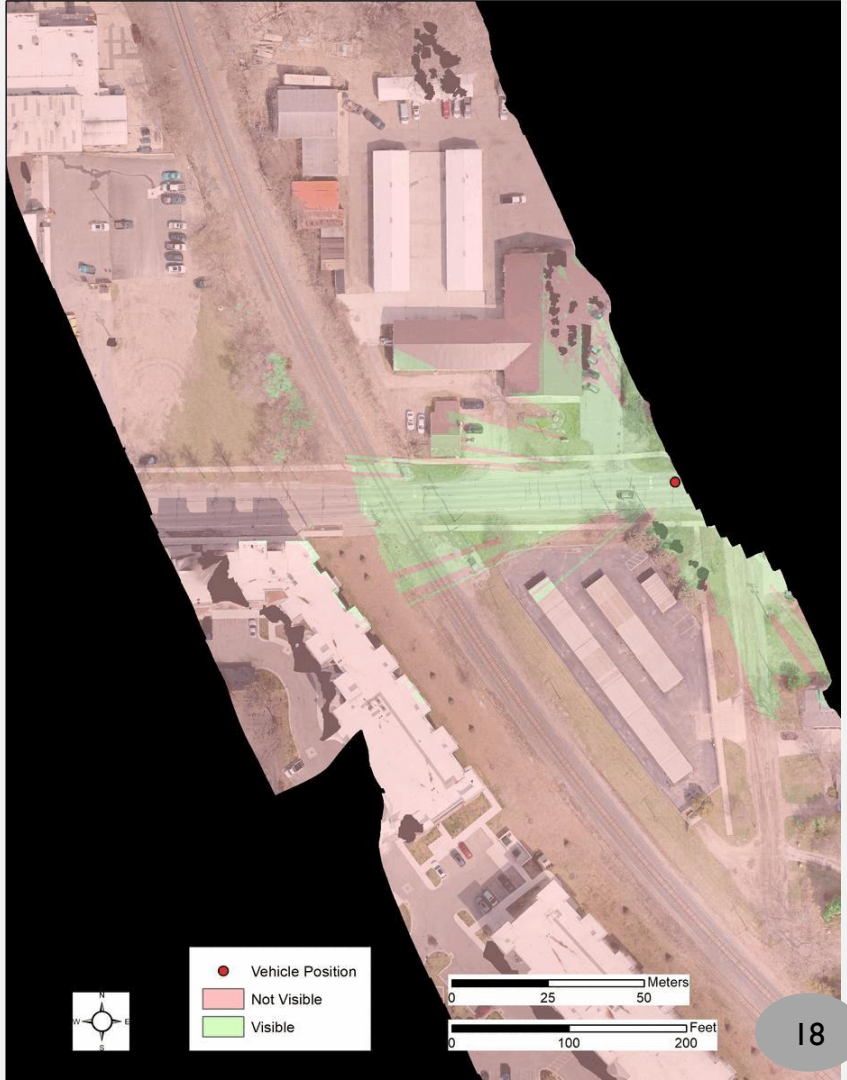
Railroad Grade Crossing Viewshed Tool Results



TECHNOLOGY SOLUTION

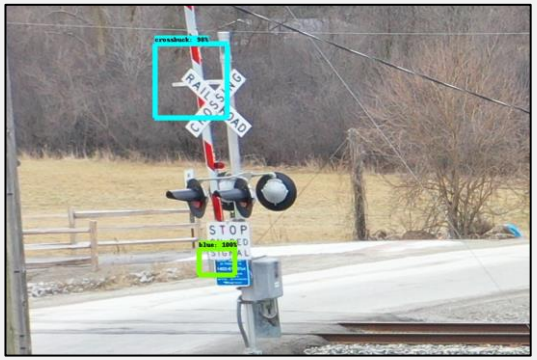
Dynamic Viewshed Tool Results





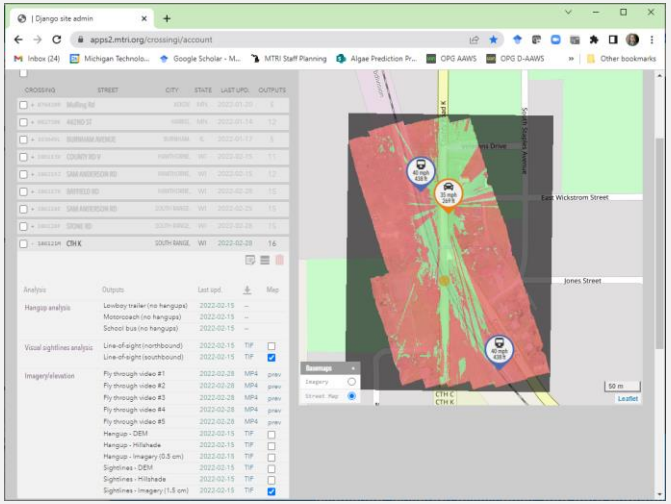
TECHNOLOGY SOLUTION – SIGN IDENTIFICATION

Automated Sign Identification Using Machine Learning Tool Results



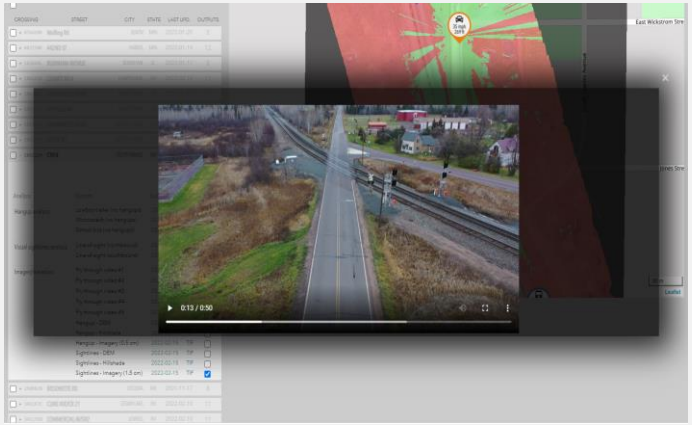
CROSSING-I PORTAL

- Customer Access Point
- Crossing-i Analytics Reports
- Fly-Through Videos
- Crossing-i GIS Outputs



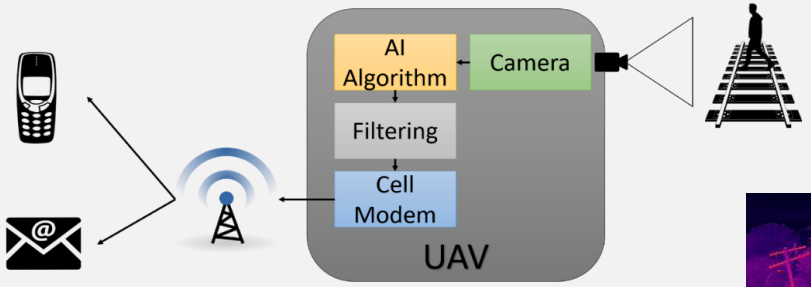
Adding 3D panoramic viewing of results to help with Virtual Diagnostic surveys

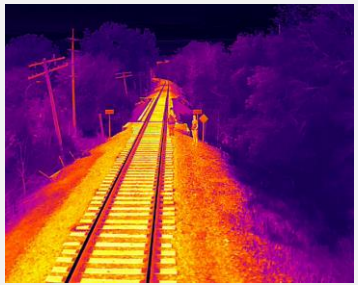
* Upgrades being done under current commercialization funding received from Michigan Economic Development Corporation MTRAC program *

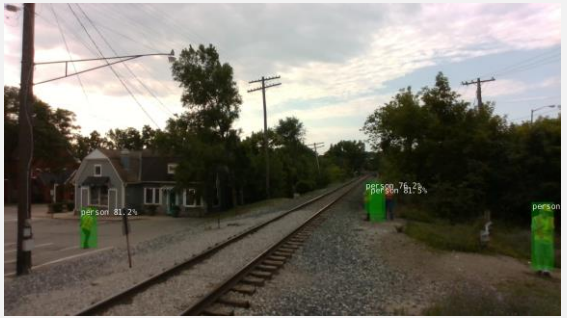


RAILROAD ARTIFICIAL INTELLIGENCE INTRUDER LEARNING SYSTEM (RAIILS)

- Drone-based automated detection of trespassers at sites of interest
- Detection can take place in real-time w/ onboard AI/ML detection algorithm
- Can send email or text message to interested party
- Report on RAIILS prototype coming from FRA
- Next steps: demonstrate with tethered & longer-duration drones







NEXT STEPS FOR DRONE-ENABLED RAIL GRADE CROSSING ASSESSMENT WITH CROSSING-I:

- Technology exists to assess all or nearly all crossings in the U.S. that might have low-ground clearance / humped problems – airborne (Crossing-i), complements train-mounted LiDAR systems as well (DOTX 218)
  - Crossing-i is useful for crossings that train-mounted LiDAR systems cannot easily be deployed at
  - Can be deployed at will unless near towered airports
- Technology is now available
  - Currently for line-of-sight high resolution 3D assessment
  - Being improved for 360° virtual crossing diagnostics in 2022-2023 with additional MN & new OH sites
- **Seeking partners** –
  - For help with data collection (appropriate drone services firms)
  - For offering as a service (with engineering firms)
  - For funded demonstrations with:
    - State & local rail agencies
    - FRA crossing inspections
    - Rail engineering firms
    - Rail companies

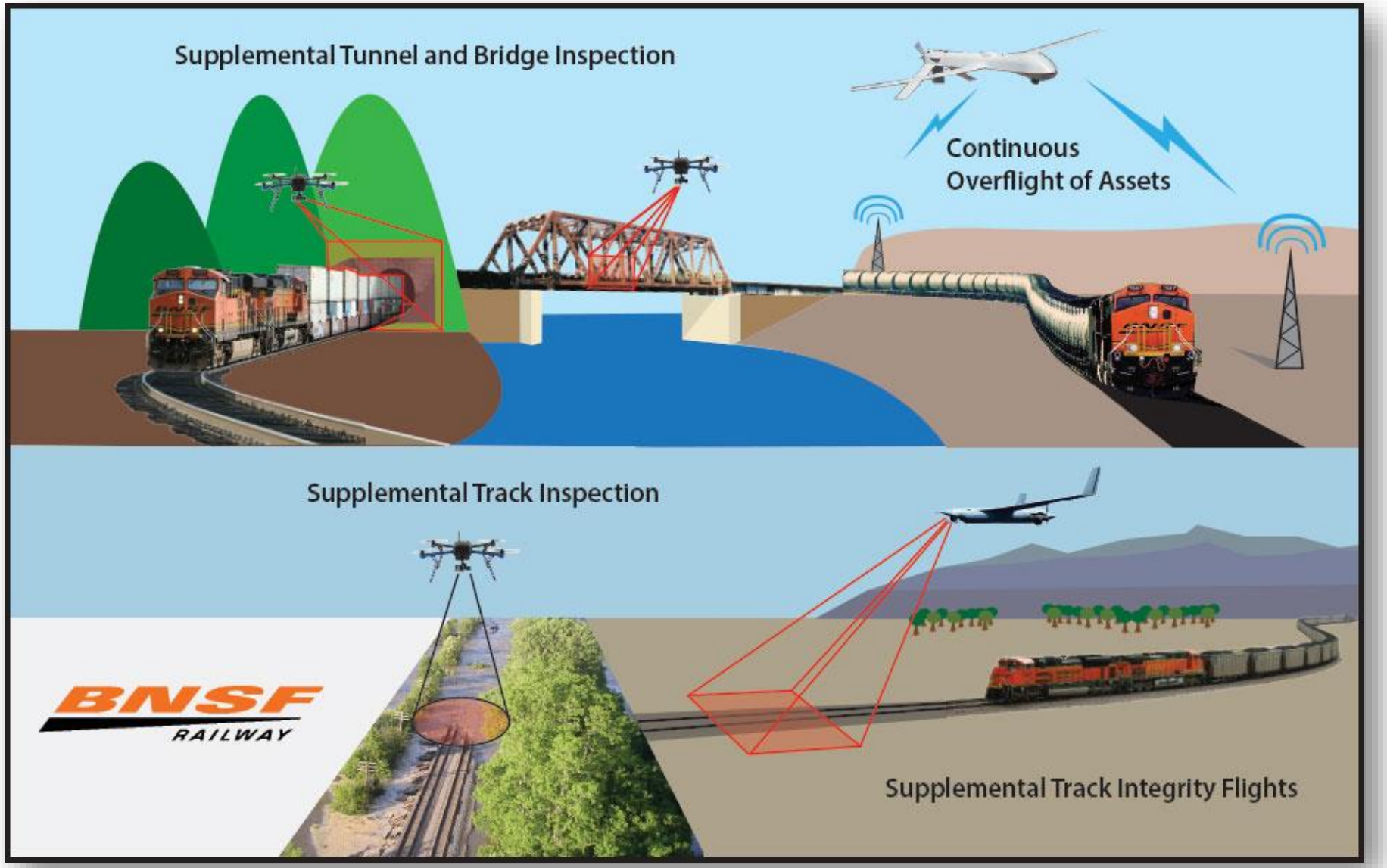
FULL FLY-THROUGH VIDEO (MN EXAMPLE)

BNSF UAS
Program Overview

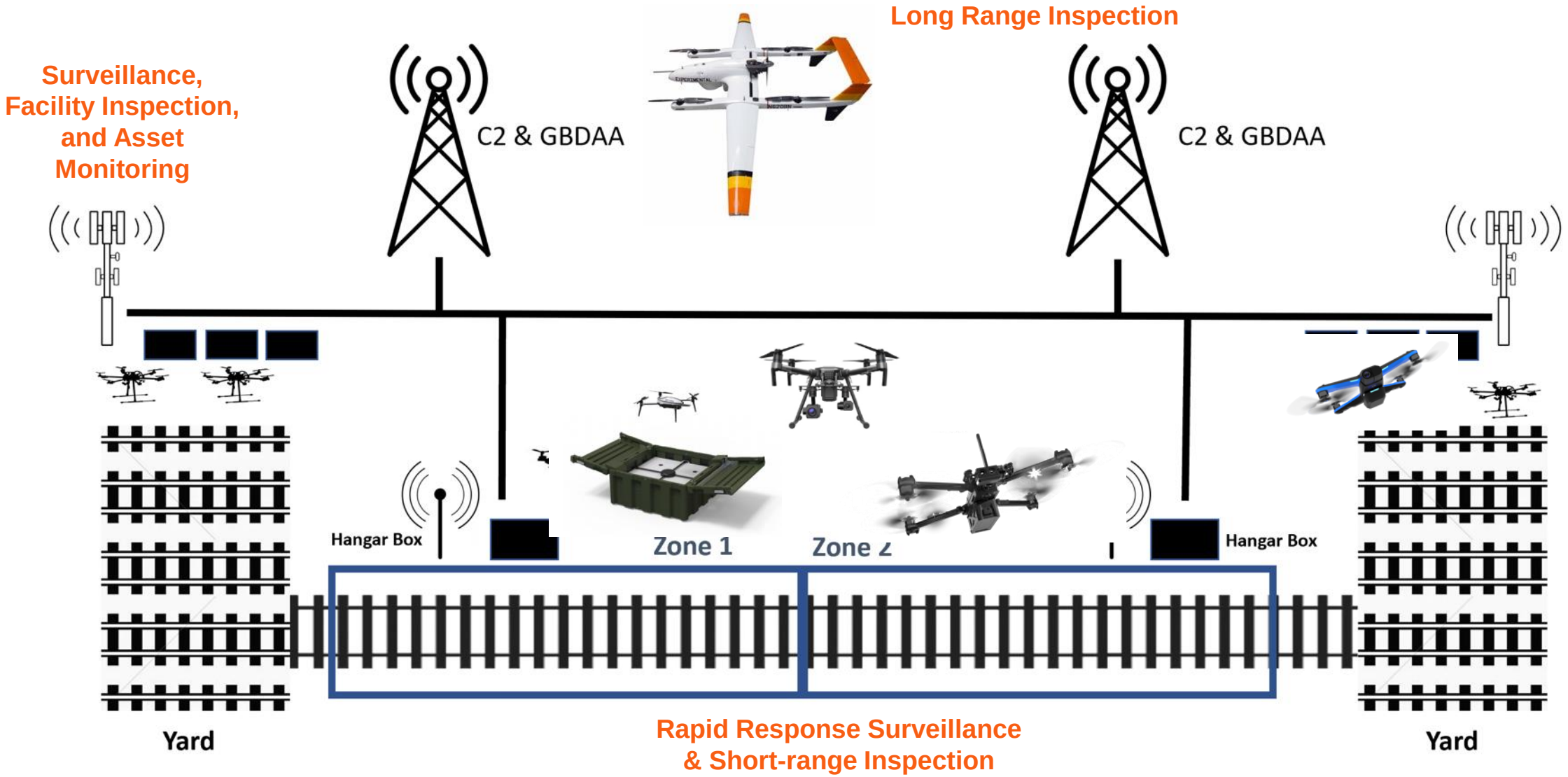
The BNSF / FAA Partnership

- A focus on community and employee safety
  - Supplemental safety inspections of track and structures
    - Additive inspections without additional track/structure occupancy
  - Opportunity to diminish derailment risk
  - ***Foundational for multi-modal linear asset and transportation inspections***
- Safe integration of UAS into the NAS
  - FAA and BNSF CRDA signed in 2015
  - BNSF and the FAA are focused on **risk elimination**
  - BNSF flights utilize known, well-managed flight corridors
  - *Existing infrastructure* supports aircraft control, ATC communications, aircraft de-confliction and sense / avoid capabilities

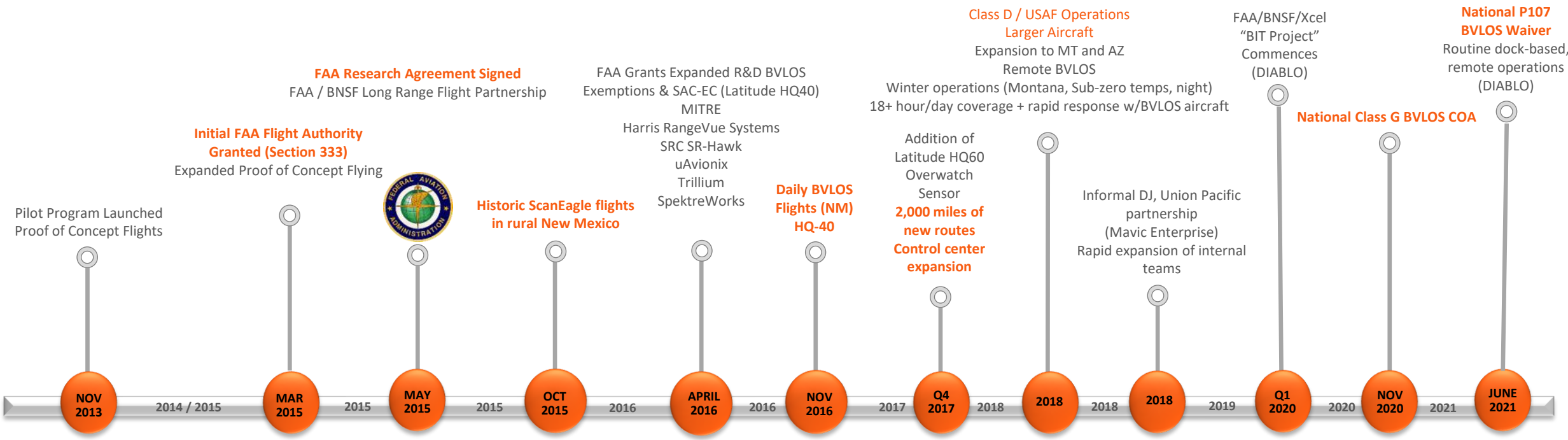
Overall Concept of Operations



2020-2022 Concept of Operations



BNSF UAS Program Timeline 2013-2022



Selected BNSF Departments/Use Cases

Claims

- Surveys
- Post Incident Documentation

Engineering (Track/Structures)

- Survey
- Pre / Post Construction
- Preventive Inspections
- Automated bridge inspections

Environmental

- Water Shed
- Permitting
- Post Service Interruption Monitoring

Load and Ride (LARS)

- Load Monitoring
- Shipment Clearance

Mechanical

- Locomotive Inventory
- Return to Service Analyses

Resource Protection

- Security
- ROW Protection
- Public Safety

Sourcing

- ROW Inventory
- Yard Inventory
- Service Interruption Overview for Procurement / Equipment Requirements

Transportation

- Operations testing
- Safety audits / clearances

UAS Is Helping Crossing and Trespasser Safety

- FRA Funded BAA/SBIR
  - MITR Inc / VisioStack
- BNSF's crossing incident tracking
  - Technology driven by safety
- Trespasser and homeless camp cleanup

A Simple Picture

- Offers a new vantage point
- Before we only had a few images from the ground

Whoa! A Map

- Automated missions allows us to take hundreds of precise overhead images
- Photogrammetry software stitches everything together

The Data is Rich!

- Elevation profiles
  - Accuracy depends on ground control systems or another GPS supplement (RTK, PPK)
- Vegetation Health
  - For crossings this could be an interesting use
  - Precision Agriculture is driving this field

3D models and Point Clouds

- Simple to easy-to-use tools allow
  - Distance measurements
  - Area measurements
  - Terrain profile
- Point Clouds

- Note: Ground Control points are used for accuracy

Trespasser Mitigation

- Working with local agencies and aid centers we utilize UAS to document trespasser encampments to ensure safe clean up
- Aerial view allows for full scope of projects which reduces risk of injury during cleanup

THANK YOU!

Blocked crossing prediction and communication

TRAINFO

Presented by
Garreth Rempel, CEO & Co-Founder
TRAINFO

U.S. Department of Transportation
Federal Railroad Administration

Grade Crossing Safety & Railroad Trespass Prevention Workshop
Raleigh, North Carolina
November 2, 2022

Outline

1. **ABOUT TRAINFO**
2. **LIVE APPLICATIONS**
   - Driver information system in Vancouver, BC
   - 911 re-routing in Charleston, SC
3. **ANALYTICS**
   - Traffic congestion at rail crossings in Hattiesburg, MS
   - 911 risk at rail crossings in Winnipeg, MB
4. **CONCLUDING REMARKS**

TRAINFO

A rail crossing information system to...

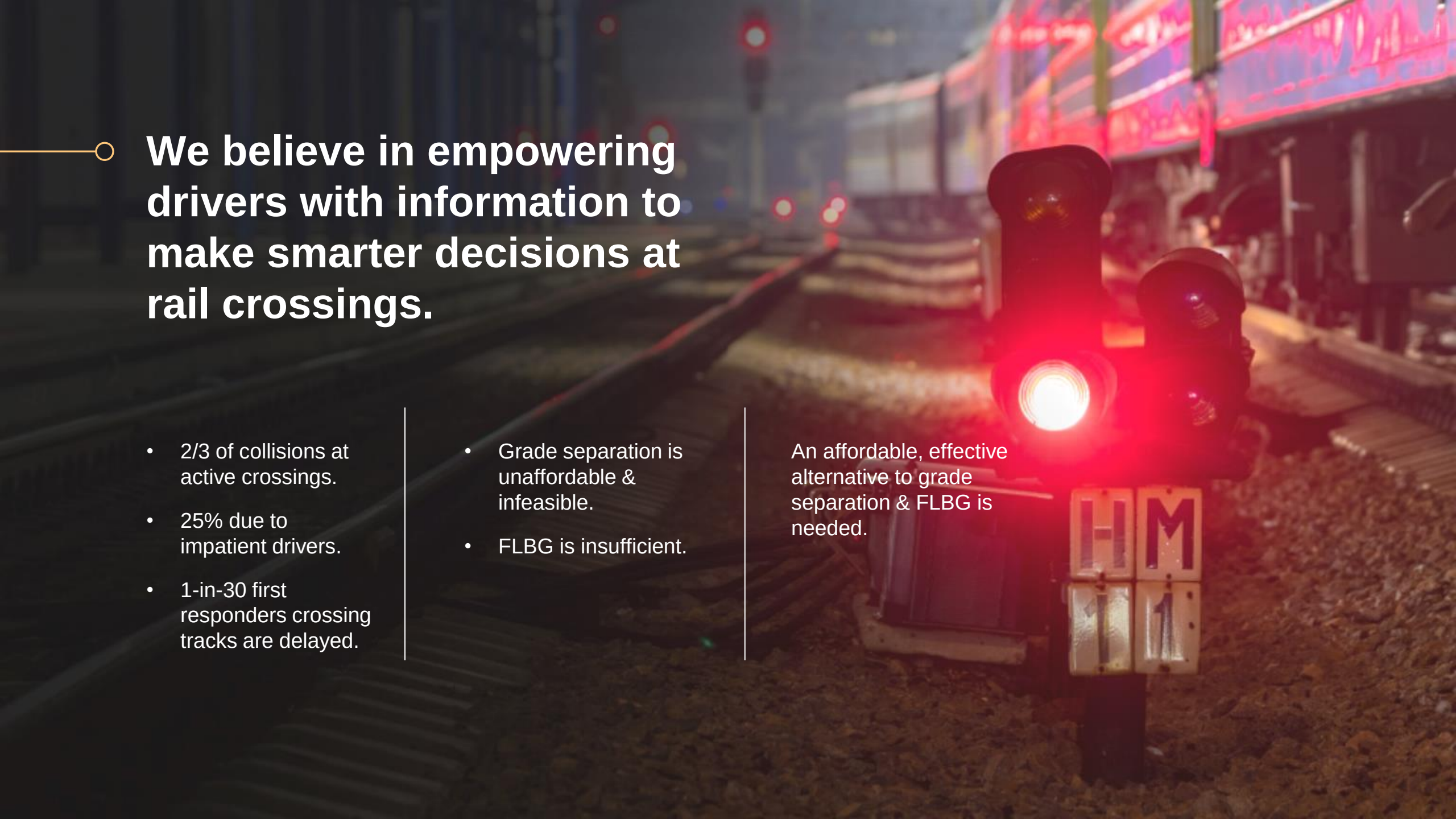
- ✓ **Prevent collisions** between vehicles and trains.
- ✓ **Decrease congestion** & first responder delays at rail crossings.
- ✓ **Reduce emissions** from idling vehicles at occupied rail crossings.

We believe in empowering drivers with information to make smarter decisions at rail crossings.

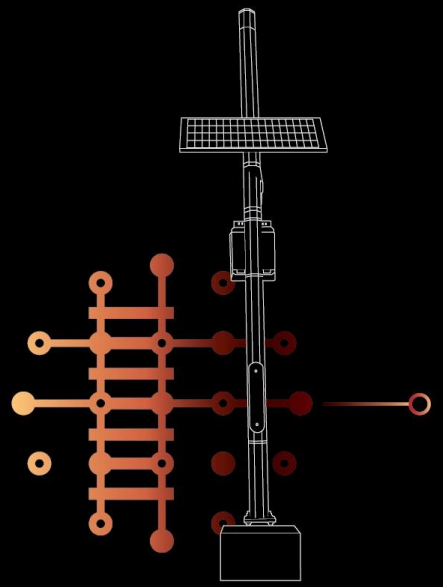
- 2/3 of collisions at active crossings.
- 25% due to impatient drivers.
- 1-in-30 first responders crossing tracks are delayed.

- Grade separation is unaffordable & infeasible.
- FLBG is insufficient.

An affordable, effective alternative to grade separation & FLBG is needed.



How TRAINFO works



Sensor on a pole in public ROW
Sensors installed within 100 ft of crossing

Blocked crossing prediction and communication (FRA Grade Crossing Safety and Railroad Trespass Prevention Workshop, 2022)

Cities across North America use TRAINFO.

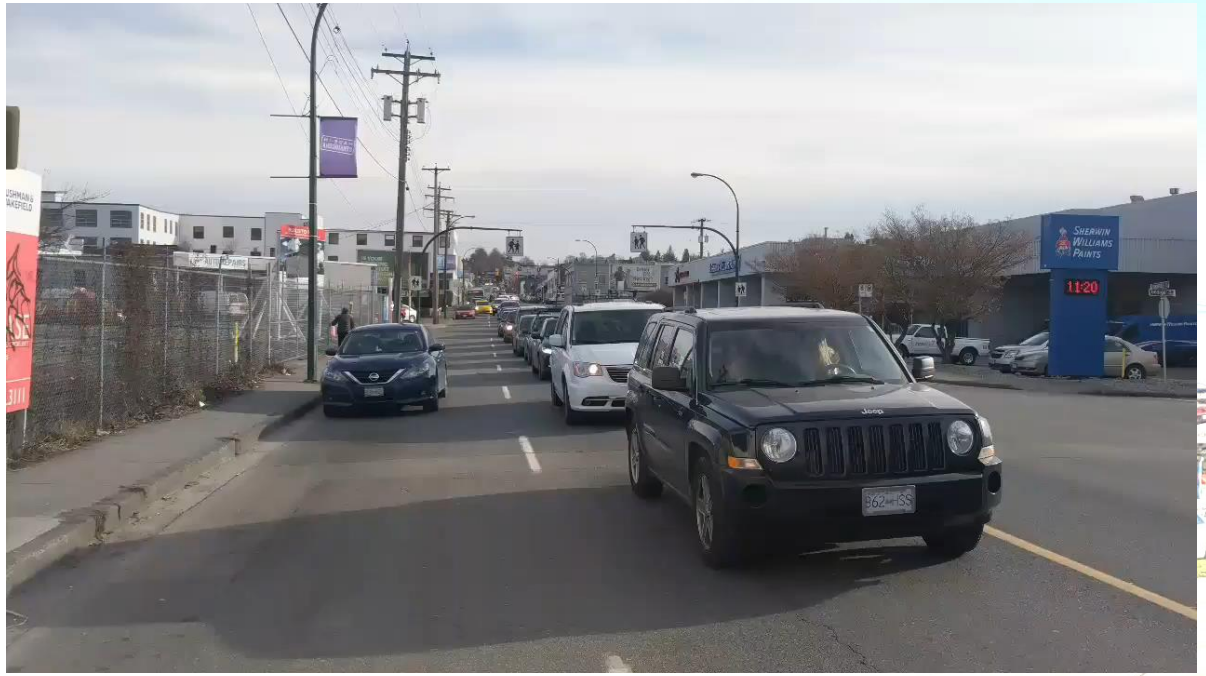
Blocked crossing prediction and communication (FRA Grade Crossing Safety and Railroad Trespass Prevention Workshop, 2022)

Cities across North America use TRAINFO.

Blocked crossing prediction and communication (FRA Grade Crossing Safety and Railroad Trespass Prevention Workshop, 2022)

TRAINFO

Live application
Traffic re-routing in Vancouver, BC



Blocked crossing prediction and communication (FRA Grade Crossing Safety and Railroad Trespass Prevention Workshop, 2022).

Live application
Traffic re-routing in Vancouver, BC

22% **decrease in collision exposure risk**

30% **decrease in congestion & emissions**

Cost to reduce 1 hour of vehicle delay

- Grade separation $109.59
- Information system $0.87

Blocked crossing prediction and communication (FRA Grade Crossing Safety and Railroad Trespass Prevention Workshop, 2022).

Live application
911 re-routing in Charleston, SC

Blocked crossing prediction and communication (FRA Grade Crossing Safety and Railroad Trespass Prevention Workshop, 2022)

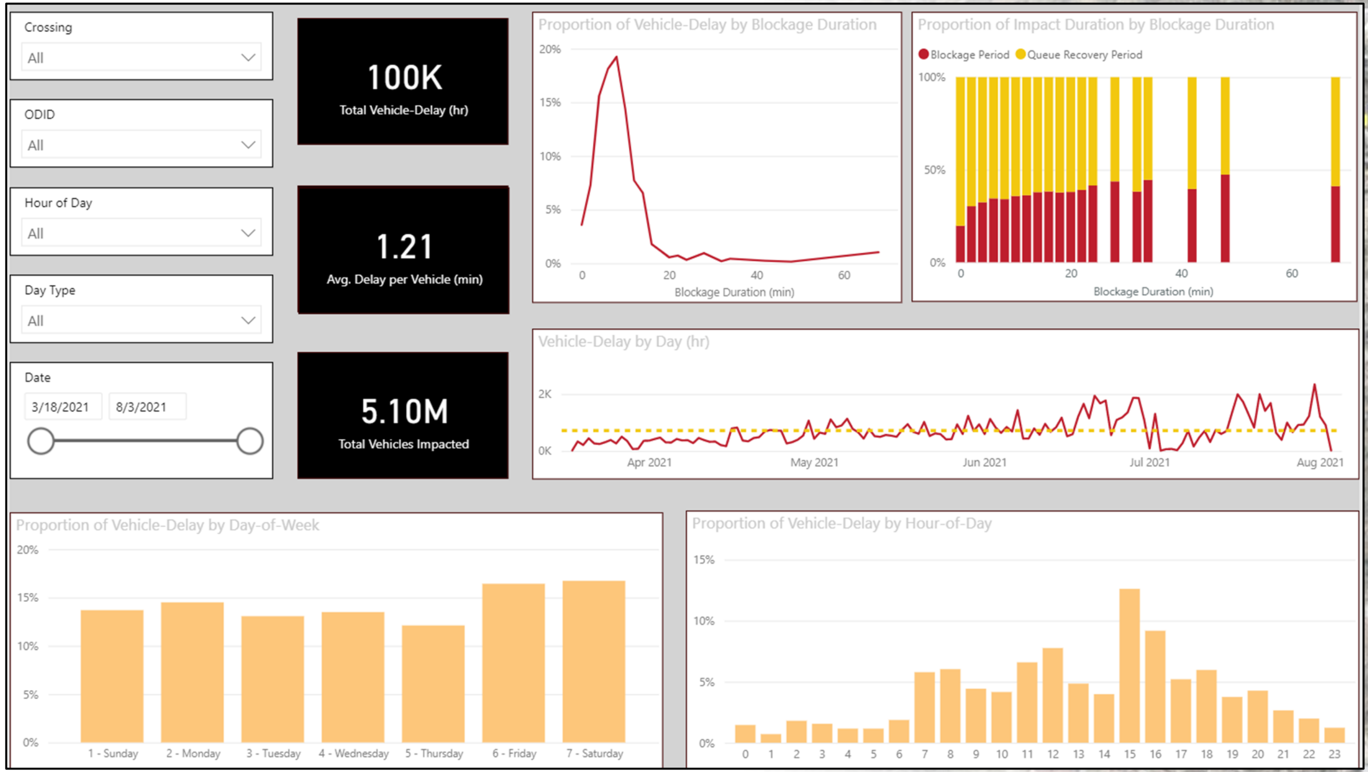
Live application
911 re-routing in Charleston, SC

91% **decrease in first responder delays**

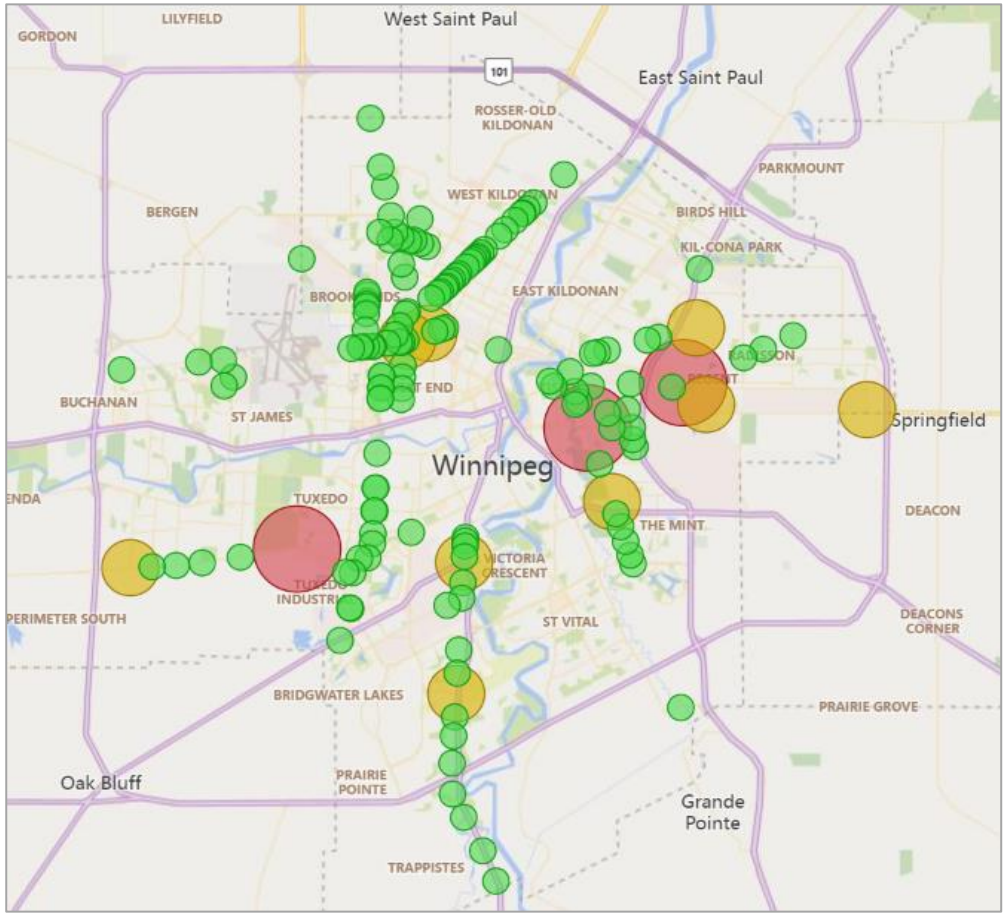
Re-routing 1 first responder each day

- Delays at rail crossings no longer an issue

Analytics
Traffic congestion in Hattiesburg, MS



Analytics
911 risk model in Winnipeg, MB



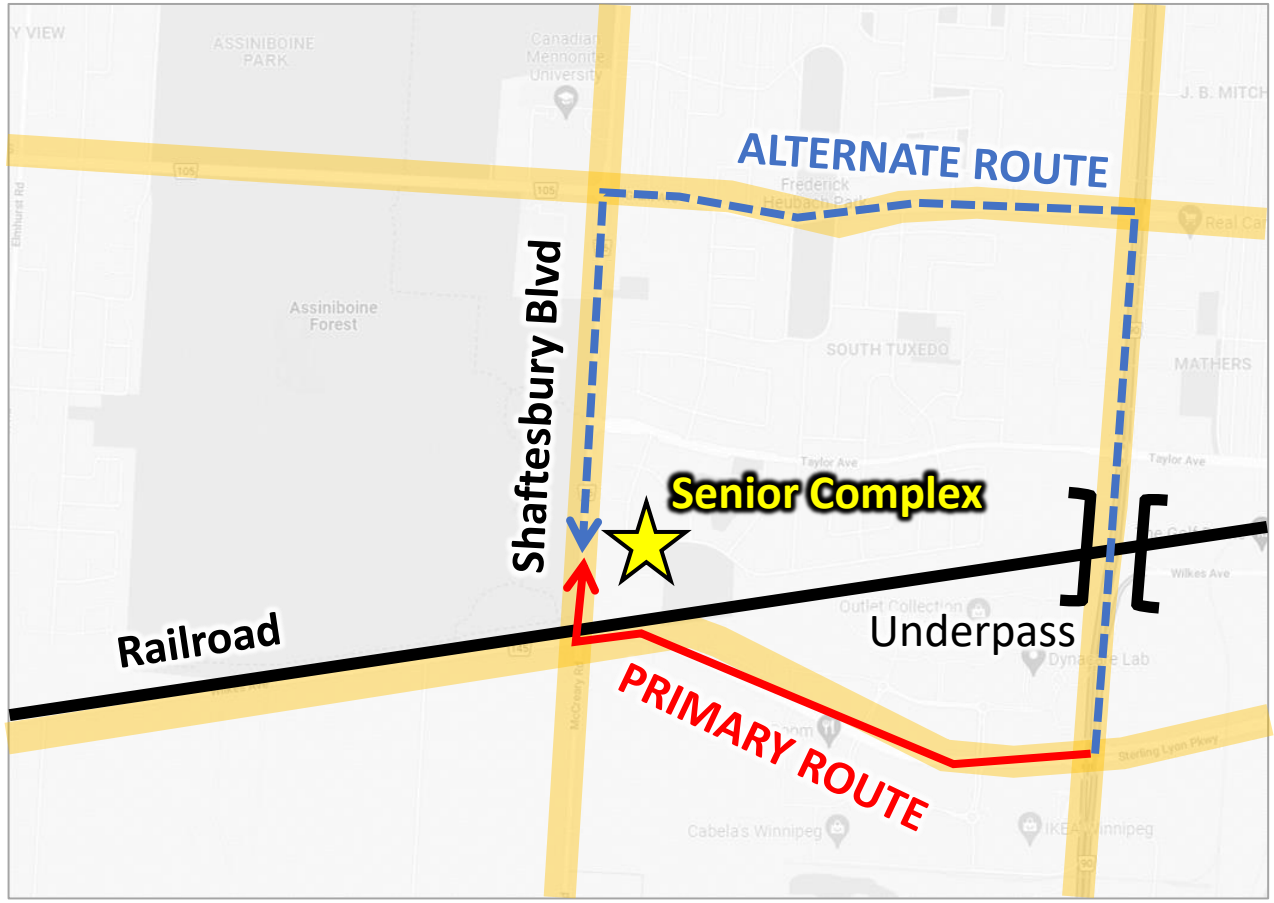
RISK BY RAIL CROSSING

- >1.5 units delayed per month
- 0.5-1.5 units delayed per month
- <0.5 units delayed per month

Blocked crossing prediction and communication (FRA Grade Crossing Safety and Railroad Trespass Prevention Workshop, 2022)

TRAINFO

Analytics
911 risk model in Winnipeg, MB



Alternate route

2 miles longer than primary

4 min. longer (without train)

Benefits of train information

81% of trips saved time

Avg time savings of 132 sec.

