

FRA/Volpe Center Trespass Prevention Research Study

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US DOT – Volpe Center

November 8, 2011

**2011 National Highway-Rail Grade
Crossing Safety Training Conference**



Trespass Prevention Research Study

Project initiated August 2009

Objective

- Eliminate trespasser incidents and fatalities
- Provide national guidance on trespass mitigation

Study Area

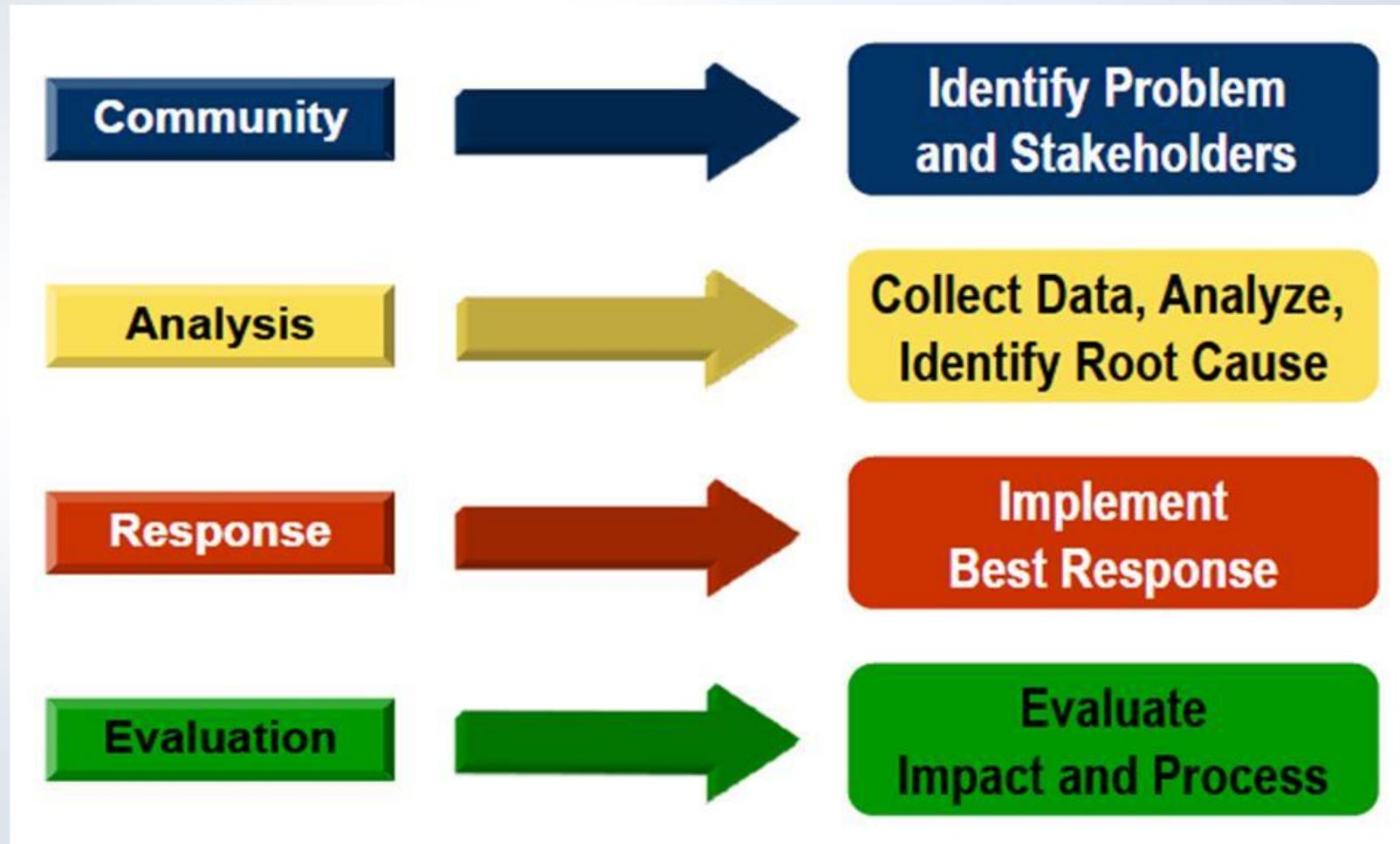
- City of West Palm Beach, FL
 - SFRTA (TriRail)/CSX/Amtrak (milepost 966-973)
 - FEC/RailAmerica (milepost 296-301)



*Sponsored by the FRA Office of Research and Development
- Signal, Train Control and Communications Division*



Trespass Prevention Research Study



Source: Canadian Pacific Police Service, *Managing Risk; A model for Deterring Trespassers, Operation Lifesaver 16th International Symposium, August 31, 2010.*

Stakeholders



U.S. Department
of Transportation

**Federal Railroad
Administration**



**West Palm Beach
Neighborhood Associations**



**PALM BEACH COUNTY
SHERIFF'S OFFICE**



Recent/Current Activities

- **Stakeholder Meetings**

- Oct 2009, Feb 2010, Apr 2010, July 2010, October 2010, March 2011, Sept 2011 (completed)
- Jan/Feb, 2012 (upcoming)

- **Data collection**

- Interview with individual stakeholders (on-going)
- TriRail right-of-way site inspection (completed)
- FEC/RailAmerica right-of-way site inspection (completed)
- TriRail locomotive video analysis (completed)

- **Education/outreach participation**

- Oct 2009 - Safety Blitz (completed)
- Apr 2010 - Train Safety Awareness Week (completed)

