Putting Rail Safety on the Map December 5th 2012

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Federal Railroad Administration
USDOT

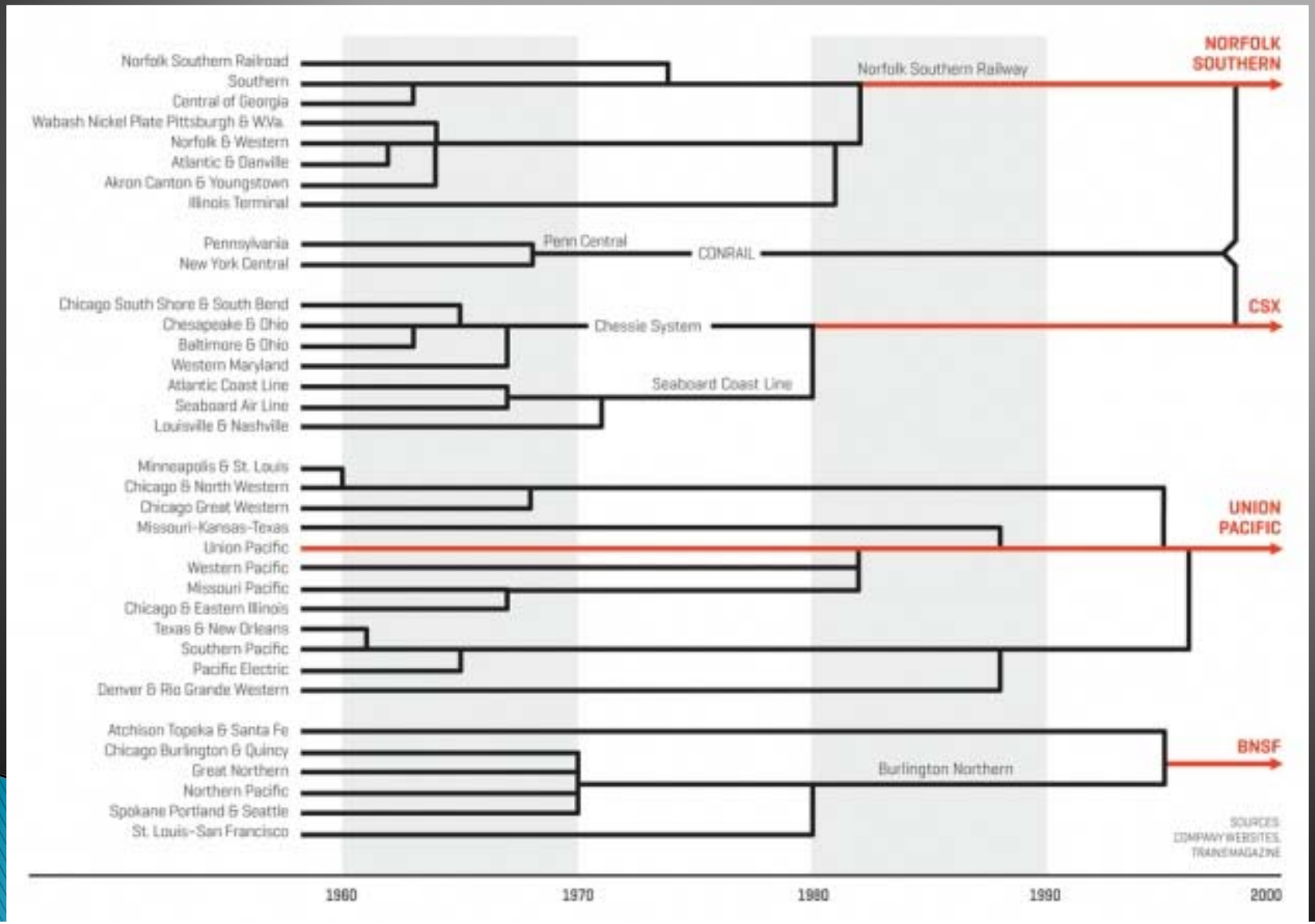
Overview

- Background
  - Rail Industry
  - FRA
- FRA GIS Program
- FRA's GIS Data
- FRA's GIS Applications


Seattle
Portland
San Francisco
San Jose
Los Angeles
San Diego
Phoenix
Denver
El Paso
Fort Worth
Dallas
Austin
San Antonio
Houston
Oklahoma City
Memphis
Milwaukee
Chicago
Detroit
Columbus
Charlotte
Jacksonville
Boston
New York
Philadelphia
Baltimore
Washington
Legend
Major Cities
Main Rail Lines


Seattle
Portland
San Francisco
San Jose
Los Angeles
San Diego
Phoenix
Denver
El Paso
Oklahoma City
Fort Worth
Dallas
Austin
San Antonio
Houston
Memphis
Milwaukee
Chicago
Detroit
Columbus
Charlotte
Jacksonville
Boston
New York
Philadelphia
Baltimore
Washington
Legend
Major Cities
Amtrak
Main Rail Lines

Rail Industry: Staggers Rail Act of 1980



Classes of Railroads

Class I Railroads	Class II Railroads	Class III Railroads
7 Companies	~ 10 Companies	> 500 Companies
Revenue ≥ $433.2 million per year	Revenue $34.7 to <$433.2 million per year	Revenue < $34.7 million per year
Large railways with interstate links	Service to selected regions	Service to small geographic areas
Mainly East-West Orientation	Mainly neighboring states/economic centers	Mostly branch lines with only one track


BNSF: Burlington
Northern Santa Fe


CN: Canadian National


CPRS: Canadian Pacific


CSXT: CSX Transportation


KCS: Kansas City Southern


NS: Norfolk Southern

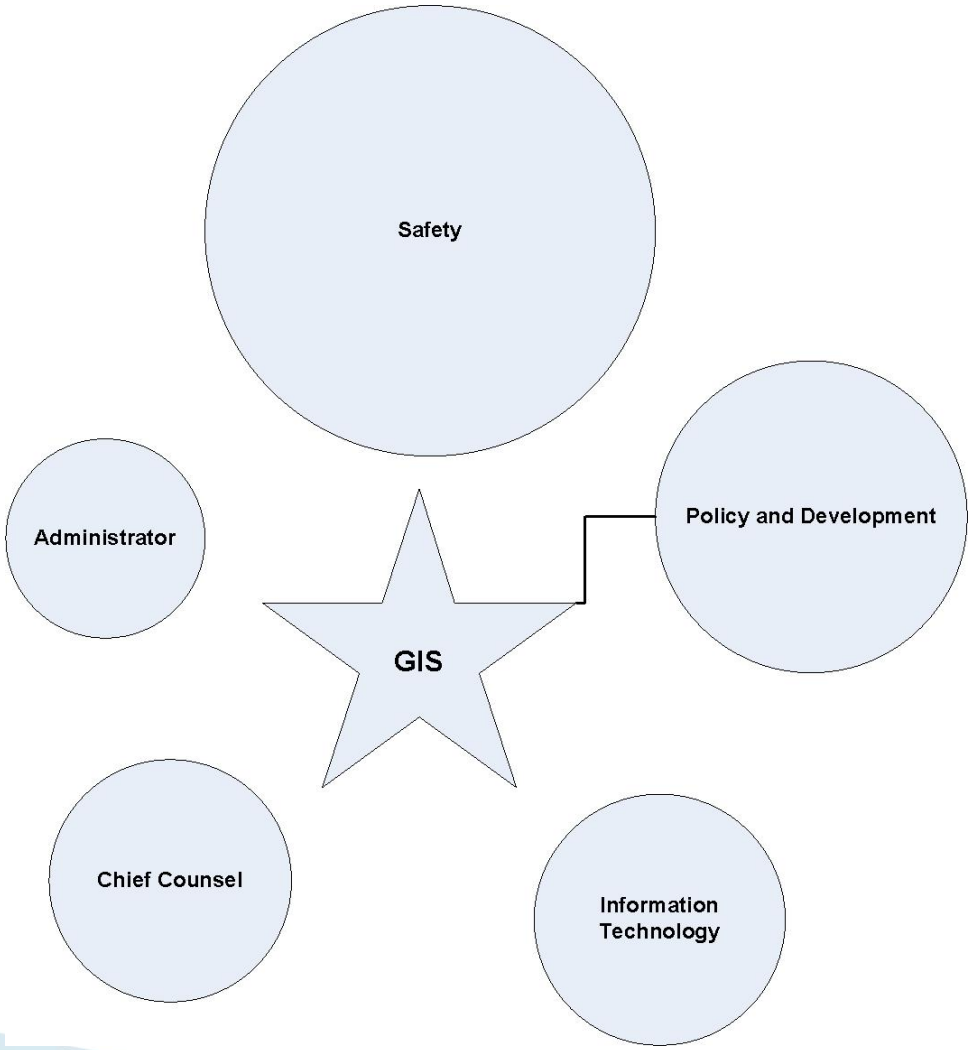
Federal Railroad Administration (FRA)