71% reduction in delay

Blocked crossing prediction and communication (FRA Grade Crossing Safety and Railroad Trespass Prevention Workshop, 2022)

TRAINFO

Concluding remarks

Collisions & delays at rail crossings are driver behavior and routing issues.

- 2/3 of collisions occur at active crossings
- 1/4 of collisions due to impatient drivers ignoring warning devices
- 1-in-30 first responder trips that cross railway tracks are delayed by trains

Information empowers drivers to make smarter decisions at rail crossings.

- **Better sensors** + **ML/AI** + **cloud** + **API** = rail crossing information as affordable solution
- 22% reduction in collision risk, 30% reduction in congestion, 91% reduction in 911 delays

Procurement policies are a barrier to implementing intelligent solutions.

- Physical solutions: Purchase material & labor → CapEx model
- Intelligent solutions: Purchase value provided → SaaS OpEx model

Blocked crossing prediction and communication (FRA Grade Crossing Safety and Railroad Trespass Prevention Workshop, 2022)

Thank You

Questions

Grade Crossing Safety and Railroad Trespass Prevention Workshop

Day 2 Session Four

RAIL

MOVING AMERICA FORWARD

Session 4: Mitigating Highway Design Challenges at or Approaching Grade Crossings

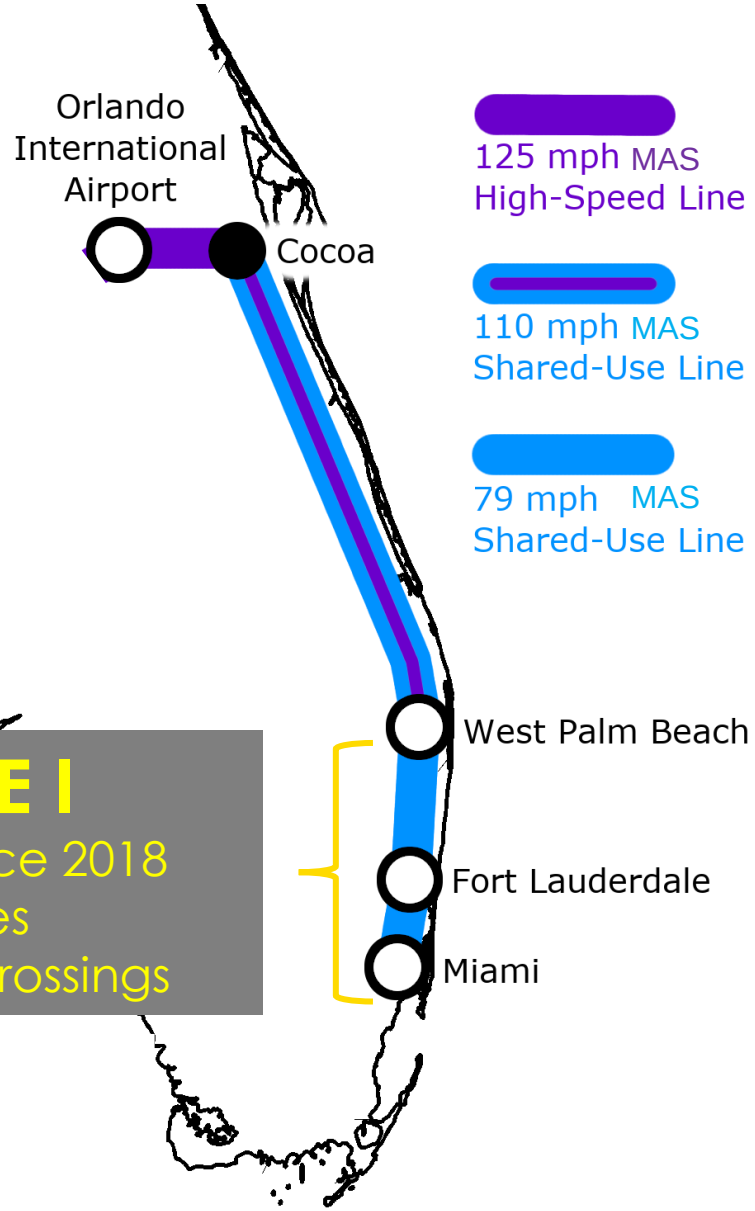
Facilitator: Howard Gillespie

brightline®

FRA Grade Crossing Safety and Railroad Trespass Prevention Workshop

Michael Lefevre, VP Operations – Brightline


We are here to challenge
the transportation status quo and
reimagine what it means to travel
by train in America.



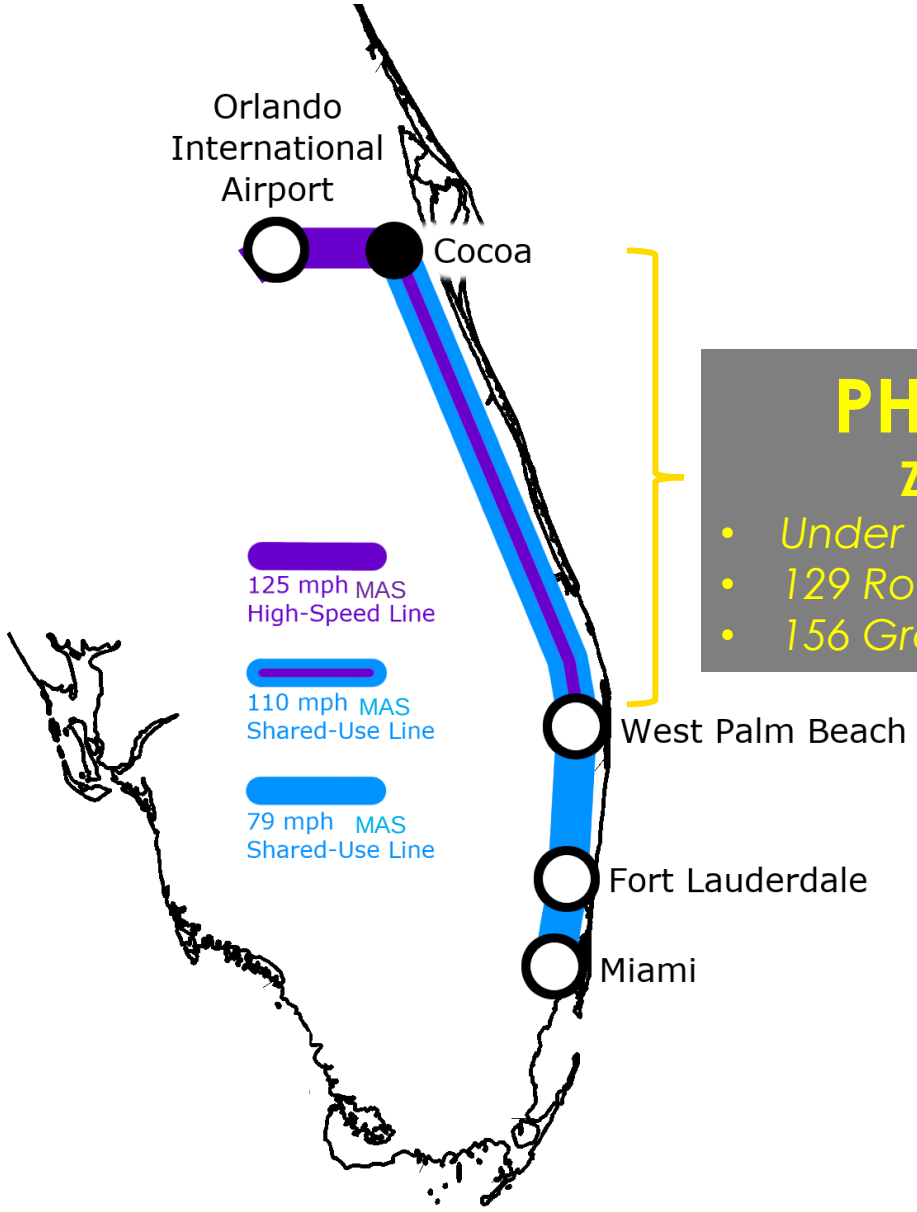
125 mph MAS
High-Speed Line

110 mph MAS
Shared-Use Line

79 mph MAS
Shared-Use Line

PHASE I

- In service since 2018
- 67 Route Miles
- 178 Grade Crossings



PHASE II

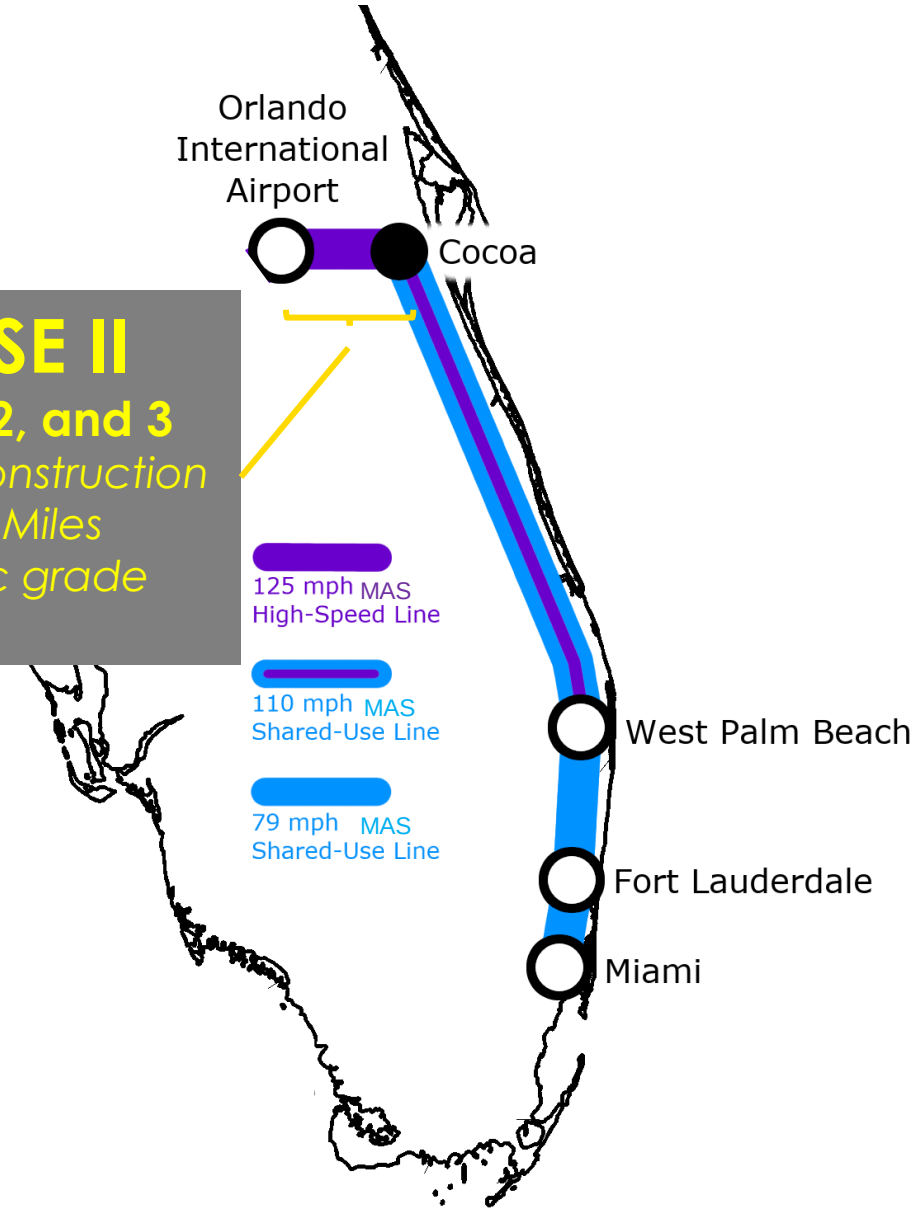
Zone 4

- *Under Construction*
- *129 Route Miles*
- *156 Grade Crossings*

PHASE II

Zones 1,2, and 3

- *Under Construction*
- *40 Route Miles*
- *No public grade crossings*




805
805
805
brightline
brightline
107
107

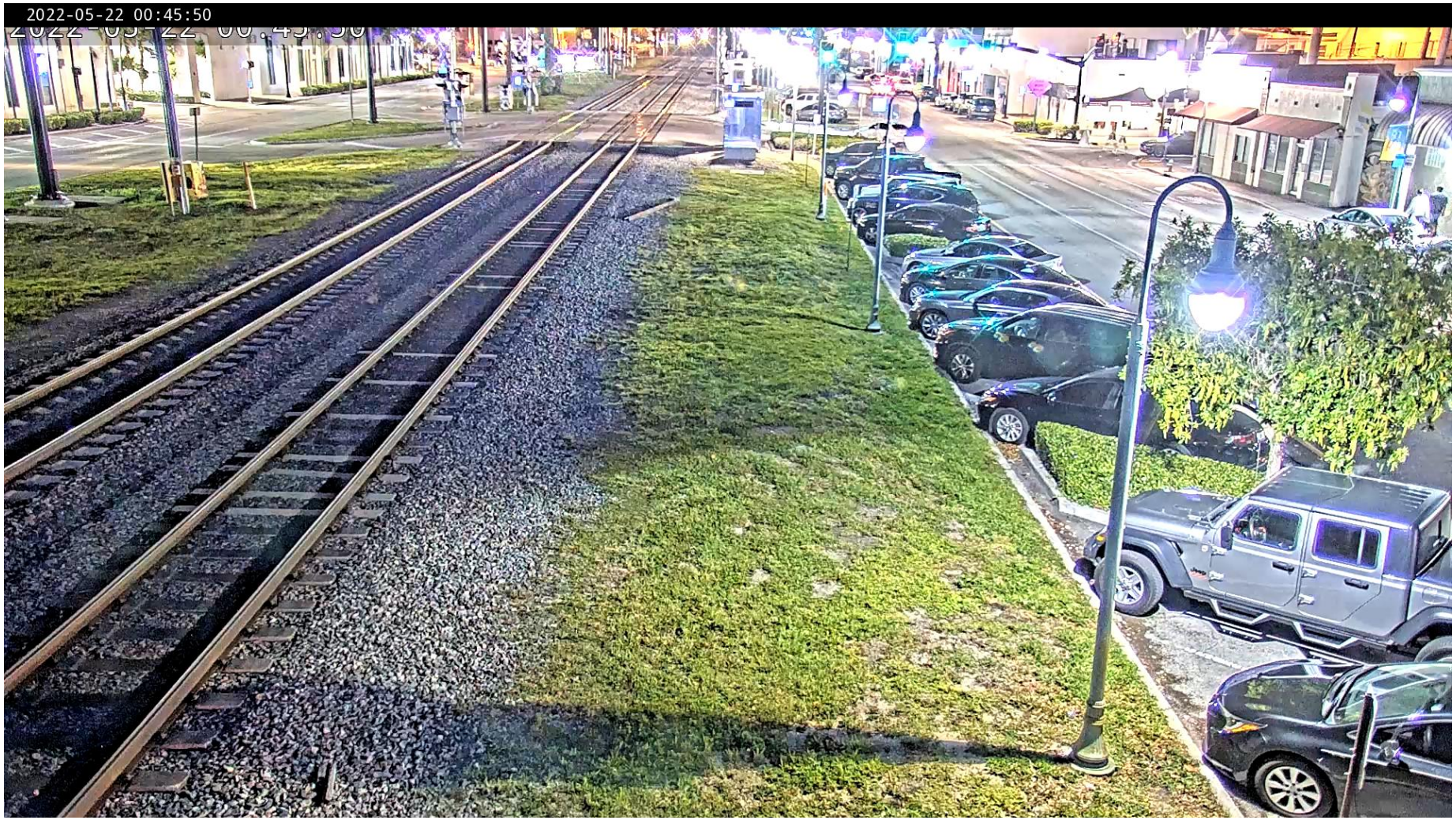
GRADE CROSSING DESIGN CHALLENGES

Challenges: Parallel Roadways

Challenges: Complex Geometries

Challenges: Saturation

DRIVER BEHAVIOR CHALLENGES

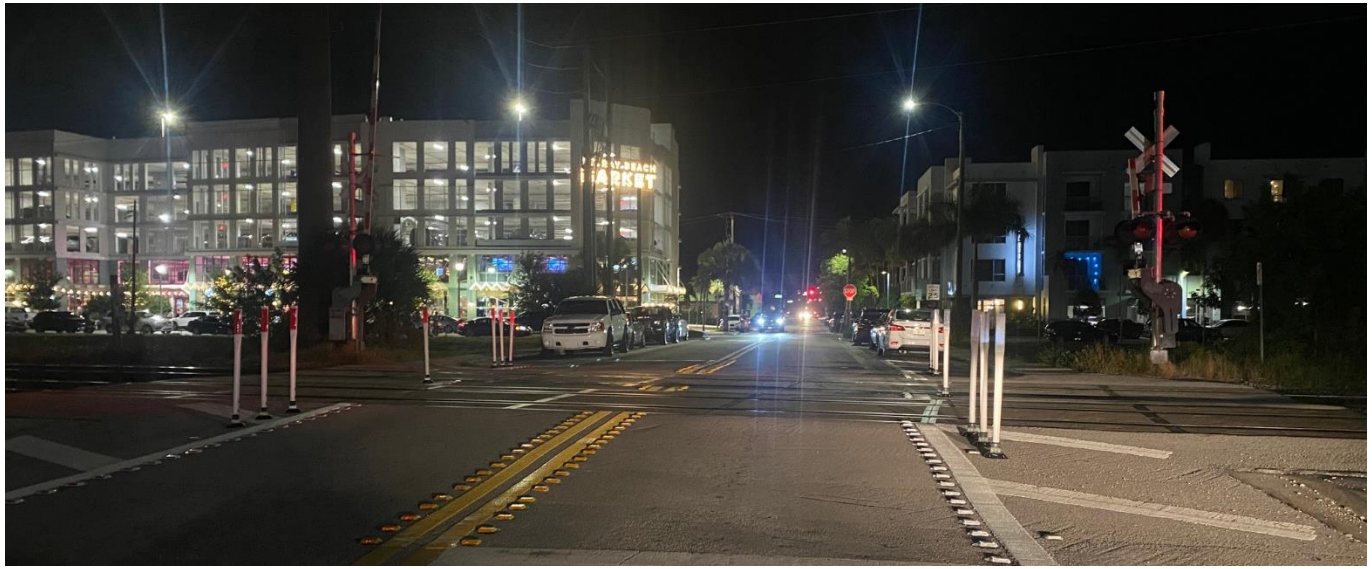

2022-05-22 00:45:50

TARGETED SOLUTIONS

Exit Gates and Centerline Delineators

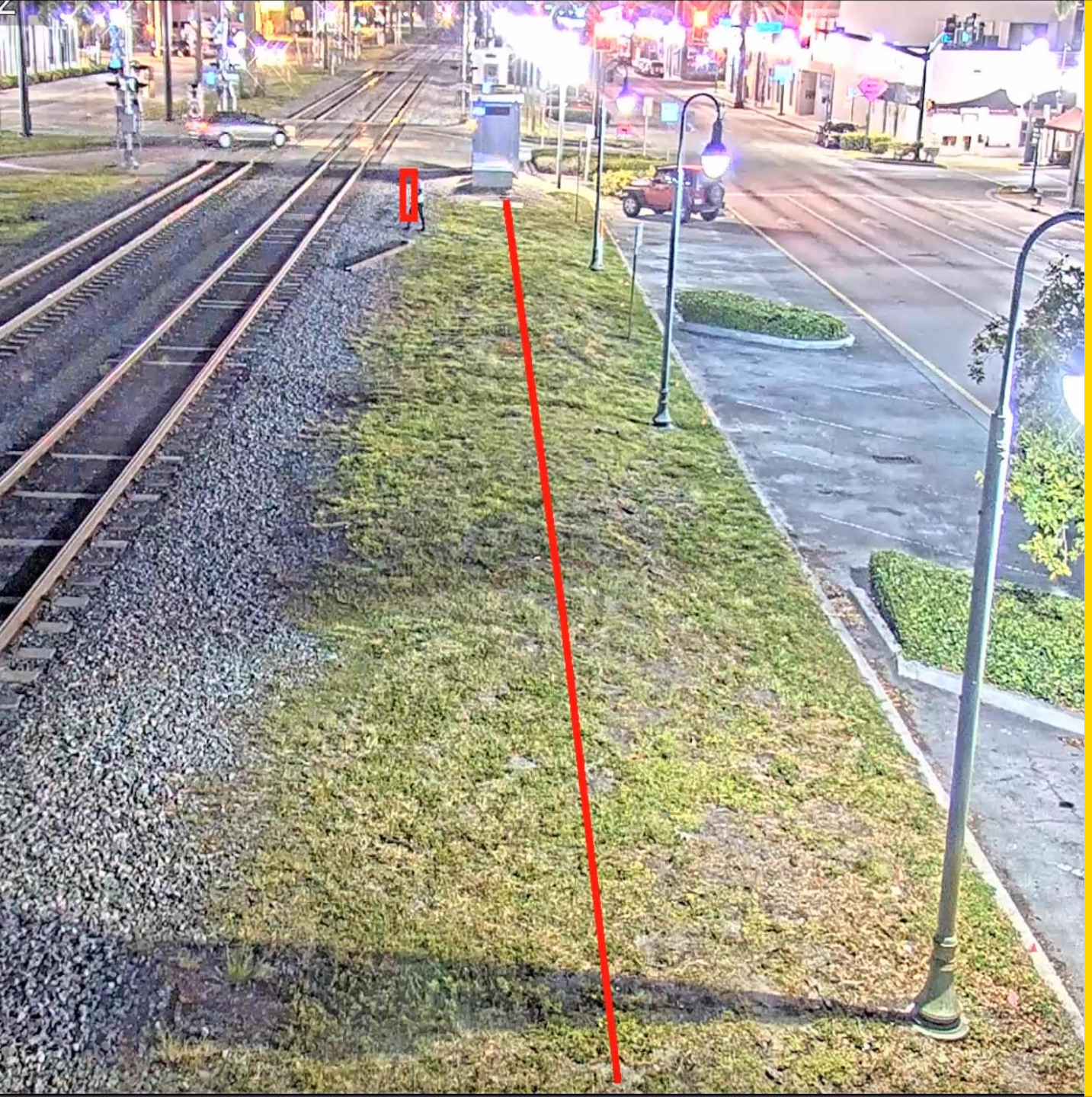

DO NOT
STOP
ON
TRACKS


NO
TURN
ON
RED
DO NOT
STOP
ON
TRACKS
SPY
SPOT
GPS Trackers




STOP

CRISI and RAISE Grants in Partnership with FRA and FDOT



INNOVATIVE
EDUCATION AND ENFORCEMENT

This program has been initiated to increase roadway safety and to reduce accidents, injuries and fatalities.

WARNING NOTICE OF RAILROAD CROSSING VIOLATION

Automated Enforcement Division
PO Box 593095
Orlando, FL 32839-3095

Plate Number: LZ[redacted]
Password: H7[redacted]
View your violation at
www.ZeroFatality.com

Florida East Coast RAILWAY

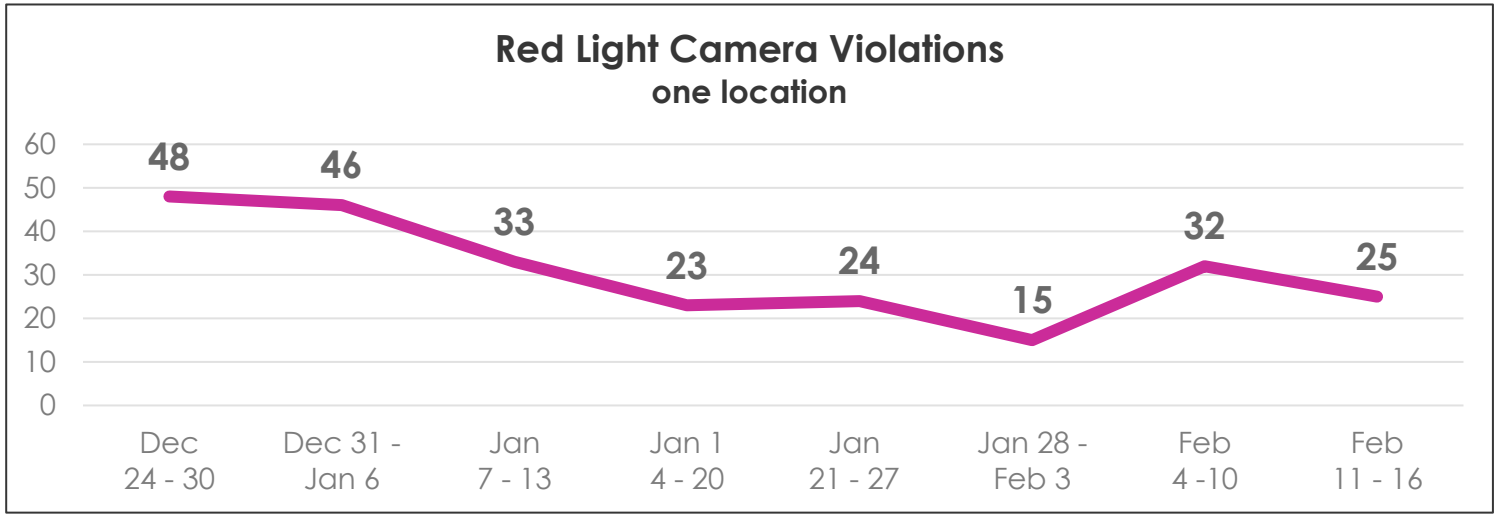
1025
ROBERT[redacted]
GOLDEN BEACH, FL[redacted]

THIS IS NOT A NOTICE OF VIOLATION. YOU ARE NOT REQUIRED TO PAY A PENALTY, GO TO COURT OR RESPOND IN ANY WAY. In the future, please exercise caution when approaching an active railroad

Your vehicle was recorded traveling through the active rail crossing at:

Location: 141st Street Railroad Crossing
Date: 11/30/2021 Time: 08:06:48
Plate Number: [redacted] Vehicle Make: AUDI
Red Time: 16.5

This warning letter is part of an educational effort led by Brightline Trains LLC, Florida East Coast Railway Police, and NovoaGlobal to advise you of a serious potential safety issue. The pictures on this notice taken by our railroad crossing security camera show a vehicle registered to you that appears to have violated F.S. 316.1575




When walking around train tracks...
STOP
LOOK
LISTEN
&LIVE
brightline
BUZZ IT FORWARD


brightline
brightline
211
$43,000.00
Forty-three thousand and 00/100


brightline
BE SAFE
brightline
STOP
LOOK
LISTEN
&LIVE
SEE TRACKS? THINK TRAIN
BUZZ-FORWARD


107
brightline
BUZZ IT FORWARD


DANGER
ACTIVE RAILROAD TRACKS
VIOLATORS WILL BE PROSECUTED


RAILROAD CROSSING
MORE & FASTER TRAINS
brightline


STAY OFF TRAIN TRACKS


STAY OFF TRAIN TRACKS!
MANTENTE FUERA DE LAS VÍAS DEL TREN
PA MACHE SOU RAY TREN AN

brightline®

THANK YOU

Michael Lefevre
Vice President, Operations
michael.lefevre@gobrightline.com

GoBrightline.com

Thank You

Please hold all questions until the end of the Session

Mitigating Highway Design Challenges at or Approaching Grade Crossings

Jana Lynn Patterson, PhD.
Associate Vice President for Student Life and Dean of Students
Elon University

The Problem

- **Students crossing illegally at (and between) railway crossings in Town of Elon**
  - Railway corridor was used as a crossing point between town business district and student apartment complex
  - Students “jumping” the fence (48” black, chain link fence), even with tunnel just a few yards away
  - Pedestrians, motorists and cyclists disregard of railway safety (lights and bars)

Hitting Home With Our Student/Town Community:

- April (2007) Student death by suicide on tracks just east of campus (North Oak Street)

- May (2014)- local man walking on track and struck and killed by train

- October (2015) “near miss” of a student walking on railroad tracks- wearing earbuds and walking toward a train, looking down, and at last minute stopped- narrowly missing train

- December (2016)- student was “hopping” between cars of stopped train after drinking- train started moving again and ran over student’s foot – student’s foot was amputated

- **From David Robinson’s visit to Elon in November 2015:**
  - Location: NCRR ROW between Oak Ave. and Williamson St.,
  - Witnessed at least 20 students crossing the tracks from Trollinger Ave. to Lebanon Ave. over the period of an hour (between the passing-through of Piedmonts #75 and #74.)
  - While 5 students aimed for the location of the fence gap, the others crossed farther west.
  - All of the "miscreants" (mostly male, but a few females) appeared to be coming from the Trollinger Apartments, which houses around 300 students and are located almost as far west as the Church Street at-grade crossing.

Results of NCSU-ITRE (Institute for Transportation Research and Education) Thermal Camera Trespass research project and the number of trespassers documented from each research site (2019).

- Elon trespass research site documented 4,638 individual trespassers during a 139 days of thermal camera observations. If you scale that number to a calendar year, it is equivalent to 12,264 annual trespassers.

- Also noted in the research for Elon, a train was present 28 times while trespassing was ongoing and S. Williamson street is 390 feet from the research trespass ‘hot spot’ path. The US Census Bureau 2020 population of Elon was 11,941.

Coming together to address the issue:

University officials met with DOT, NCRR, NS, Amtrak and Town of Elon officials to discuss problem (2014) and concerns:

Enforcement: There seemed to be confusion about what constituted and who had jurisdiction over enforcement. Little awareness that trespassing along railway was a crime.

Signage: Trespass signage along the existing fencing.

Communications Campaign: Evaluated current railway safety and communications campaign with students:

- Direct e-mail campaign
- "tabling" in our student center

Physical Barriers: The current length of 48". fence (which runs from Oak Avenue to slightly west of Williamson) was not high enough to deter students from jumping or climbing over it. In addition, there was a substantial length of exposed right of way west of Haggard to Church Street with no fencing or barrier. This area is highly dense with Town Businesses and student residences.

Initiatives Since 2014:

Enforcement and Training:

- While University police cannot enforce laws off campus (unless requested for mutual aid), Elon University PD agreed to work with Town of Elon and NCRR, NS enforcement personnel. Bi-annual notification to students of misdemeanor violation.

- Engage materials in “BeRailSafe Program” to educate current and new police, fire, public works, recreation and parks, and administrative staff in Rail Safety Awareness

- Meet once a year with town businesses- discuss using “BeRailSafe” materials

Signage: Increased signage along the existing fencing indicating it is a crime to trespass on or in corridor of railway

Communications Campaign: Launched an increased safety and communications campaign with students using “BeRailSafe” materials:

- Direct e-mail campaign to students three times per year- information about enforcement and safety is included- we also send to parents
- Added information about rail safety to the Elon University Student Handbook and the Student Code of Conduct
- Displays in our student center and on digital signage with rail safety messaging
- Developed railway posters to provide for local businesses
- Developed a campaign to decrease normalization of students/persons walking along a track and to alert students that persons walking along a track or sitting on a train track may be having a mental health issue and to report immediately
- Purchased an “app” so that students can anonymously report persons walking along the tracks- goes directly into Campus Police who notifies Town of Elon Police to investigate

- **<u>Increase Physical Barriers</u>:** The University, NC RR and The Town of Elon partnered to extend fencing along the entirety of the university pedestrian corridor (Oak Street to Church Street) and to raise the height of the fence from 48” to 72”.
- Project was completed in 2018.
- Total project cost was $ 60,000 (DOT paid $ 30,000; Town of Elon paid $ 15,000 and University paid $ 15,000).

Updates

- Reduction in reports of students “jumping the fence “and provided additional deterrent in the section from Williamson to Church that was formerly not fenced.
- Since the improved fence was installed, the Town of Elon has added parking along the fence line on the western half of the corridor.
- Increased reports via app to Campus/Town Police if someone is on or walking near tracks
- The main crossing point in the middle of town (Williamson and Trollinger/Lebanon) remains an issue (and is the reference point for the November 2019 statistics)

Future

Town and university planning is cognizant of railway safety issues in planning:

- The Town of Elon has developed additional parking near businesses and away from the railway to deter folks from parking and walking across the tracks to access services.

- The Town of Elon Master Plan calls for additional side walks to be installed along Trollinger to create safer passage to campus.

- The University is building additional campus housing to reduce reliance on off campus housing that may increase pedestrian/motor vehicle traffic at railroad crossings. Strategic placement of housing will take pedestrian traffic away from railway corridor.

Questions?

Jana Lynn Patterson
Elon University
patters@elon.edu
(336) 278-7200

Grade Crossing Safety and Railroad Trespass Prevention Workshop

Crossing Safety Improvement Efforts

November 2, 2022

Will Miller
Public Safety Director

GCS
Day 2

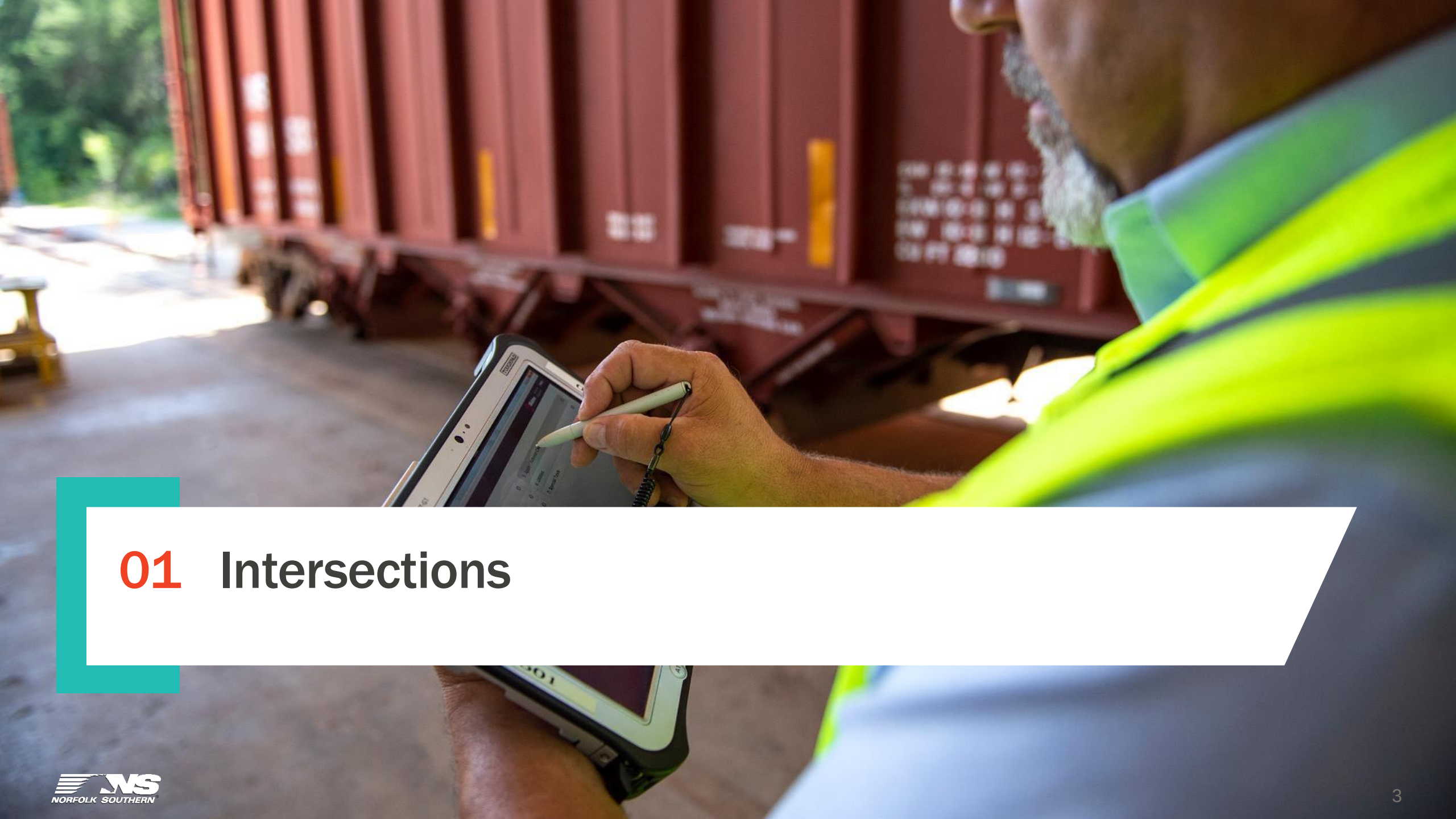
01 Intersections

02 Safety Trends & Crossing Consolidation Initiatives

03 Mitigating Safety Challenges

04 Challenges

NORFOLK SOUTHERN



01 Intersections

Intersections

Highway/Rail at-grade intersections

- 16 million
- 203,998
- Are there other types of modes that intersect on the highway system?