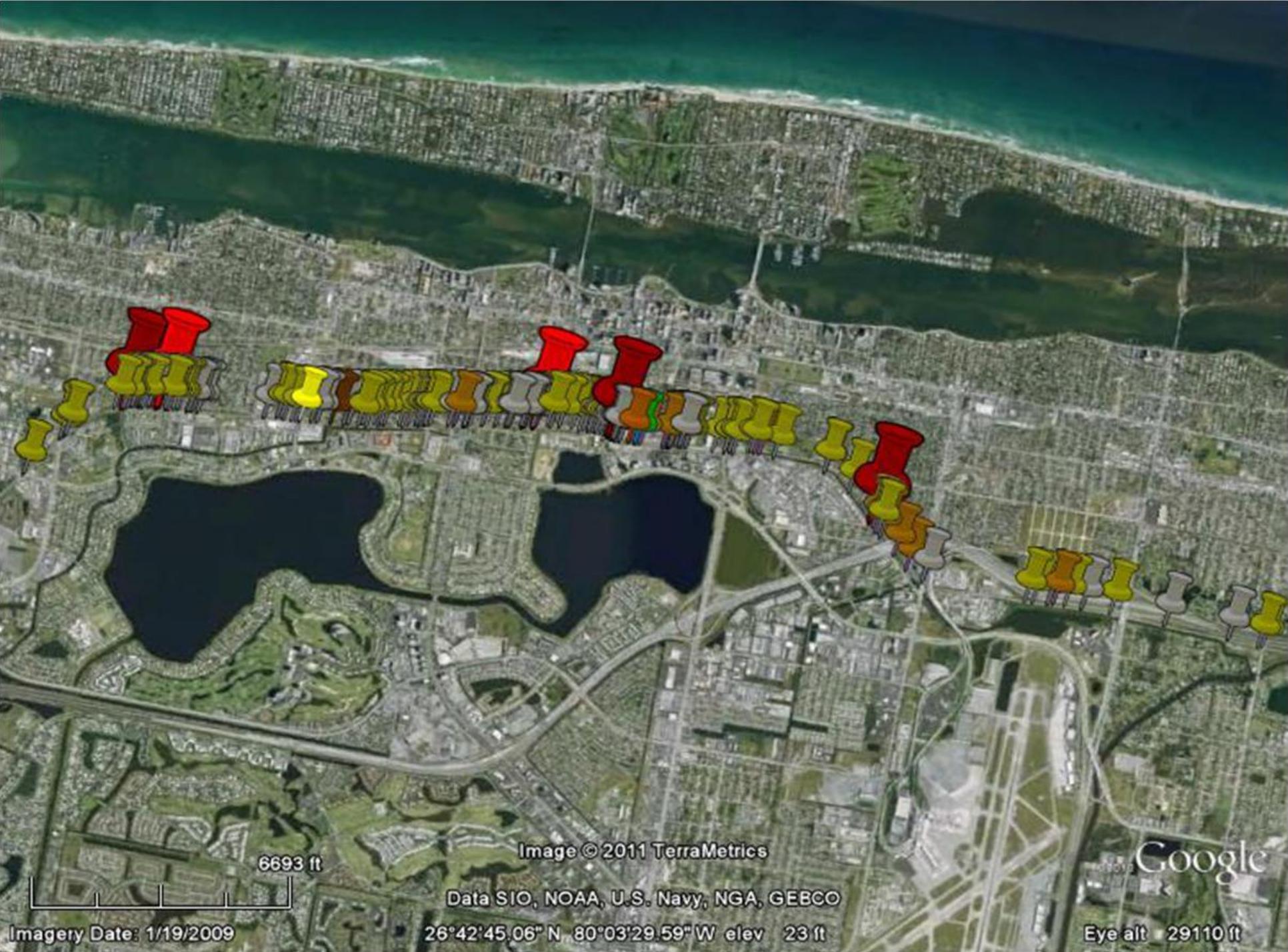


Incident Data Collection

Stakeholder	Data Type	Status
FRA	Incident data	✓
Volpe/FRA	Field observations	✓
SFRTA	Incident data	✓
SFRTA	Train crew observations	✓
SFRTA	Locomotive video	✓
Amtrak Police	Incident Data	✓
CSXT Police	Incident Data	
FEC Police	Incident Data	
West Palm Beach PD	Violation/Incident data	
PB County School District PD	Incident Data	

As of Oct 2011





6693 ft

Image © 2011 TerraMetrics

Data SIO, NOAA, U.S. Navy, NGA, GEBCO

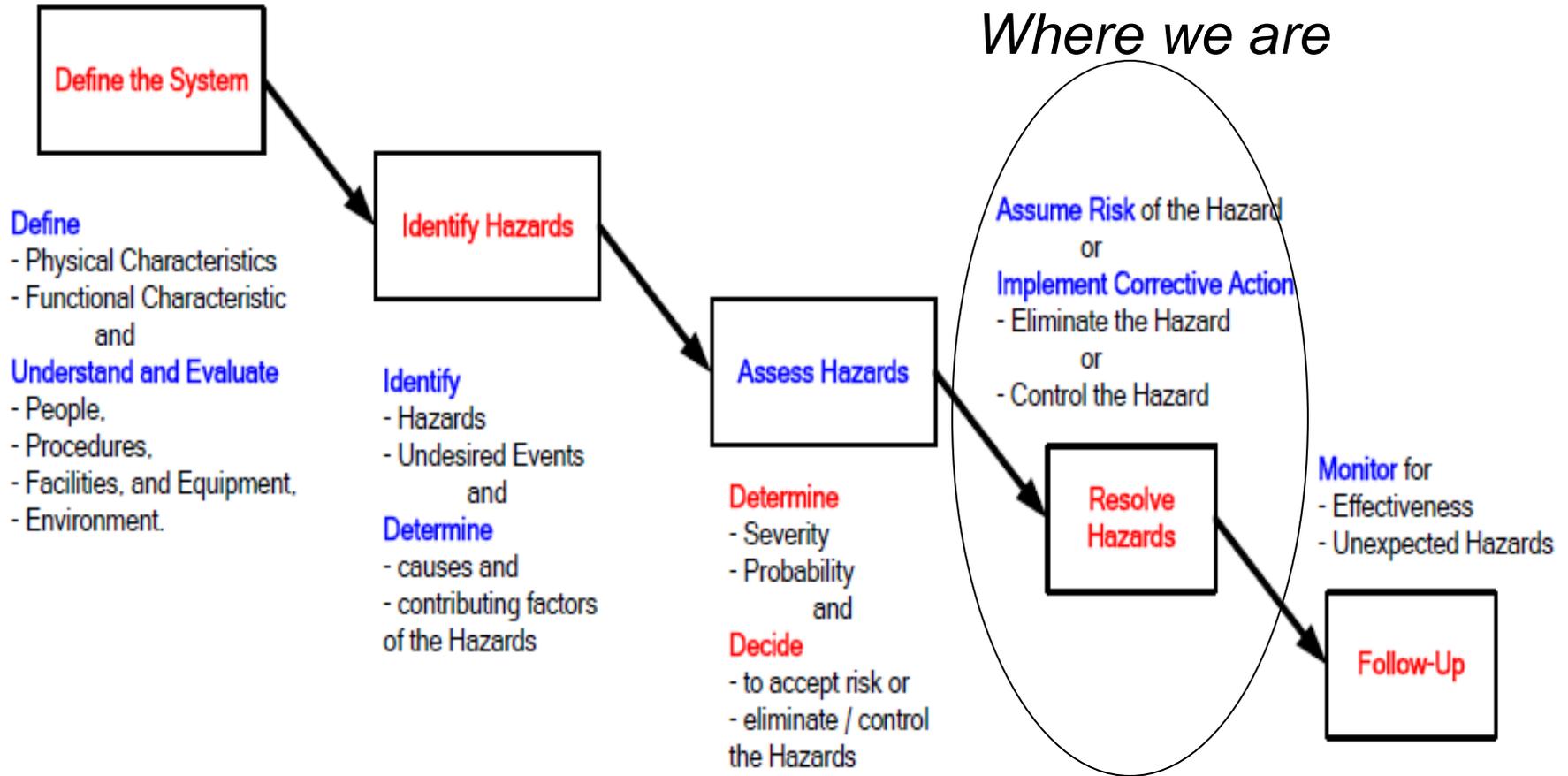
26°42'45.06" N 80°03'29.59" W elev 23 ft