- Created by the Department of Transportation Act of 1966 (49 U.S.C. 103, Section 3(e)(1))

- The purpose of FRA is to:
  - Promulgate and enforce rail safety regulations
  - Administer railroad assistance programs
  - Conduct research and development in support of improved railroad safety and national rail transportation policy
  - Provide for the rehabilitation of Northeast Corridor rail passenger service
  - Consolidate government support of rail transportation activities.

- Today, FRA is one of ten agencies within the U.S. Department of Transportation concerned with intermodal transportation. It operates through seven divisions under the offices of the Administrator and Deputy Administrator.

FRA's GIS Program



FRA's GIS Data Overview

- Primary
  - 1:100k network
  - Milepost
  - Freight Stations
  - Highway-rail grade crossings
  - Amtrak passenger stations
- Secondary
  - Yards
  - Subdivisions
  - Accidents
  - FRA Inspections
  - Designated Quiet Zones
  - Bridges
  - Etc.

Previous Networks

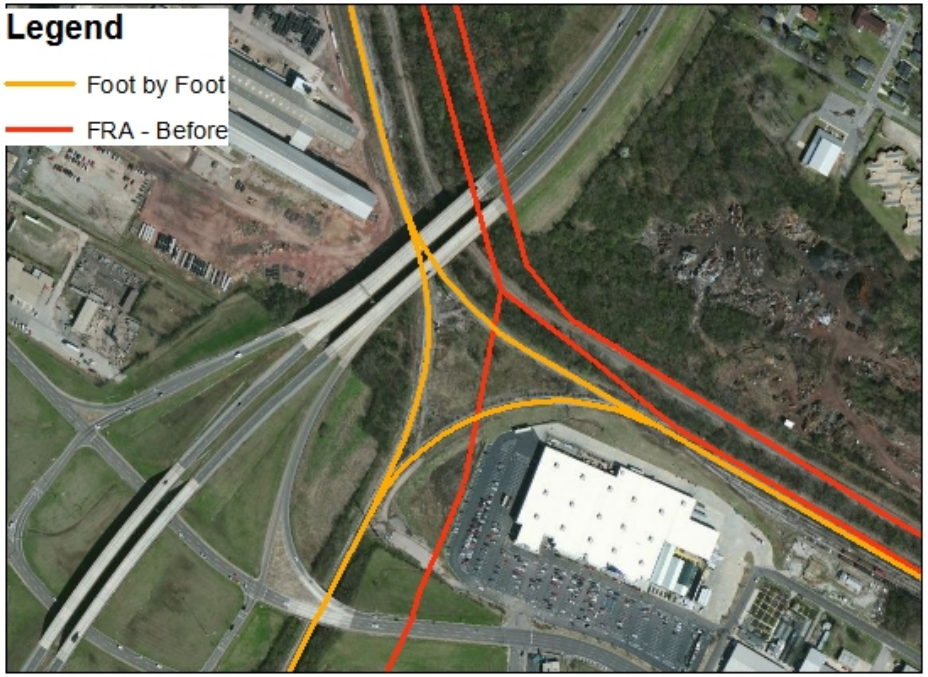
- 1:2 million (USGS): Used for cartographic representation, attributes, and routing
- 1:100,000 (Census): Had a better spatial representation but lack routability and attributes
- By 2005, the 1:2 million attributes were conflated to the 1:100,000 network & the 1:100,000 was completely routable

2008 Total Waybill Flow

Spatial Improvements

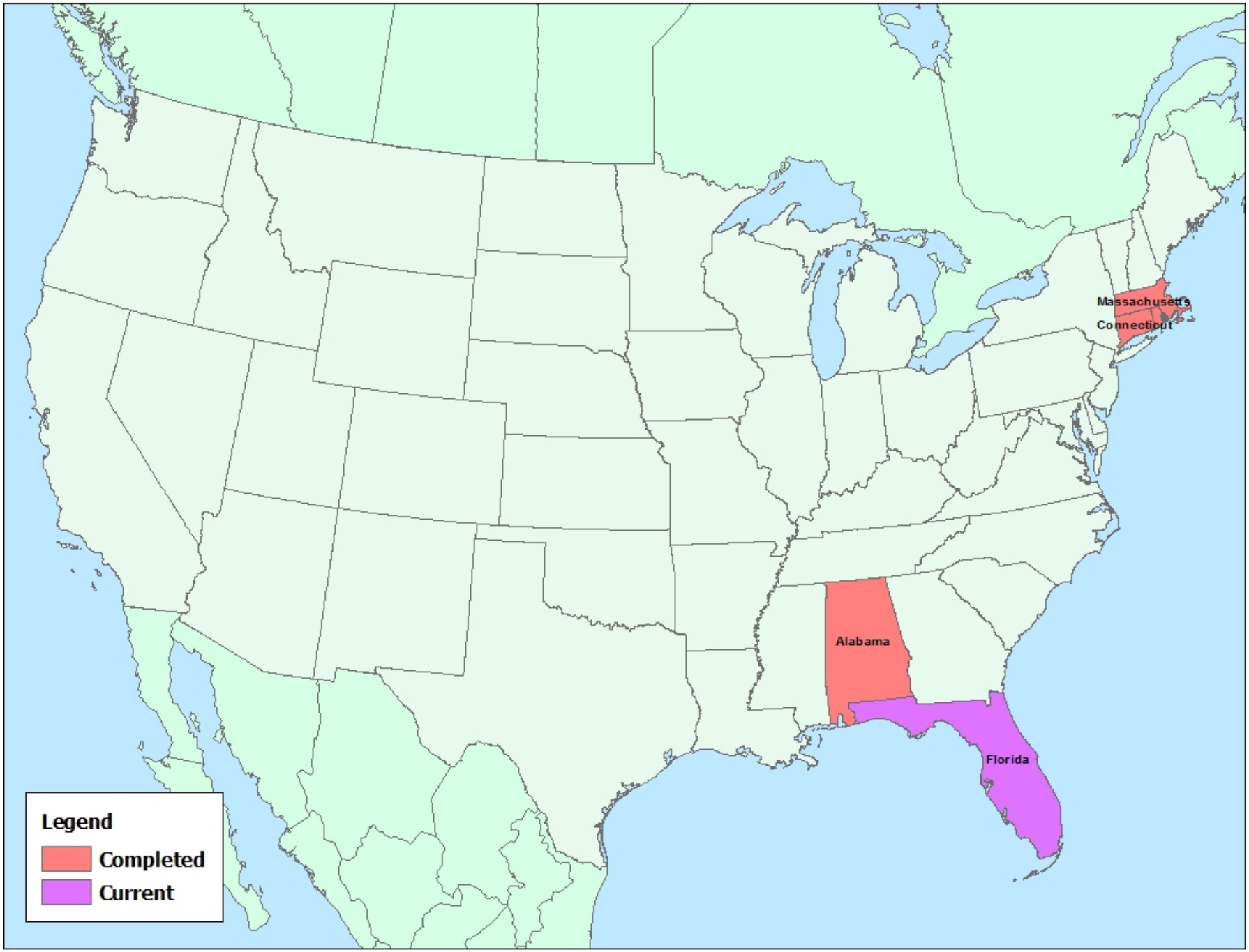
- Integrating the FRA's Automated Track Inspection Program (ATIP) Data