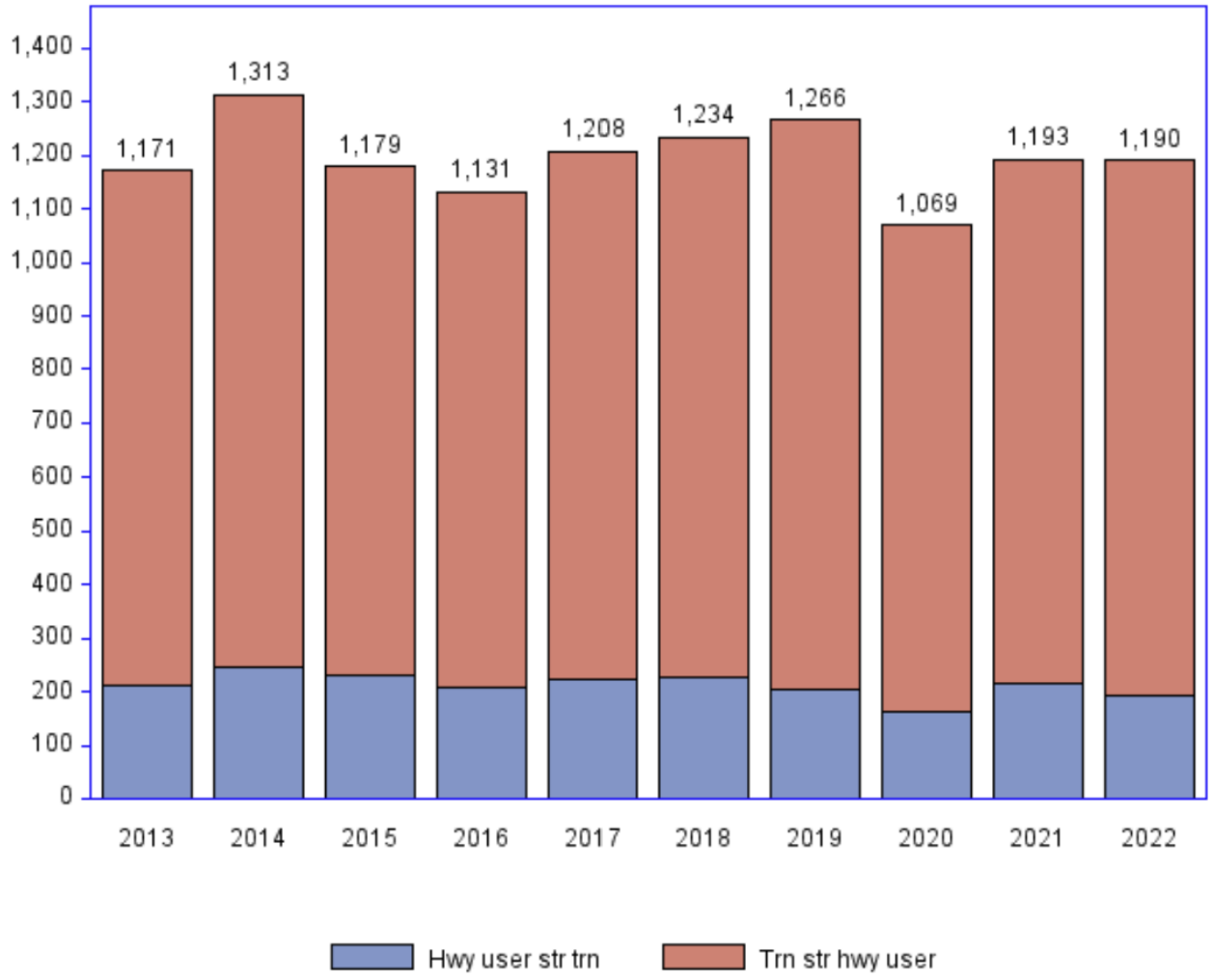
Just another type of intersection!

- No two are just alike
- Driver has the duty to follow the law
- What makes a crossing safe?
- What does every crossing need?

NORFOLK SOUTHERN

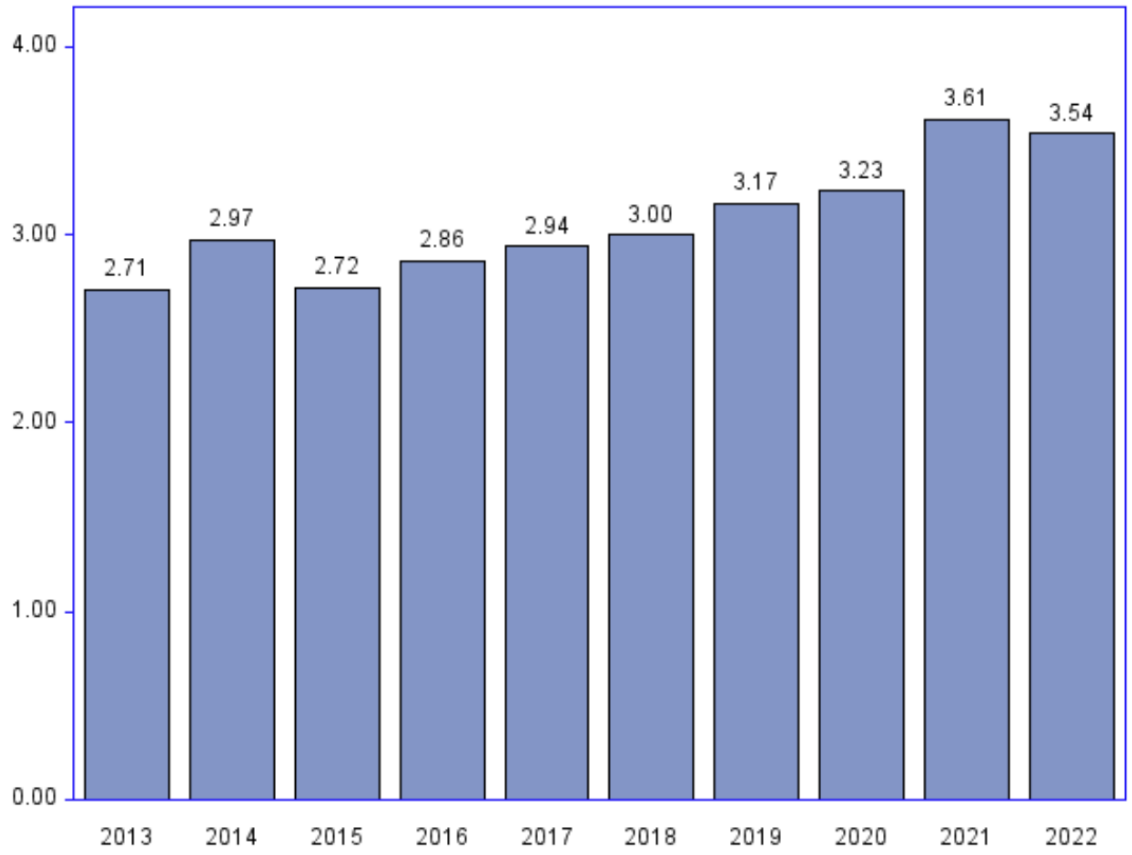
02 Safety Trends

12 – HIGHWAY–RAIL INCIDENTS, JAN – JUL (2022 preliminary)



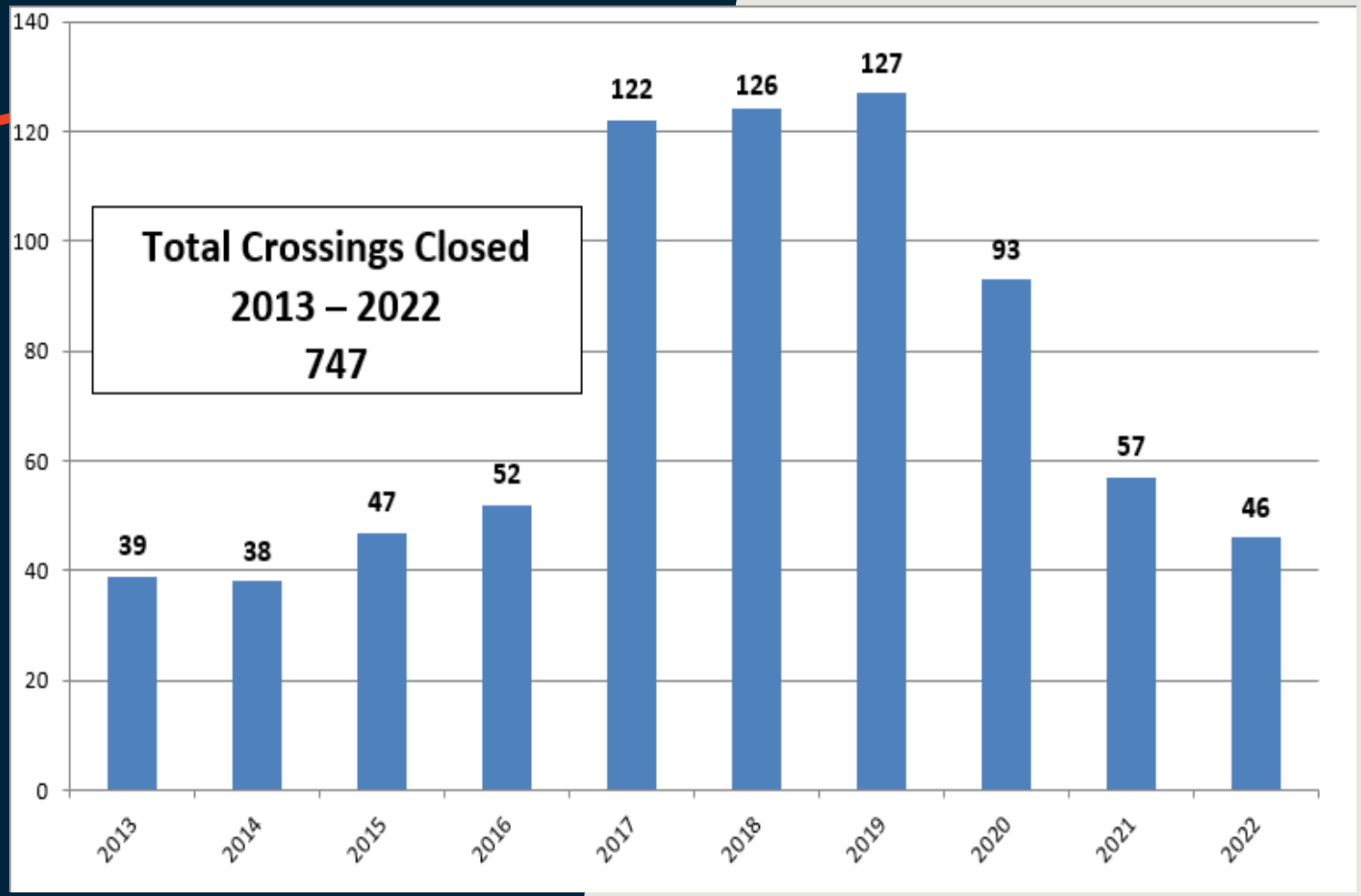
Source: FRA Office of Safety Analysis.

11 — HIGHWAY–RAIL INCIDENT RATE, JAN — JUL (2022 preliminary)



Number of accidents per 1,000,000 train miles

Source: FRA Office of Safety Analysis.


Total Crossings Closed
2013 – 2022
747
140
120
100
80
60
40
20
0
39
38
47
52
122
126
127
93
57
46
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022

03 Mitigating Safety Challenges

203,998

What is Missing?

Complimenting AWD's

- On NS in 2021, 73.84% of all incidents at public crossings occurred at crossings with automatic warning devices.
- On NS in 2021, roughly 1/6 of all incidents at public crossings (49/302) were the result of the driver choosing to drive around lowered crossing gates.
- Nationally, as reported by FRA, in 2021, the three leading causes of highway vehicle/train incidents were:
  - "Did not stop", accounting for 36.66%
  - "Stopped on the crossing" at 26.46%, and
  - "Went around gate" at 15.28%.

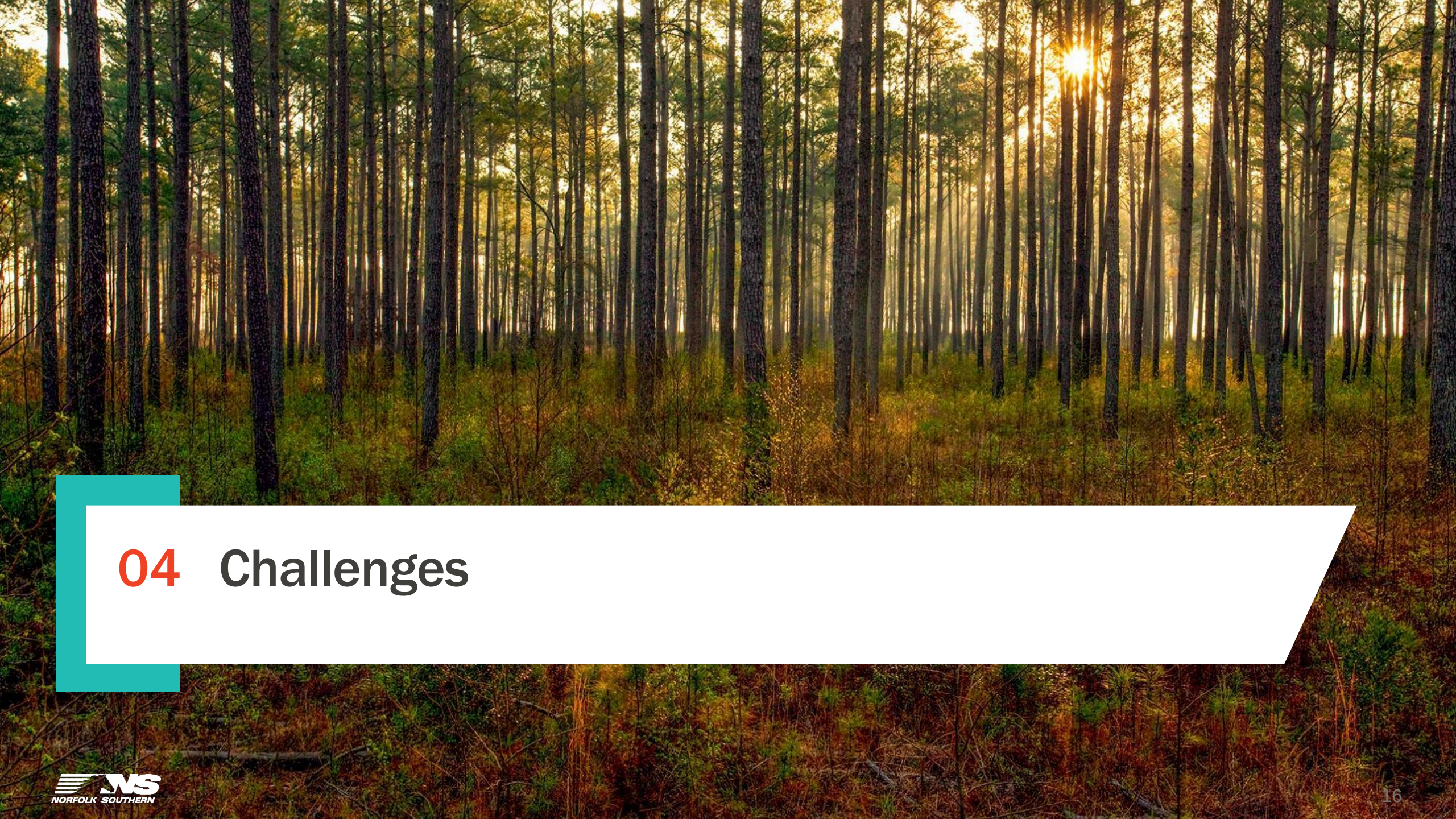
Source: FRA Office of Safety Analysis.

Supplemental Treatments

Supplemental Treatments

Supplemental Treatments

Image Source: USDOT Report: Effectiveness of LED-Enhanced Signs in Reducing Incidents of Vehicles Stopping on Tracks



04 Challenges

Challenges

- Maintenance
- Parallel Roads and Driveways
- Width
- Snowplows
- State Programs
- Change

- No crossing should be constructed or modified unless these features can be built into the plans
- This is not a cost or effectiveness issue

William.miller@nscorp.com

Thank you.

www.norfolksouthern.com

Thank You

Questions

CSX PUBLIC PROJECTS
PUBLIC CROSSING PROGRAMS
NOVEMBER 2022

WHY ARE WE HERE?

THE FIRST QUESTION: CAN WE CLOSE?

- CSX partners with local communities and state agencies to pursue closure opportunities.
- Closure projects can take many shapes: grade separations, consolidations and corridor safety projects.
- Many grant program opportunities to support these initiatives.

SUPPLEMENTAL SAFETY MEASURES

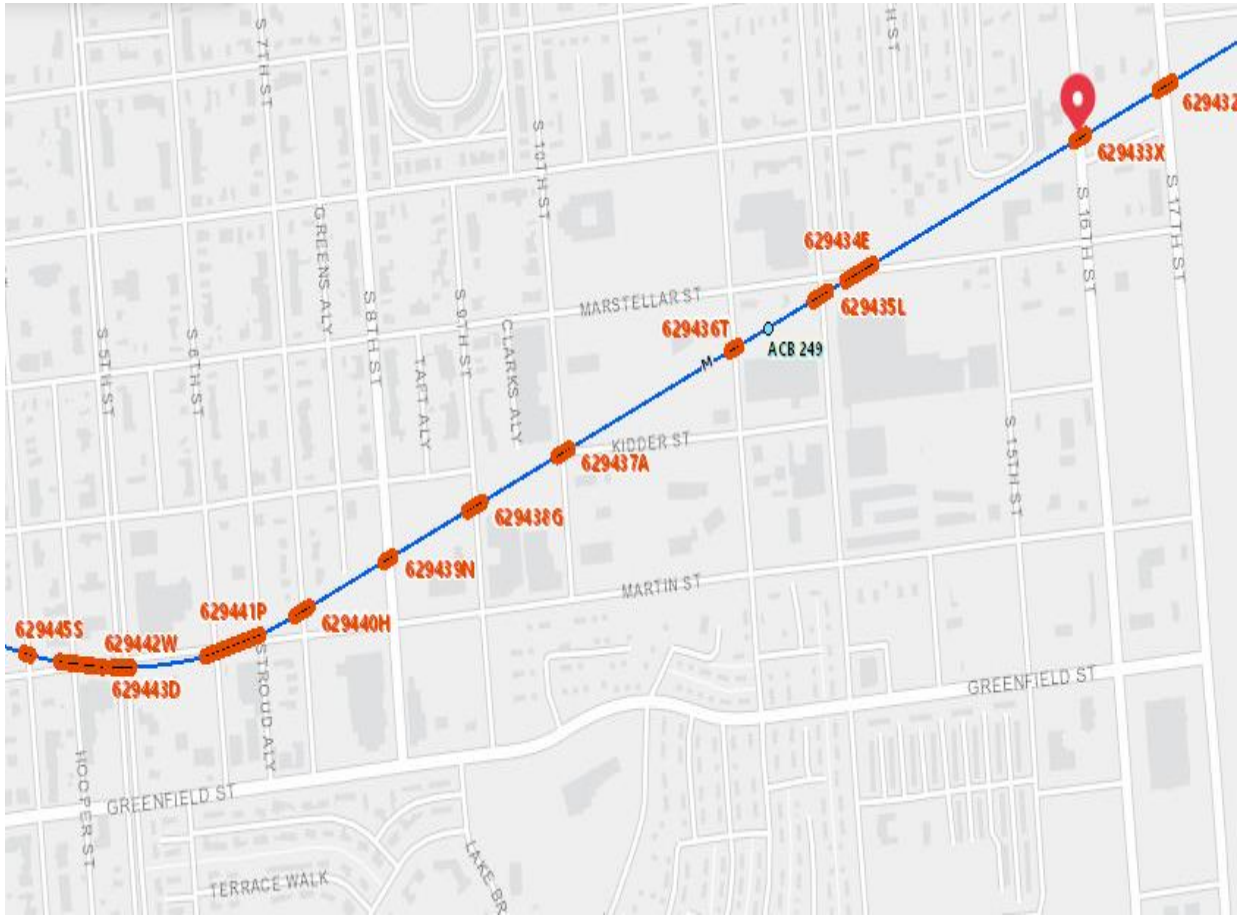
- More or upgraded warning devices are not always the answer.
- Signage, delineators, roadway markings are cost effective and have immediate impact!

GRADE SEPARATIONS

- In some cases the roadway traffic volume is too high to be consolidated to other crossings, but that volume also poses a high risk of incidents at the crossing.
- Railroads are required to participate in funding grade separation projects which will close a crossing with active warning devices.
- A case for Grade Separation: Broad Rock Blvd.

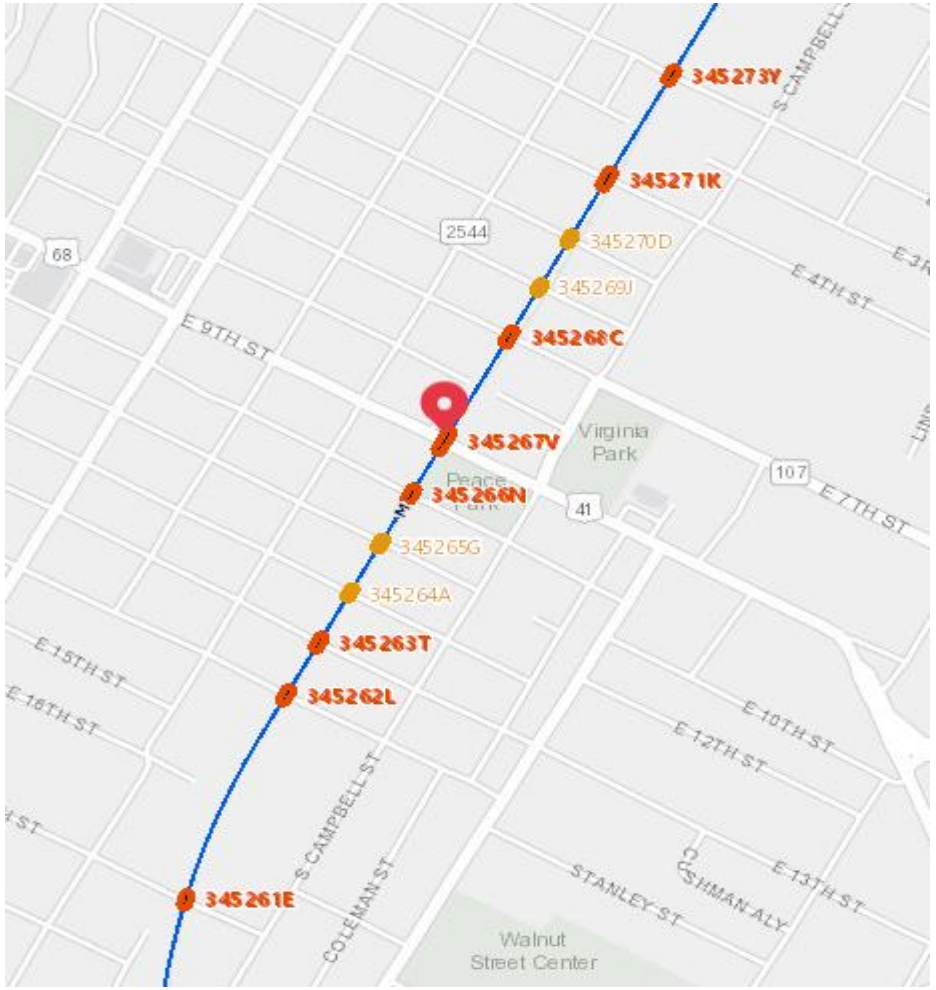
CROSSING CONSOLIDATIONS & CLOSURES

- Crossing consolidations can occur when there is alternative means of access to each side of the Railroad
- CSX and the Roadway Authority should seek to partner in selecting one or more of these redundant crossings.



CORRIDOR PROJECTS

- Corridor wide projects can take place throughout an entire city or “subdivision”.
- These projects generally take the shape of crossing consolidations coupled with roadway realignments, roadway widening and warning device upgrades at multiple crossings.
- CSX may also work with roadway authorities to replace high cost maintenance items such as LED flashing lights.

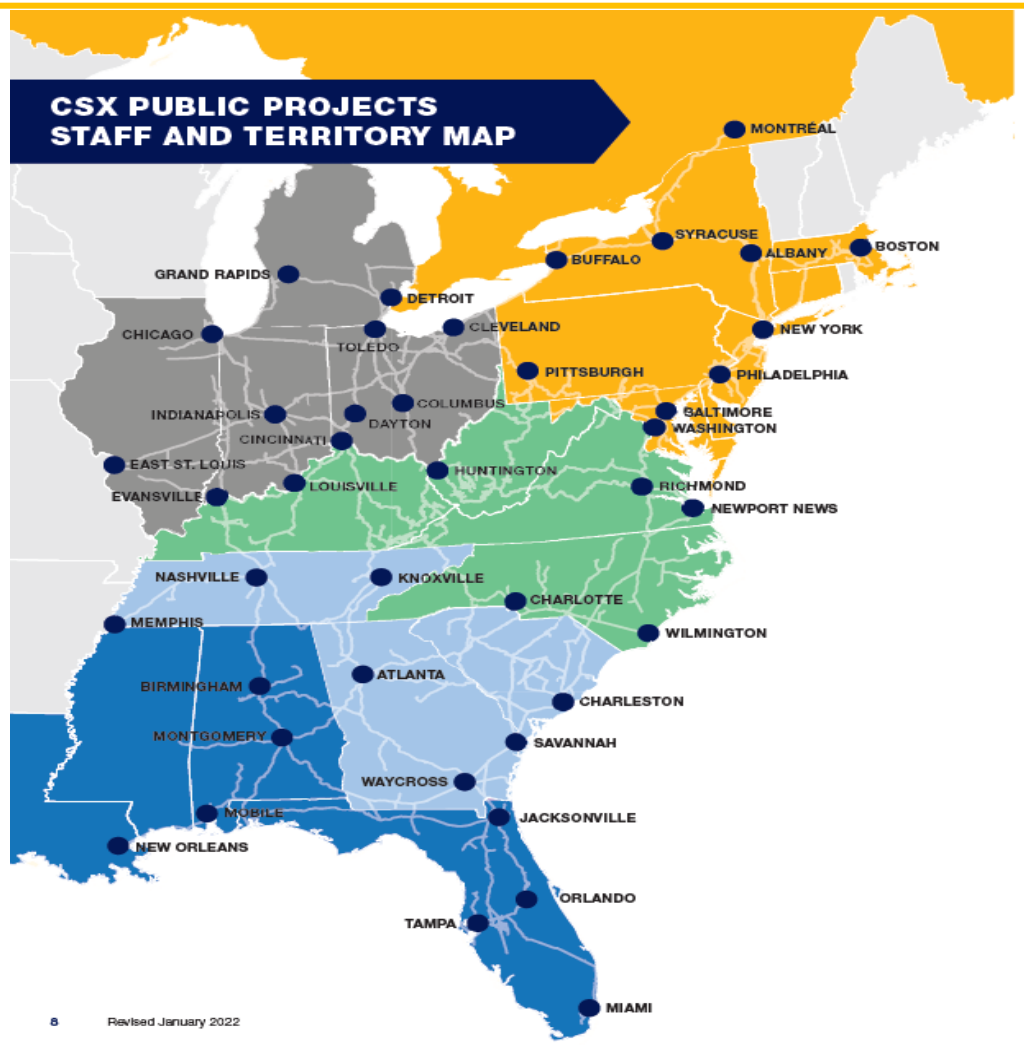


CORRIDOR PROJECTS – WILMINGTON, NC AND HOPKINSVILLE, KY

Crossing Closure – 6th Street Hopkinsville

NCDOT Planimetric for 6th Street Wilmington

CSX PUBLIC PROJECTS TEAM



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DIRECTOR PROJECT MANAGEMENT – PUBLIC PROJECTS

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CROSSING DATABASE SPECIALIST

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CLOSING AND QUESTIONS?

Resources (web search key words):

- CSX Public Projects Manual
- FHWA Highway Crossing Program Resources
- FRA Highway-Rail Grade Crossing Safety and Trespass Prevention

CSX PUBLIC PROJECTS
PUBLIC CROSSING PROGRAMS
NOVEMBER 2022

WHY ARE WE HERE?

THE FIRST QUESTION: CAN WE CLOSE?

- CSX partners with local communities and state agencies to pursue closure opportunities.
- Closure projects can take many shapes: grade separations, consolidations and corridor safety projects.
- Many grant program opportunities to support these initiatives.

SUPPLEMENTAL SAFETY MEASURES

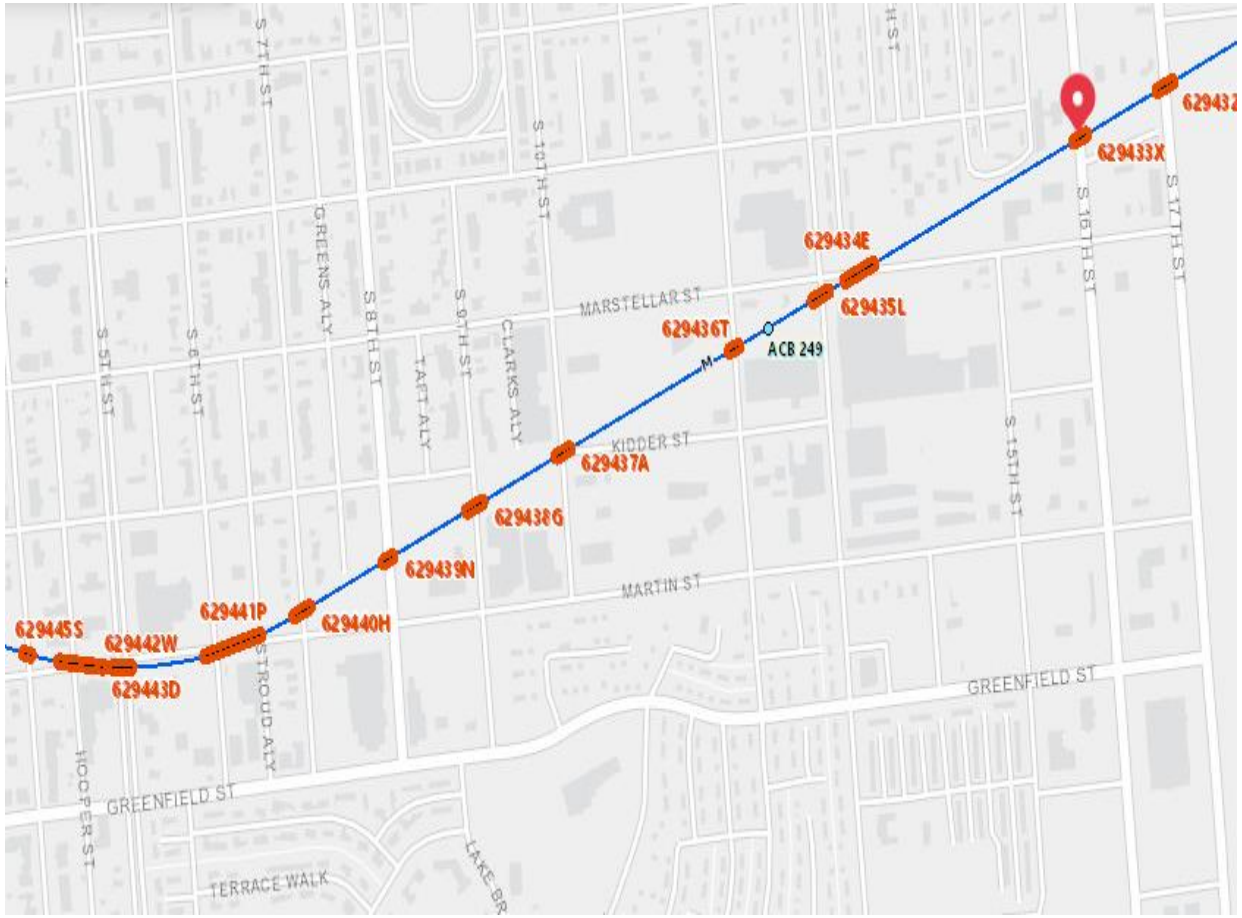
- More or upgraded warning devices are not always the answer.
- Signage, delineators, roadway markings are cost effective and have immediate impact!

GRADE SEPARATIONS

- In some cases the roadway traffic volume is too high to be consolidated to other crossings, but that volume also poses a high risk of incidents at the crossing.
- Railroads are required to participate in funding grade separation projects which will close a crossing with active warning devices.
- A case for Grade Separation: Broad Rock Blvd.

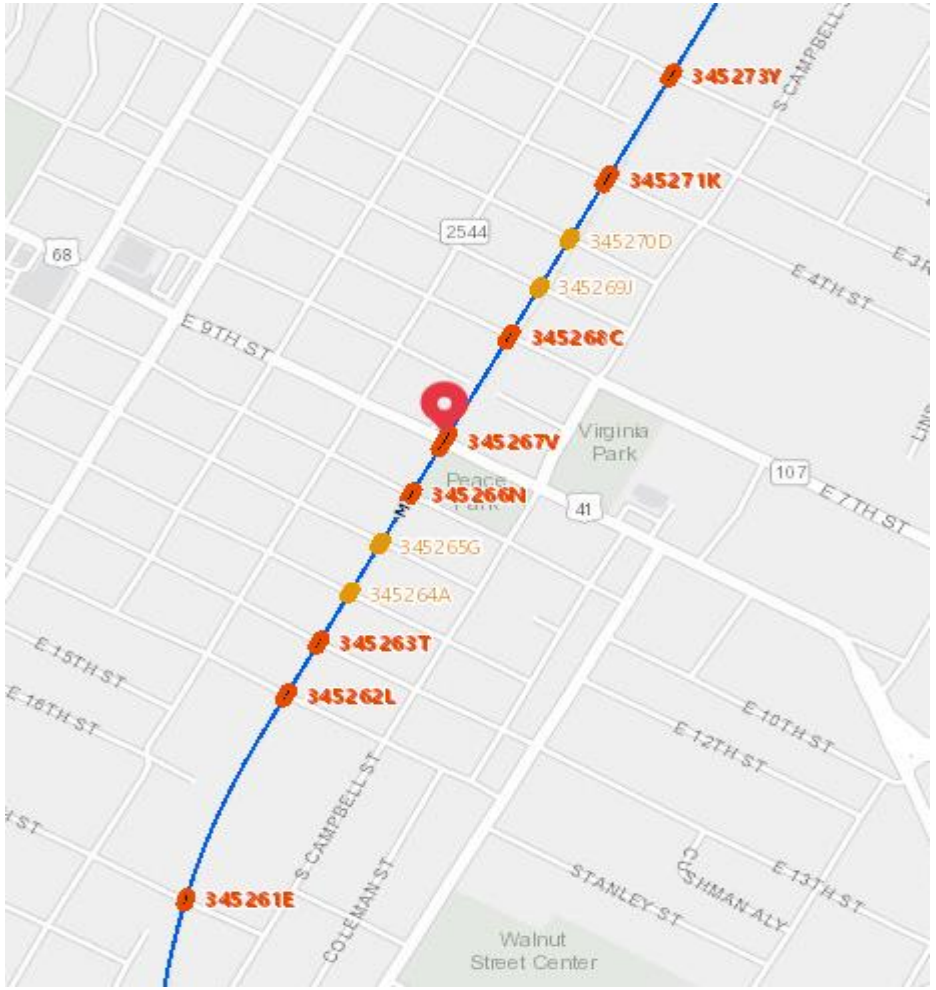
CROSSING CONSOLIDATIONS & CLOSURES

- Crossing consolidations can occur when there is alternative means of access to each side of the Railroad
- CSX and the Roadway Authority should seek to partner in selecting one or more of these redundant crossings.



CORRIDOR PROJECTS

- Corridor wide projects can take place throughout an entire city or “subdivision”.
- These projects generally take the shape of crossing consolidations coupled with roadway realignments, roadway widening and warning device upgrades at multiple crossings.
- CSX may also work with roadway authorities to replace high cost maintenance items such as LED flashing lights.