Google

Eye alt 29110 ft

Imagery Date: 1/19/2009

Hazard Analysis and Resolution Process



Source: U.S. Department of Transportation Federal Railroad Administration. 2007. "FRA Approach to managing Gap Safety."

Hazard Analysis Methodology - 3. Assess Hazards

Assessment criteria examples

- Prior incidents
- Near miss history
- Track curvature
- Sight obstructions
- Number of tracks
- Train speed
- Prevalent trespass type (along/cross)
- Attractive nuisances (schools, community centers, parks...)
- Number of daily trains
- Suicide??

Rating Scheme

- Assign weight (point rating) for each type of criteria
- Add up points, resulting in a **risk-based prioritized list**



Hazard Analysis Methodology

Trespass Severity



504Front Top Site
17 Mar 2010 17:07:21 Eastern Daylight Time



Camera07 510
13 May 2010 17:43:39 Eastern Daylight Time



Trespass Location Severity Analysis (TLSA)

Priority Score Mapping to Risk Class (proposed)

- A (high risk):** PS \geq 20 3 locations
- B (medium risk):** $10 \leq$ PS $<$ 20 4 locations
- C (low risk):** $5 \leq$ PS $<$ 10 6 locations
- D (negligible risk):** PS $<$ 5 21 locations

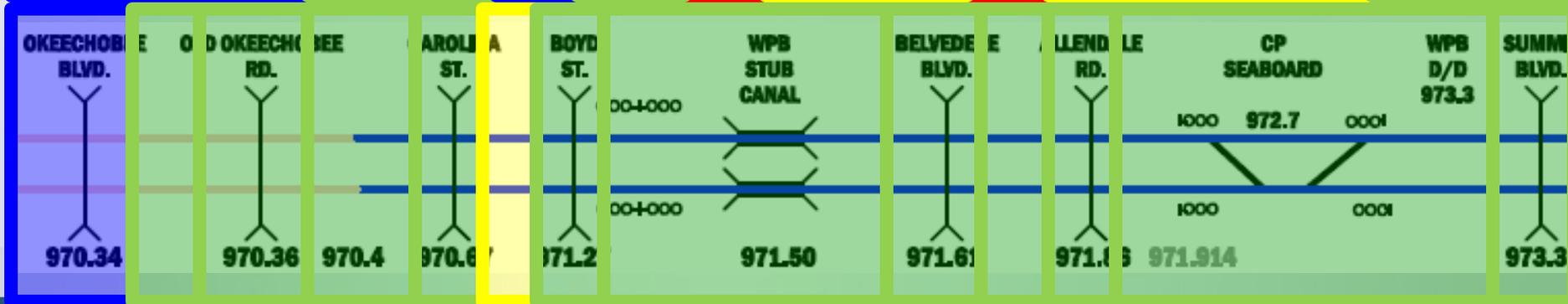
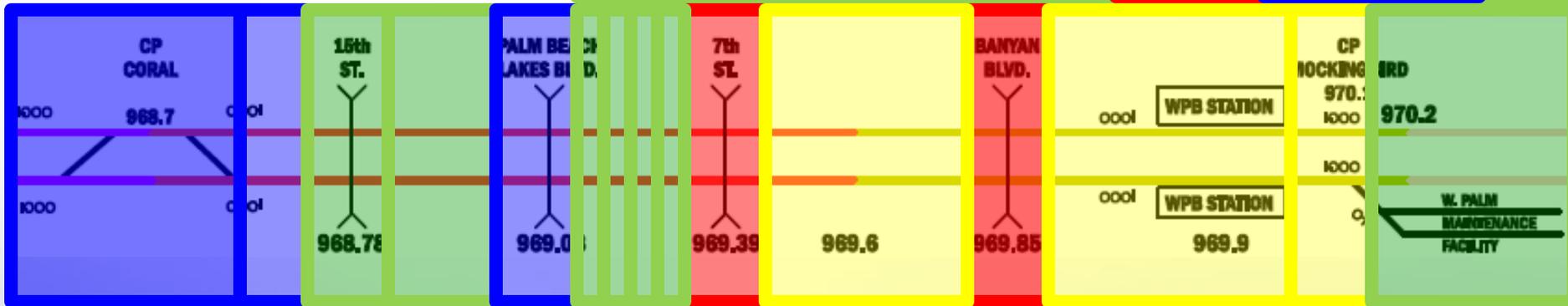
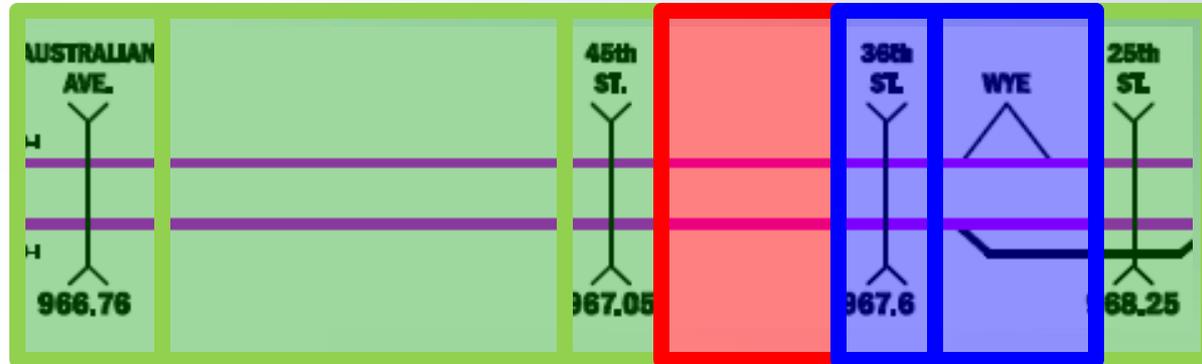
Frequency	Consequence								
	R	C1	C2	C3	C4	C5	C6	C7	C8
	Service Related	Negligible	Minor	Minor with Medical Care	Serious Admitted to Hospital	Serious	Serious with Multiple Injuries	Critical	Disastrous
Certain	R	B	B	B	A	A	A	A	A
Likely	R	C	B	B	B	B	A	A	A
Probable	R	C	C	B	B	B	B	A	A
Unlikely	R	C	C	C	C	C	B	B	A
Rare	R	D	C	C	C	C	C	B	B
Improbable	R	D	D	D	D	C	C	B	B
Incredible	R	D	D	D	D	D	D	C	C