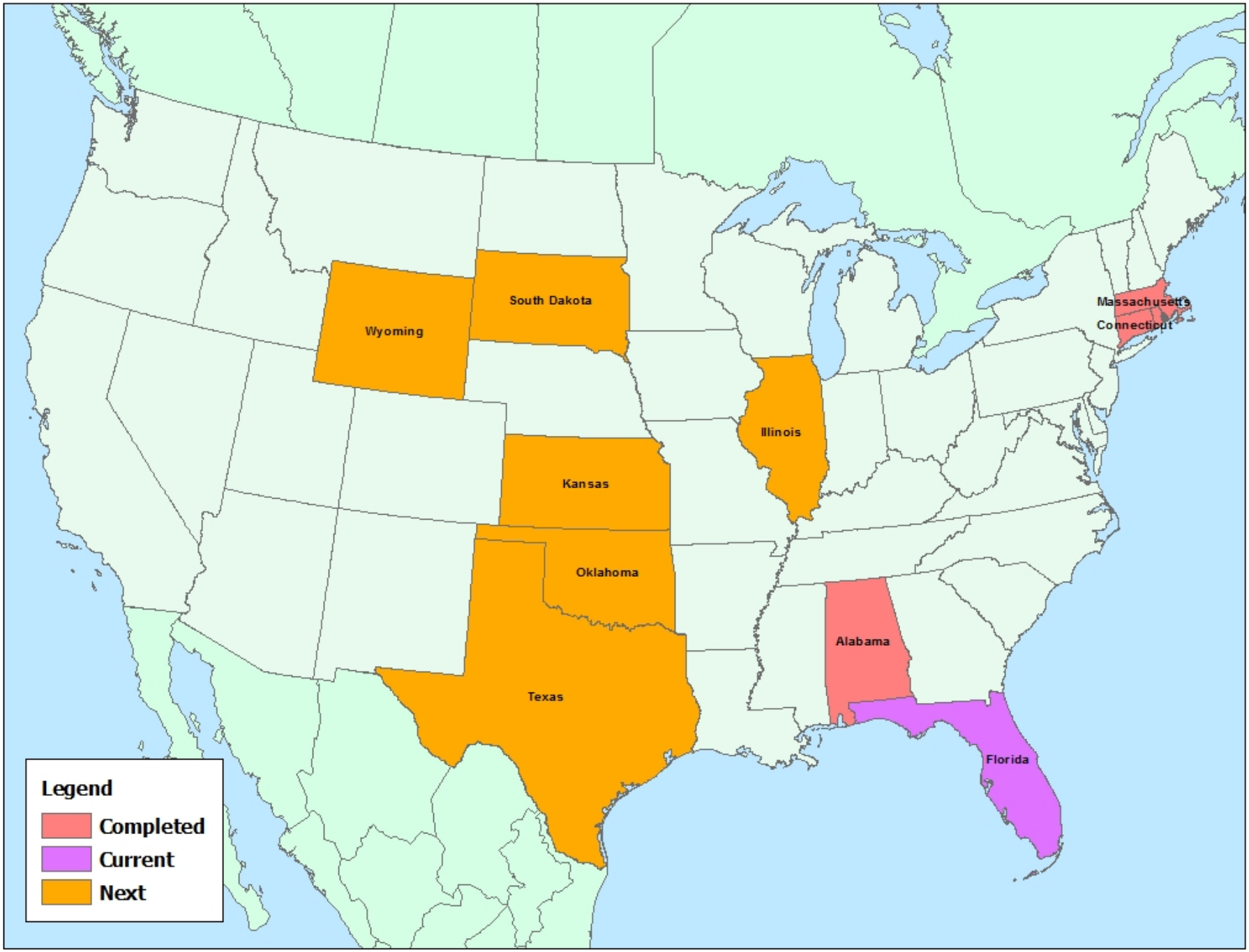
- The ATIP cars takes a latitude and longitude reading every foot.