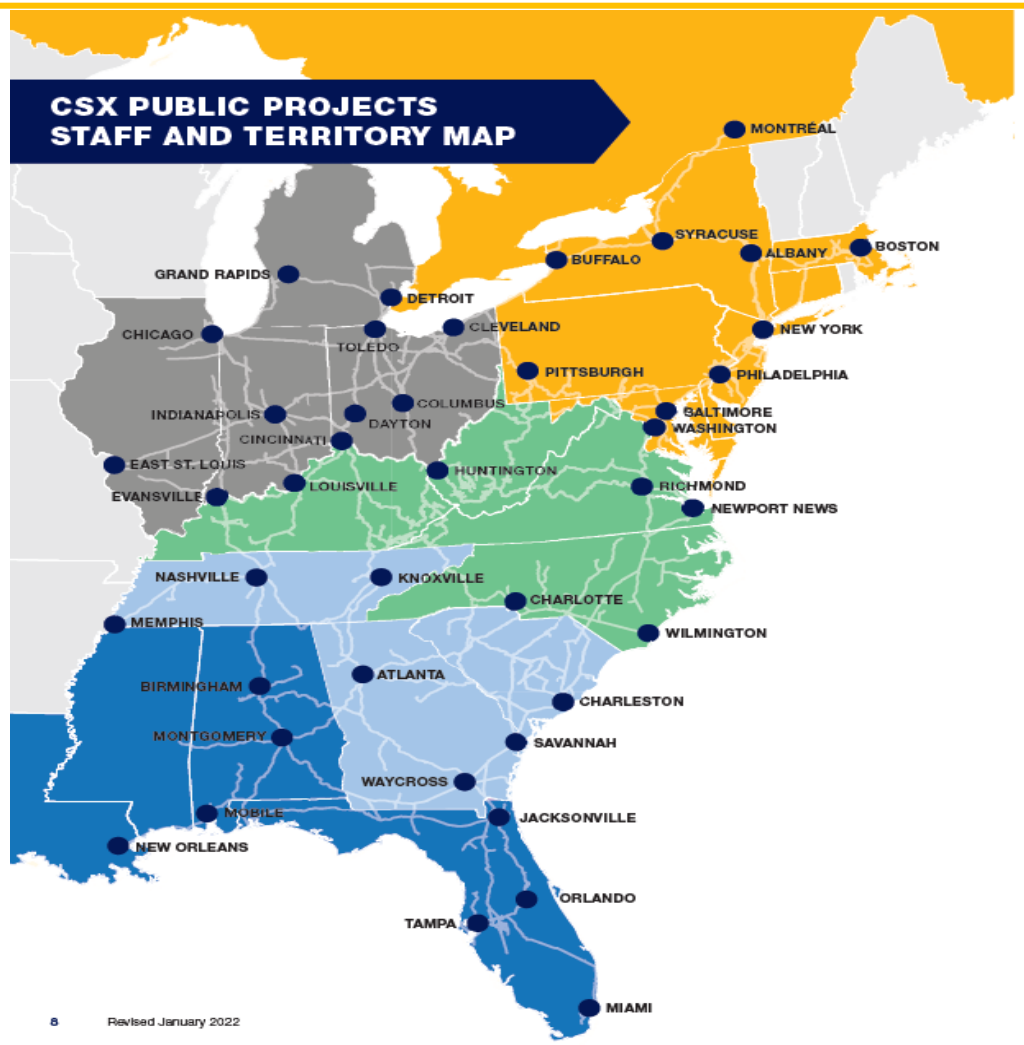


CORRIDOR PROJECTS – WILMINGTON, NC AND HOPKINSVILLE, KY

Crossing Closure – 6th Street Hopkinsville

NCDOT Planimetric for 6th Street Wilmington

CSX PUBLIC PROJECTS TEAM



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CLOSING AND QUESTIONS?

Resources (web search key words):

- CSX Public Projects Manual
- FHWA Highway Crossing Program Resources
- FRA Highway-Rail Grade Crossing Safety and Trespass Prevention

Grade Crossing Safety and Railroad Trespass Prevention Workshop

Day 2 Session Five

RAIL

MOVING AMERICA FORWARD

Session 5: Crossing Program Planning and Policy

Christopher Vaughan

RAIL

MOVING AMERICA FORWARD

EMERGENCY NOTIFICATION SIGN

Liz Hudd
D3- Railroad Safety Inspector

ENS SIGN

PURPOSE:

Provide the **public** with critical emergency contact information at every highway-rail crossing.

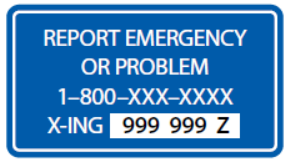
Enable the **public** to reach the railroad responsible for the crossing and to identify the specific crossing in the event of an emergency.

STATE DRIVERS MANUALS

RAILROAD CROSSING GATES CANNOT TRAP YOU OR YOUR VEHICLE drive through the gate. It is flexible and will not block you in. If you stop and try to back up, your vehicle may stall;

- Crossing gates will not trap you, but stopping traffic might. Be sure the traffic ahead of you will not stop and block you in on the tracks;

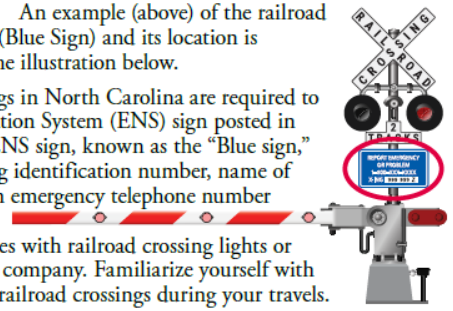
Railroad related emergencies: What you need to know.



Railroad Emergency Notification System sign, also known as the Blue Sign.

Knowing how to use the Blue Sign to directly contact the railroad company is the quickest method to stop a train in the event of a railroad related emergency.

An example (above) of the railroad Emergency Notification Sign (Blue Sign) and its location is depicted in the red circle on the illustration below.



- All highway-railroad crossings in North Carolina are required to have an Emergency Notification System (ENS) sign posted in each traffic direction. The ENS sign, known as the "Blue sign," contains the railroad crossing identification number, name of the railroad company and an emergency telephone number to report emergencies, hazardous conditions or issues with railroad crossing lights or gates directly to the railroad company. Familiarize yourself with the "Blue Sign "locations at railroad crossings during your travels.
- Each railroad company has its own emergency telephone number and each railroad crossing has a unique USDOT crossing identification number.
- If your vehicle stalls on or near the tracks GET OUT IMMEDIATELY. A train, which may weigh several thousand tons traveling at 55 mph may take more than a mile to stop. By the time the engineer on the train sees you, it is too late to stop the train.
- Move away from your vehicle and the tracks. Walk quickly along the roadway to a safe location away from the railroad tracks.
- When safely away from the tracks, find the blue sign at or near the railroad crossing and report the emergency/safety concern using the information on the ENS sign. For damaged or missing signs, contact the USDOT Federal Railroad Administration at 1-800-232-0144.

When a train hits a 4,000-lb. car, it is like your car running over a soda can. No vehicle is worth a life.

With rail traffic increasing throughout North Carolina, it is more important than ever to practice safety at railroad crossings. Trains cannot stop quickly, but your vehicle can.

When you need to cross railroad tracks, look both ways and cross the tracks quickly, without stopping. If a train is crossing the highway, you must wait to cross a highway-railroad grade crossing until the train is well down the track or railroad devices (such as lights and gates) indicate it is safe to cross. If you are approaching railroad tracks and you need to stop for traffic or a signal, stop at the stop line before the railroad tracks. If your vehicle ever gets stuck on a track, contact the emergency phone number listed on the blue sign and provide the crossing information.

FRA Flyer

HIGHWAY-RAIL GRADE CROSSINGS

EMERGENCY NOTIFICATION SYSTEM (ENS)

Get HELP! Use the Blue ENS Sign

Keeping Railroads and the Public Safe

The mission of the Federal Railroad Administration (FRA) is to enable the safe, reliable and efficient movement of people and goods for a strong America, now and in the future.

U.S. Department of Transportation
Federal Railroad Administration

In Case of Emergency

- **Locate** the blue and white Emergency Notification System (ENS) sign at the grade crossing.
- **Call for help!** Call the railroad's emergency contact number listed on the blue sign.
- **Communicate** your location, by providing the identification number (see below) and state the nature of the emergency to the dispatcher.

The ENS sign includes:

1. Each railroad's emergency contact number,
2. The U.S. Department of Transportation (USDOT) National Crossing Inventory Number, which identifies the exact location of the crossing to the railroads.

Emergencies and safety concerns at the grade crossing should be reported by using the information on the ENS sign.

For more information visit us at www.fra.dot.gov
Connect with us USDOTFRA

RAIL Moving America Forward

ABOUT THE FEDERAL RAILROAD ADMINISTRATION (FRA)

Our mission is to enable the safe, reliable and efficient movement of people and goods for a strong America, now and in the future.

Get to Know the FRA

- Created in 1966 as part of The Department of Transportation Act
- One of ten agencies that make up USDOT
- Led by an administrator, appointed by the President of the United States and confirmed by the United States Senate. FRA has eight regional offices across the nation
- Employs a diverse workforce to accomplish its mission

Protecting People and Railroads

The FRA is the chief safety regulator for all passenger and freight railroads nationwide. We accomplish our mission through:

- A rigorous oversight and inspection program based on strategic use of data
- Advancing proactive approaches for early identification and mitigation of risk
- Capital investments and a robust research and development program

The FRA advances market-based rail improvements. Today, we manage a portfolio that includes grants and loans, laying a solid foundation of sustainable, long-term rail improvements.

Emergency Notification System

To improve highway-rail crossing safety, the FRA now requires each railroad to have an Emergency Notification System (ENS), allowing emergency response center staff to identify crossing locations and railroad contacts for reporting safety problems and emergency situations.

- Look for a blue-and-white emergency notification sign.
- The ENS sign should be posted near the crossing and clearly visible. It includes the name of the railroad, the railroad's emergency contact number, and the USDOT National Crossing Inventory Number.
- **Using the information on the ENS sign is the quickest way to notify the railroad.**

A USDOT National Crossing Inventory Number is a unique number that is assigned to each grade crossing and can be used to obtain valuable information.

The National Law Enforcement Terminal Systems (NLETS) has joined the FRA to make a mirror image of FRA's highway-rail grade crossing database. Using the USDOT National Crossing Inventory Number, and NLETS will provide the first responder's agency instant access to FRA's database.

More Resources

FRA has created the "Rail Safety for Emergency Responders" informational video series. Visit https://www.fra.dot.gov/Page/P0850 or contact Michail Grizkewitsch at michail.grizkewitsch@dot.gov for further information.

PUBLIC MESSAGE

Why ?

* Report a vehicle stuck on the tracks
* Broken gate arm/signal system not operating
* Suspicious activity near the tracks

What to do:

* Evacuate the vehicle IMMEDIATELY
* Call the Railroad Emergency Number & provide DOT#
* Call 911

OCCURRENCES

May 18, 2022 - The driver told officers she was **unfamiliar with the area** and accidentally turned right onto the train tracks and became stuck. The video showed the woman exit her car, then reach in to grab what appeared to be personal belongings.

The police department reminded citizens to call 911 immediately if their car stalls or gets stuck on the railroad tracks.

June 21, 2022 - An 18-year-old driving a delivery van told police his **GPS directed him to drive onto the tracks**, so he did and got stuck.

August 2022 - A woman had missed her turn onto I-85 and was **making a U-turn on a side street where the railroad tracks crossed**, when her car became hung up on the tracks

Sept. 27, 2022 - Police were dispatched to where a teenage driver's car was stuck on the train tracks.

An arriving officer immediately contacted CSX, which was advised about the situation and quickly stopped an incoming train.

After the vehicle was towed away from the scene, the officer alerted CSX to restart normal train traffic.

Incident Reports – Unoccupied Vehicles

NRC Reports – District 3

2019 – 15

2020 - 8

2021 – 16

2022 – 20 (As of 10/20/22)

Public Outreach

- State Driver's Manuals – Question on test?
- CDL Operators
- Driver's Ed programs – High Schools
- Driver's Ed training schools

- COMMUNITY ENGAGEMENT!

???

Contact Us

Federal Railroad Administration
1200 New Jersey Avenue, SE
Washington, DC 20590

Liz Hudd
Phone: 770-375-9634
Email: Elizabeth.hudd@dot.gov

Connect with us at **USDOTFRA**

U.S. Department of Transportation
Federal Railroad Administration

NORTH CAROLINA
Department of Transportation

Freight Rail and Rail Crossing Safety Improvement Program (FRRCSI)

Grade Crossing and Trespasser Workshop

Neil Perry, P.E., CPM – Rail Division Planning Manager
Mark Johnston – FRRCSI Program Manager

November 2, 2022

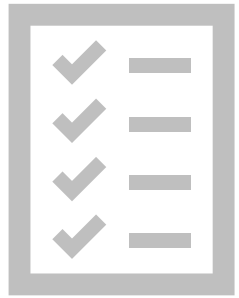
Freight Rail & Rail Crossing Safety Improvement Fund (FRCCSI)

Established in 2013 under NCGS § 124-5.1.

Program Goals:

- Safety
- Modernize track infrastructure
- Support economic development
- Freight diversion to rail
- Increase freight capacity
- Corridor preservation and reactivation for new services

Keys to FRRCSI Program Success



2014 – The NCDOT formalized the FRRCSI Program

- Forward thinking legislation addresses many needs of freight rail network
- 50-50 public-private matching funds doubles the impact on rail in NC
- Recurring annual funding allows programs to develop and facilitates long term planning
- Partnering with railroads and industries builds successful projects and strengthens relationships
- FRRCSI sub-programs enhance flexibility and target specific needs of freight rail in NC

FRRCSI – Infrastructure and Freight Transit Programs

Short line Infrastructure

Enhancement of short line freight rail corridors

Improved access to Ports

Improved access to military installations

Focuses on freight rail infrastructure improvements

Freight Rail Diversion

Focuses on diverting heavy truck freight to rail service

Supports truck-to-rail transload builds and upgrades

Rail Industrial Access

Economic development arm for FRRCSI

Builds rail access to industrial sites

Corridor Protection & Reactivation

Preserves rail corridors from abandonment and permanent closure

Seeks to reestablish use/service where practicable

FRRCSI – Safety Programs

Crossing Surfaces

Improves surface conditions of existing at-grade rail crossings

Consolidations & Closures

Eliminates train-vehicular and pedestrian conflict points through closures and grade-separations

Signals & Safety

Improves safety at existing at-grade rail crossings implementation and upgrade of technology and equipment

FRRCSI – Crossing Surfaces Program

Projects improve surface conditions of existing at-grade crossings

- Facilitate safer/smoother crossings for pedestrians and motor vehicles
- May accommodate existing pedestrian facilities through the crossing location

Eligible Recipients

- Short line railroads

Eligible Projects

- At-grade short line railroad crossings
- Crossings on state-maintained roads

Qualification

- NCDOT field evaluation of crossing condition and safety index
- Projects are scored, ranked and selected by eligible funding

Funding

- Funding is allocated from the annual FRRCSI appropriation
- Program receives ~$1M to $1.5M in annual funding, dependent on Rail Division priorities

Crossing Surface **Before**

WH Smith Blvd
SR 1324
Greenville, NC
Crossing# 465514R


Crossing Surface
After
WH Smith Blvd
SR 1324
Greenville, NC
Crossing# 465514R

FRRCSI – Consolidations and Closures

Projects consolidate at-grade crossing points

- Eliminates high-risk crossings
- Removes conflict points between train, motor vehicles and pedestrians
- Facilitates uninterrupted flow

Eligible Recipients

- Class I and short line railroads

Eligible Projects

- At-grade Class I and short line railroad crossings

Qualification

- NCDOT Rail Division Engineering Coordination and Safety Branch review
- Ranked by investigative index, existing site conditions, and overall need

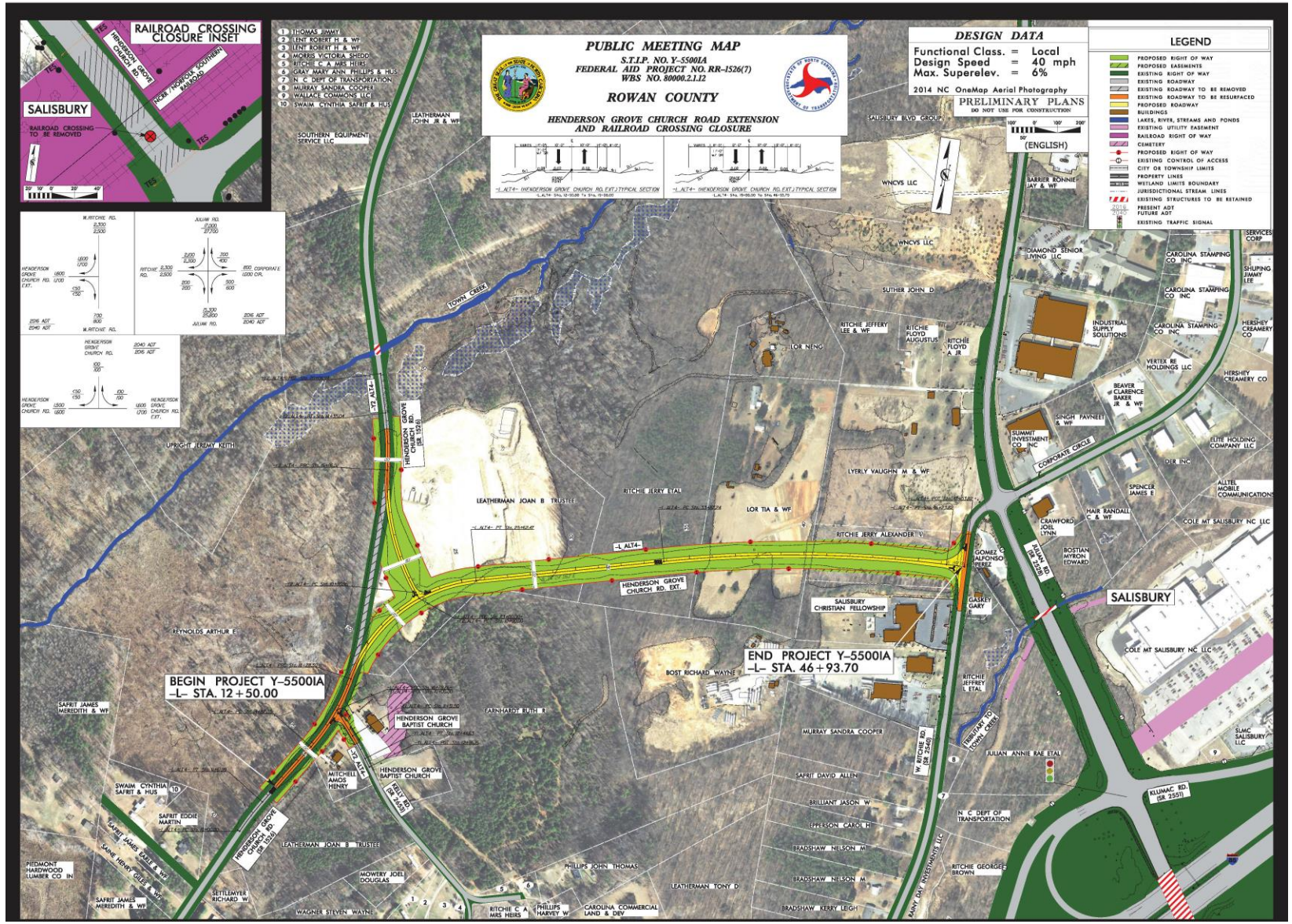
Funding

- Funding is considered on an as-need basis in advance of annual program allocations.

Consolidation Project

- Realigns Henderson Grove Church Road to Julian Road via new alignment
- Provides permanent closure of the Henderson Grove Church Road at-grade crossing
- Estimated project cost: $6m

Henderson Grove Church Road
SR 1526
Salisbury, NC
Crossing# 724362M



Fencing Project

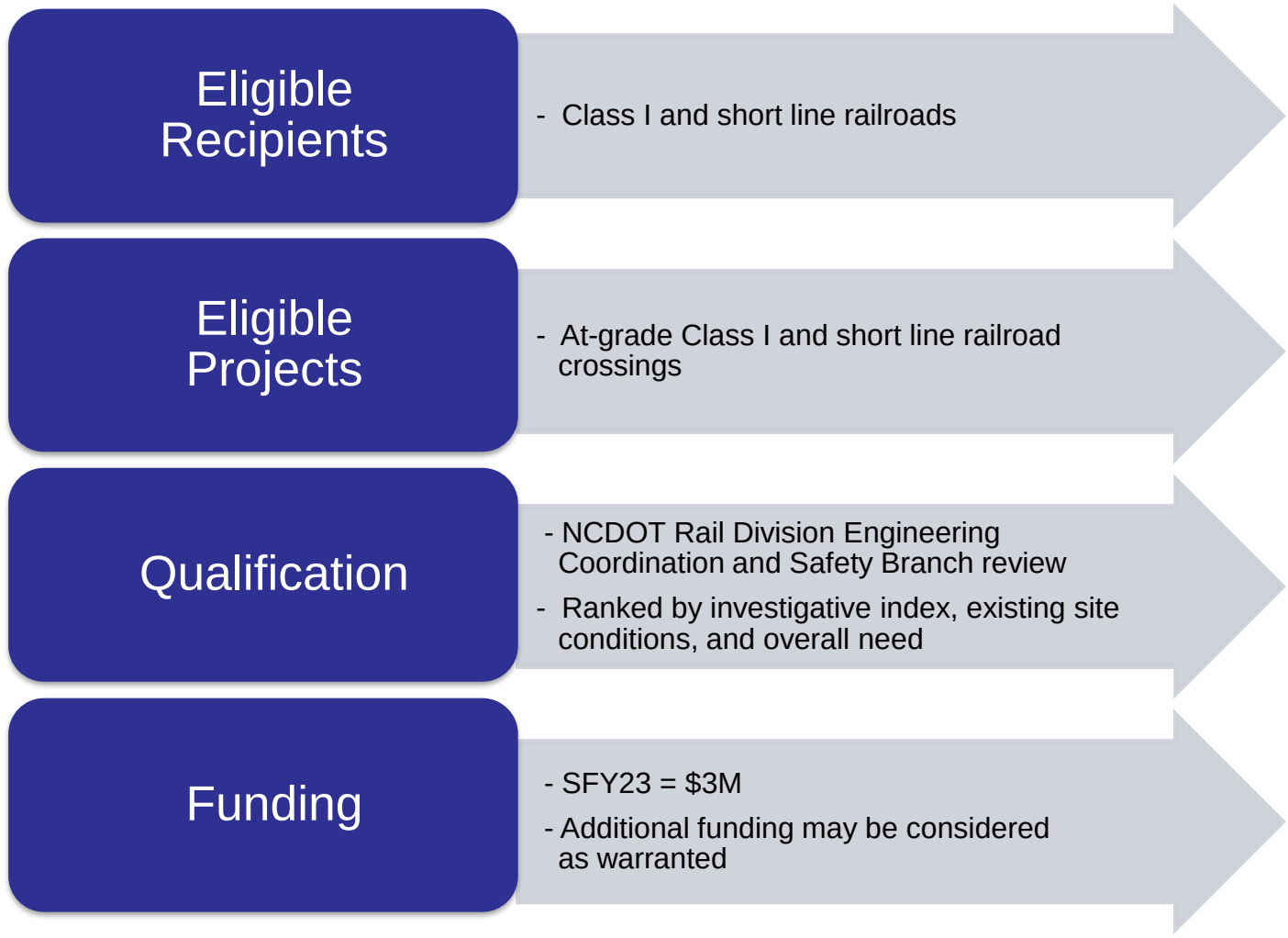
- Outlier project through Consolidations group
- Collaboration between Elon University, Town of Elon, North Carolina Railroad, Norfolk Southern and NCDOT
- Discourages rail corridor trespassing in high pedestrian area
- Facilitates a channelization effect
- Guides pedestrians to a safe crossing location
- New projects will be considered on an as-needed basis

Between Williamson and Church Street Elon, NC

FRRCSI – Signals & Safety

Projects improve conditions of at-grade crossings through implementation and upgrade of technology and equipment

- Preemption devices
- Signals and receivers
- Deterrent equipment
- Driver awareness tech (warning signs, lights, etc.)
- Soon to implement motion detection



FRRCSI – Program Highlights

- Projects facilitate safe crossing locations with improved surfaces
- Projects eliminate conflict points
- Projects may channelize potential trespassers to safe crossing locations
- Projects increase user (motorist or pedestrian) awareness at crossing points

FRRCSI Safety Accomplishments to Date

- Improved **1,098** railroad crossings
- Removed **13** railroad crossings
- Built **1** rail corridor fencing project

Current to May 2022

NCDOT
Be Rail Safe

What is BeRailSafe?

A NCDOT safety outreach program created to prevent rail-related deaths and injuries in North Carolina.

Our Goal:

To end the tragedy of train-related death, injury and other events in North Carolina.

Mission Statement

BeRailSafe is NCDOT's accident prevention and public safety program with the aims of:

incorporating rail-specific safety policies, procedures, and information into various emergency response & driver education platforms;

updating legislation, rules , and policies to include vital rail-specific safety awareness considerations.

Emergency Notification Sign

110th Congress public law 110-432, ‘‘Rail Safety Improvement Act of 2008’’ requiring Emergency Notification Sign(s), October 16, 2008

The final rule became effective 13 August 2012.

49 CFR 234.303

In 2017 -- No mention made of ENS (AKA, the Blue Sign) in:

- NC Drivers License Handbook
- NC School Bus Drivers Handbook
- NC Basic Law Enforcement Training
- NC CDL Training Manual
- NC 911 Operator Training

RAIL

MOVING AMERICA FORWARD

Thank You

Questions

2019 FRA letter

U.S. Department of Transportation

Federal Railroad Administration

1200 New Jersey Avenue, SE
Washington, DC 20590

RECEIVED
MAY 02 2019
N.C. DEPT. OF TRANSPORTATION
OFFICE OF THE SECRETARY

April 25, 2019

Mr. James H. Trogdon
Secretary of Transportation
North Carolina Department of Transportation
1501 Mail Service Center
Raleigh, NC 27699-1501

Dear Mr. Trogdon:

As you are aware, the mission of the Federal Railroad Administration (FRA) is "to enable the safe, reliable, and efficient movement of people and goods for a strong America, now and in the future." Our Nation requires a transportation system that supports a growing economy and an urban population. As our Nation grows, so does the need to increase safety awareness throughout our transportation network for both the railroad and the highway systems. The March 7, 2017, freight train collision with a motorcoach in Biloxi, Mississippi, that killed four people and injured 38 more, provides an example of a deadly accident that could have been prevented with greater public awareness of safety precautions and emergency procedures at highway-rail grade crossings.

In the Biloxi accident, the coach driver failed to heed a "Low Ground Clearance" warning sign at the railroad crossing, so that he caught the undercarriage of his vehicle on the tracks where it could not move. Then instead of evacuating his passengers immediately, the driver only began moving them out of harm's way when he saw the lights of an oncoming train. The post-accident

- Education and training to pay close attention to "Low Ground Clearance" rail-grade crossing approach warning signs and when to find an alternate route;
- Education and training to immediately evacuate a stranded or disabled vehicle;
- Training to ensure awareness and understanding of ENS signs that are posted at all crossings. This characteristic blue-and-white sign gives the public an emergency telephone number to reach the railroad responsible for the crossing to report the disabled vehicle before a train arrives and as well as the crossing location identity number for the railroad dispatcher's reference. A sample ENS sign is shown below:

Please alert other stakeholders in your State's safety efforts of FRA's online document: "Get Help! Use the Blue ENS Sign" (at https://www.fra.dot.gov/eLib/Details/L18658).

Working together, we know we can increase crossing safety. FRA is willing and available to assist with providing further information and training in the use of the ENS. If you have questions or need additional information, please contact Mr. Larry Woolverton, Acting Staff Director, Highway-Rail Grade Crossing and Trespasser Programs Division at larry.woolverton@dot.gov or 202-493-6212.

Sincerely,

Karl Alexy
Deputy Associate Administrator for Railroad Safety

ENS training

Emergency Notification Sign Training has been provided in:

NC Law Enforcement In-service Training

NC BLET materials

NC Drivers License Handbook

NC School Bus Drivers Handbook

NC Telecommunicators Certification training materials

Gastonia, NC -19 April 2022

How to Educate?

HOUSE BILL 285

Requires DMV to include in its Drivers License Handbook and

Requires the Department of Public Instruction to include the

Drivers Education Classes taught in school information about the

Emergency Notification Sign

Makes it a crime to call, attempt to call, access, or attempt to access ENS for

purposes other than emergency communications.

Language from HB 285

Instruction on the Emergency Notification Systems (ENS) for telephonic reporting of unsafe conditions at highway-rail and pathway grade crossings. Instruction shall include that highway-rail and pathway grade crossings have unique United States Department of Transportation National Crossing Inventory numbers and a posted telephone number to contact the dispatching railroad in accordance with 49 C.F.R. Part 234. Instruction shall also include information on when to call the telephone number if an emergency condition exists at the highway-rail or pathway grade crossing, including the following:

a. If there is an unsafe condition at highway-rail and pathway grade crossings.
b. If the highway-rail or pathway grade crossing is obstructed.
c. If the highway-rail or pathway grade crossing warning devices, if present, are malfunctioning.
d. If the ENS sign is discovered to be missing, damaged, or in any other way unusable.

- AAMVA produces the material for the Commercial Drivers Licenses training with funding from the Federal Motor Carrier Safety Administration

- FMCSA recently approved AAMVA's final report to update the training and AAMVA will start updating the training materials.

Contact information:

Ike Avery
Rail Safety Consultant

(919) 829-2523

iaverypc@gmail.com

BeRailSafe.org

RAIL

MOVING AMERICA FORWARD

Thank You

Questions

Grade Crossing Safety and Railroad Trespass Prevention Workshop

Day 2 Session Six

RAIL

MOVING AMERICA FORWARD

Session 6: Data Collection and Analyses

Facilitator: Todd Meyer

U.S. Department of Transportation
Federal Railroad Administration

Institute for Transportation Research and Education

Highway-Rail Grade Crossing Incident Data Collection Project

Roger Smock
Daniel J. Findley, PhD, PE
Nihal Erian, MS, PMP

Introduction

- Project Sponsor
  NCDOT – Rail Division
- Project Started in
  January 2022

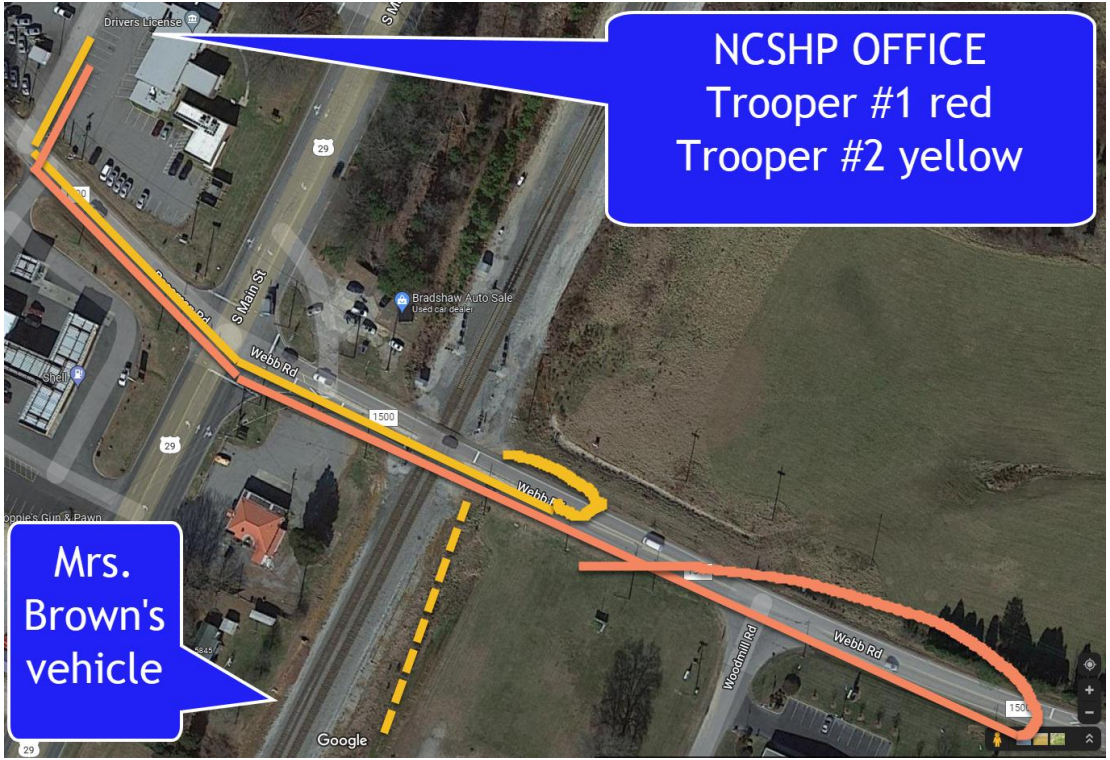
NCDOT BeRailSafe

- ***BeRailSafe is NCDOT's accident prevention and public safety program conducted in a manner consistent with the requirements of Federal laws 49 U.S.C. 5329(f)(3) and (5), 49 U.S.C. 5330(c)(2)(B), and North Carolina Gen. Stat. § 136-18(34) and 136-18(36)(c).***
- (34) [To] conduct, in a manner consistent with federal law, a program of accident prevention and public safety covering all railroads **and to investigate the cause of any railroad accident.**

BeRailSafe PSAP investigative findings

- PSAPs lack rail awareness/inconsistent practices across NC
- PSAP rail training & rail call practices/operations widely varied
- Observed PSAP patterns; no sense of urgency, treated as a low priority call
- PSAP practices contributed to rail incidents (segue to video)
- Need for PSAP survey/study
- NCDOT Research & Development sponsored ITRE survey/study

I NEED HELP, DESPERATELY (video)



I NEED HELP, DESPERATELY

(video)

- Two troopers at NCSHP Office, receive a call of child pedestrian in parking lot struck by car
- Meanwhile Mrs. Brown, stuck on RR tracks calls 911
- NCSHP dash cam video & radio traffic is joined with Mrs. Brown's 911 audio

I NEED HELP, DESPERATELY

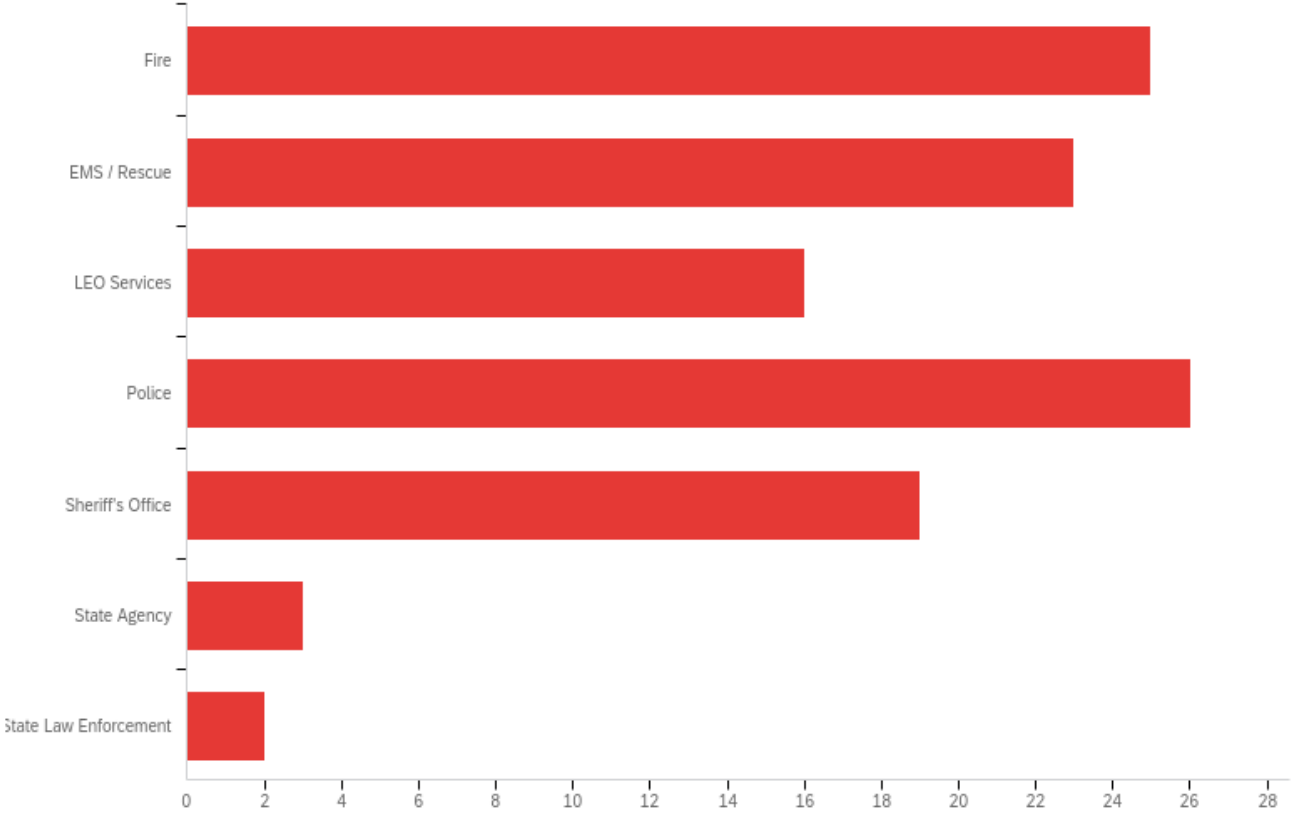
(video)

- WARNING
- Graphic content
- Violent train versus car impact
- I understand if you do not wish to view
- Please step outside the room
- The video is 4:10

Methodology

- Develop survey to assess and evaluate current PSAP call-taking protocols
- Obtain records pertaining to rail-related incidents from PSAPs
- Analyze survey results and records to understand 911 communication and reporting gaps
- Recommend standardized methods to improve response and response time to railroad crashes
- Survey distributed between September 29 and October 14
- 39 respondents

PSAPs support a wide variety of emergency services

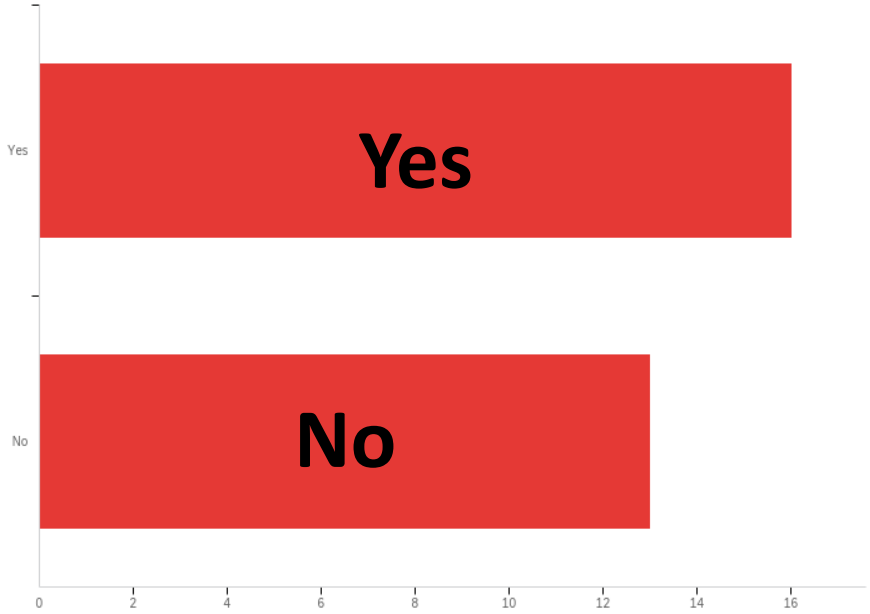


Respondents also noted that they each serve between 1 and 70 departments / agencies
&
17 different railroads in total

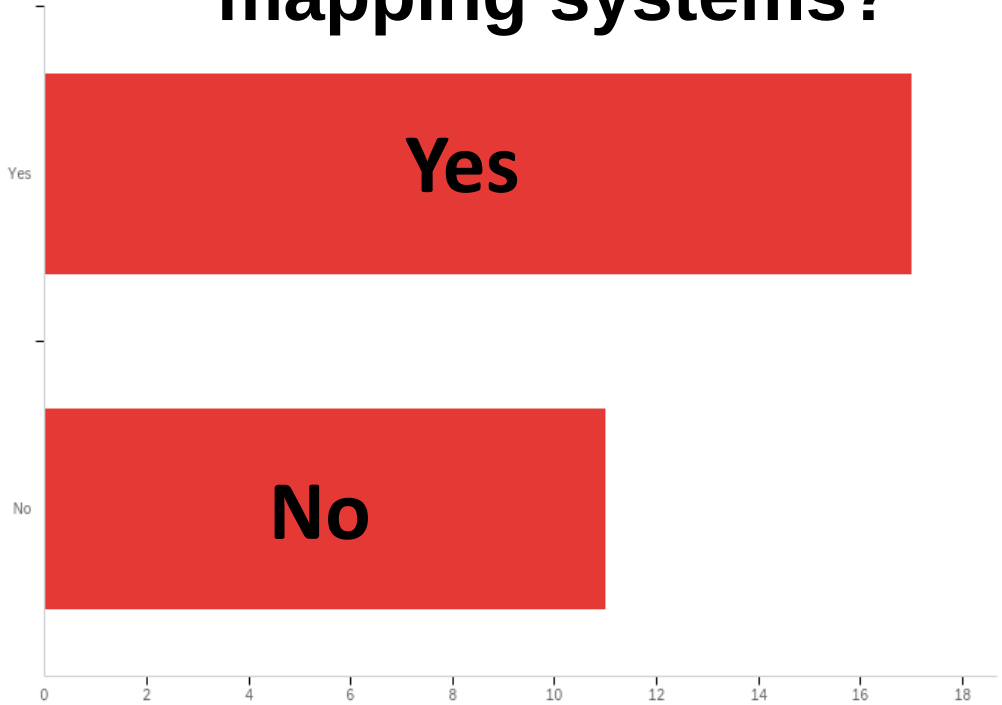
Frequency of rail-related calls per year various tremendously

- 5 reported 0 calls per year
- 21 reported 1 call per month or fewer
- Maximum of 210 calls per year
- Other responses included a couple of times per month up to every other day

Do you have a standardized call-taking protocol for rail-related incidents or incidents that are in close proximity to rail environments?