Source: U.S. Department of Transportation Federal Railroad Administration. 2007. "Collision Hazard Analysis Guide: Commuter and intercity Passenger Rail Service."



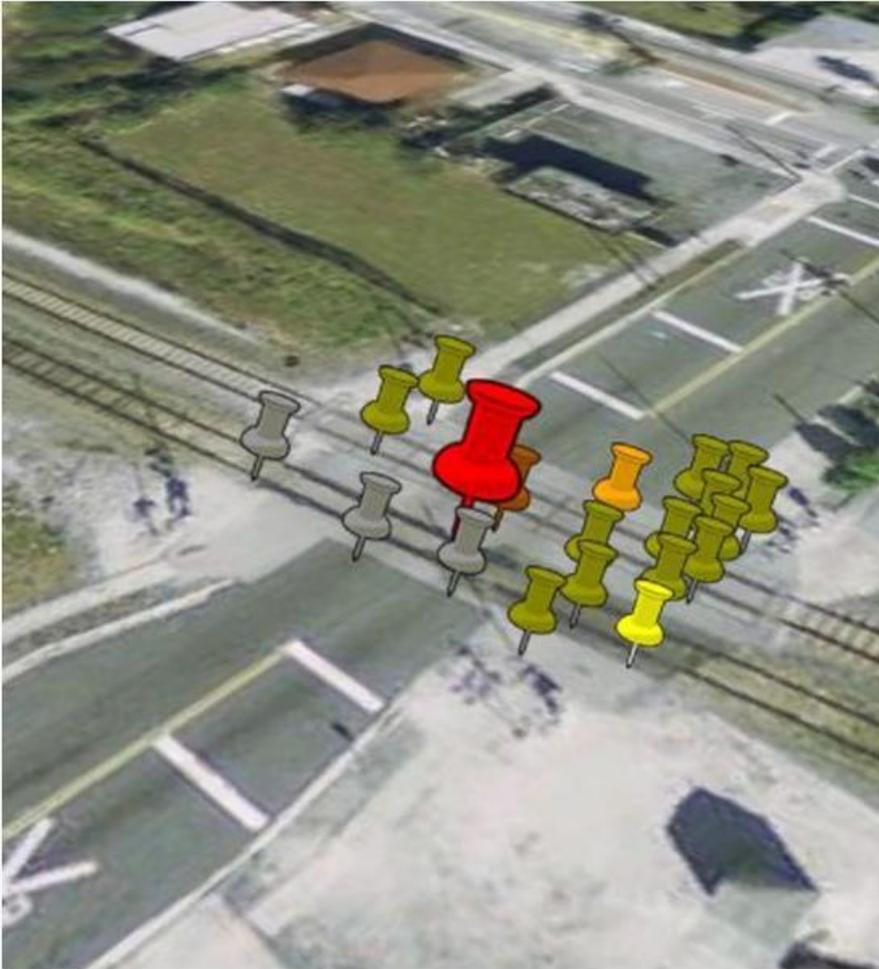
Trespass Location Severity Analysis (TLSA)

- A (high risk):
- B (medium risk):
- C (low risk):
- D (negligible risk):