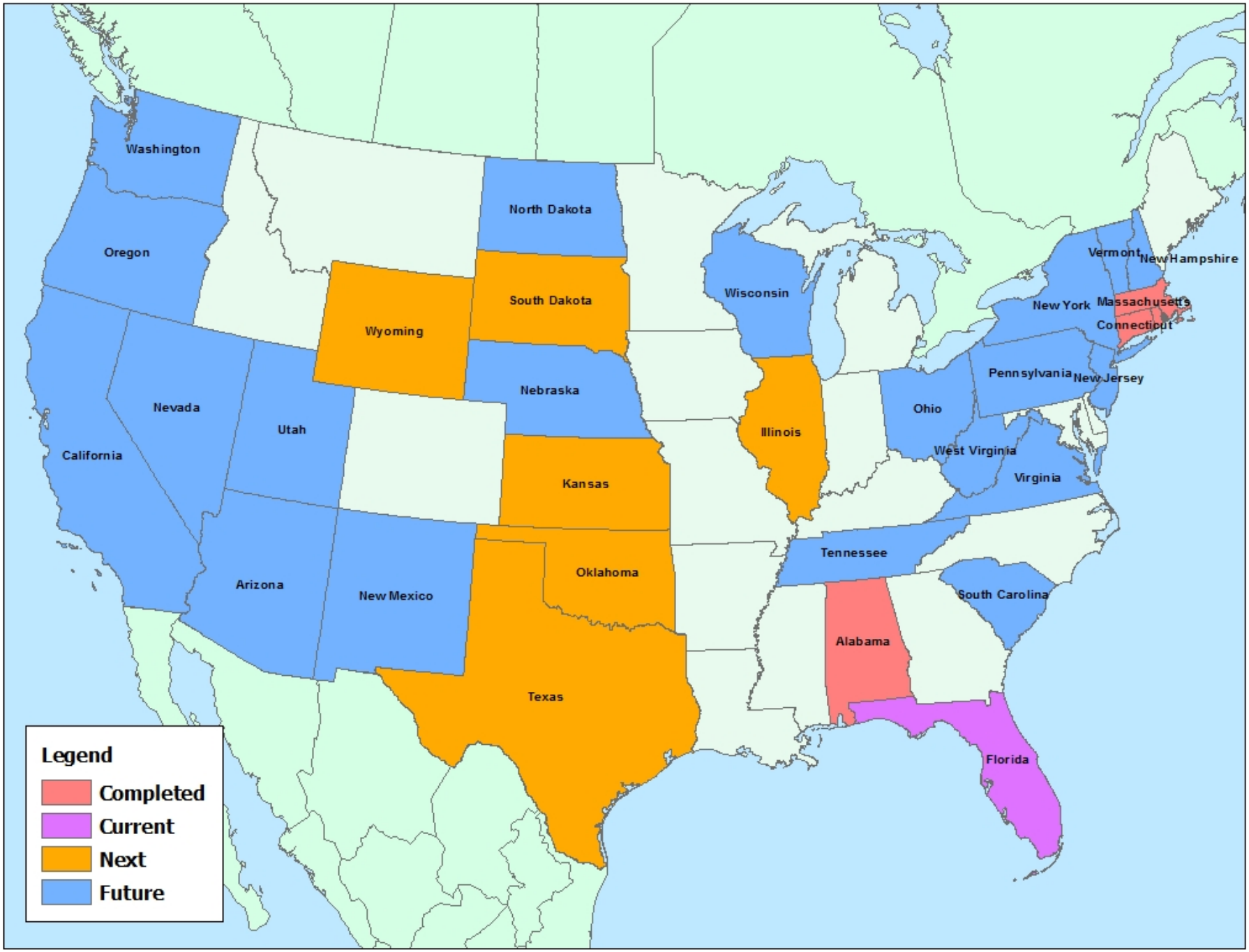

Legend
Foot by Foot
FRA - Before


Legend
Foot by Foot
FRA - After

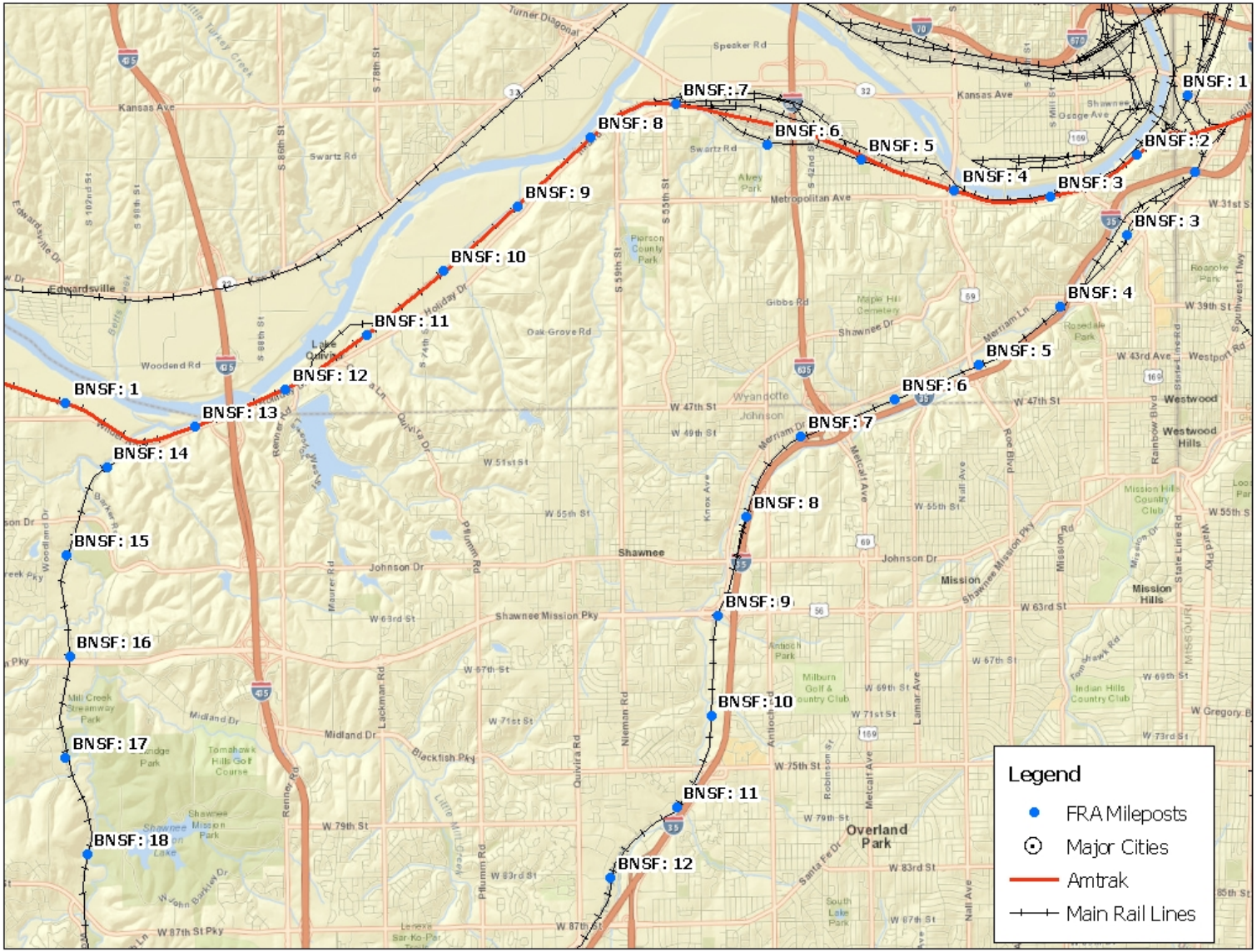

Massachusetts
Connecticut
Alabama
Legend
Completed


Massachusetts
Connecticut
Alabama
Florida
Legend
Completed
Current


Wyoming
South Dakota
Massachusetts
Connecticut
Illinois
Kansas
Oklahoma
Alabama
Texas
Florida
Legend
Completed
Current
Next


Washington
Oregon
California
Nevada
Utah
Arizona
New Mexico
Wyoming
North Dakota
South Dakota
Nebraska
Kansas
Oklahoma
Texas
Wisconsin
Illinois
Ohio
Pennsylvania
New York
Vermont
New Hampshire
Massachusetts
Connecticut
New Jersey
West Virginia
Virginia
Tennessee
South Carolina
Alabama
Florida
Legend
Completed
Current
Next
Future

Mileposts


BNSF: 1
BNSF: 2
BNSF: 3
BNSF: 3
BNSF: 4
BNSF: 4
BNSF: 5
BNSF: 5
BNSF: 6
BNSF: 6
BNSF: 7
BNSF: 7
BNSF: 8
BNSF: 8
BNSF: 9
BNSF: 9
BNSF: 10
BNSF: 10
BNSF: 11
BNSF: 11
BNSF: 12
BNSF: 12
BNSF: 13
BNSF: 14
BNSF: 15
BNSF: 16
BNSF: 17
BNSF: 18
Legend
FRA Mileposts
Major Cities
Amtrak
Main Rail Lines