Do you have railroads indicated in your CAD mapping systems?



Various scenarios were presented to solicit a free-text response about their response.

1. Vehicle Stuck on Track
2. Train - Pedestrian incident
3. Accidents Near Loading Docks
4. Trespassing - Criminal Activity

Check Back With Us for Full Results in the Final Report Soon

Various scenarios were presented to solicit a free-text response about their response.

Hierarchy is Important

- Focus on the most pressing actions (i.e., instruct caller to get out of vehicle, then call the railroad, then call local law enforcement)

Examples:

- *Dispatch the appropriate law enforcement agency to handle this call (request wrecker once on scene) and call the railroad company.*
- *Put in an assist motorist call, send an officer, notify railroad police.*
- *Immediately notify railroad company and law enforcement. Get tow truck on the way.*

Check Back With Us for Full Results in the Final Report Soon

Various scenarios were presented to solicit a multiple-choice response about their response.

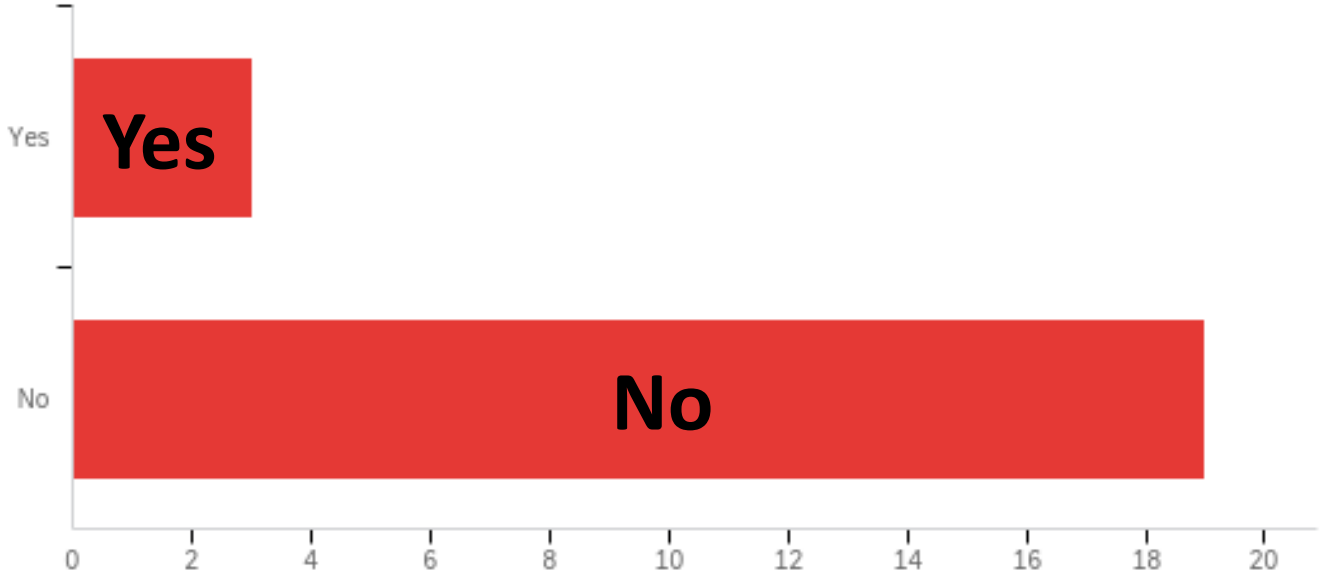
1. Vehicle - Vehicle Crash near Railroad
2. Brush Fire Near Tracks
3. Lost Persons Near Railroad- Railroad Yards
4. False Activation
5. Derailment

Check Back With Us for Full Results in the Final Report Soon

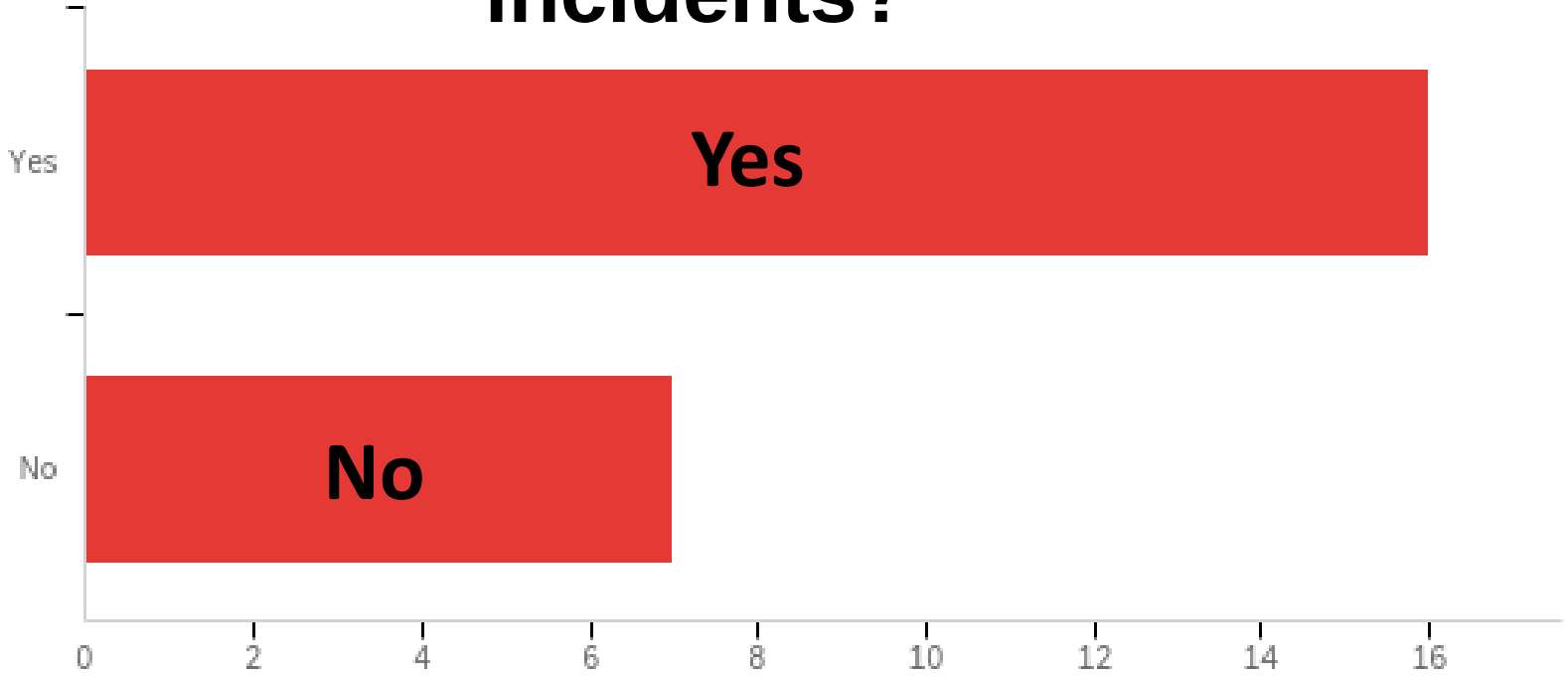
Which terms are you likely to use in free text for rail-related calls?

Term	Responses
Train	21
RR	21
Tracks	19
Railroad	18
Specific Railroad Company Name	17
Stranded Motorist	15
Trespassing	11
Rail	10
Motorist Assist	10
Trespasser	10
Railroad accidents	9
At-grade crossing	3
Locomotive	2
Conductor	2
Engineer	2

Do you have a 10-Code, signal code, other unique identifier or naming convention for rail-related incidents?



Have your staff been provided with training on how to handle rail-related incidents?



Thank you!

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NORTH CAROLINA
Department of Transportation

Pedestrian Strikes at Highway-Rail Grade Crossings
-North Carolina's Experience-

Presented by: Nancy M. Horne, PE
Richard E. Mullinax, PE, PTOE

Pedestrian Strikes at Grade Crossings in North Carolina

- $1.2-Trillion Infrastructure Investments and Jobs Act
  - Passed in October 2021
  - Vulnerable Road User
- Vulnerable Road Users in North Carolina
  - Rail Infrastructure
  - Pedestrian Strikes at Grade Crossings
  - Identify Trends and Impacts

Federal Railroad Administration

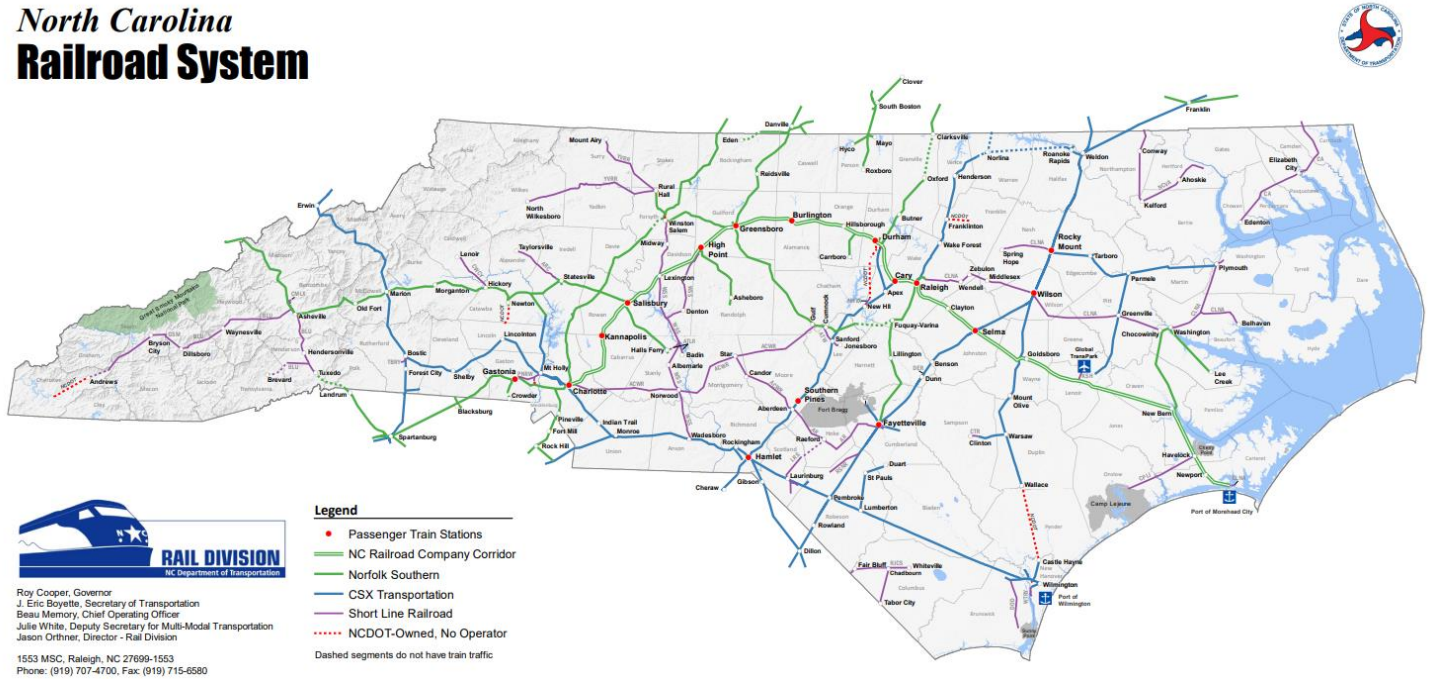
- Trespassing Along Railroad Rights-of-Way is Leading Cause of Rail-Related Deaths in America
- >500 Trespasser Fatalities and Nearly as Many Injuries Annually (One Year Tipping 600)
- From 2012 to 2016, 229 People Died by Suicide and 176 Injured by Attempting Suicide
- Nationally, 74% of Trespassing Incidents Occurred Within 1,000 Feet of a Grade Crossing.

North Carolina in a Glance

- **Population (26% Increase)**
  - 8,326,201 (2002)
  - 10,551,163 (2021)
  - Gained More People Than All Other States in Recent Years Except for Texas, Florida, and Arizona
- **Rail Services**
  - 70% of Population is Within 30-Mile Radius of Passenger Station.
  - 2 Class I and Over 20 Short Line Railroads
  - 7 Intercity Passenger Routes

North Carolina in a Glance

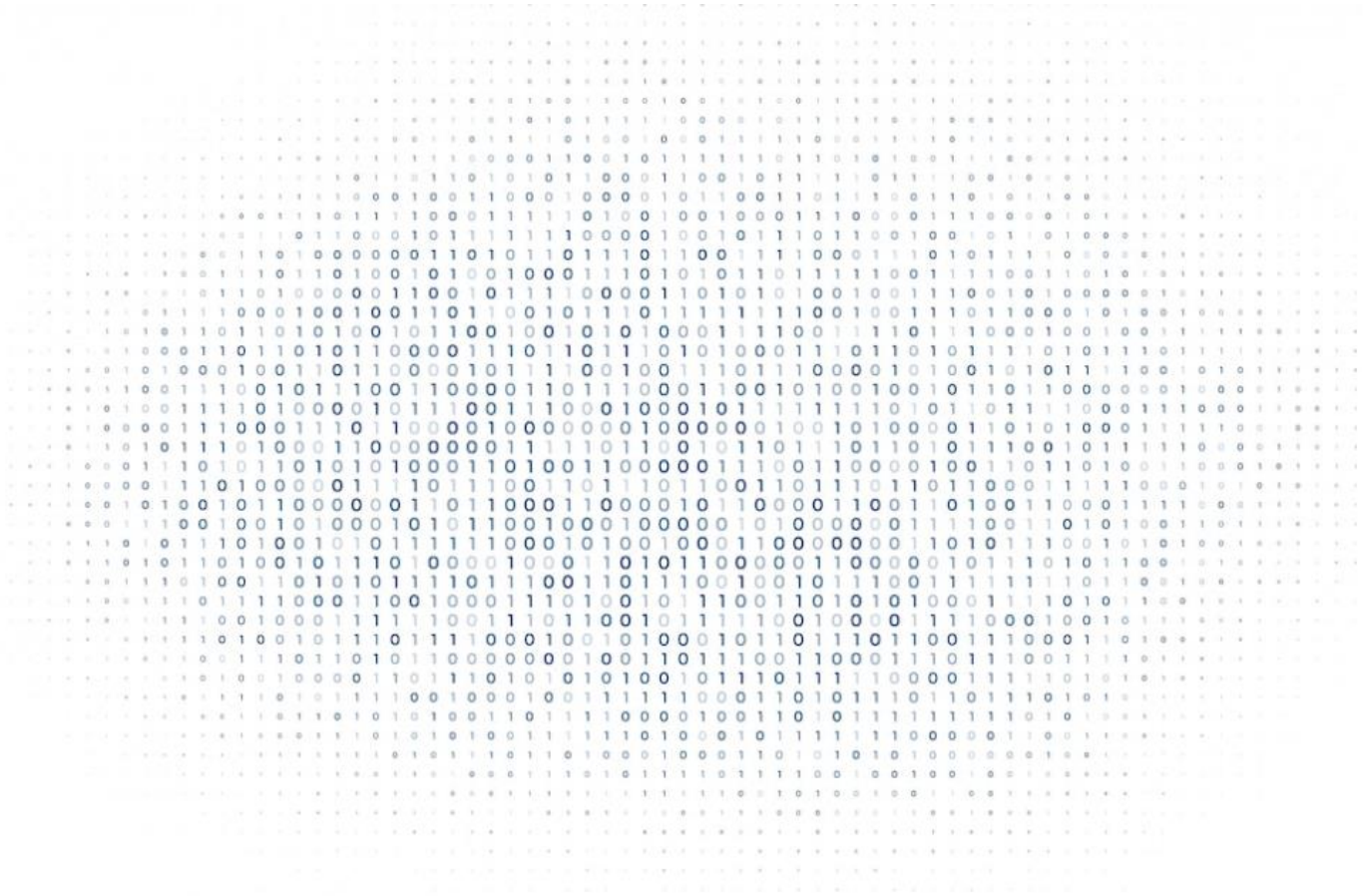
- **Rail Infrastructure**
  - 3,200 Miles of Railroad
  - 6,850 Grade Crossings
    - 3,761 Public
    - 3,089 Private



North Carolina in a Glance

- **3,761 Public Crossings**
  - Class I – 1,901 Active Warning / 558 Passive Warning (77% Active)
  - Short Line – 765 Active Warning / 537 Passive Warning (59% Active)
- **3,089 Private Crossings**
  - Class I – 44 Active Warning / 1,609 Passive Warning (3% Active)
  - Short Line – 28 Active Warning / 1,408 Passive Warning (2% Active)
- **Summary**
  - Active Devices Present at 2,738 Public and Private Crossings (40%)

Data Review



North Carolina Overall Trespassing Statistics

<u>January 1, 2002 to December 31, 2021</u>

(20-Year Period)

652 Reported Pedestrian Strikes
383 Fatalities

- 570 Away From a Grade Crossing
  - 349 Fatalities
- 55 at a Grade Crossing
  - 34 Fatalities

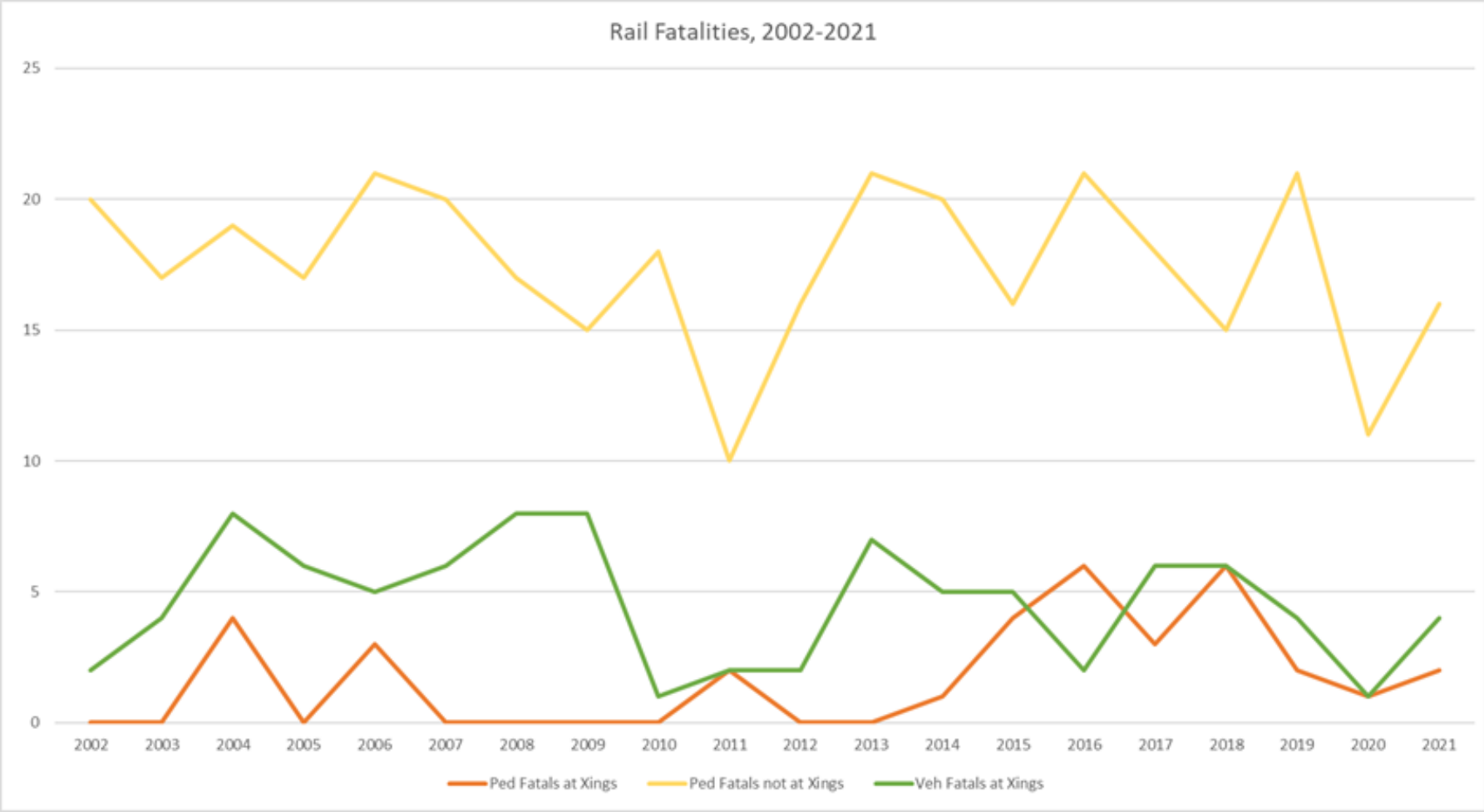
For the 20-Year Period from January 1, 2002 through December 31, 2021 in North Carolina	
91%	of pedestrian strikes along rail infrastructure occurred along railroad right-of-way but away from a grade crossing
9%	of pedestrian strikes along rail infrastructure occurred at a grade crossings

Rail Incidents in North Carolina

Highest Incidents = Vehicles at Grade Crossings

Second Highest Incidents = Pedestrians Not at a Grade Crossing

Rail Fatalities in North Carolina

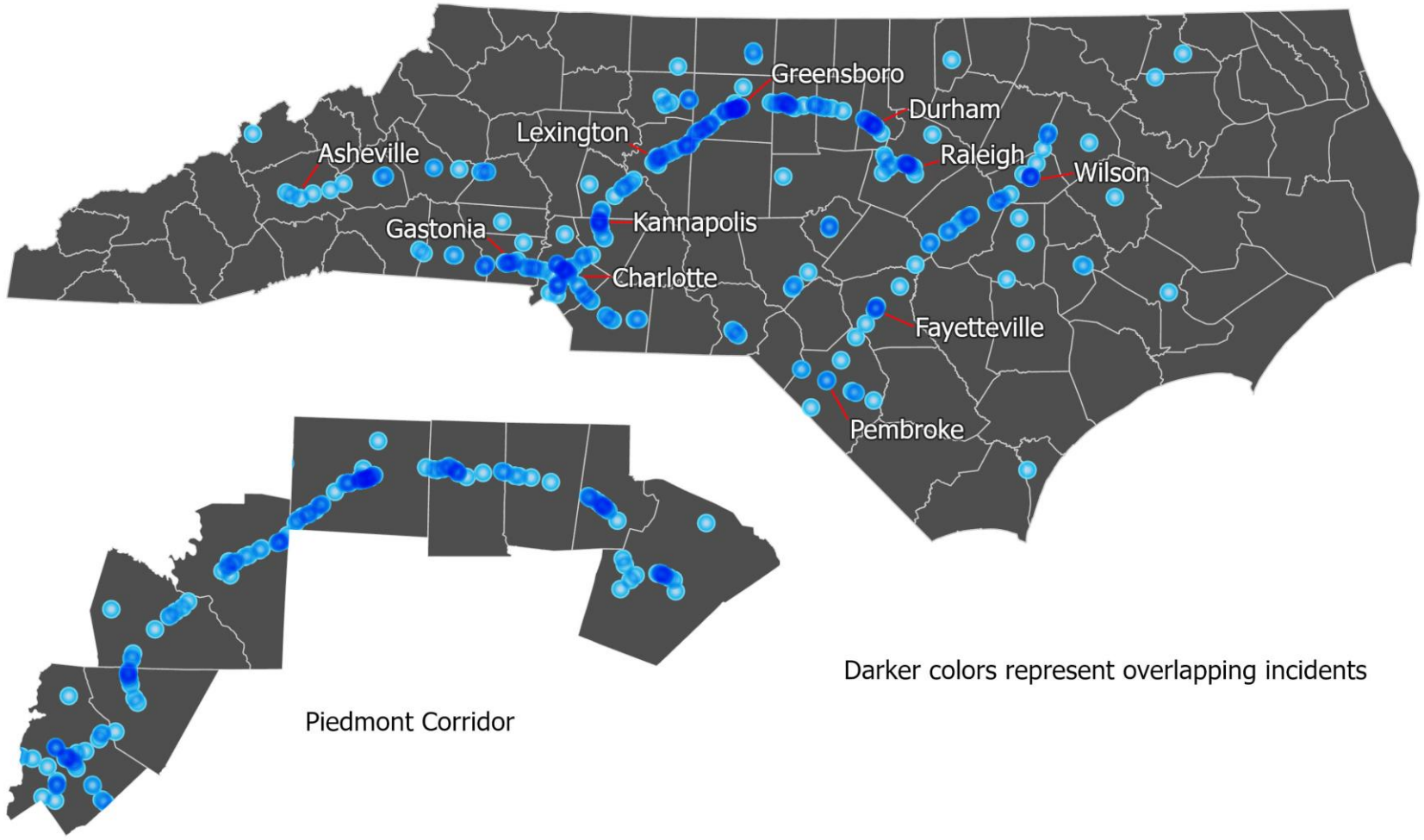


Most Fatalities = Pedestrians Not at a Grade Crossing

Second Highest Fatalities = Vehicles at Grade Crossings

All Pedestrian Incidents

January, 2012 - December, 2021

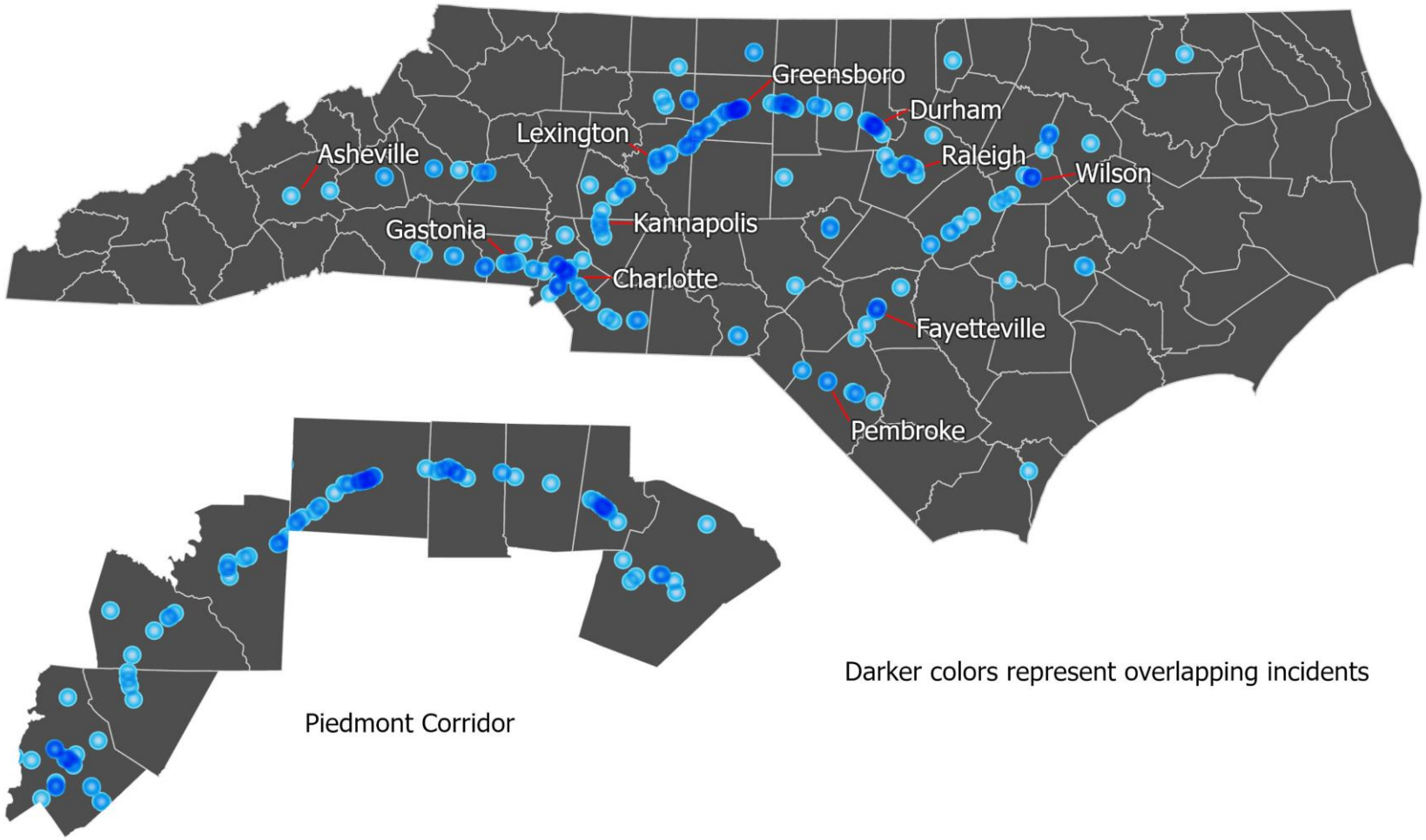


10-Year Period

- 315 Pedestrian Strikes
- 200 Fatalities

Pedestrian Incidents within 1000 feet of a Crossing

January, 2012 - December, 2021



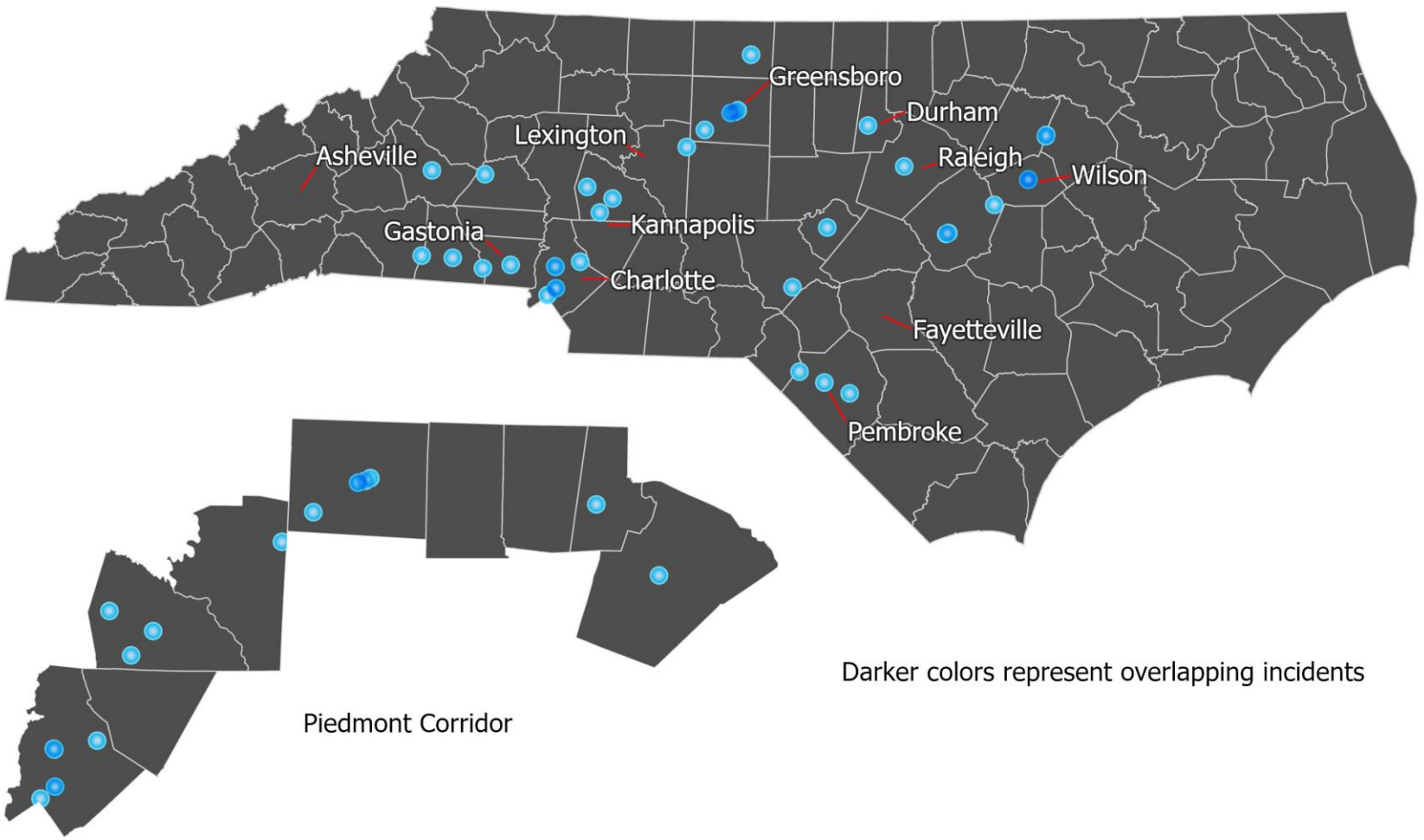
10-Year Period

- 172 of 278 (62%) Pedestrian Strikes were Within 1,000 Feet of a Grade Crossing
- 101 of 175 Fatalities (57%)
- Mean – 1,273 Feet
- Median – 645 Feet

(Figures Exclude Pedestrian Strikes at a Crossing)

Pedestrian Incidents at a Crossing

January, 2012 - December, 2021

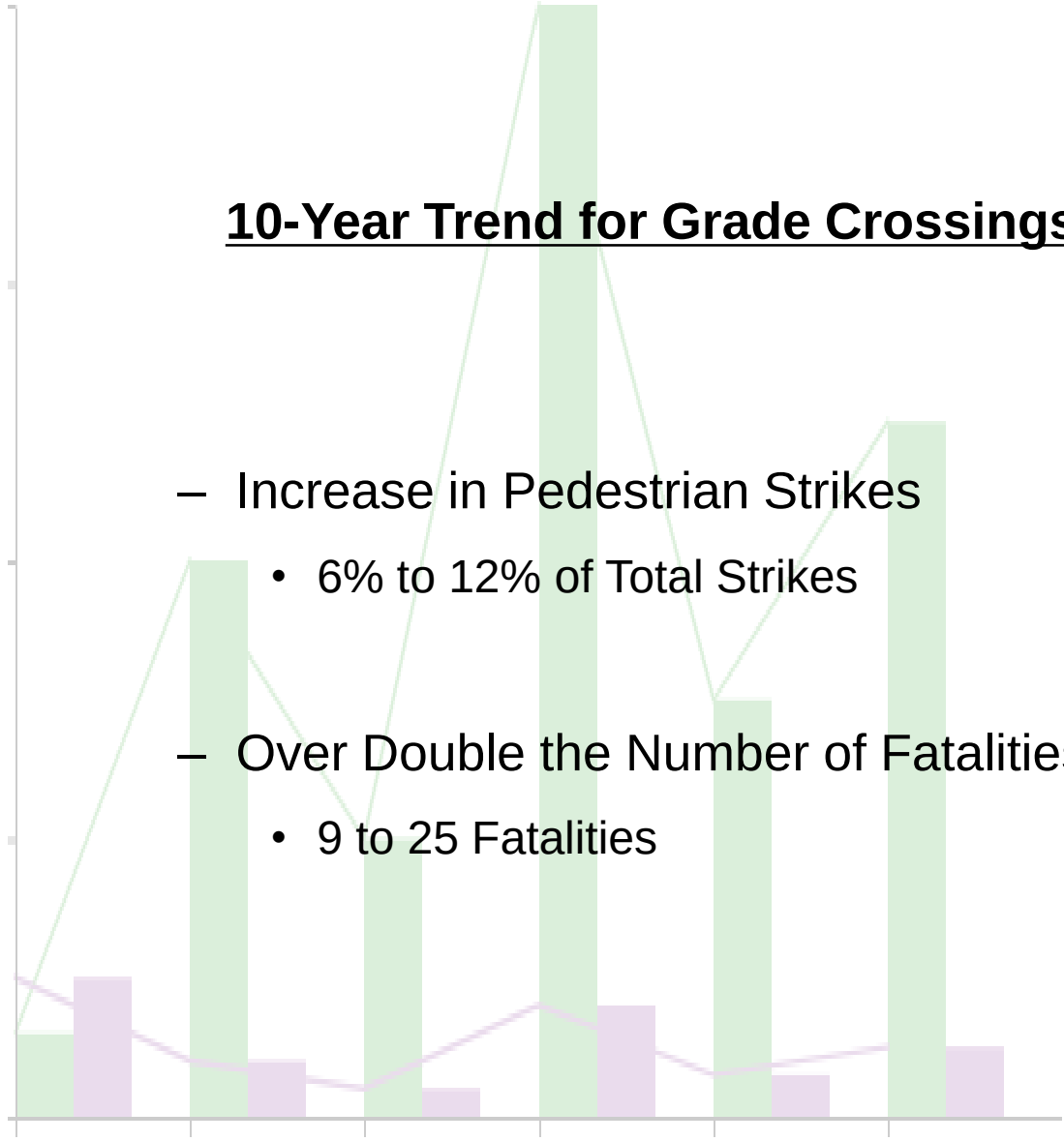


10-Year Period

- 37 Pedestrian Strikes
- 34 Grade Crossings
- 25 Fatalities

Pedestrian Strikes					
January 1, 2002 through December 31, 2021					
Grade Crossing		Not at Grade Crossing		Total	
Strikes	Fatalities	Strikes	Fatalities	Strikes	Fatalities
55	34	570	349	625	383
January 1, 2002 through December 31, 2011					
Grade Crossing		Not at Grade Crossing		Total	
Strikes	Fatalities	Strikes	Fatalities	Strikes	Fatalities
18	9	292	174	310	183
January 1, 2012 through December 31, 2021					
Grade Crossing		Not at Grade Crossing		Total	
Strikes	Fatalities	Strikes	Fatalities	Strikes	Fatalities
37	25	278	175	315	200

10-Year Trend for Grade Crossings



- Increase in Pedestrian Strikes
  - 6% to 12% of Total Strikes
- Over Double the Number of Fatalities
  - 9 to 25 Fatalities

Public and Private Grade Crossings
January 1, 2012 Through December 31, 2021

- **Pedestrian Strikes Are Occurring Mostly Along Class I Railroad Trackage**
  - All 37 Reported Pedestrian Strikes at a Grade Crossing
  - 272 of 278 Pedestrian Strikes Away From a Grade Crossing

- **Higher Number of Pedestrian Strikes at Grade Crossings Involved Freight Trains**
  - 25 Pedestrian Strikes Involved Freight Trains
  - 12 Pedestrian Strikes Involved Intercity Passenger Trains

Pedestrian Facilities

- Pedestrian Facilities at Grade Crossings
  - No Pedestrian Facilities
  - Pedestrian Facilities in Vicinity of Crossing (But Not at the Crossing)
  - Sidewalk Approaches to the Crossing but Poor Connectivity (Does Not Provide a Continuous Walkway)
  - Sidewalk Continues Through the Crossing with Good Connectivity

- Sidewalk Location
  - Inside of Vehicular Gates
  - Outside of Vehicular Gates
  - Combination (Inside, Outside)

Pedestrian Facilities (Examples)

No Pedestrian Facilities

Pedestrian Facilities in the Vicinity
(But Not at the Crossing)

Pedestrian Facilities (Examples)

Sidewalk Approaches the Crossing but Poor Connectivity

(Same Crossing - One Approach Without Sidewalk)

Pedestrian Facilities (Examples)

Sidewalk Continues Through the Crossing

Pedestrian Facilities

Presence or Lack of Pedestrian Facilities Not a Contributor to Pedestrian Strikes

- 12 Pedestrian Strikes – No Pedestrian Facilities
  - No Crossing Had More Than 1 Strike.
- 25 Pedestrian Strikes – Pedestrian Facilities
  - 3 Crossings Had 2 Strikes Each
  - 19 Crossings Had 1 Strike Each
  - 22 Crossings Total
    - 11 Crossings With Sidewalk Through Crossing / Good Connectivity
    - 3 Crossings with Sidewalk Approaching Crossing / Poor Connectivity
    - 8 Crossings Pedestrian Facilities in Vicinity of Crossing

Pedestrian Facilities	Percent of Total
Sidewalk Continuity / Connectivity Through Crossing	32%
Sidewalk Approaches / Poor Connectivity / Continuity Through Crossing	9%
Pedestrian Facilities in Vicinity of Crossing	24%
No Pedestrian Facilities Present	35%
Total	100%

Sidewalk Location

Sidewalk Location Appeared to Have Minimal Impact on Prevalence of Pedestrian Strikes

11 Crossings With Sidewalk Through Crossing / Good Connectivity

- 5 Sidewalk Inside
- 2 Sidewalk Outside
- 4 Combination (Inside/Outside)

Crossing Protection

Almost All Grade Crossings Which Experienced a Pedestrian Strike Had Active Warning Devices

- 32 Public Grade Crossings
  - 4 Four-Quadrant Gated Protection
  - 25 Two-Quadrant Gated Protection
  - 3 Flashing Lights Only
- 2 Private Grade Crossings
  - Both Passive Protection

Suicide and Drug Abuse

Suicide and Drug Abuse Is a Significant Issue

Suicide May Actually Be Under-Reported

- 32% Pedestrian Strikes at Grade Crossings Provided Anecdotal Evidence of Suicide or Drug Abuse Issues
  - 10 Involved Freight Train
  - 2 Involved Passenger Train

- Mostly an Urban Issue
  - 9 in Urban Locations
  - 3 in Rural Locations

The National Suicide Prevention Lifeline is now: 988 Suicide and Crisis Lifeline

988 has been designated as the new three-digit dialing code that will route callers to the National Suicide Prevention Lifeline. While some areas may be currently able to connect to the Lifeline by dialing 988, this dialing code will be available to everyone across the United States starting on July 16, 2022.