John A. Volpe National Transportation Systems Center

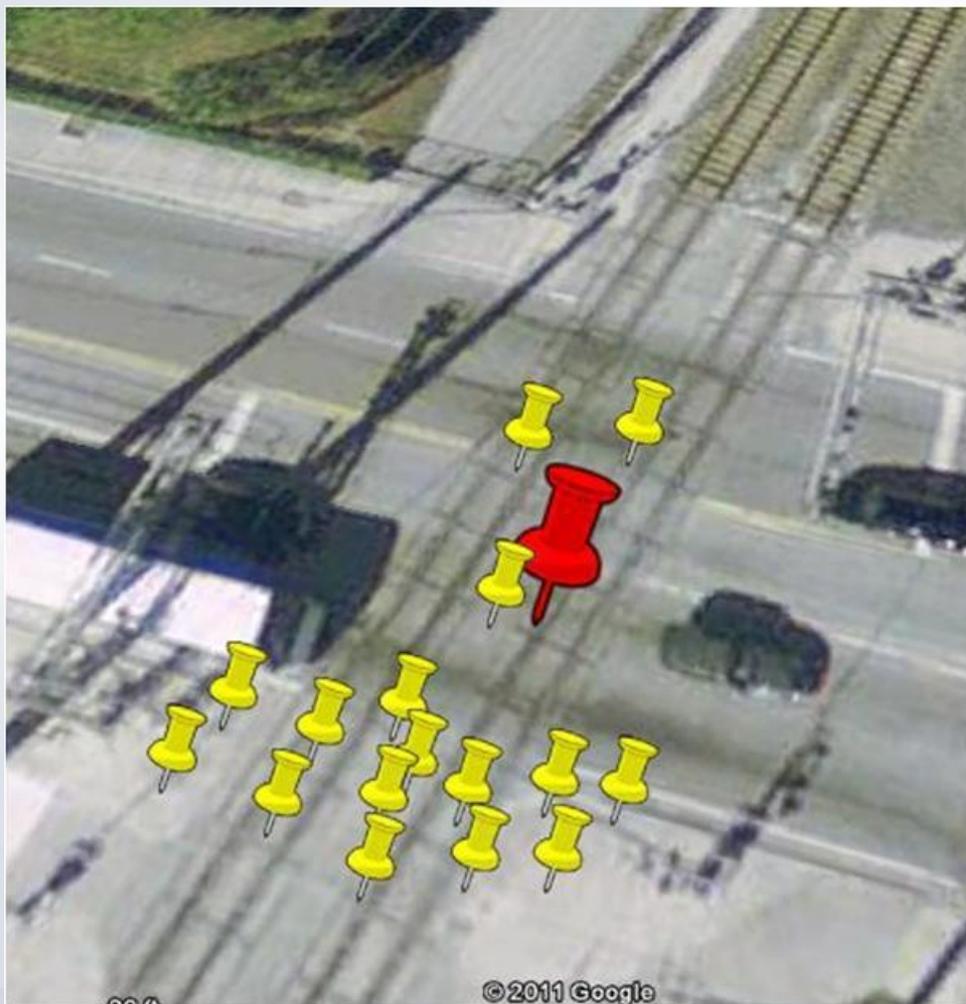
TLSA – 7th Street Crossing



- 1 fatality
- 1 suicide
- 1 attempted suicide
- 14 trespass events (locomotive video)
- Risk Class A (high risk)**



TLSA – Banyan Blvd Crossing



1 fatality

16 trespass events (locomotive video)

Risk Class A (high risk)



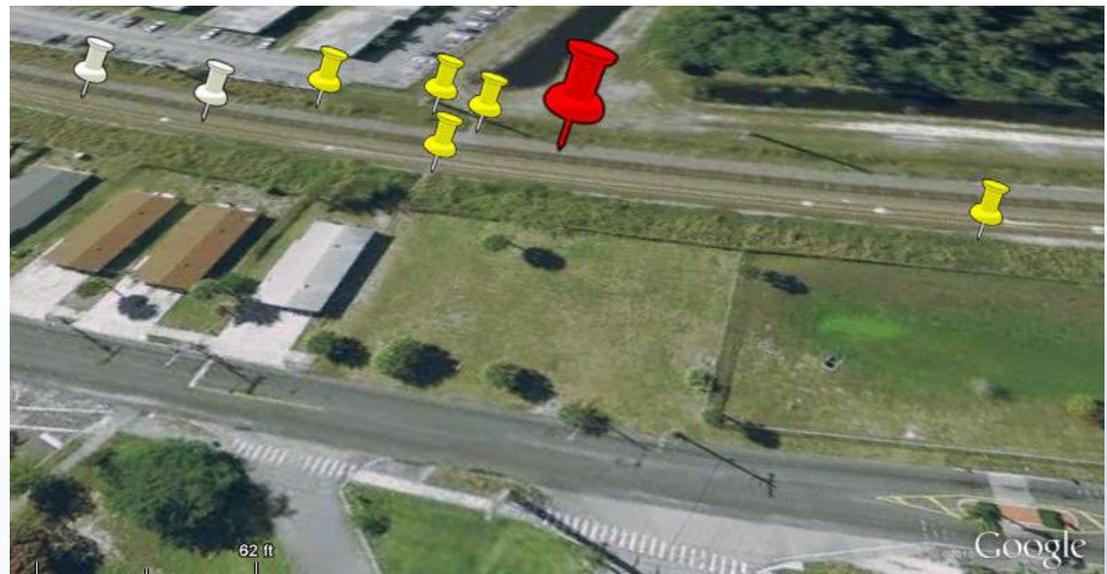
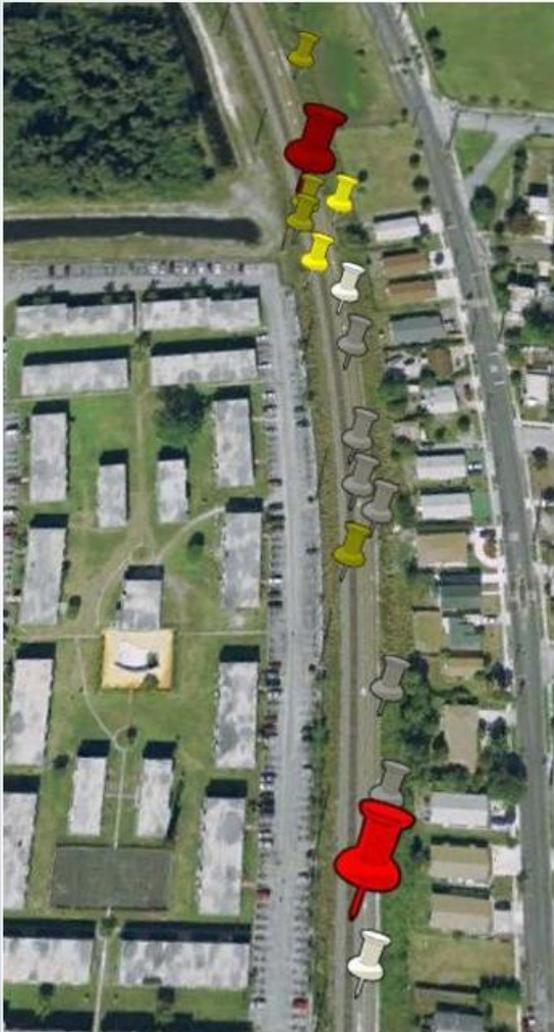
TLSA – ROW between 45th and 36th

2 fatalities

14 trespass events

- 7 within 100 ft of end of canal
- All 7 between 2:14 PM and 6:03 PM
- Northmore Elementary School (and playground) on East side

Risk Class A (high risk)



TLSA – ROW between 45th and 36th



504Front Top Site
17 Mar 2010 17:07:21 Eastern Daylight Time



TLSA – ROW between Banyan Blvd and WPB Station



1 attempted suicide (unsure of exact location)
22 trespass events (locomotive video)
Risk Class B (medium risk)