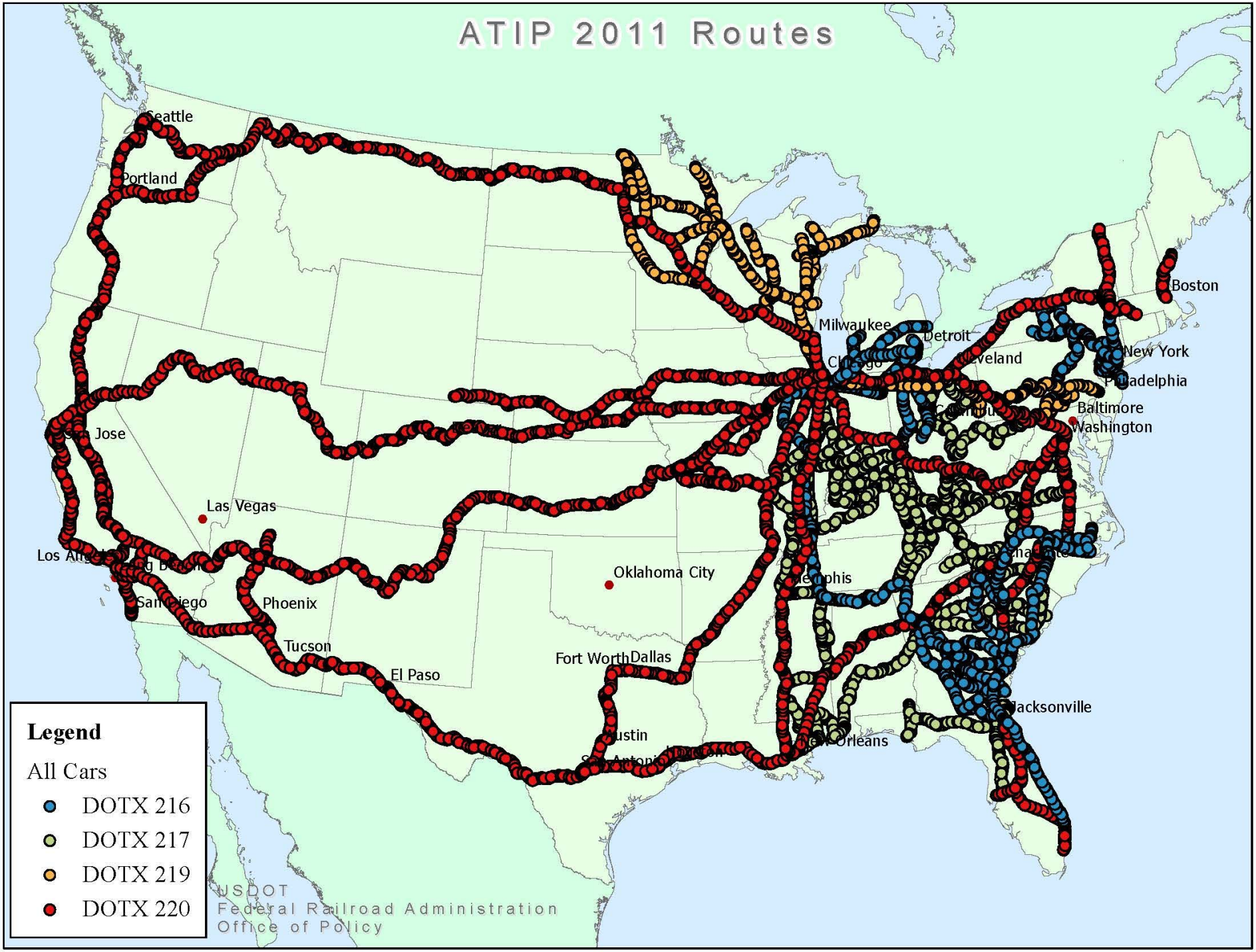
Grade Crossings

- FRA has a Highway-Rail Crossing and Trespasser Program Division that plans, develops, and directs programs that address highway-rail safety and trespasser issues. Committed to reducing the number of collisions at highway-rail crossings and along railroad right-of-way.

- Prior to the Rail Safety Improvement Act of 2008, this information was not required and the spatial information provided could be very inaccurate. Beginning in the fall of 2010, grade crossing data collected and recorded by the state DOT or railroad had to contain spatial coordinates.

- Since 2008, FRA has provided guidance and input for the development of the policy for 911 operators and responders regarding rail accidents/incidents. This policy can be found in the NENA Railroad & PSAP Interaction Operations Information Document (OID).

- The use of GIS data and technology has been essential to the program


ATIP 2011 Routes
Seattle
Portland
Jose
Las Vegas
Los Angeles
Long Beach
San Diego
Phoenix
Tucson
El Paso
Oklahoma City
Fort Worth
Dallas
Austin
San Antonio
Houston
Milwaukee
Detroit
Chicago
Cleveland
Columbus
Memphis
New Orleans
Jacksonville
Charlotte
Boston
New York
Philadelphia
Baltimore
Washington
Legend
All Cars
DOTX 216
DOTX 217
DOTX 219
DOTX 220
USDOT
Federal Railroad Administration
Office of Policy

FRA GIS Applications

- Data Driven
  - National Transportation Atlas Database (NTAD)

http://www.bts.gov/publications/national_transportation_atlas_database/2012/

- Web Services
  - FRA's Main web Application

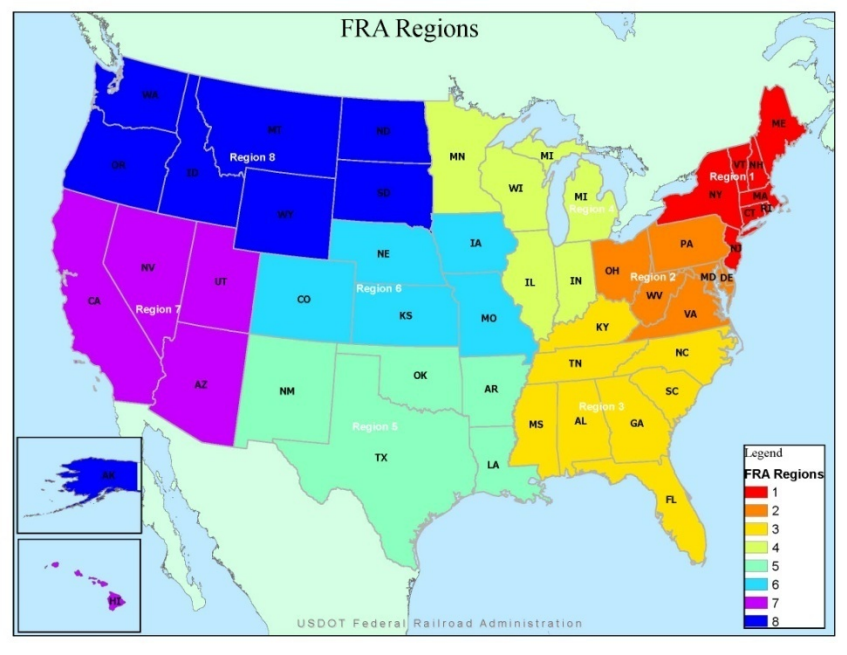
http://fragis.frasafety.net/GISFRASafety/default.aspx