Other Causes

- **Other Possible Suicides or Mental Health Related?**
  - walked past active signals & gates into train*; standing on crossing; standing close to #1 main track had back turned to train…did not respond to train horn & bell; walked into path of train sounding horn…failed to acknowledge hearing train horn; (motorized wheelchair) was stopped on the crossing for unknown reasons
- **Maybe Playing Games?**
  - stood in front of train…attempted to jump out of way
- **Environmental Related?**
  - walking east toward the tracks with sun in …. face and hood pulled up, stepped into path of train
- **Intentionally Violating Active Warning Devices?**
  - walked past active signals & gates into train*; violated activated crossing signals and gates; exited passenger side of vehicle to manually lift gates and struck trying to beat the train; **killed trying to beat train** after going around lowered crossing arms
- **Unknown / Lack Detail**
  - struck by train while attempting to walk across crossing; struck a pedestrian; fatally struck at crossing; struck a pedestrian at the crossing; walked in front of a freight train

Legal / Policy

- **Disclaimer: References to certain general statutes herein are provided solely for education and awareness. Information should not be considered as legal advice nor interpreted as the practice of law.**

Adequacy of Grade Crossing Warning Devices

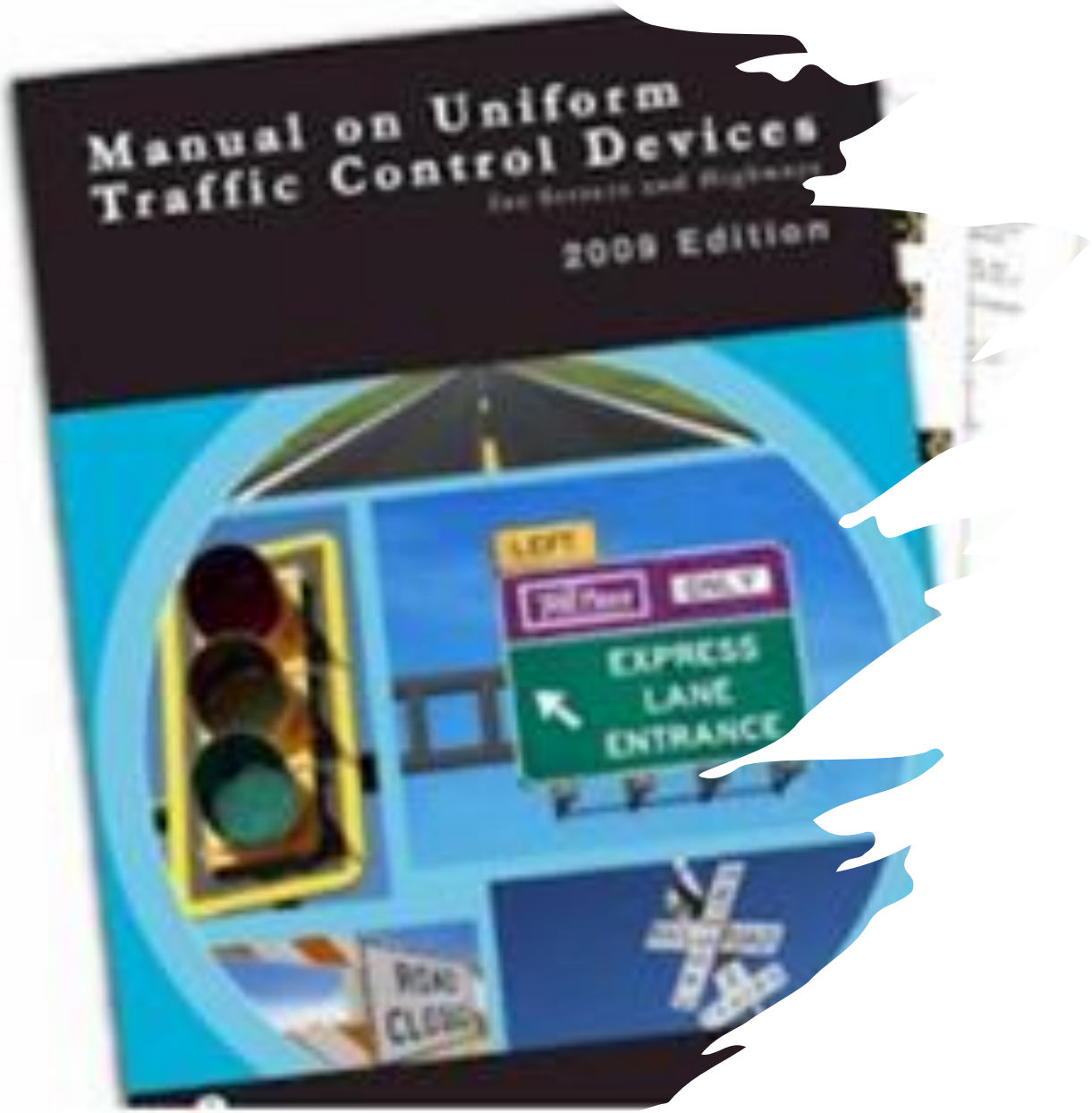
- Federal Railroad Administration

  "*Public Grade Crossings are Roadways under the Jurisdiction of, and Maintained by, a Public Authority.*"

- United States Supreme Court - Norfolk Southern Railway Co. v Shanklin (April 17, 2000)
- Diagnostic Team

Sidewalk Authority in North Carolina

- NCDOT (NCGS 136-18)
  - Broad Powers Over State Highway System
  - Generally Silent on Sidewalk
- Local Municipalities (NCGS 160A-296)
  - Specifically Grants Authority and Control for Sidewalk

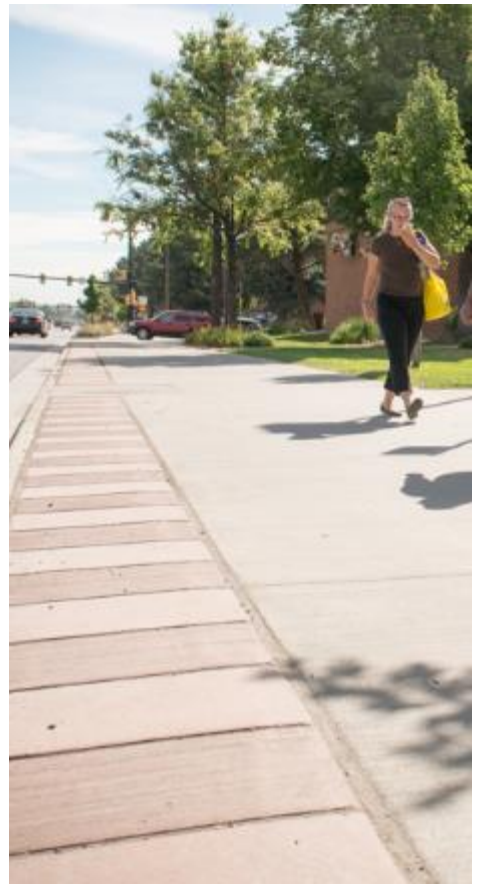


Manual on Uniform Traffic Control Devices (MUTCD)

- Compliance With the MUTCD is Mandatory for Any Street Open to Public Travel.
  - (23 CFR Part 655, Subpart F and NCGS 136-30(a) & (d))
- MUTCD Standards Are Applicable to All Public Grade Crossings.
  - (MUTCD Introduction, Paragraph 1)
- MUTCD Standards Are Not Applicable to Private Grade Crossings.
  - (23 CFR 655.603(a) and MUTCD Section 1A.13, Definition 159 - Private Road Open to Public Travel)
- Part 4 – Highway Traffic Signals
- Part 8 – Railroad and Light Rail Transit Grade Crossings

NCDOT Pedestrian Policy (August 1993)

- May Construct Sidewalk Adjacent to a State Highway Project
  - Local Government Request
- Local Government to Reimburse NCDOT Unless Sidewalk is Existing
  - Except Incidental Projects (Cost Share Based on Population)
- Local Government to Maintain Sidewalk
- Does Not Allow Reduced Lane Width for Pedestrian Facilities



NCDOT Complete Streets (July 2009)

- Consider and Incorporate All Modes of Transportation in Projects
- Collaborate with Local Governments
- NCDOT to Fund Full Cost of Bicycle and Pedestrian Features
  - Qualifying Plan & Complete Streets Evaluation Process

Safety Projects Such as Grade Crossing Improvements are Exempt from Complete Streets

Maintenance of Crossing Warning Devices

- Railroad Maintains Crossing Warning Devices
- Road Authority Reimburses Railroad 50% of Maintenance Costs
  - State Highway System – NCGS 136-20(h)
    - Intersection of Railroad and Road on State Highway System
  - Local Streets – NCGS 160A-298(c)
    - Cost of Maintaining Signs, Signals, Gates, Lights, and Other Safety Device
- Pedestrian Gate
  - None Currently in North Carolina
  - Maintenance Payments
    - Local Street
    - State Street

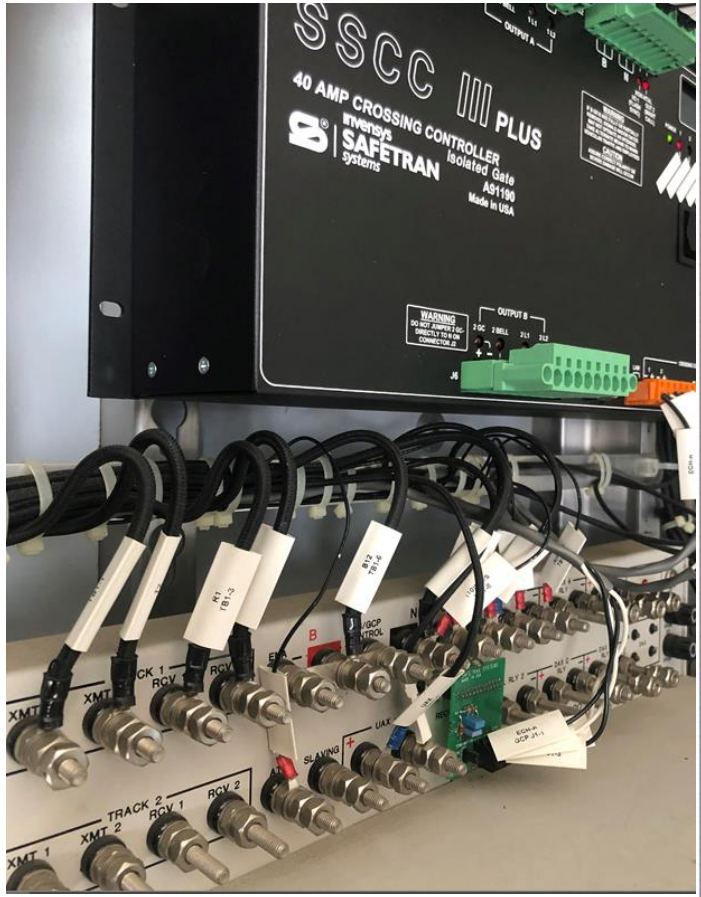
Maintenance Costs

- Maintenance Rates (Updated Every 5 Years)
  - Class 1: Flashing Lights / One Track……$1,184 (Total $2,368)
  - Class 2: Flashing Lights / Multiple Tracks……$1,564 (Total $3,128)
  - Class 3: Flashing Lights & Gates / One Track…….$1,784 (Total $3,568)
  - Class 4: Flashing Lights & Gates / Multiple Tracks….$2,241 (Total $4,482)
  - Class 5: Preempted Highway Traffic Signals……$ 708 (Total $1,416)

- Pedestrian Gates (Estimated)
  - Initial Installation……$125,000 - $150,000 (Typical)
  - Fencing……..$100,000 +/-
  - Annual Maintenance……..……..$3,000 to $4,000

NCDOT Maintenance (2022) = $3,376,756

Next Maintenance Rate Adjustment – July 1, 2024




Engineering

Sidewalk and Pedestrian Gates

- **MUTCD Proposed Language**
  - Sidewalk Should Be Outside the Vehicular Gates.
  - Pedestrian Gates Allowed, But Must Be Provided Where Train Speeds Exceed 80 MPH.
  - Where Pedestrian Gates Are Provided, an Escape Route Should Be Provided.
  - Pedestrian Gates Should Provide Full Coverage of Sidewalk/Pathway

- **North Carolina – Rail Division Practice**
  - Provide Tactile Pads as Warranted for Sidewalks
  - Sidewalk Preferred Outside of Vehicular Gates.
  - Unable to Determine a Statistical Need or Warrant For Pedestrian Gates in North Carolina From Review of Data

  (Will Consider With Engineering Study Supported by Diagnostic Team Consensus)

Remember


REPORT PROBLEM
OR EMERGENCY
1-800-555-5555
X-ING 836 597 H
XYZ RAILROAD

Conclusion

The Presenters Wish to Acknowledge the Following Contributors Without Whom This Presentation Would Not Have Been Possible

- Mr. Chris Raichle
- Mr. David Mathern

Contact Us

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Thank You

Questions

Grade Crossing Safety and Railroad Trespass Prevention Workshop

Day 3 Session One

RAIL

MOVING AMERICA FORWARD

Discussion on Future Research Needs Topics

North Carolina Grade Crossing Safety and Railroad Trespass Prevention Workshop

November 3, 2022

FRA Crossing Safety and Trespass Prevention Research Program

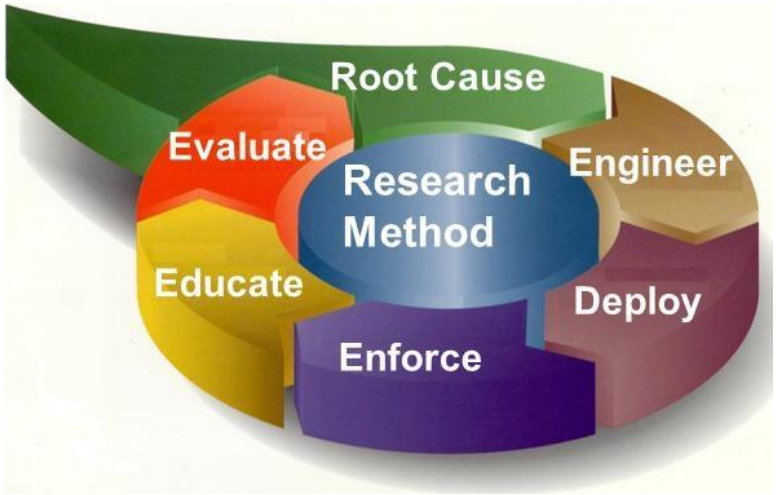
FRA's Office of RD&T conducts research to improve grade crossing (GX) safety and trespass prevention by developing and evaluating human factors and engineering solutions, funding research, and working in partnership with railroads, universities, vendors, and local governments.

Goal

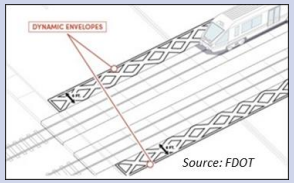
- Analyze crash causation and develop safety countermeasures, programs, and guidance to reduce the number of casualties at grade crossings and along railroad rights-of-way (ROW)

Research Method

- Research the root cause of incidents and fatalities
- Identify corrective actions
  - Engineering, Enforcement, Education
- Engage stakeholders/deploy and evaluate solutions



Impact of FRA R&D Research

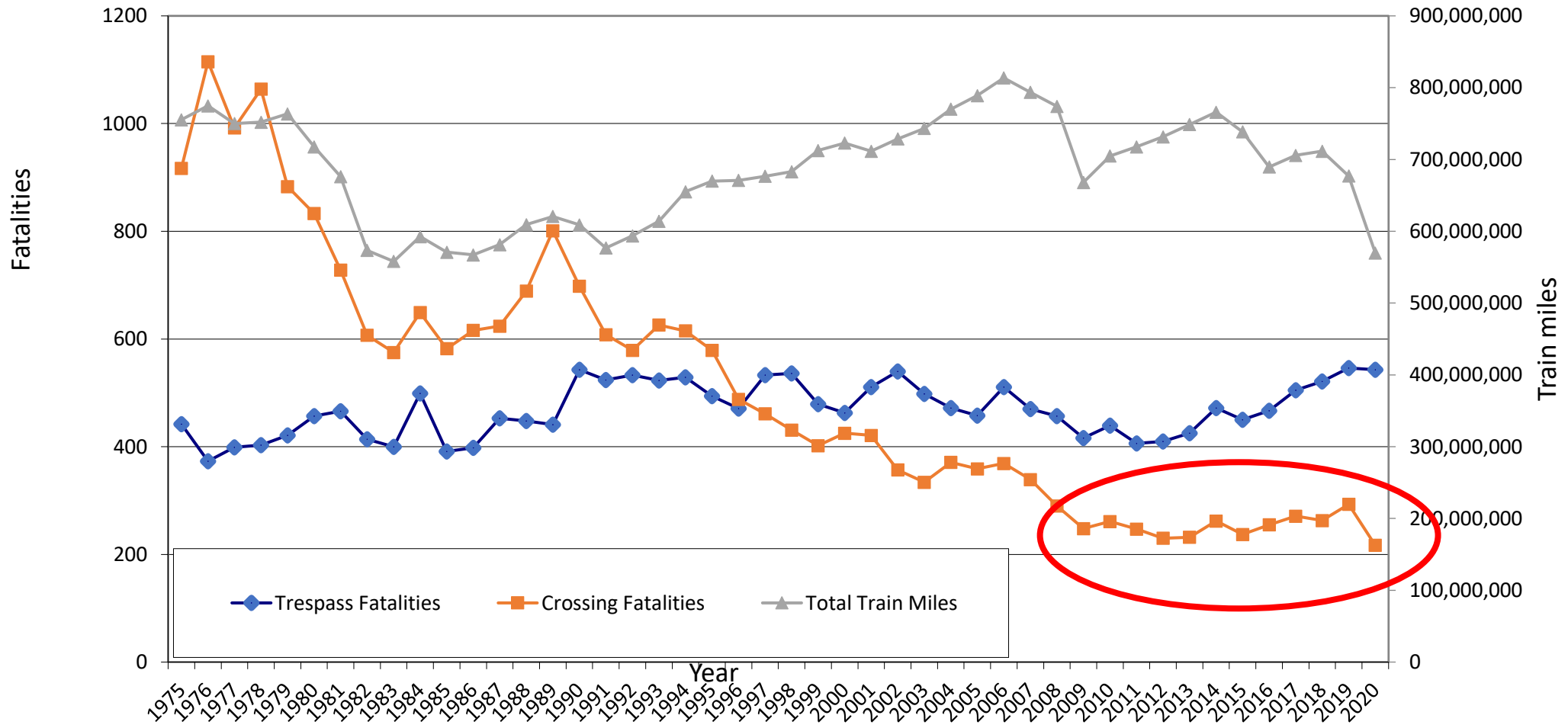
Research Topic	Product		Impact	Implementation	Partners
Vehicle ROW Incursion Prevention	**Pavement markings** through the crossing and reflective markers and flexible delineators on both sides and in between the tracks		**85% reduction** in frequency of vehicles turning onto the tracks in initial FRA/Volpe study (2016-2018) **86% train delay reduction** in FRA/Volpe study of LIRR implementation (2018-2019)	Systemwide implementation by LIRR (296 crossings) upon initial study (2018) Brightline installation 2022-2023	SunRail, LIRR, Volpe
Pedestrian ROW access at Crossings	**Anti-trespass panels**		**38% reduction** in pedestrian violations in initial FRA/Volpe study (2014-2016)	MTA Metro-North: 1 crossing (2022) Chicago Transit Authority: 20+ crossings (2019-) Metrolinx (Canada): 18 crossings (2020)	Arkansas and Missouri Railroad, CTC, Volpe
Vehicles Stopping on Tracks	Pavement markings on the **dynamic envelope zone** and signage on approach		**15% decrease** in vehicles stopping on tracks in FRA/Volpe study (2012-2014)	Florida DOT: 4,000 crossings (2020); CRISI funding Brightline: 333 crossings (2022-2023, RAISE funding)	Florida DOT, Volpe
Photo Enforcement-Based Driver Education	Use of **automated photo enforcement** for driver education at highway-rail grade crossings		Over **17% reduction** in grade crossing violations in FRA/Volpe study (2016-2018)	Multiple locations in South Florida by Brightline (2022)	City of Orlando FL, Sensys America, Volpe
Pedestrian Gate Violations	**Gate Skirts**		**55% reduction** in pedestrian horizontal gate violations in initial FRA/Volpe study (2012-2013)	FHWA Noteworthy Practice (2019) Proposed MUTCD Revision (2022?)	NJDOT, NJT, ConnDOT, Volpe

FRA R&D Program

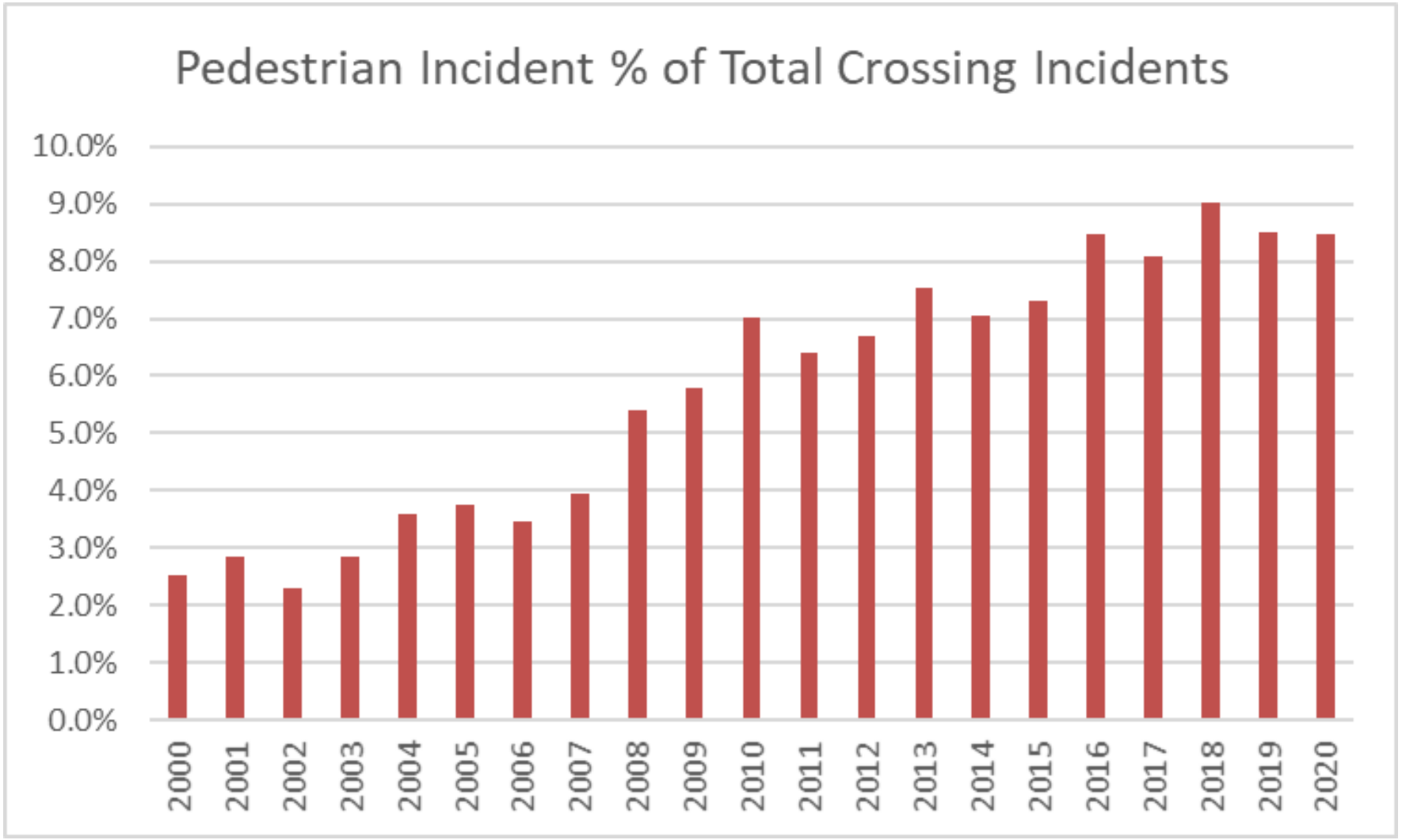
Procurement Strategies

- Most of the R&D work sponsored by FRA is conducted by contractors and grantees.
- Research providers include research institutions, universities and consulting firms.
- Research projects may be funded by FRA through grants and cooperative agreements, primarily with non-profit institutions and universities.
- Broad Agency Announcement (BAA)
- Small Business Innovative Research (SBIR)
- Transportation Research Board (TRB)
  - Innovations Deserving Exploratory Analysis (IDEA) Program
  - National Cooperative Rail Research Program (NCHRP)

Crossing and Trespass Data



Crossing and Trespass Data



Discussion on Future Research Needs Topics

Objective: Solicit new ideas from the workshop attendees on prospective new or expanded

- Initiatives
- Strategies
- Programs
- Research projects

2015 Right-of-Way Fatality and Trespass Prevention Workshop

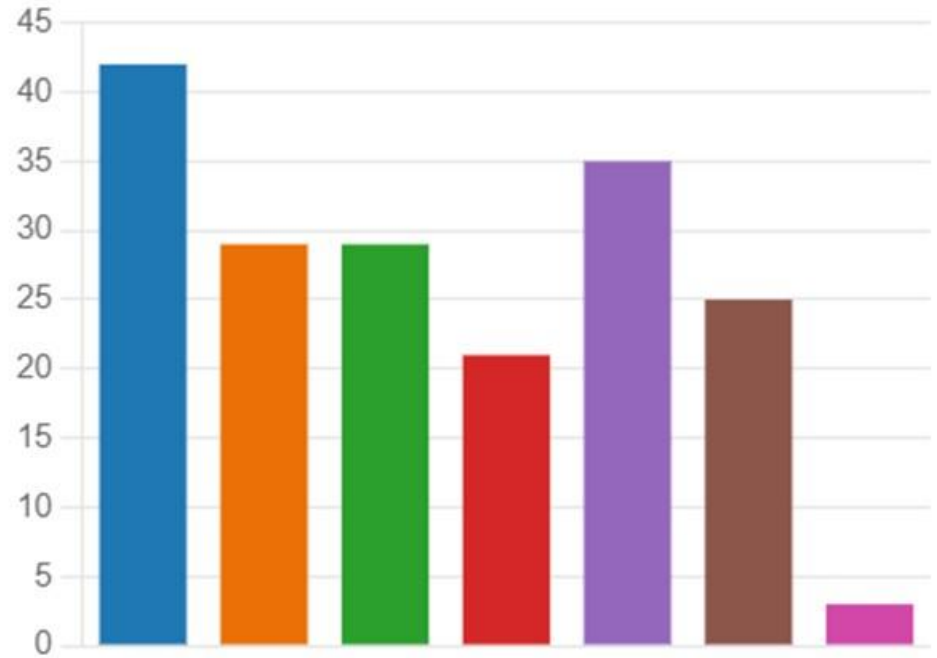
Discussion on Future Research Needs Topics

Feedback received from the trespass sessions on Day 1

6. What railroad trespass topics would you like more information about, or think more research is needed? (select all that apply)

More Details

Engineering treatments	42
Education programs	29
Enforcement initiatives	29
Suicide prevention	21
Pedestrian treatments at crossin...	35
Outreach activities	25
Other	3



Discussion on Future Research Needs Topics

Trespass Research Needs Feedback

- More research of social media methods to increase rail safety
- How to recruit/train officers for greater outreach
- Determining numbers of "unreported" incidents which don't involve train strikes or other injuries
- How to engage the local and state elected officials
- Engineering solutions for pedestrian trespassers
- Technology Implementation Research
- A focused national strategy to inform the public on trespassing and the Blue Sign
- More research on reasons for trespassing
- Enforcement and education program ideas & successes
- Low cost treatments

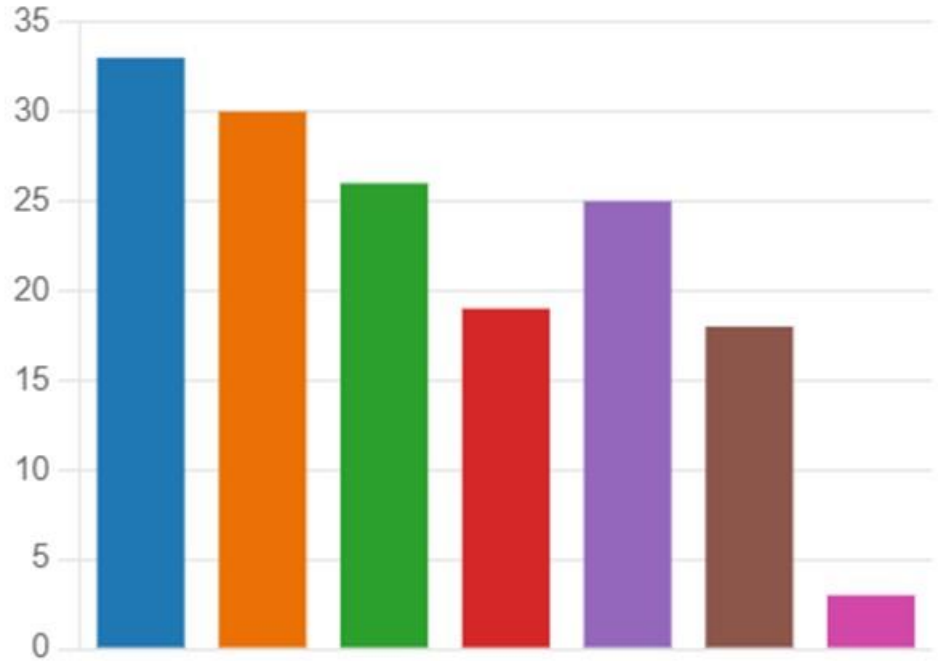
Discussion on Future Research Needs Topics

Feedback received from the grade crossing sessions on Day 2

6. What grade crossing safety topics would you like more information about, or think more research is needed? (select all that apply)

More Details

Engineering treatments	33
Education programs	30
Enforcement initiatives	26
Suicide prevention	19
Pedestrian-specific treatments a...	25
Outreach activities	18
Other	3



Discussion on Future Research Needs Topics

Grade Crossing Research Needs Feedback

- ENS sign placement
- More enforcement ideas
- More educational initiatives
- Railroad education and media coverage
- Public outreach
- Suicide prevention
- Information dissemination with other State DOTs
- Improved identification of locations that see frequent non-strike
- Dispatcher/911 and or 1st responder dispatcher protocol training

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What are some other issues you are seeing that we have not covered?

What do you think are the current gaps in research?

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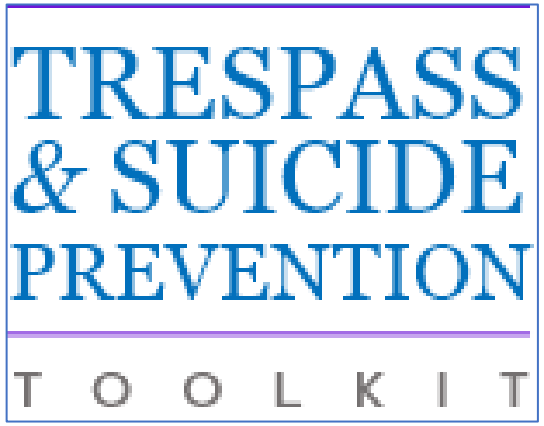
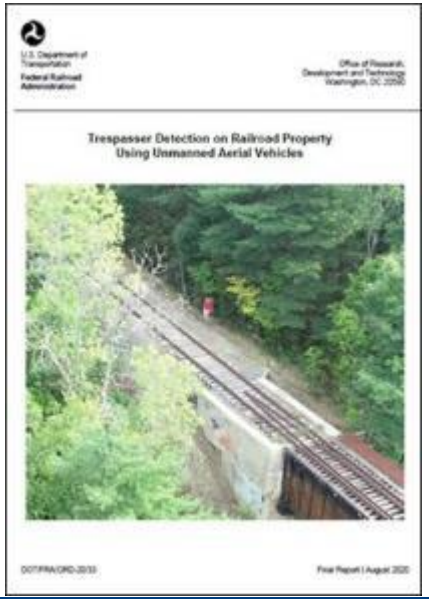
- FRA Trespass & Suicide Prevention Toolkit (2022): https://trespasstoolkit.fra.dot.gov/





Contact

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Federal Railroad Administration
1200 New Jersey Avenue, SE
Washington, DC 20590
(202) 493-0800
Francesco.Bedini@dot.gov

Grade Crossing Safety and Railroad Trespass Prevention Workshop

Day 3 Session One

RAIL

MOVING AMERICA FORWARD

Discussion on Future Research Needs Topics

North Carolina Grade Crossing Safety and Railroad Trespass Prevention Workshop

November 3, 2022

FRA Crossing Safety and Trespass Prevention Research Program

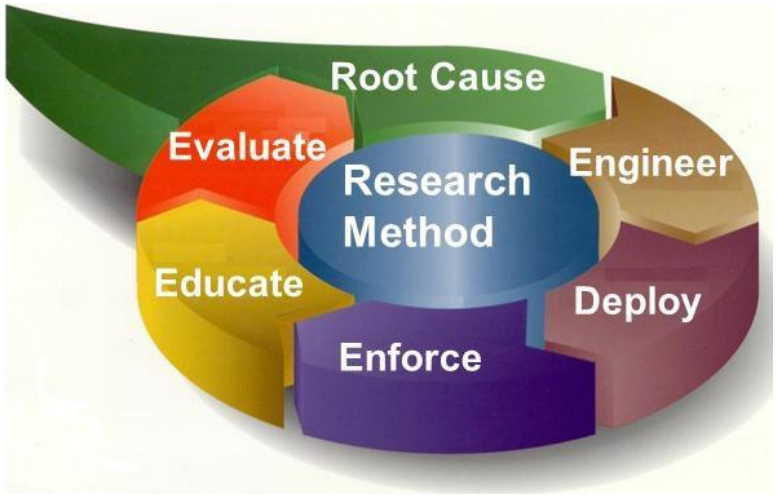
FRA's Office of RD&T conducts research to improve grade crossing (GX) safety and trespass prevention by developing and evaluating human factors and engineering solutions, funding research, and working in partnership with railroads, universities, vendors, and local governments.