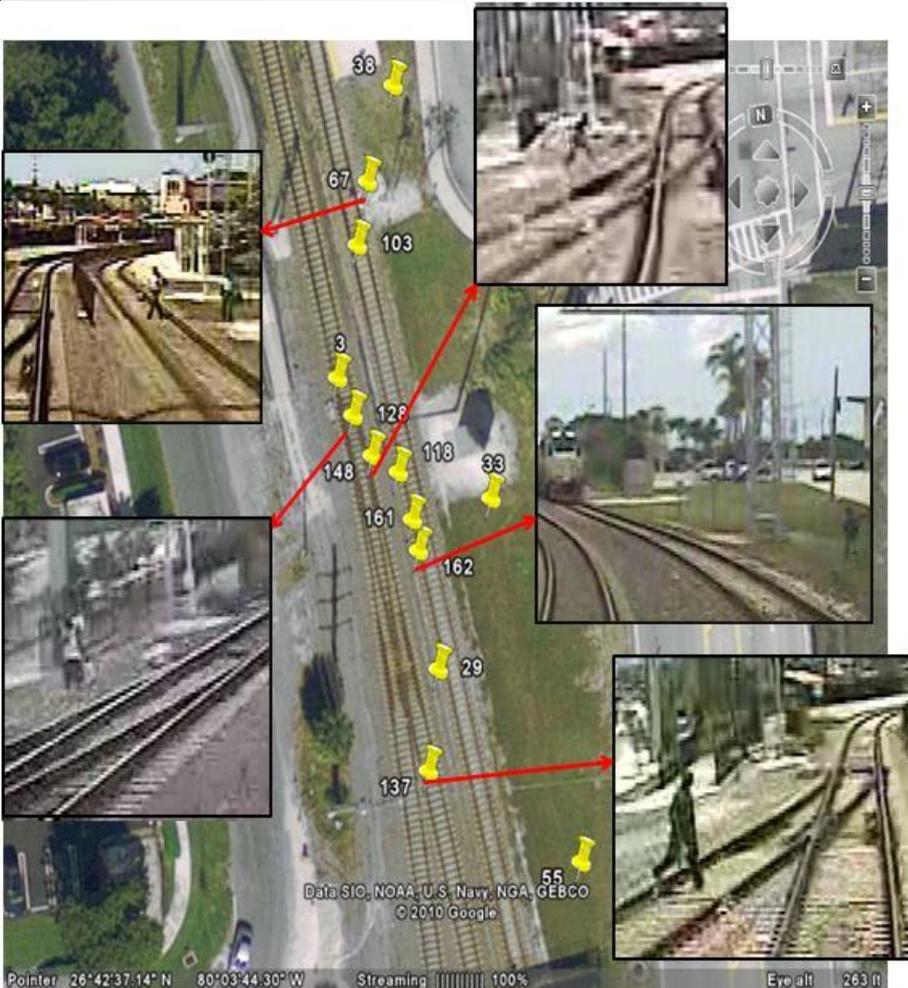


TLSA – CP Mockingbird

13 trespass events (locomotive video)

- All involved trespassers crossing the tracks

Risk Class B (medium risk)



Time



Hazard Analysis Methodology – 4. Resolve Hazards

Mitigation Strategies

Engineering

- Signs
- Fencing/landscaping/environmental design/channelization
- Second train warning signs (for crossing trespass)
- Pedestrian gate skirts (for crossing trespass)
- Pedestrian crossing, over/underpass
- Second train approaching signals (for crossing trespass)
- Other treatments



Mitigation Strategies

Education

- Safety message (signage and/or PSAs) on platforms and in trains (system-wide)
- Media events
- OL presentations to local community (targeted)
 - Local schools
 - Local businesses
 - Specific “attractive nuisances”, such as the Boys & Girls club on Pinewood Ave (near 40th St) abutting FEC ROW and King Foods on 36th St abutting CSX ROW
- Safety blitzes (targeted)
- Bulletin material for local employers, coordinated through their Safety or HR offices (signs, safety notices...)



Mitigation Strategies

Enforcement

- Enforcement of state and local trespass laws
 - May involve educating the police department on the statutes and their authority
 - May need to work on energizing enforcement through outreach to law enforcement agencies and the judicial branch to recognize grade crossings and trespass violations as serious problems. (2004 Secretary's Action Plan, p7)
- Remote monitoring (video-based)



Mitigation Strategies – Draft Recommendation

Mitigation strategy recommendations

- Location-based & system-wide
- Risk-based priority score
- Trespass history
- Trespass characteristics
- Mitigation strategies
- Recommended measures

Location ID: A16
Description: 7th Street
Priority Score: 34
(Risk Class A, high risk)



Trespass History:

- 1 fatality (12/04/07)
- 1 suicide (09/22/05)
- 1 attempted suicide (03/24/06)
- Tr-Rail locomotive video - 14 trespass events (03/05/10-07/05/10)
- 3 trespass events noted via Veolia reports (04/07/10-04/19/10)





Existing Conditions: As an active highway-rail grade crossing, the 7th street grade crossing (location A16) features numerous active and passive vehicle and pedestrian traffic control devices. The crossing is secured by a four-quadrant gate with accompanying pedestrian gates. West of the grade crossing along 7th street, a number of traffic calming devices are in use including chicanes and bulb outs. A standard 5ft tall chain-link fence lines the ROW to the north and south on the west side of the intersection.

Trespass characteristics: Events at A16 typically involve pedestrians violating the pedestrian gates at the crossing. North of the grade crossing, at the closed crossings of 8th, 9th, and 10th streets, worn trails leading through fenced or missing sections of fencing serve as clear indicators of pedestrian trespass activity. Footpaths along the ROW are visible, indicating that pedestrians also walk alongside the tracks to reach points north and south of the crossing.

Potential mitigation strategies:

Fencing: A pedestrian channelization system including a combination of fencing, Z-gates, and pedestrian gate skirts could restrict pedestrian movement to designated areas within the crossing while closing gaps within the existing fencing along the ROW. Static wayfinding signage along the corridor should be installed to direct pedestrians to appropriate crossing points.

Education: A targeted pedestrian blitz at location A16 should be assigned to enhance passenger awareness to the potential hazards of disregarding pedestrian railroad warning devices.

Enforcement: A targeted enforcement at crossing could support an education campaign while gaining further publicity for safe crossing practices. Better display of penalties, including posted signs with signal-violation penalties, can also serve as an effective deterrent.