  - Popup Viewer

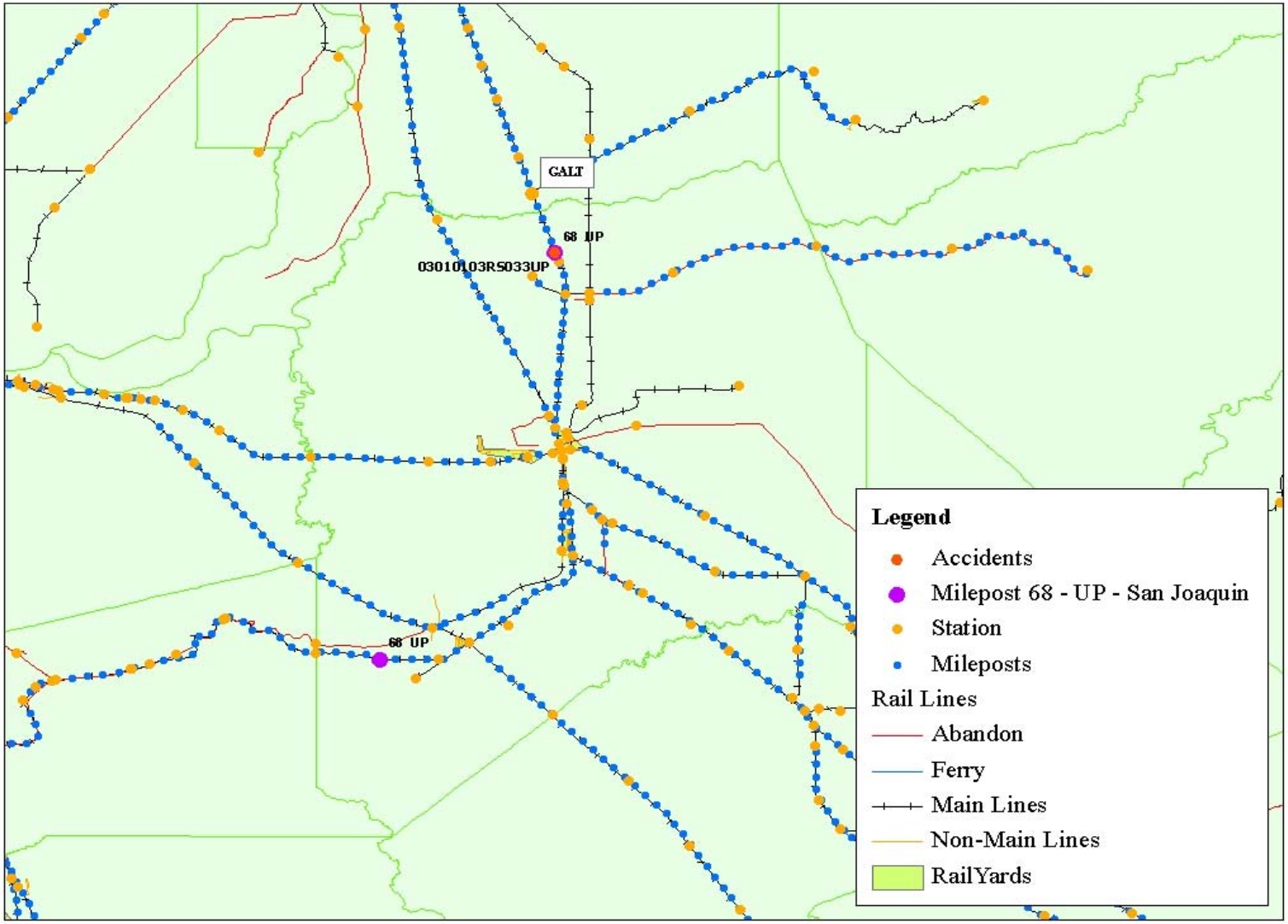
http://safetydata.fra.dot.gov/OfficeofSafety/PublicSite/Crossing/Crossing.aspx

FRA Regions

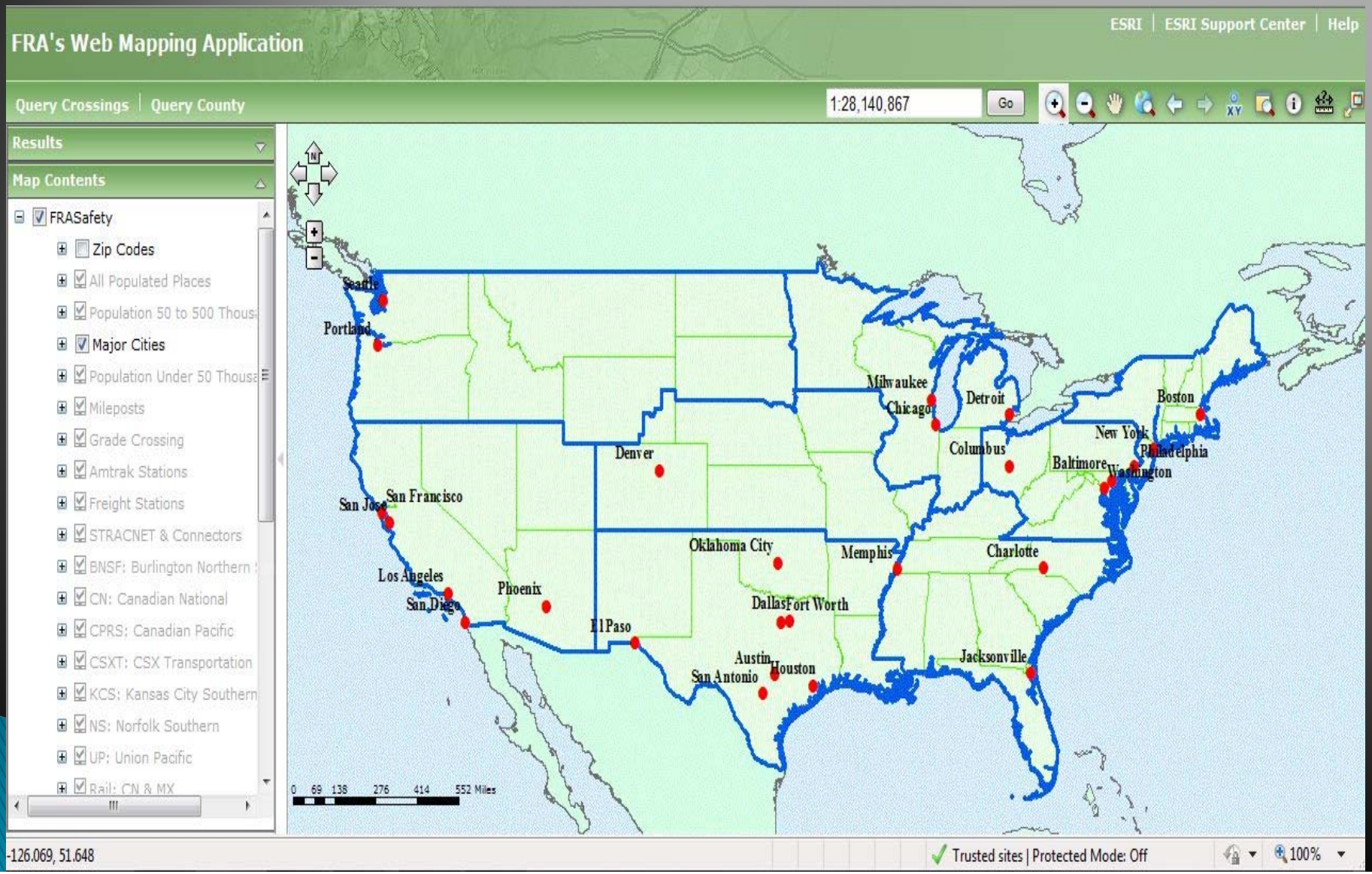
- Regulatory of Safety
- Safety Disciplines
  - Hazardous Materials
  - Motive Power and Equipment
  - Operating Practices
  - Signal and Train Control
  - Track Structures



Accidents


GALT
68 UP
03010103RS033UP
68 UP
Legend
Accidents
Milepost 68 - UP - San Joaquin
Station
Mileposts
Rail Lines
Abandon
Ferry
Main Lines
Non-Main Lines
RailYards

Main GIS Web Application



Popup Viewer

Federal Railroad Administration
Office of Safety Analysis

Home | Crossing | Forms/Publications | Downloads | Data | Documents | Policies | Support

5.02 - Generate Crossing Inventory and Accident Reports

Please click on one of the links below or enter a crossing number, pick the report type and click on the **Generate Report** button to produce the Report.