Goal

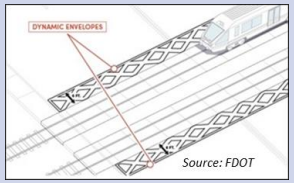
- Analyze crash causation and develop safety countermeasures, programs, and guidance to reduce the number of casualties at grade crossings and along railroad rights-of-way (ROW)

Research Method

- Research the root cause of incidents and fatalities
- Identify corrective actions
  - Engineering, Enforcement, Education
- Engage stakeholders/deploy and evaluate solutions



Impact of FRA R&D Research

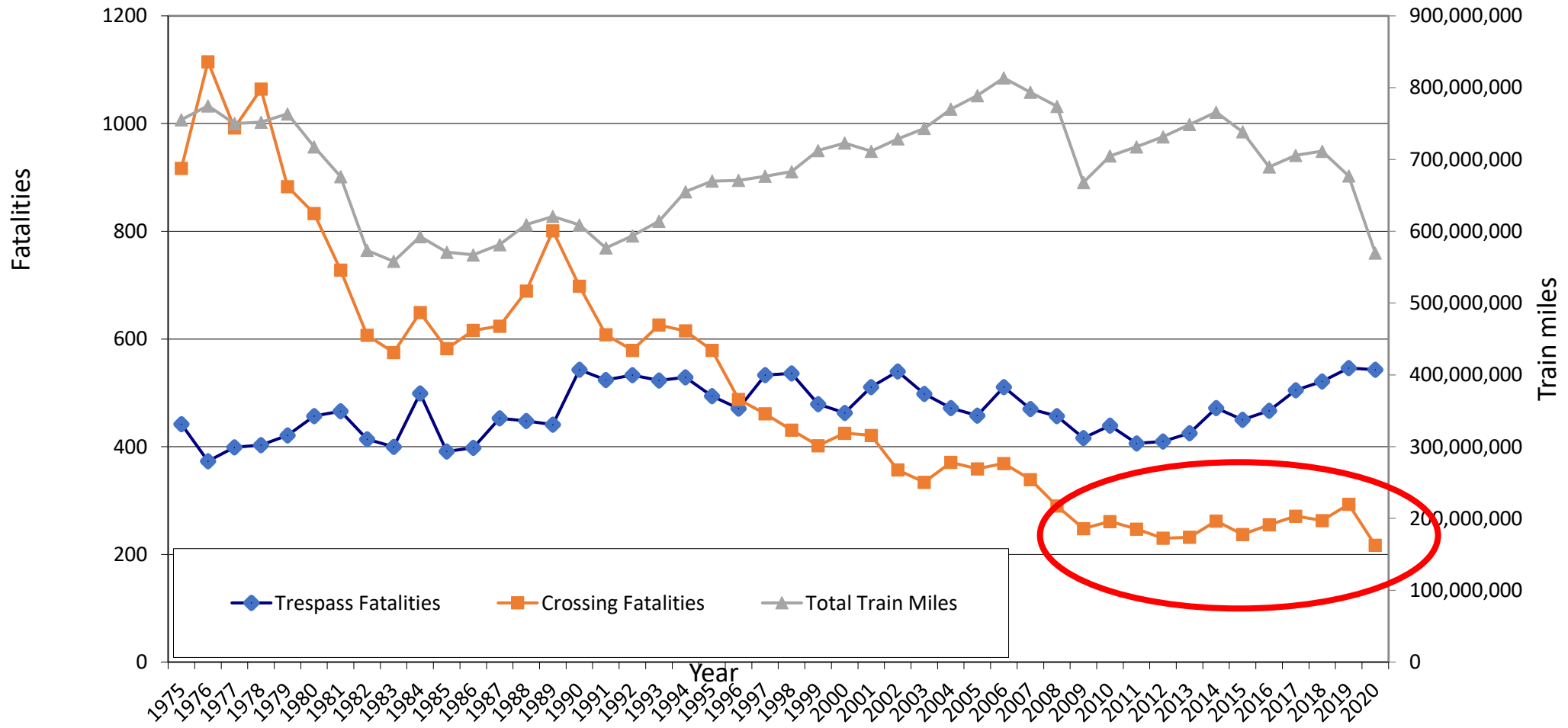
Research Topic	Product		Impact	Implementation	Partners
Vehicle ROW Incursion Prevention	**Pavement markings** through the crossing and reflective markers and flexible delineators on both sides and in between the tracks		**85% reduction** in frequency of vehicles turning onto the tracks in initial FRA/Volpe study (2016-2018) **86% train delay reduction** in FRA/Volpe study of LIRR implementation (2018-2019)	Systemwide implementation by LIRR (296 crossings) upon initial study (2018) Brightline installation 2022-2023	SunRail, LIRR, Volpe
Pedestrian ROW access at Crossings	**Anti-trespass panels**		**38% reduction** in pedestrian violations in initial FRA/Volpe study (2014-2016)	MTA Metro-North: 1 crossing (2022) Chicago Transit Authority: 20+ crossings (2019-) Metrolinx (Canada): 18 crossings (2020)	Arkansas and Missouri Railroad, CTC, Volpe
Vehicles Stopping on Tracks	Pavement markings on the **dynamic envelope zone** and signage on approach		**15% decrease** in vehicles stopping on tracks in FRA/Volpe study (2012-2014)	Florida DOT: 4,000 crossings (2020); CRISI funding Brightline: 333 crossings (2022-2023, RAISE funding)	Florida DOT, Volpe
Photo Enforcement-Based Driver Education	Use of **automated photo enforcement** for driver education at highway-rail grade crossings		Over **17% reduction** in grade crossing violations in FRA/Volpe study (2016-2018)	Multiple locations in South Florida by Brightline (2022)	City of Orlando FL, Sensys America, Volpe
Pedestrian Gate Violations	**Gate Skirts**		**55% reduction** in pedestrian horizontal gate violations in initial FRA/Volpe study (2012-2013)	FHWA Noteworthy Practice (2019) Proposed MUTCD Revision (2022?)	NJDOT, NJT, ConnDOT, Volpe

FRA R&D Program

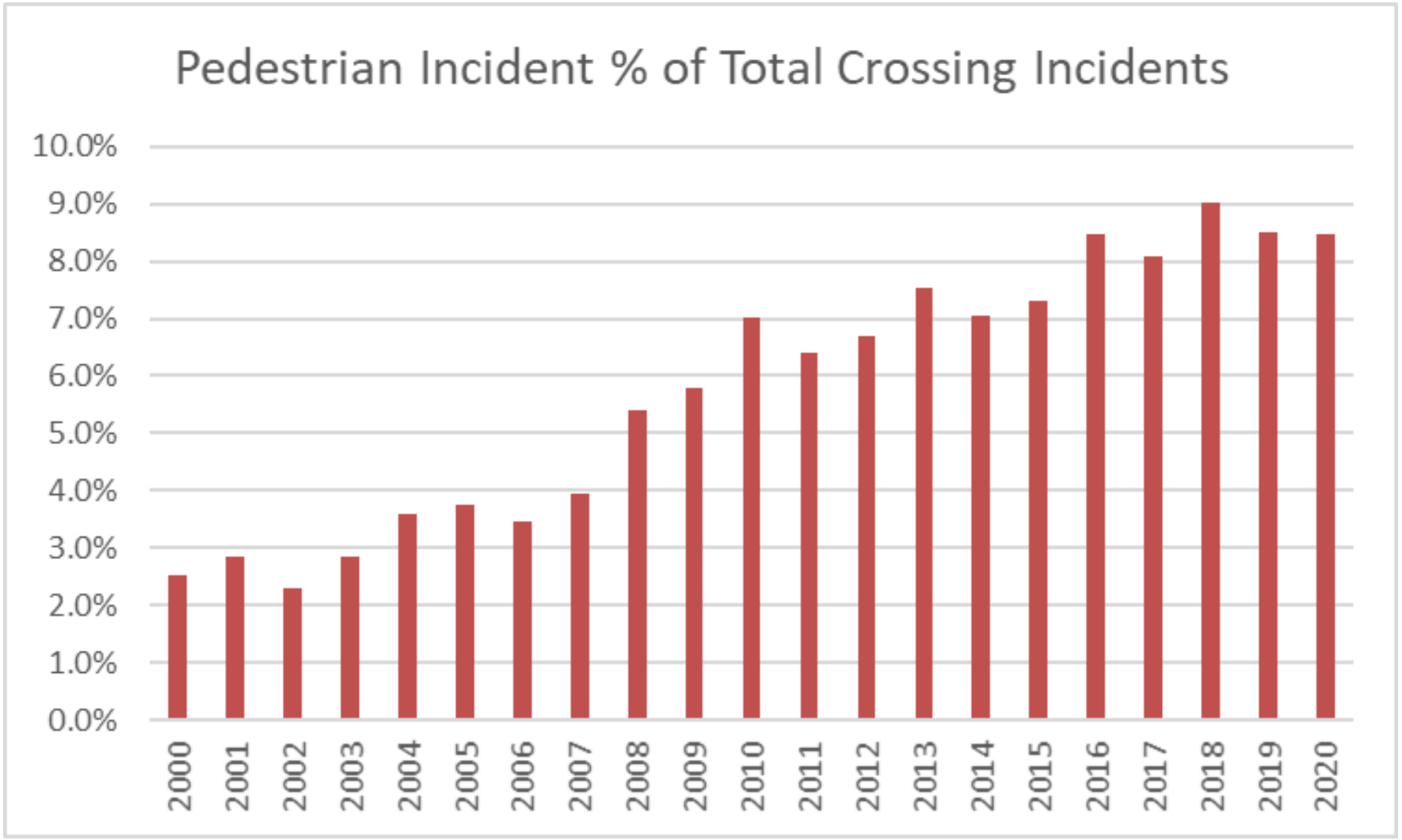
Procurement Strategies

- Most of the R&D work sponsored by FRA is conducted by contractors and grantees.
- Research providers include research institutions, universities and consulting firms.
- Research projects may be funded by FRA through grants and cooperative agreements, primarily with non-profit institutions and universities.
- Broad Agency Announcement (BAA)
- Small Business Innovative Research (SBIR)
- Transportation Research Board (TRB)
  - Innovations Deserving Exploratory Analysis (IDEA) Program
  - National Cooperative Rail Research Program (NCHRP)

Crossing and Trespass Data



Crossing and Trespass Data



Discussion on Future Research Needs Topics

Objective: Solicit new ideas from the workshop attendees on prospective new or expanded

- Initiatives
- Strategies
- Programs
- Research projects

2015 Right-of-Way Fatality and Trespass Prevention Workshop

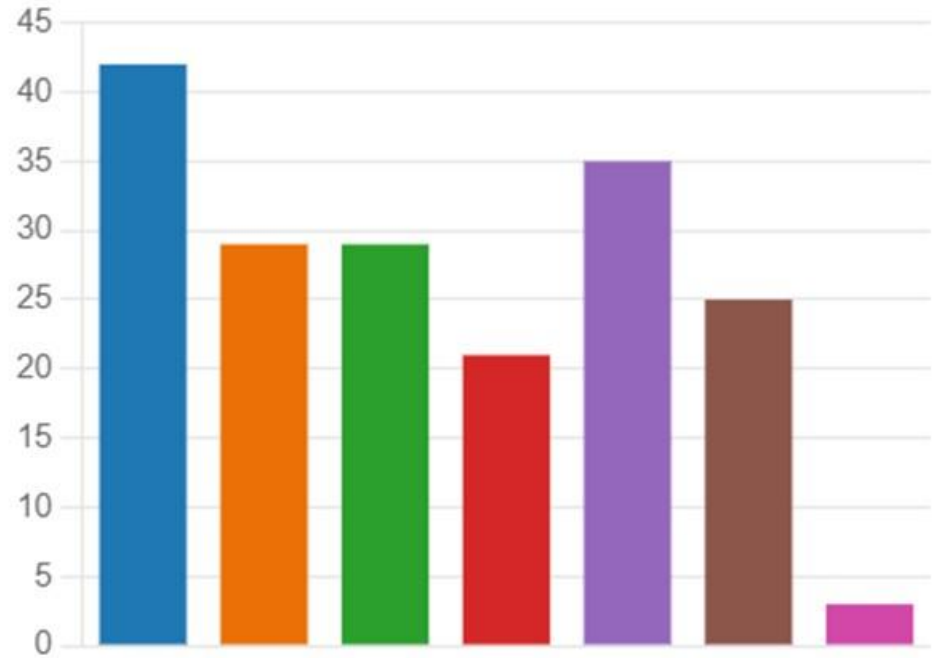
Discussion on Future Research Needs Topics

Feedback received from the trespass sessions on Day 1

6. What railroad trespass topics would you like more information about, or think more research is needed? (select all that apply)

More Details

Engineering treatments	42
Education programs	29
Enforcement initiatives	29
Suicide prevention	21
Pedestrian treatments at crossin...	35
Outreach activities	25
Other	3



Discussion on Future Research Needs Topics

Trespass Research Needs Feedback

- More research of social media methods to increase rail safety
- How to recruit/train officers for greater outreach
- Determining numbers of "unreported" incidents which don't involve train strikes or other injuries
- How to engage the local and state elected officials
- Engineering solutions for pedestrian trespassers
- Technology Implementation Research
- A focused national strategy to inform the public on trespassing and the Blue Sign
- More research on reasons for trespassing
- Enforcement and education program ideas & successes
- Low cost treatments

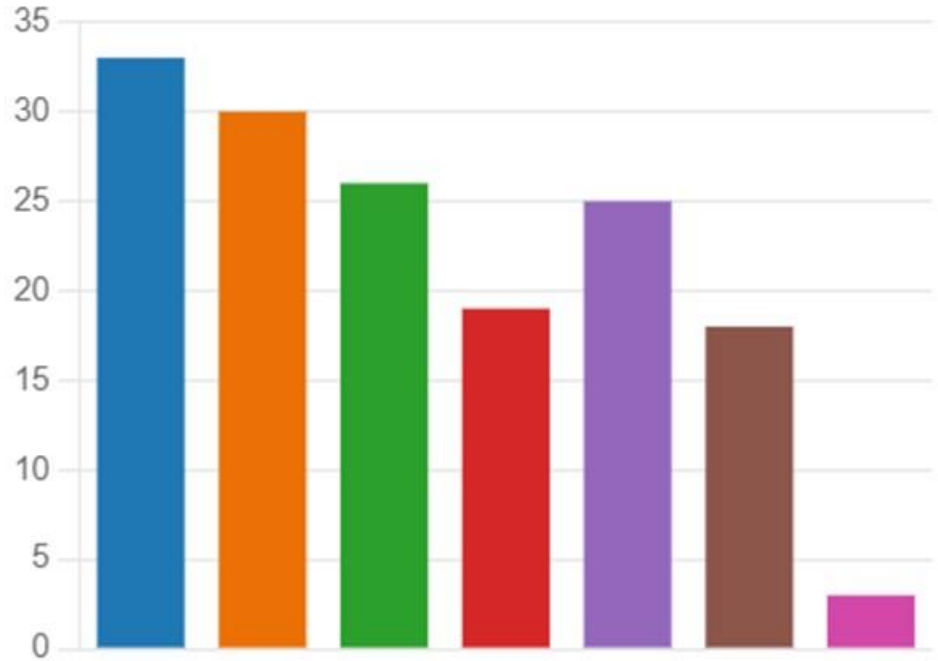
Discussion on Future Research Needs Topics

Feedback received from the grade crossing sessions on Day 2

6. What grade crossing safety topics would you like more information about, or think more research is needed? (select all that apply)

More Details

Engineering treatments	33
Education programs	30
Enforcement initiatives	26
Suicide prevention	19
Pedestrian-specific treatments a...	25
Outreach activities	18
Other	3



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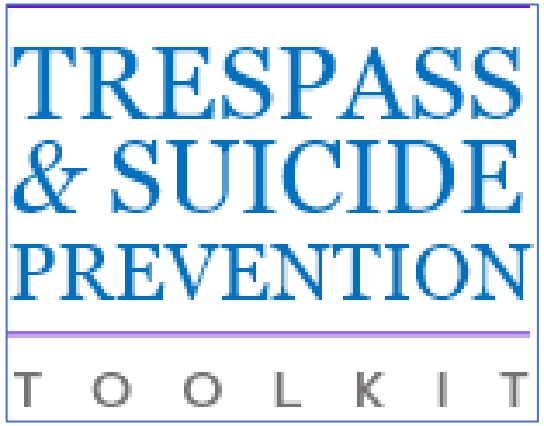

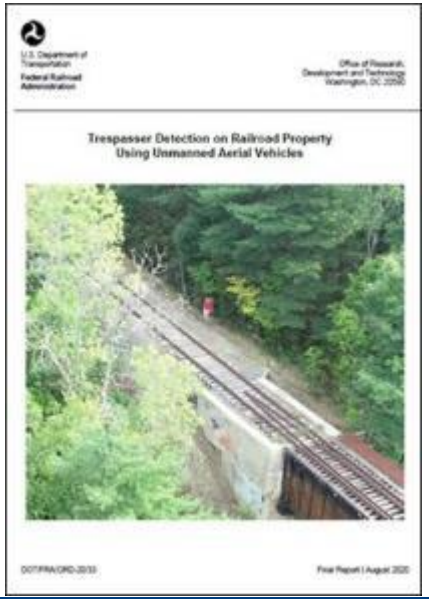

Contact

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Grade Crossing Safety and Railroad Trespass Prevention Workshop

Day 3 Session Two

NORTH CAROLINA
Department of Transportation

NCDOT Research & Development

Curtis T. Bradley, Ph.D. / John Kirby

November 3, 2022

Connecting people, products and places safely and efficiently with customer focus, accountability and environmental sensitivity to enhance the economy and vitality of North Carolina

Table of Contents

Research Program Overview

What do we Research?

Testbed of CAV Shuttles

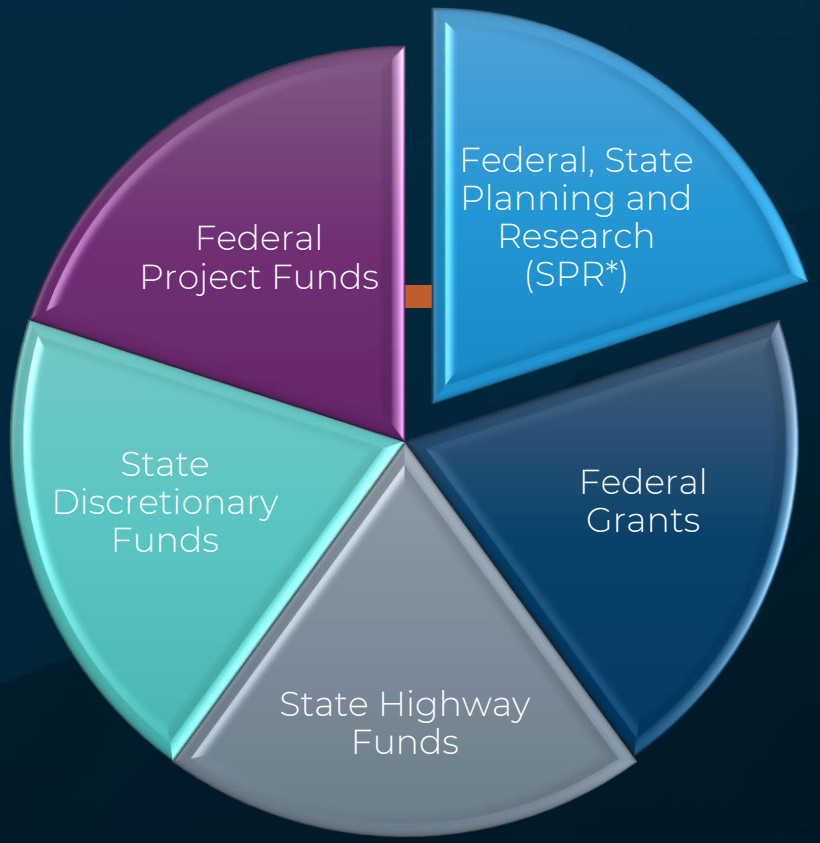
Guidance on CAVs

Equity Analysis for Long Range Transportation Planning

Deep Learning of Pavement Conditions

Electrification Investigation of NCDOT Ferry Division

How is NCDOT Research Funded?



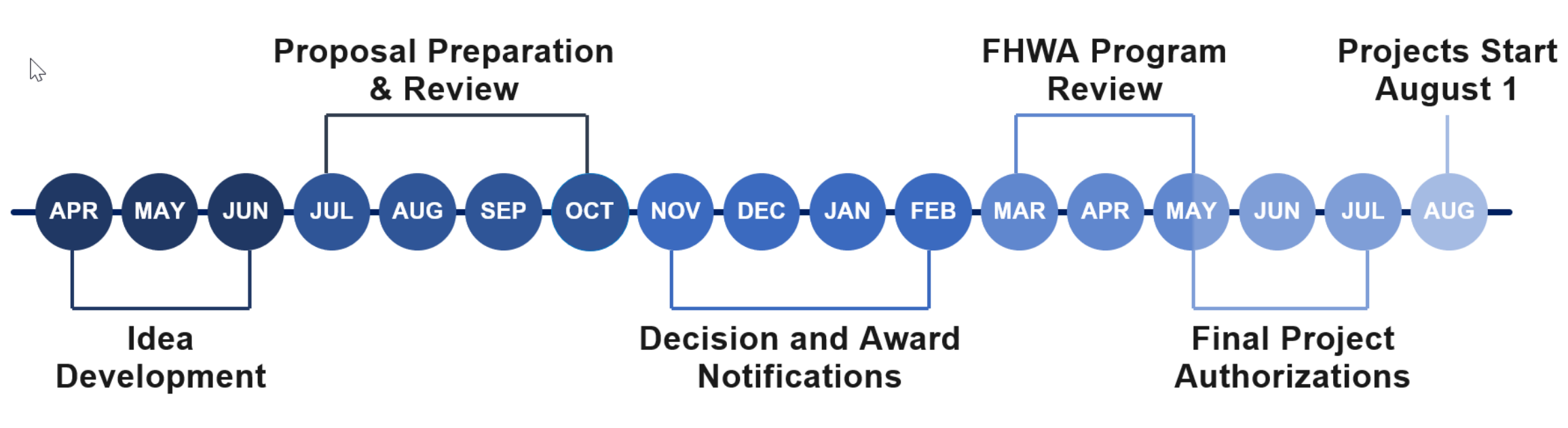
Who conducts the Research?

NOT FOR PROFIT


Research Programs
Annual Research Program
Technical Assistance Program
Technology Transfer

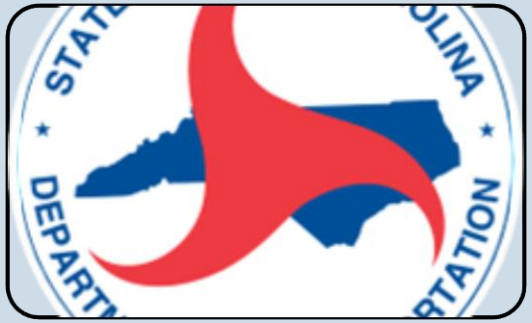
Annual Research Program

Research Program Timeline



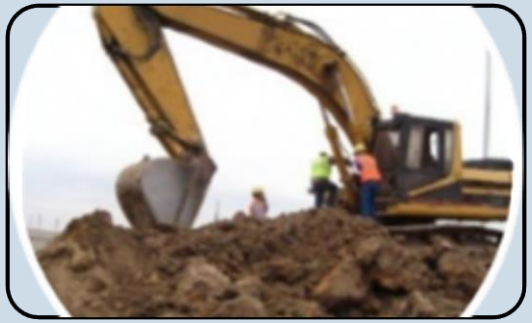
What Makes a Good Research Idea / Proposal?

Collaborate with NCDOT Subject Matter Expert



Lines up with ongoing initiatives and supports NCDOT's current mission and goals

Clearly articulated methodology: Needs to be useable for NCDOT



Tangible / Useable Deliverables (Implementation)

Types of Rail Research – Annual Research Program

Rail Network Trespass Statewide Severity Assessment and Predictive Modeling

Effects of Rail Noise and Pedestrians

Inductive Wireless Power Transfer for Switcher Trains

What is the Technical Assistance Program?

120-hour short-term research

NCDOT Subject Matter Experts submit requests

RESEARCH & DEVELOPMENT NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
TECHNICAL ASSISTANCE REQUEST FORM

NCDOT Managers and their staff are invited to consult appropriate faculty at any UNC system university or at Duke University for technical assistance. Discussion with the faculty member should involve defining the scope of the assistance needed and estimating the time required to complete the assignment.

To initiate the work, the NCDOT business should fill out the scope of work, consulting faculty information, and receive verbal Division/Manager approval. R&D will review and process this request form with ITRE. A technical assistance project should be limited to activities requiring **no more than 120 hours (15 work-days)** of individual consultation and may include the use of research assistants, temporary labor, travel or laboratory equipment rentals.

Any technical assistance request that is **not completed within ninety days of the start date shown below will be canceled**. One extension can be granted upon request by the PI to the ITRE project administrator.

Payment by ITRE will be made upon completion of the work and delivery of a satisfactory summary report or other documents as required by the scope of work outlined below.

Submit this document in MS Word format to R&D. R&D will initiate the signature process through DocuSign.

Nature and Scope of Work – Be detailed and specific. Include estimated work hours required per task

Title:			
Start Date:		**Completion Date:**	

Description of Work (*box will expand as needed*):

Faculty / Researcher Information	**Name:**	
	Affiliation:	
	Phone:	
	Email:	

NCDOT Requester Information	**Name:**	
	Division/Unit	
	Phone:	
	Email:	

All work is performed under Master Agreement MA2019-01 TA v3.4; Updated 20210216

RESEARCH & DEVELOPMENT NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
TECHNICAL ASSISTANCE REQUEST FORM

Budget

Personnel	$	
Other Direct Costs	$	
Indirect Costs	$	
Total Cost	$	

NCDOT Approval (Division Official or other Manager)

Print or Type Name | Signature | Date

Faculty/Researcher Approval

Print or Type Name | Signature | Date

NCDOT Approval (Research and Development Manager)

Neil Mastin, PE
Print or Type Name | Signature | Date

Approval (ITRE Director)

Print or Type Name | Signature | Date

Total Hours: _____ **Cost: $** _____ **Technical Assistance #: TA-** _____

All work is performed under Master Agreement MA2019-01 TA v3.4; Updated 20210216

What types of short-term research?

Rail Related Technical Assistance

Compiling rail-related data from NC DETECT, EMS, etc.

NCDOT Highway-Rail Crossing Incident Data Collection

Rail Summit Planning

Staged Highway-Rail Crossing Incident

What is the Technology Transfer Program?

Implementation / Development

NCDOT Subject Matter Experts submit requests

RESEARCH & DEVELOPMENT

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

Technology Transfer (T^2) Request Form

NCDOT Managers and their staff are invited to participate in the Research & Development Units' Technology Transfer (T^2) Program (Note: If the potential T^2 request is less than $7,500, please consider making a Technical Assistance request). Listed below are the steps and information that should be filled out and submitted to the NCDOT R&D Unit:

1. A Technology Transfer request should be made by the Project Champion / Project Chair from NCDOT.
2. This request can be made on any existing or completed NCDOT or National research project.
3. The Project Champion may work with the perspective researcher / consultant to fill out the form below, but it must be submitted by the Project Champion.
4. Once this form is filled out, please have the Unit Head sign this document prior to submitting to the R&D Unit's Implementation Manager (or designate R&D official):

Information Request:

Date:	Click or tap to enter a date.	T^2 Request #:	Click or tap here to enter text.
Name:	Click or tap here to enter text.	Phone:	Click or tap here to enter text.
Division / Unit:	Click or tap here to enter text.	Email:	Click or tap here to enter text.
Title:	Click or tap here to enter text.		

What Technology Transfer effort would you like to pursue?

☐Training ☐Workshop ☐Development ☐Pilot ☐Conference

Provide a brief explanation on the scope of work:

Click or tap here to enter text.

Who will be conducting the work?

Name:	Click or tap here to enter text.
Position:	Click or tap here to enter text.
University:	Click or tap here to enter text.

Technology Transfer Details:

Audience:	☐State Employees	☐Federal Employees	☐Municipality / City / Town
	☐Private Sector	☐Other:	
Class Size (If Applicable):	Click or tap here to enter text.		
Where:	Click or tap here to enter text.		
When:	Click or tap here to enter text.		
How Often:	Click or tap here to enter text.		

RESEARCH & DEVELOPMENT

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

Equipment / Development Component: *Describe any IT, Equipment, or logistical services that you may need:*

☐Presentation	☐Printed Material	☐Web Based Access / Recording
☐Scribe / Note Taker	☐Audio / Visual Recording	☐Material Development
☐Training Video	☐Specification Development	☐Other: Click or tap here to enter text.

Project Champion:

Unit:	Click or tap here to enter text.
Title:	Click or tap here to enter text.
Name:	Click or tap here to enter text.

Approval (Division Official or Unit Head through Docusign):

Print Name:	Click or tap here to enter text.
Title:	Click or tap here to enter text.
Signature:	

Technology Transfer Projects

Rail Network Trespass Statewide Severity Study

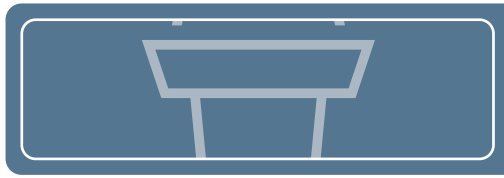
Comprehensive Cost of Rail Incidents in NC

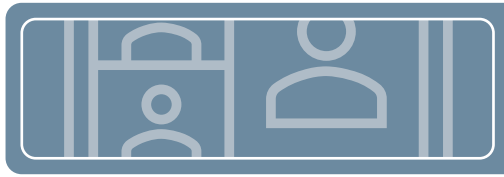
Pedestrian Incident Detection in the Rail ROW

Types of Efforts?


Development


Pilot


Training


Workshops


Conferences

Contact Us

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919-707-6662

Curtis T. Bradley, Ph.D.
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research@ncdot.gov

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NCDOTcommunications
@NCDOT
ncdotcom
ncdot_comm

Thank you!

RAIL

MOVING AMERICA FORWARD

Civil Rights Considerations

for

Grade Crossing Safety and Railroad Trespass Prevention

U.S. Department of Transportation
Federal Railroad Administration

November 9, 2022

Welcome

Ed Pritchard
Equal Opportunity Specialist
Federal Railroad Administration

Since 2015 Ed Pritchard has been a part of the Federal Railroad Administration's (FRA) Office of Civil Rights Team. He conducts external ADA investigation on Amtrak and Title VI complaints throughout the United States.

INTRODUCTION

The Office of Civil Rights provides advice and assistance to Federal Railroad Administration (FRA) senior management and other FRA officials and employees on all matters concerning civil rights, including the Americans with Disability Act of 1990 (ADA), equal employment opportunity, Title VI of the Civil Rights Act of 1964 (Title VI) and matters related to small and disadvantaged business.

The Two Primary Considerations for Today

- Understanding the At-Risk Population
- Civil Rights Elements in FRA's Grant Program

Understanding the At-Risk Population

- Demographic Socio-Economic Profiles
  - The FRA published a study in 2013 titled, “Rail Trespasser Fatalities - Demographic and Behavioral Profiles.” The Point of the study is to provide policymakers and other groups with information to enable targeting individuals most at risk of trespassing on rail rights-of-way
- Data Tracking
  - Tracking your regional and local data looking at the socioeconomic and demographic components will round out the picture
- Targeted Solutions
  - The socioeconomic and demographic data will then help inform your targeted outreach and other solutions to reduce the number of injuries and decedents.

FRA's Grant Program

- Title VI of the Civil Rights Act of 1964
  - The Federal Railroad Administration (FRA) policy is to ensure that no person shall, on the ground of **race, color, national origin, Limited English Proficiency, sex, age, or disability, (and low-income, where applicable)**, be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any of our programs and activities, as provided by Title VI of the Civil Rights Act of 1964.

- Title VI and the Grant Application Process
  - FRA manages all aspects of the grant lifecycle, including application, reporting, payments, monitoring, and closeout
  - Grants Application process: https://railroads.dot.gov/grant-administration/applying-grants/competitive-grants-application-process
  - Additional Grant questions can be sent to FRA-NOFO-Support@dot.gov

- Title VI Compliance
  - FRA is required to conduct compliance reviews of its recipients
  - The review may cover all or a portion of the recipient's compliance with Title VI
  - A compliance report after the review, detailing the findings of no deficiency, deficiency, or noncompliance

Contact Us

Federal Highway Administration
Federal Railroad Administration
1200 New Jersey Avenue, SE
Washington, DC 20590

Connect with us at **USDOTFRA**

Ed Pritchard
Phone: 202-493-0669
202-527-2995
Email: civil.rights@dot.gov
edward.a.pritchard@dot.gov

RAIL

MOVING AMERICA FORWARD

Competing for the Latest FRA Grants

U.S. Department of Transportation
Federal Railroad Administration

November 1, 2022

Agenda

1. **Bipartisan Infrastructure Law Funding Overview**
2. **FRA Grant Programs**
3. **Railroad Crossing Elimination Program**
   - Project Narrative
   - Statement of Work
4. **Consolidated Rail Infrastructure and Safety Improvements Program**
   - Project Narrative
   - Statement of Work
5. **Resources for Grant Applicants**
6. **NOFO Overview and How to Apply**

Bipartisan Infrastructure Law: Rail Funding Overview

[ADVANCED APPROPRIATIONS]

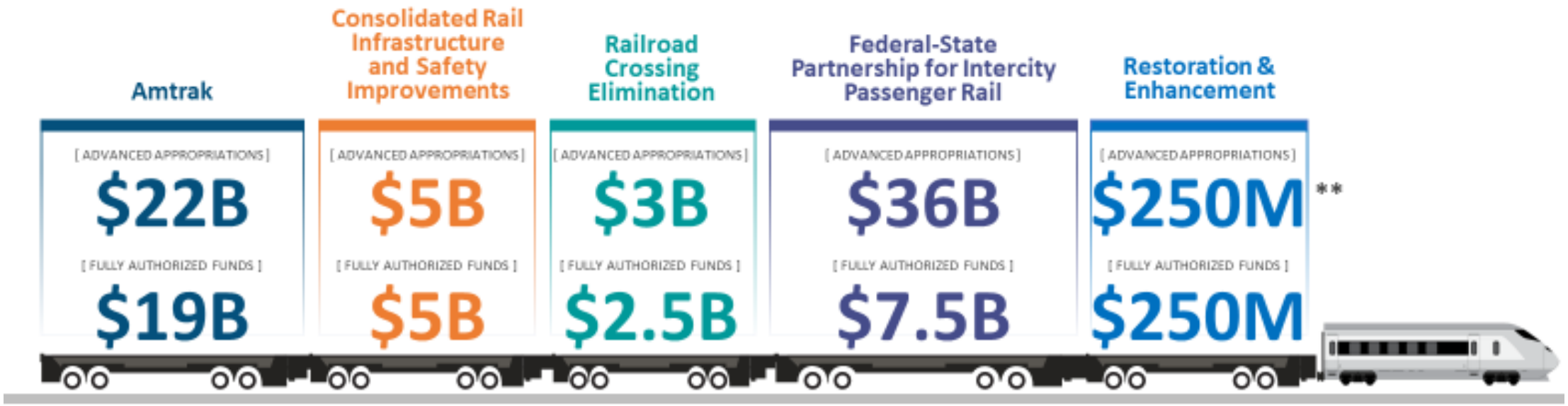
From FY22-FY26

$66B in total funding

[FULLY AUTHORIZED FUNDS]

From FY22-FY26

$36B* in total funding



U.S. Department of Transportation
Federal Railroad Administration

** $34.5 billion for grant programs; additional $1.5 billion is authorized for FRA operations and R&D – not included in this graphic.*

*** Grants for Restoration & Enhancement (advanced appropriations portion) are funded through "takedowns" from Amtrak NN account; not included in totals to avoid double-counting.*

1

FRA Grant Program Opportunities Under BIL

Programs	Purpose	Appropriated	Additional Authorized Over Five Years	Total
Consolidated Rail Infrastructure and Safety Improvements (CRISI)	To fund projects that improve the safety, efficiency, or reliability of intercity passenger and freight rail.	$5 billion ($1 billion annually)	$5 billion ($1 billion annually)	**$10 billion**
Railroad Crossing Elimination *(New)*	To promote highway rail or pathway-rail grade crossing improvement projects that focus on improving the safety and mobility of people and goods.	$3 billion ($600 million annually)	$2.5 billion ($500 million annually)	**$5.5 billion**
Federal-State Partnership for Intercity Passenger Rail *(Significantly Changed)*	To fund capital projects that reduce the state of good repair backlog, improve performance, or expand or establish new intercity passenger rail service, including privately operated intercity passenger rail service if an eligible applicant is involved.	$36 billion ($7.2 billion annually)	$7.5 billion ($1.5 billion annually)	**$43.5 billion**
Restoration & Enhancement	To provide operating assistance to initiate, restore, or enhance intercity passenger rail service.	$250 million ($50 million annually from Amtrak National Network fund)	$250 million ($50 million annually)	**$500 million**
Interstate Rail Compacts *(New)*	This program will provide funding for interstate rail compacts' administrative costs and to conduct railroad systems planning, promotion of intercity passenger rail operations, and the preparation of grant applications.	$15 million ($3 million annually)	$15 million ($3 million annually)	**$30 million**

Railroad Crossing Elimination Program Overview

Railroad Crossing Elimination – Program Overview

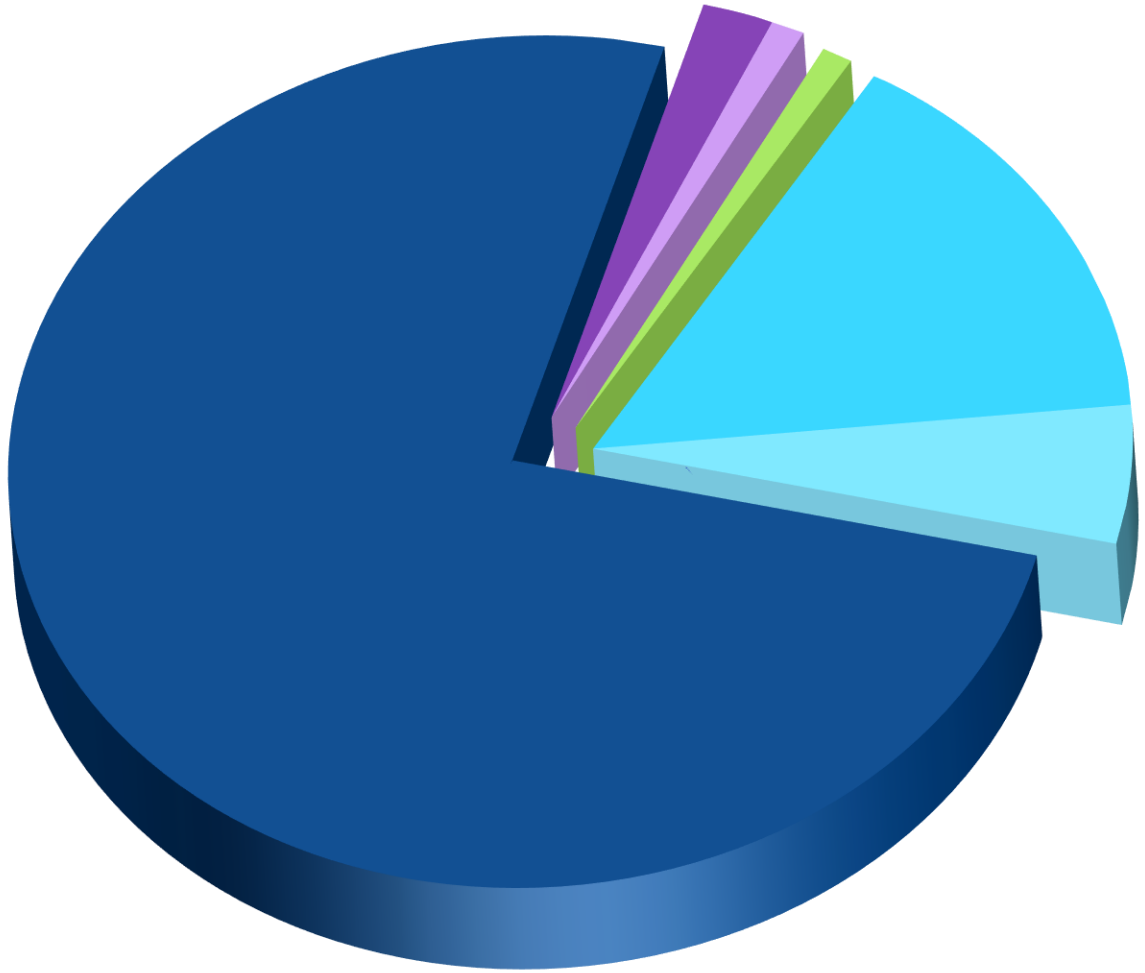
PROGRAM PURPOSE

- To fund highway-rail or pathway-rail grade crossing improvement projects that focus on **improving the safety and mobility of people and goods.**

Notice of Funding Opportunity (NOFO)

- Published in the Federal Register on July 6, 2022
  - $573 million available
  - Application period closed on October 11, 2022; applications are being reviewed by FRA
  - FY22 Selection Announcement – **Spring/Summer 2023**

Railroad Crossing Elimination Program Purpose and Funding Overview – FY22



Planning

- Not less than 3% of total funding (*$18,000,000*) is for planning projects.
  - Not less than 25% of these funds (*$4,500,000*) is for planning projects in rural areas or on Tribal lands.