Recommended Risk Control Measures:

1. Pedestrian channelization and gates skirts (Eng.)
 - Stakeholders: FDOT, CSX, WPB
 - Cost/Ease of Implementation: Medium/Medium
2. Targeted pedestrian blitz at crossing (Educ.)
 - Stakeholders: OL, WPB PD, CSX, Tr-Rail, Amtrak
 - Cost/Ease of Implementation: Low/Easy

FRA/Volpe Field Site Investigation – West Palm Beach TriRail Station



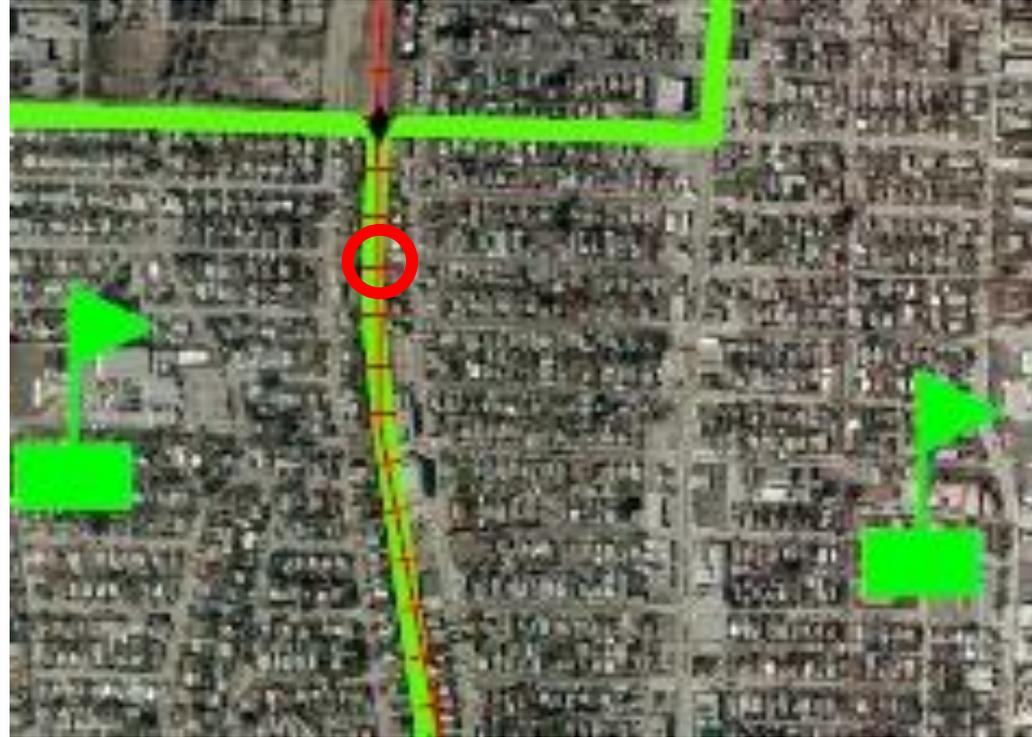
FRA/Volpe Field Site Investigation – West Palm Beach TriRail Station



FEC Railroad Field Observations



Location: FEC line south of 45rd Street HRGC



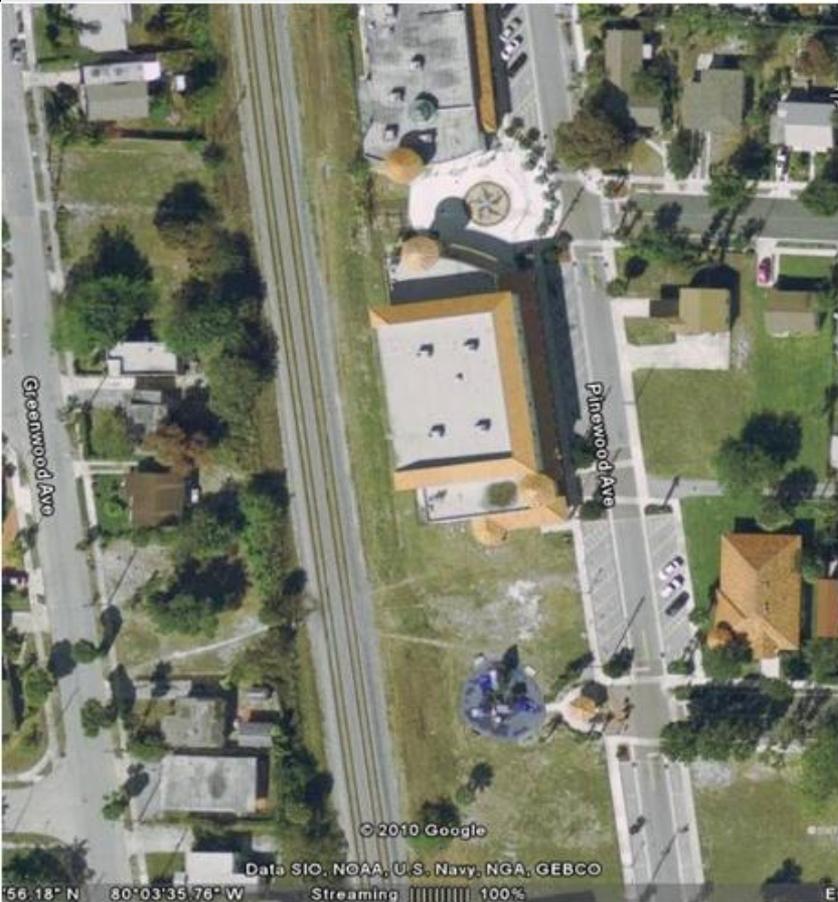
Source: Palm Beach County School District,
http://gis.palmbeach.k12.fl.us/cms/Download_Shapefiles.html

Palm Beach County School District – Attendance Boundaries



Source: Palm Beach County School District,
http://gis.palmbeach.k12.fl.us/cms/Download_Shapefiles.html

FRA/Volpe Field Site Investigation – FEC Boys & Girls Club (near 39th St)