Report Type: Inventory Accident Contact Sheet

Crossing#: 289474L

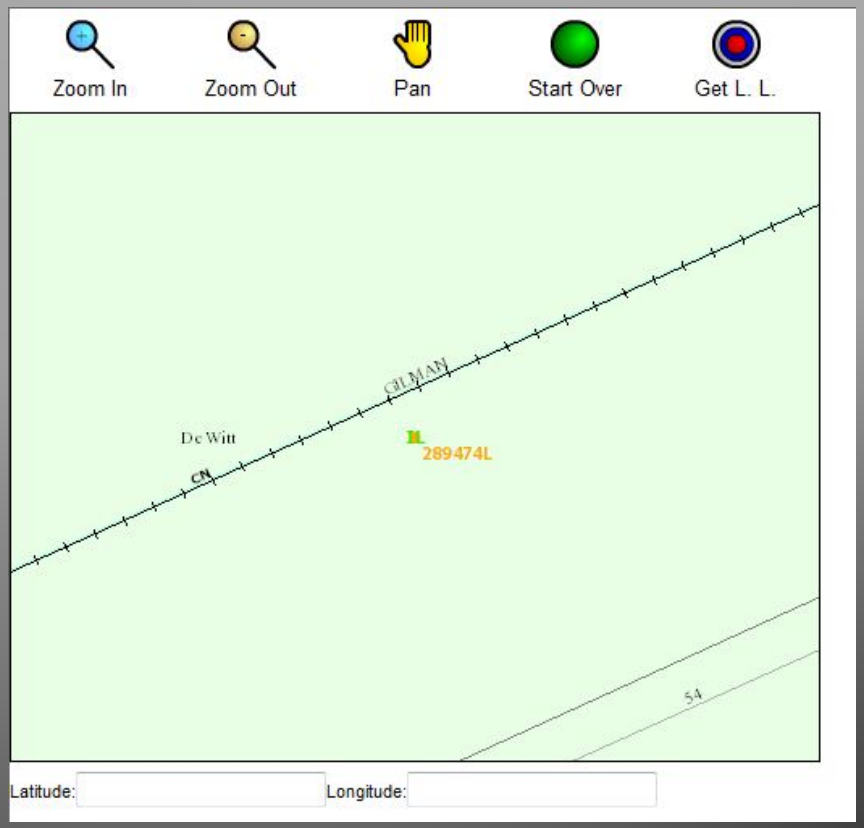
Inventory: Current History

Generate Report | Generate Map

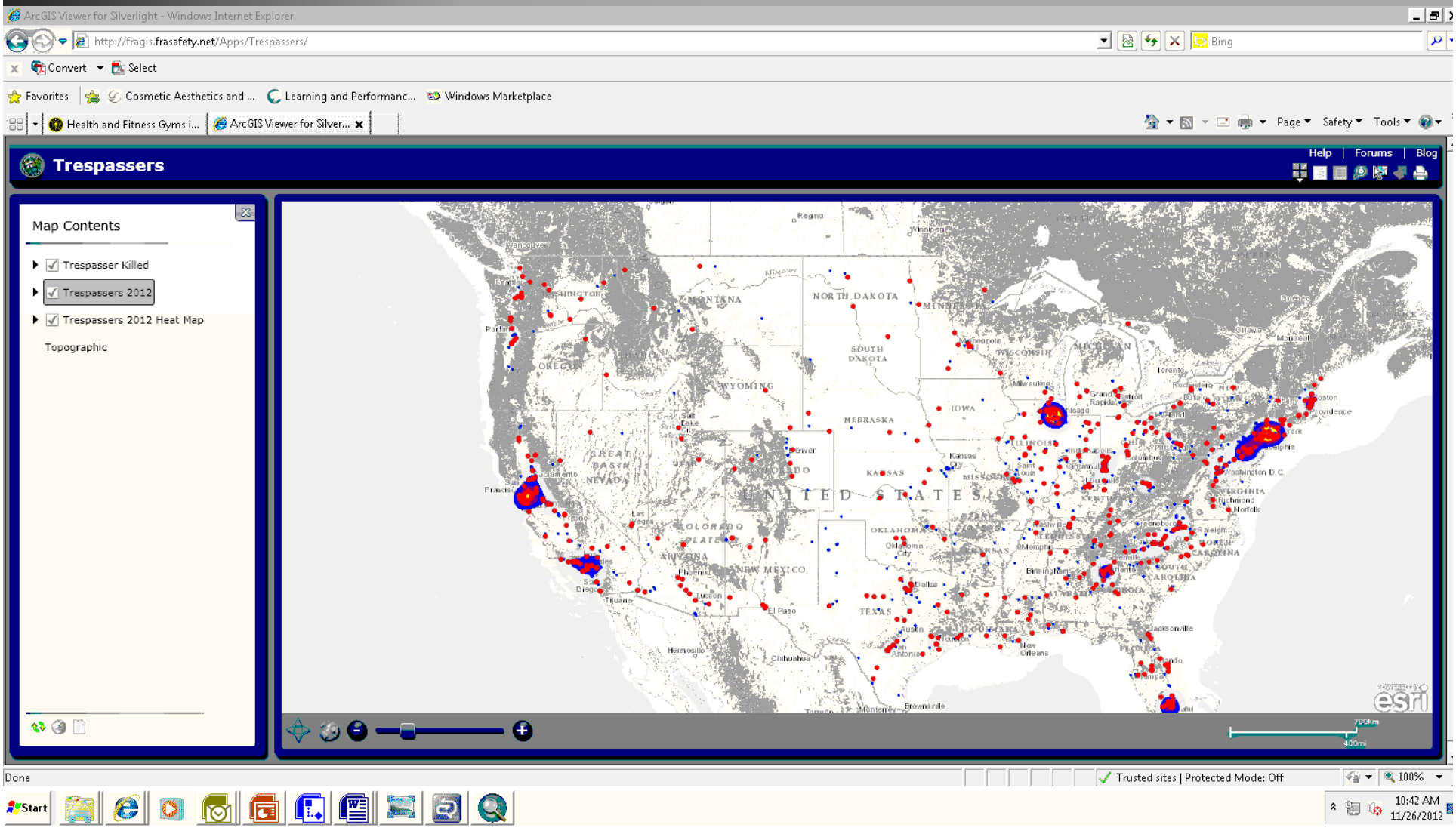
Additional Links

Query by Location\Railroad
Query by Crossing
Accident Prediction (WBAPS)
Crossing Inventory Data File Reconciliation (CIR)
DOT Crossing Inventory Information
Crossing Data help
Maps
Notice
Using this Site