Crossing Safety Information and Education Program

- At least *$1,500,000* will be made available for highway-rail grade crossing safety information and education programs

Rural and Tribal Set Aside

- Not less than 20% of total funding (*$114,652,800*) is reserved for projects located in rural areas or on Tribal lands.
  - Not less than 5% of these funds (*$5,732,640*) are reserved for projects in counties with 20 or fewer residents per square mile.

Grant Conditions

- No grant awarded shall be smaller than $1M, except for planning grants.

State Limitation

- No more than 20% of total funding (*$114,652,800*) in any fiscal year may be selected for projects in a single State.

Railroad Crossing Elimination – Program Conditions

Differences Relative to other FRA Programs

Benefit-Cost Analysis (BCA)

- BCAs are not required, although applicants must at the very least provide sufficient qualitative information on the project's benefits for FRA to evaluate.
- Note that applicants would need to provide a BCA if interested in applying for CRISI for the same project.

Pre-Award Costs

- Applicants may count costs incurred for preliminary engineering associated with an eligible project if such costs were incurred before project selection for award and no earlier than Nov. 15, 2021 (date of BIL enactment). These costs must also be compliant with 2 CFR part 200 and RCE requirements.

Commuter Rail Projects

- Commuter rail passenger transportation projects are eligible, but commuter rail authorities are not.
- Selected projects must be transferred to FTA to administer.

Railroad Crossing Elimination – Key Program Definitions

Grade Separation or Closure

- An underpass or overpass to eliminate level crossings between railroad and highway users at an existing highway-rail or pathway-rail grade crossing.
- The closing of a highway-rail grade crossing to vehicular or pedestrian traffic.

Improvement Project

- A project related to an existing highway or pathway-rail crossing including:
  - installation, repair, or improvement of crossings, grade separations, railroad crossing signals, gates, bells, audible warning devices and related technologies;
  - highway traffic signalization, lighting, crossing approach signage, and roadway improvements such as medians or other barriers;
  - pathway improvements such as bollards; railroad crossing panels and surfaces; and other safety engineering improvements, or highway-rail programs to reduce risk.

Railroad Crossing Elimination – Eligible Applicants

ELIGIBLE APPLICANTS

- States, including the District of Columbia, Puerto Rico, and other U.S. territories and possessions
- Political subdivision of a State
- Federally recognized Indian Tribe
- A unit of local government or a group of local governments
- A public port authority
- A metropolitan planning organization
- A group of the entities described above

Railroad Crossing Elimination – Eligible Projects

ELIGIBLE PROJECT CRITERIA

- **Grade separation or closure** including through-use of a bridge, embankment, tunnel or combination thereof.
- Track relocation.
- Improvement or installation of protective devices, signals, signs, or other measures to improve safety, **provided that such activities are related to** a separation, or relocation project.
- Other means to improve the safety and mobility of people and goods at highway-rail grade crossings (including technological solutions).
- A group of related projects, described above, that would collectively improve the mobility of people and goods.
- The planning, environmental review, and design of an eligible project type.

Railroad Crossing Elimination – Evaluation and Selection Criteria

EVALUATION CRITERIA

Technical Merit:

- Quality of statement of work and application materials
- readiness and completion of prerequisites
- applicant past performance, technical capacity, and financial contributions
- private-sector participation
- qualifications and experience of key personnel and organizations
- consistency with planning documents

Project Benefits:

- improvements to safety at highway-rail or pathway rail grade crossings
- proposals to grade separate, eliminate, or close one or more highway-rail/pathway rail grade crossings
- improvements to the mobility of both people and goods
- reductions in emissions, protects the environment and provides community benefits
- improvements to access emergency services
- improvements to access communities; economic benefits
- contracting incentives to employ local labor, to the extent permissible under Federal law

Railroad Crossing Elimination – Selection Criteria

DEPARTMENTAL GOALS

- Safety
  - Applicants are strongly encouraged to submit safety justifications for a project that relies on standardized, objective safety metrics and data, if available, including data from sources such as: GradeDec.Net; National Risk Index; safety metrics found in Appendix D of 49 C.F.R. Part 222; the FRA crossing incident dashboard (FRA Safety Data & Reporting | dot.gov); or other relevant safety data or metrics.
- Equitable Economic Strength and Improving Core Assets
- Equity and Barriers to Opportunity
- Climate Change and Sustainability
- Transformation of Our Nation's Transportation Infrastructure

Program Preference

- Grade separations, closing crossings through track relocation, and corridor-wide grade crossing improvements

Consolidated Rail Infrastructure and Safety Improvements (CRISI) Grant Program

CRISI – Program Overview

PROGRAM PURPOSE

- To fund projects that improve the safety, efficiency, and/or reliability of intercity passenger and freight rail systems

Notice of Funding Opportunity (NOFO)

- Published in the Federal Register on September 2, 2022
  - $1.425 billion available
  - Applications due by 5pm EST on December 1st, 2022
  - Open for 90 days
- Please read this NOFO carefully and follow all instructions for completing and submitting your application.
- Applications that are incomplete or received after the deadline will not be considered for funding. There are no exceptions.

CRISI – Program Set Asides

Rural Set Aside

- At least $376,035,000 or 25% will be made available for projects in rural areas

Intercity Passenger Rail Set-Aside

- At least $150,000,000 will be made available for capital projects to support the development of new Intercity Passenger Rail services

Trespassing Measures Set-Aside

- At least $25,000,000 will be made available for the development and implementation of measures to prevent trespassing and reduce associate injuries and fatalities ***including law enforcement***

Intercity Passenger Rail Set-Aside

- At least $150,000,000 will be made available for capital projects to support the development of new Intercity Passenger Rail services

CRISI – Program Overview

ELIGIBLE APPLICANTS

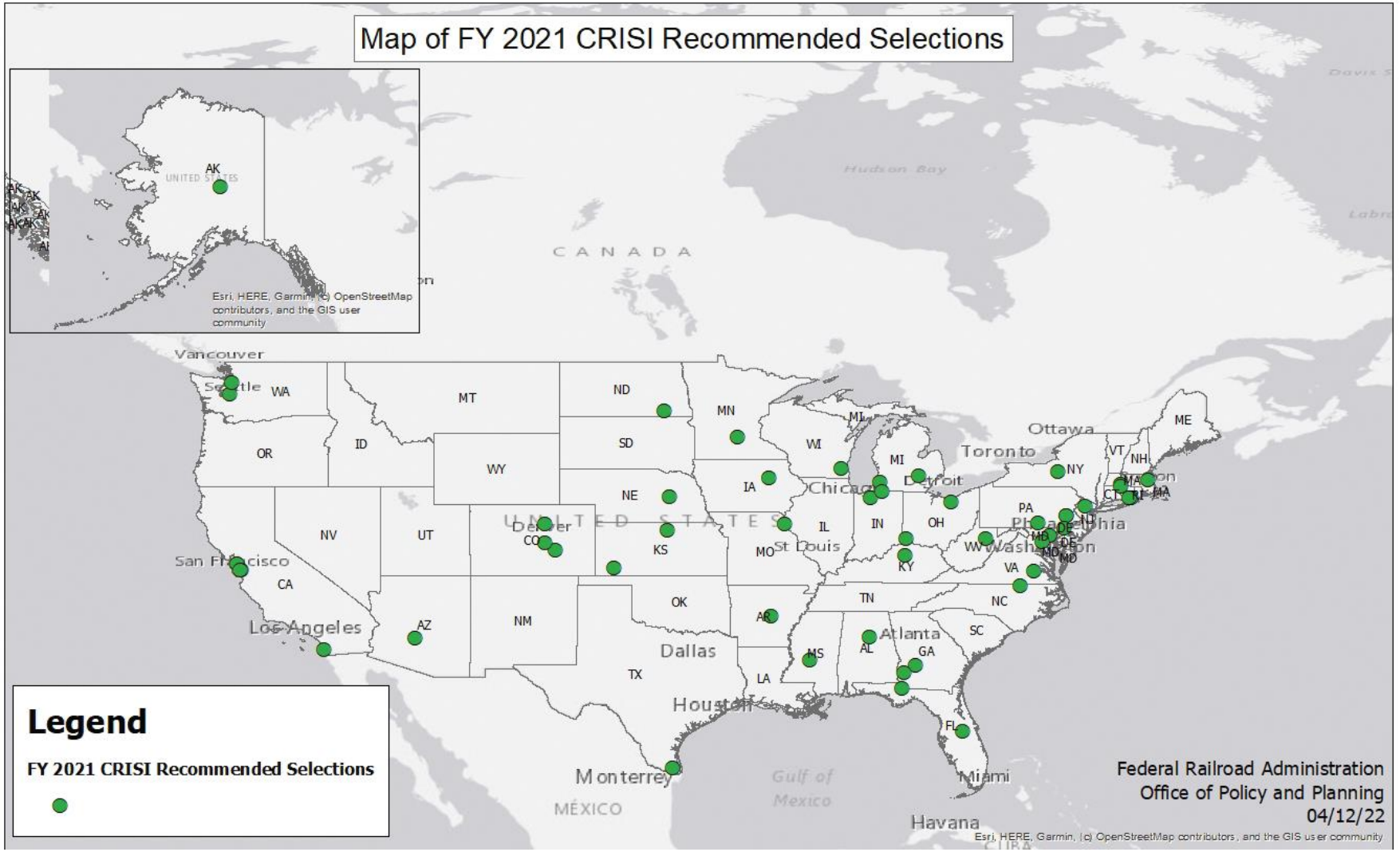
- A State (*including the District of Columbia*) or group of States
- An Interstate Compact
- Public agencies or publicly chartered authorities established by one or more States
- Political subdivision of a State
- Amtrak or other intercity passenger rail carrier
- Class II or III railroads and *associations that represent a Class II or III railroad* ***(new)***
- Any rail carrier or equipment manufacturer in partnership with at least one state entity, public agency, and/or local government
- *Federally recognized Indian Tribe* ***(new)***
- The Transportation Research Board (TRB) together with any entity with which it contracts in the development of rail-related research, including cooperative research programs.
- A university transportation center engaged in rail-related research
- A non-profit labor organization representing a class or craft of employees of rail carriers or rail carrier contractors

CRISI – Program Overview

ELIGIBLE PROJECT CRITERIA

- **Wide Range of Rail Capital Projects**
  - Congestion mitigation
  - Ridership growth facilitation
  - Enhancements to multimodal connections
  - Improvements to short-line or regional railroad infrastructure
- **Railroad Safety Technology**
- **Track, Station, and Equipment Improvements for Intercity Passenger Rail**
- **Grade Crossing Improvements**
- **Rail Line Relocation and Improvement**
- **Regional and Corridor Service Planning and corresponding Environmental Analyses**
- **Safety Programs and Institutes**
- **Research**
- **Workforce Development and Training**
- ***New in BIL:***
  - *Measures that prevent trespassing*
  - *Preparation of emergency plans for hazardous materials are transported by rail*
  - *Rehab or procurement of locomotives, provided that such activities result in a significant reduction of emissions.*

CRISI – Program Map



Resources for Grant Applicants

How to Apply and Available Grant Resources

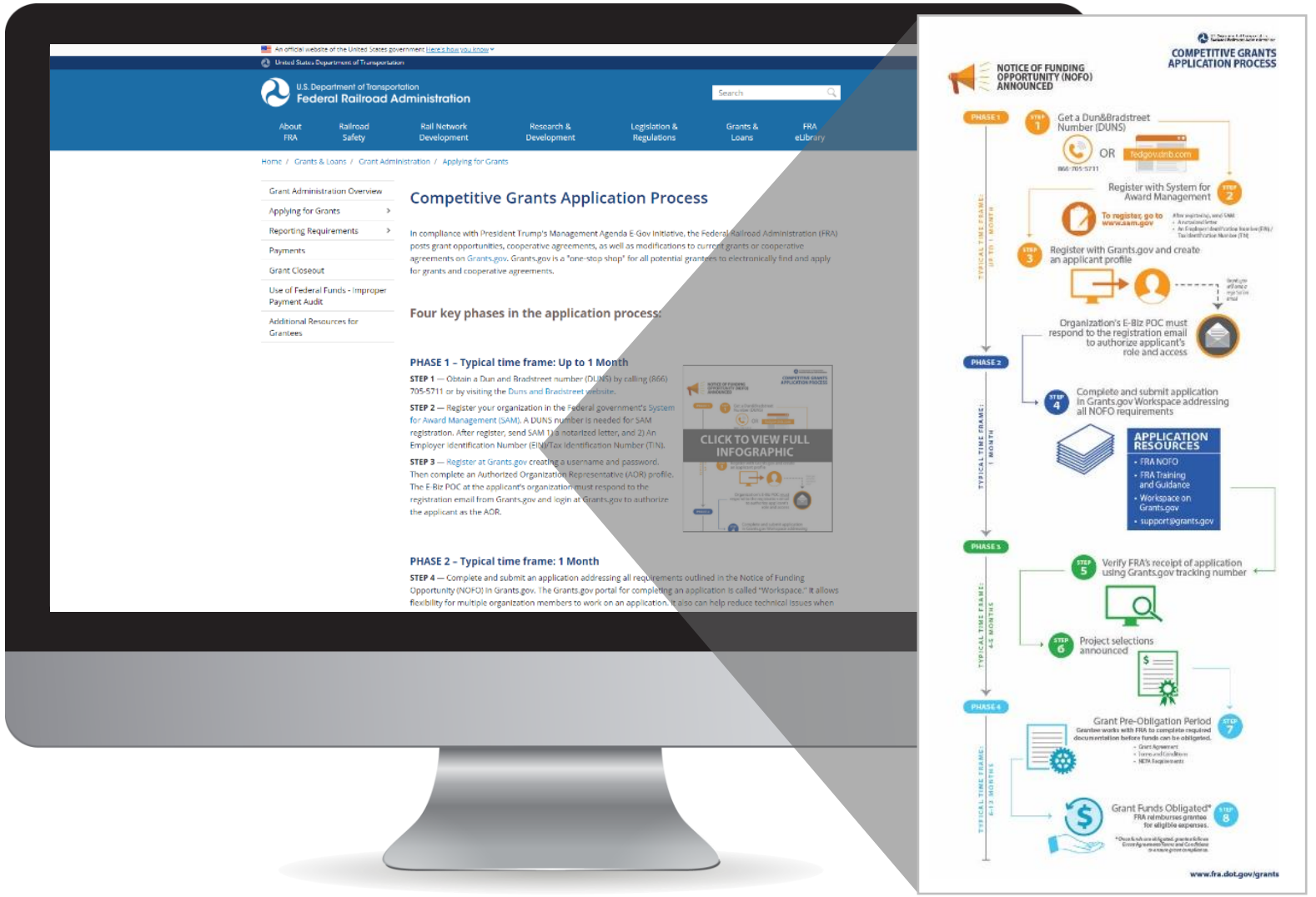
Step-by-step process for applying:

https://railroads.dot.gov/grant-administration/applying-grants/competitive-grants-application-process

Webinar recordings and presentation files:

- Railroad Crossing Elimination NOFO and CRISI NOFO

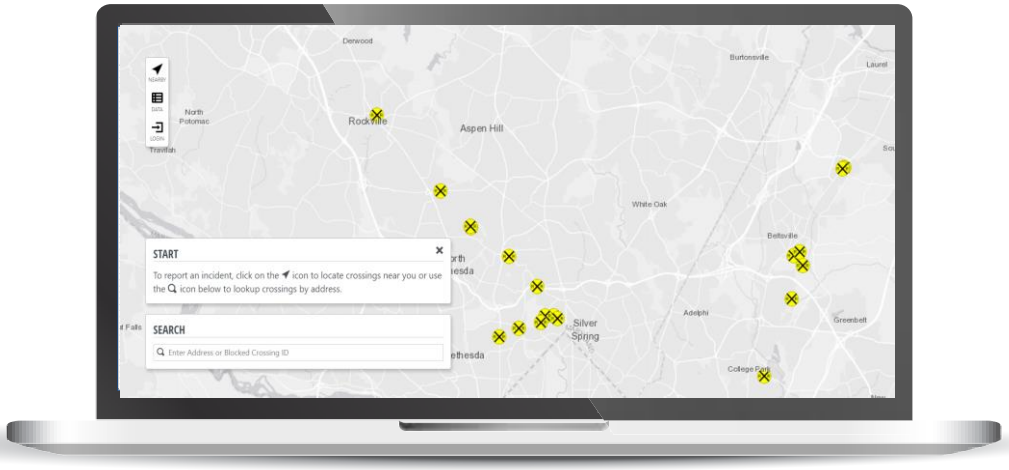
https://railroads.dot.gov/rail-network-development/training-guidance/webinars-0



FRA Blocked Crossing Portal

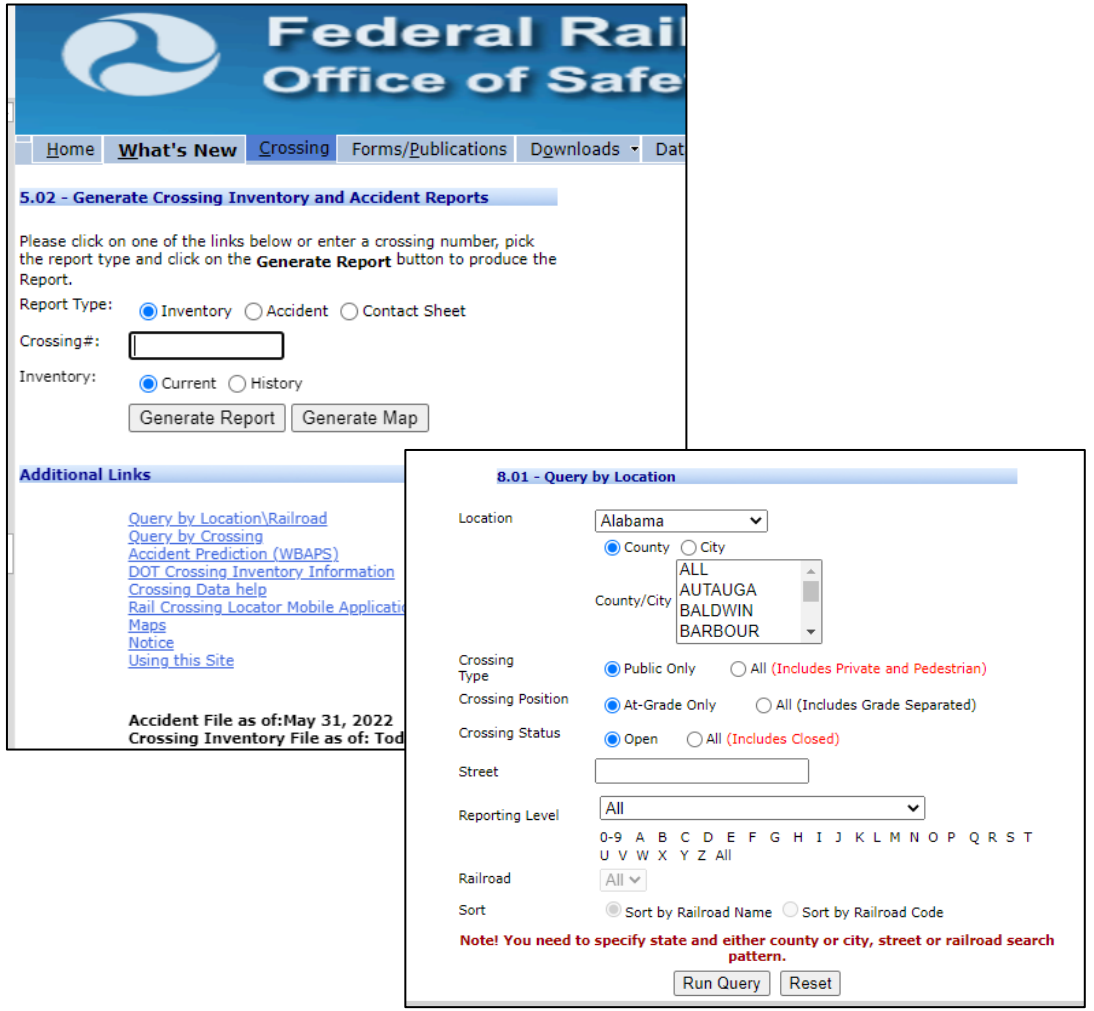
- Blocked crossings pose potential safety risks, specifically in locations where trains routinely hinder roadway and pedestrian movement for extended periods
- To address this potential safety risk, FRA established the Blocked Crossing Portal in 2019
- Specific information required from users—including, **date**, **time**, **location** and **duration that crossing is blocked**

- Report a blocked crossing: http://www.fra.dot.gov/blockedcrossings
- Provide feedback about the Blocked Crossing Portal: https://www.federalregister.gov/documents/2022/06/14/2022-12785/request-for-information-regarding-fras-public-blocked-crossing-portal



DOT National Grade Crossing Inventory

- Allows public to cite specific DOT National Grade Crossing Inventory information, including:
  - Railroad that owns infrastructure
  - Primary railroad operator
  - DOT crossing inventory number
  - Roadway at the crossing



NOFO Overview & How to Apply

What is a NOFO?

KEY PARTS OF A NOFO

A **Notice of Funding Opportunity (NOFO):**

- Announces the grant opportunity
- Contains details about the application requirements and procedures to request Federal funding for eligible projects

What information is in a NOFO?

KEY PARTS OF A NOFO

- Program Summary
- Key Dates
- Required Documents
- Addresses
- FRA Contact Information
- Table of Contents
  - Program Description
  - Federal Award Information
  - **Eligibility Information**
  - **Application and Submission Information**
  - **Application Review Information**
  - Federal Award Administration
  - Federal Awarding Agency Contacts

Where Do I Start?

Check the FRA Competitive Discretionary Grant Programs webpage

- https://railroads.dot.gov/grants-loans/competitive-discretionary-grant-programs/competitive-discretionary-grant-programs

Where is the FY22 CRISI Program NOFO?

NATIONAL ARCHIVES

FEDERAL REGISTER

The Daily Journal of the United States Government

Notice

Notice of Funding Opportunity for the Consolidated Rail Infrastructure and Safety Improvements Program

A Notice by the Federal Railroad Administration on 09/02/2022

PUBLISHED DOCUMENT

AGENCY:

Federal Railroad Administration (FRA), Department of Transportation (DOT).

ACTION:

Notice of funding opportunity (NOFO or notice).

SUMMARY:

This notice details the application requirements and procedures to obtain grant funding for eligible projects under the Consolidated Rail Infrastructure and Safety Improvements Program for Fiscal Year 2022. This notice solicits applications for program funds made available by the Consolidated Appropriations Act, 2022 and the Infrastructure Investment and Jobs Act. This notice also solicits applications for projects under the Magnetic Levitation Technology Deployment Program, funded by the Consolidated Appropriations Act, 2021. The opportunity described in this notice

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is made available under Assistance Listings Number 20.325 "Consolidated Rail Infrastructure and Safety Improvements," and Assistance Listings Number 20.318, "Maglev Project Selection—SAFETEA-LU."

DOCUMENT DETAILS

Printed version:
PDF

Publication Date:
09/02/2022

Agencies:
Federal Railroad Administration

Dates:
Applications for funding under this solicitation are due no later than 5 p.m. ET, December 1, 2022. Applications that are incomplete or received after 5 p.m. ET, on December 1, 2022 will not be considered for funding. See section D of this notice for additional information on the application process.

Document Type:
Notice

Document Citation:
87 FR 54278

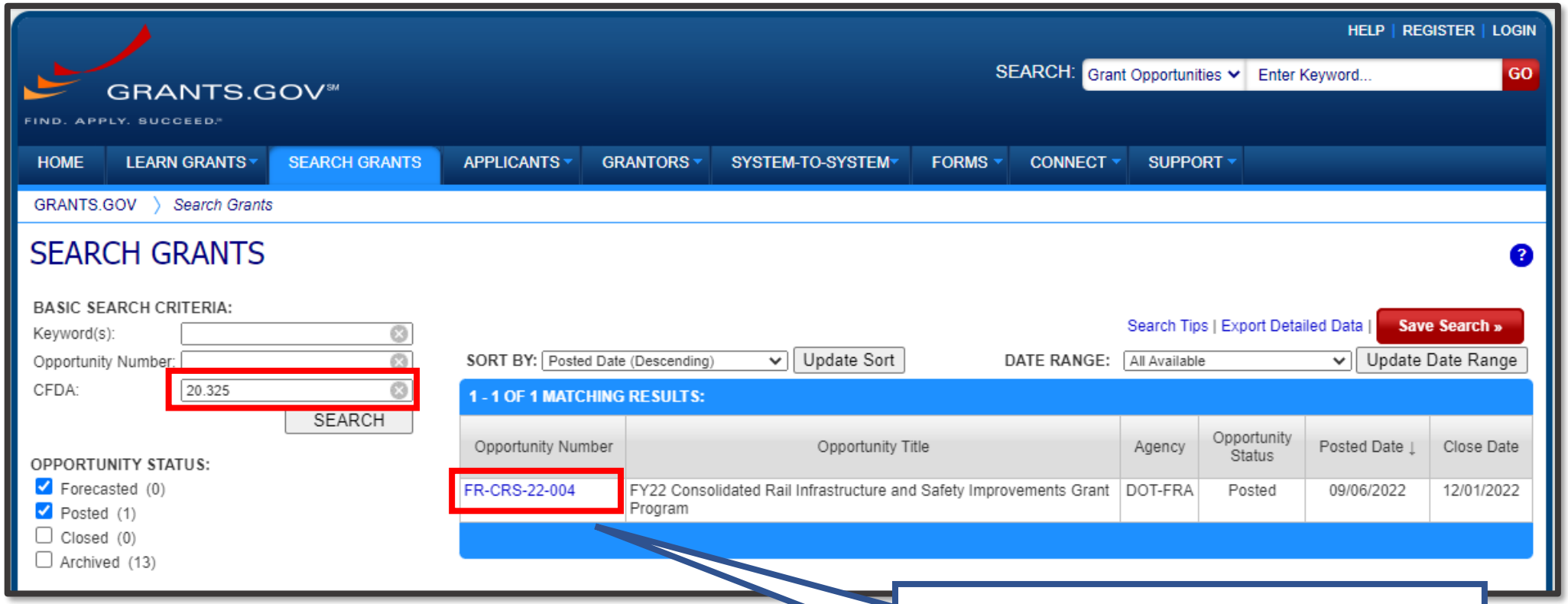
Page:
54278-54295 (18 pages)

Document Number:
2022-19004

NOTE: Application deadline is **5 p.m.** EST, Thursday, December 1, 2022

Where do I find “How to Apply” information?

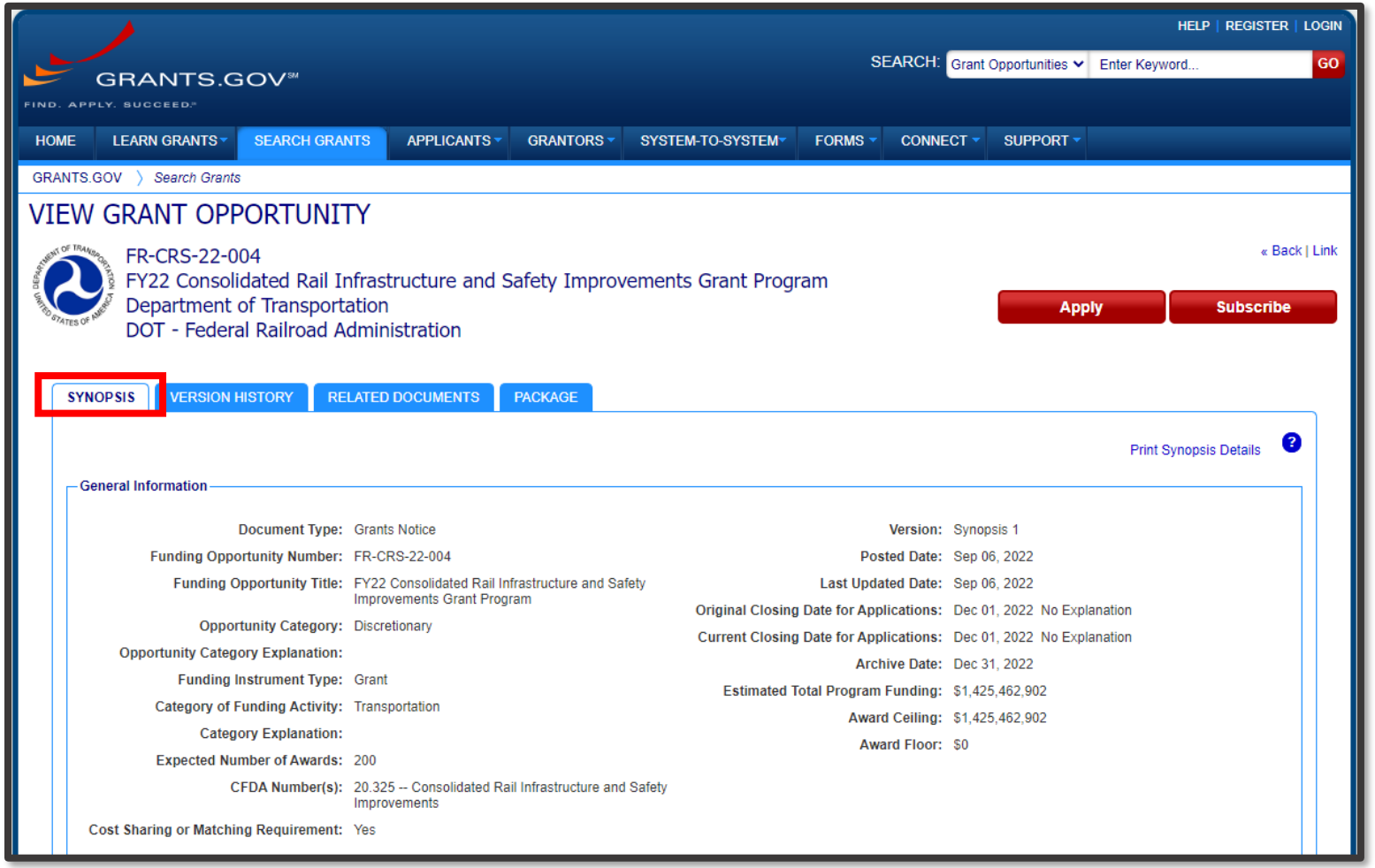
Search grants on **Grants.gov:**



Click the **Opportunity Number** to see the Synopsis

What is the Synopsis?

Summary information about the grant opportunity in Grants.gov:



How do I apply?

KEY STEPS

- Obtain a Unique Entity Identifier (UEI)
- **Register early** in the Federal government's System for Award Management (SAM)
  - **NOTE: SAM registration can take up to 2 weeks (longer if you do not have an Employer Identification Number)**
- For Grants.gov, complete an **Authorized Organization Representative** profile and create a username and password
- Submit an application addressing all requirements outlined in the NOFO

What do I include in my application?

REQUIRED DOCUMENTS

- Project Narrative
- Statement of Work
- Benefit-Cost Analysis
- Environmental Compliance (NEPA*) Documentation
  - *Note: The Applicant may include a draft document that will require development, review, and approval by FRA, or an existing completed NEPA document approved by FRA or another Federal agency that covers the proposed project scope*
- Draft Use/Ownership Agreement *(if applicable)*
  - *Note: FRA requires that a written agreement exist between the applicant and the railroad regarding use and ownership consistent with 49 U.S.C. 22905(c)(1) for projects using rights-of-way owned by a railroad that is not the applicant*

*NEPA: National Environmental Policy Act

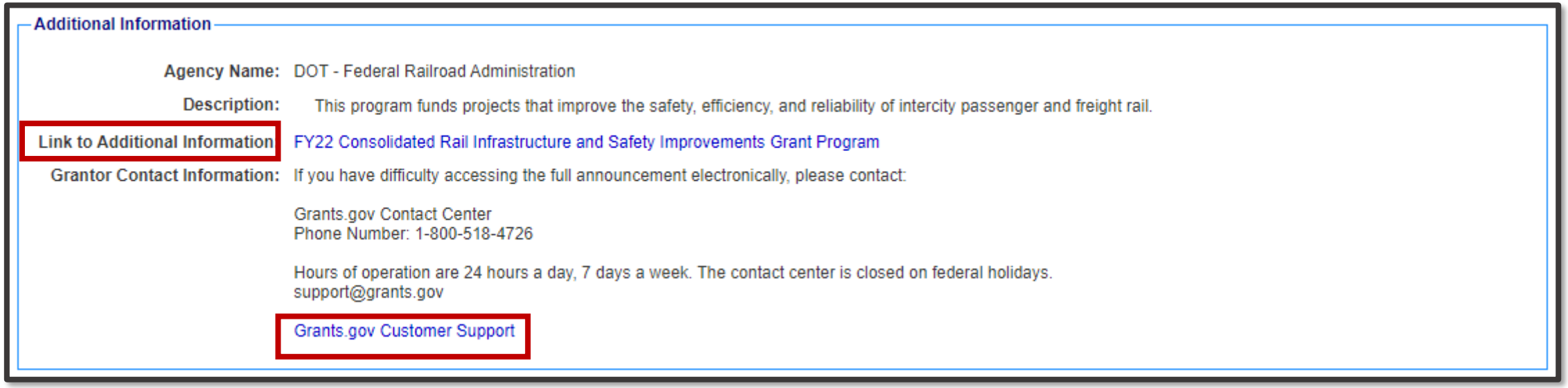
What forms are required?

REQUIRED FORMS

- SF424 (Application for Federal Assistance)
  - *Either*: SF 424A or 424C – Budget info for Non-Construction OR Construction
  - *Either*: SF 424B or 424D – Assurances for Non-Construction OR for Construction
- FRA's Additional Assurances and Certifications (FRA F 30)
- FRA's Applicant Financial Capability Questionnaire (FRA F 251)
- SF LLL: Disclosure of Lobbying Activities (only required if reportable Lobbying activities exist)

Where do I find additional information and help?

Find **Additional Information** about the grant opportunity in Grants.gov at the bottom of the Synopsis page:



Additional Information

Agency Name: DOT - Federal Railroad Administration

Description: This program funds projects that improve the safety, efficiency, and reliability of intercity passenger and freight rail.

Link to Additional Information FY22 Consolidated Rail Infrastructure and Safety Improvements Grant Program

Grantor Contact Information: If you have difficulty accessing the full announcement electronically, please contact:

Grants.gov Contact Center
Phone Number: 1-800-518-4726

Hours of operation are 24 hours a day, 7 days a week. The contact center is closed on federal holidays.
support@grants.gov

Grants.gov Customer Support

Application Review and Selection Process

1. Intake and Eligibility

Each application is reviewed for completeness and eligibility to determine which applications move to the evaluation stage

2. Evaluation

Each complete and eligible application is evaluated by a panel of DOT subject matter experts using criteria outlined in the NOFO

3. Selection

Final funding decisions are made by taking into account the evaluation and selection criteria outlined in the NOFO

4. Announcement

FRA press release announces selections approximately 4 to 5 months following application due date

QUESTIONS?

Contact Us

Federal Railroad Administration
1200 New Jersey Avenue, SE
Washington, DC 20590

Connect with us **USDOTFRA**

U.S. Department of Transportation
Federal Railroad Administration

FRA Competitive Discretionary Grant Programs
Webpage: https://www.fra.dot.gov/grants
Email: FRA-NOFO-Support@dot.gov

Michail Grizkewitsch
Grade Crossing & Trespassing Outreach Division
Michail.Grizkewitsch@dot.gov
202-493-1370