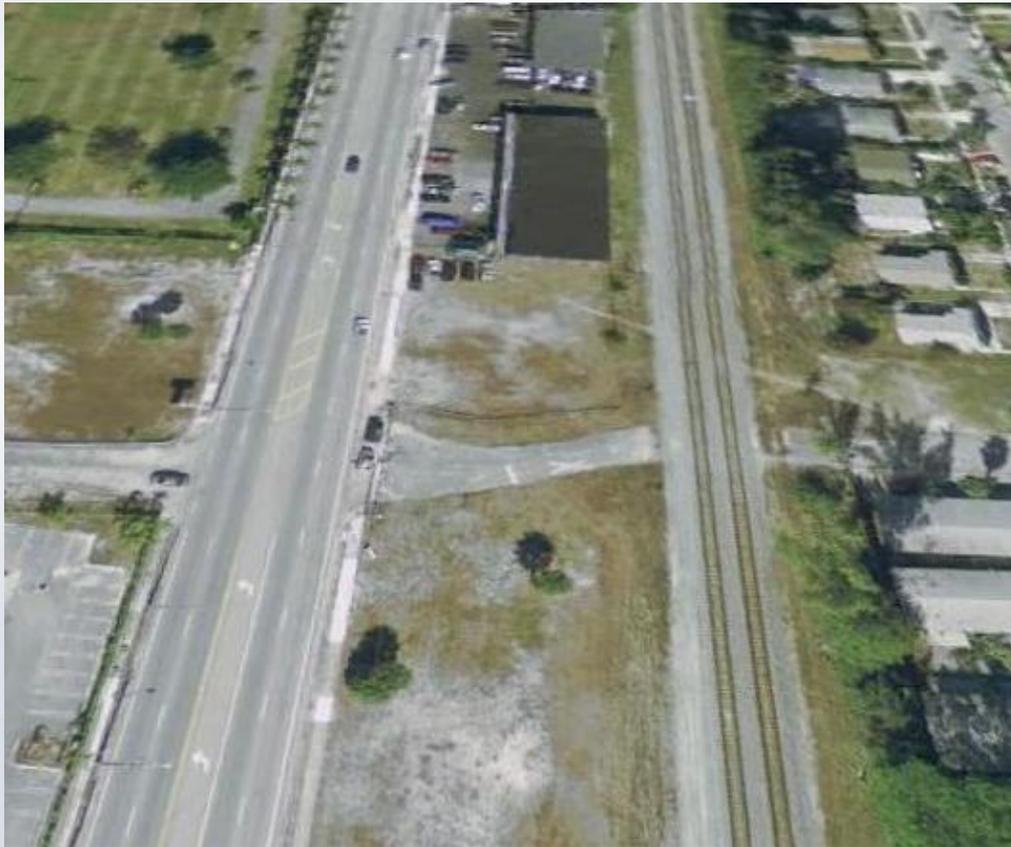


FRA/Volpe Field Site Investigation – FEC Boys & Girls Club (near 39th St)

Sept 2011



FRA/Volpe Field Site Investigation – FEC 54th St (closed crossing) and Greenwood Ave



Florida State Statute

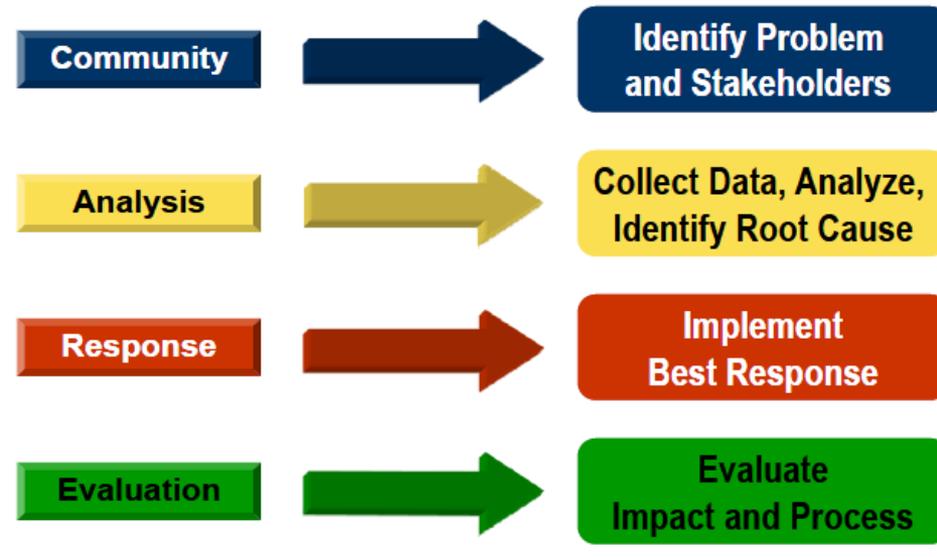
FSS 810.09

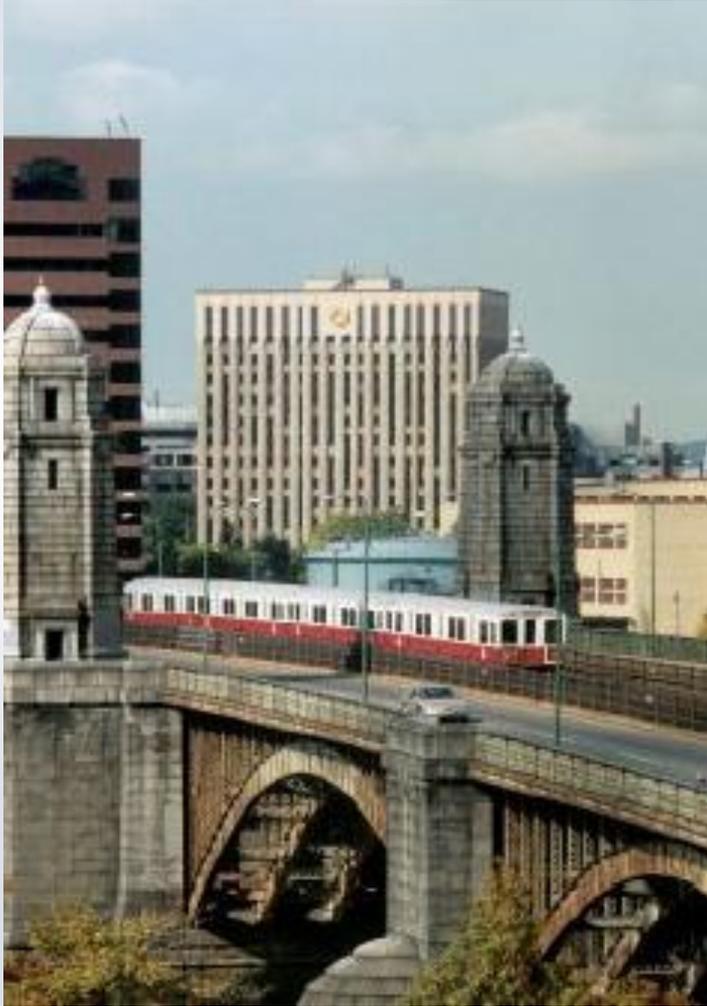
- Trespass on property other than structure or conveyance
 - Signs must be posted no less than 500' apart, 2" min lettering



Next Steps

- Identify Responses
 - Finalize mitigation strategy recommendations for priority locations based on stakeholder input
- Support Implementation
- Evaluation
 - Install surveillance equipment at select locations for further trespass data collection
 - Assess effectiveness of implemented treatments





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*Sponsored by the FRA Office of Research and
Development - Signal, Train Control and
Communications Division (RDV-33)*



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