Crossing Inventory File (hard-copy submissions) as of:4/30/2012
Crossing Inventory File (electronic submissions) as of:2/29/2012
Accident file as of:3/31/2012

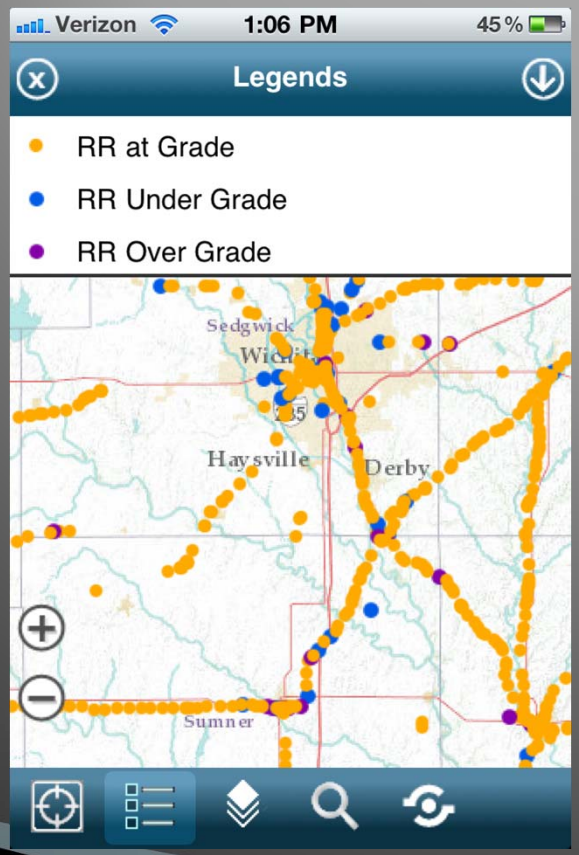


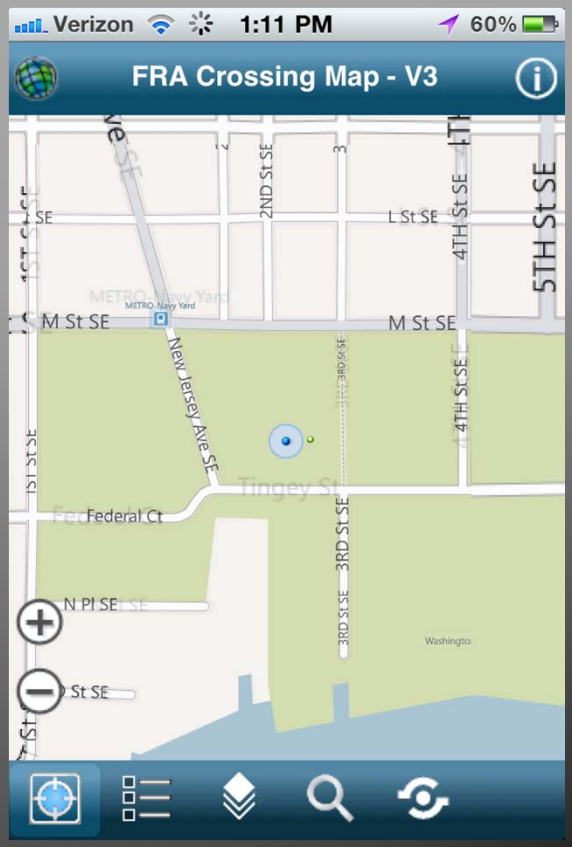
Trespassers



Mobile Applicaiton

- Mobile GIS application utilizing GPS from mobile device (iOS) and FRA's spatial data (GX'ings)



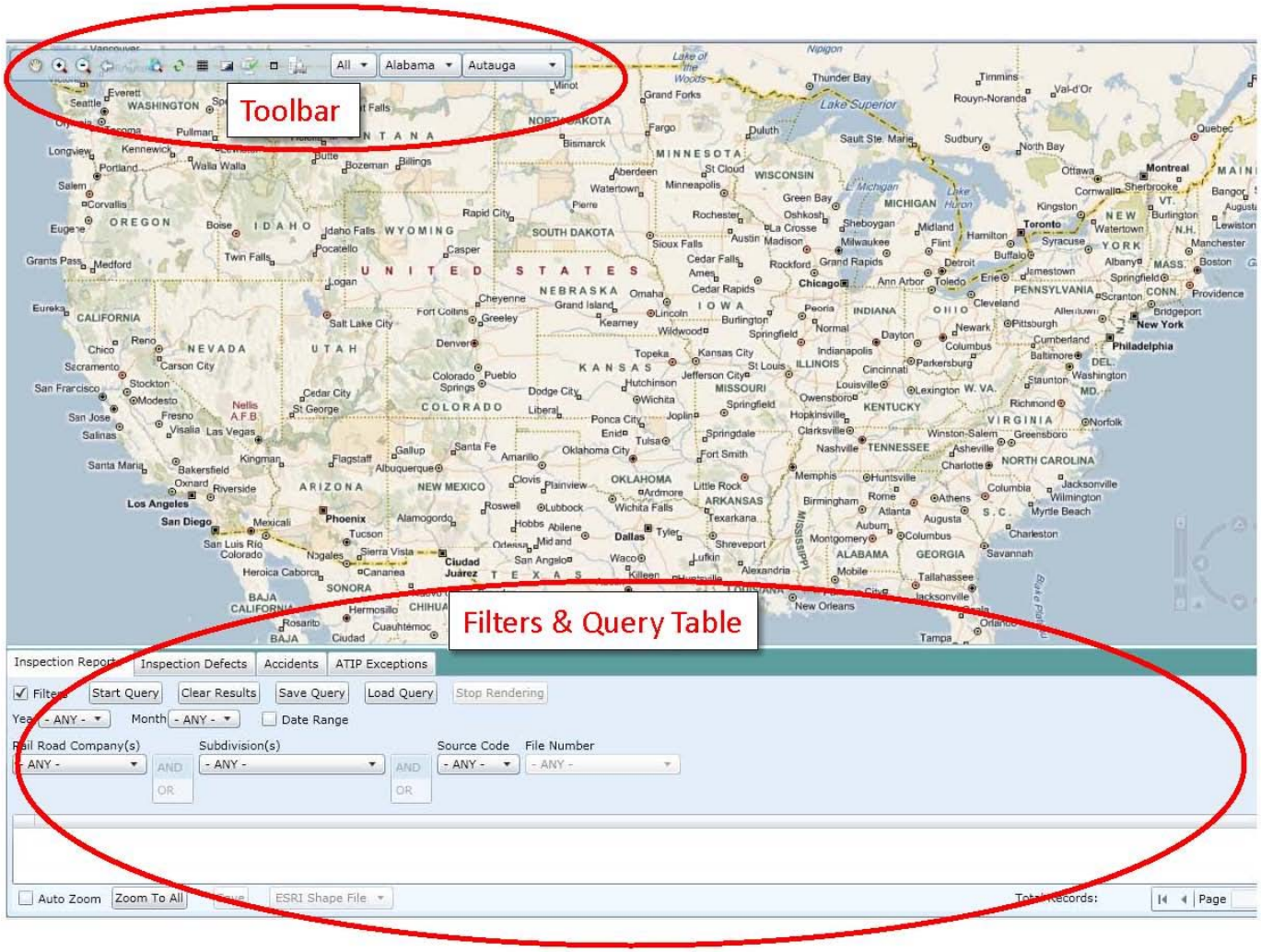


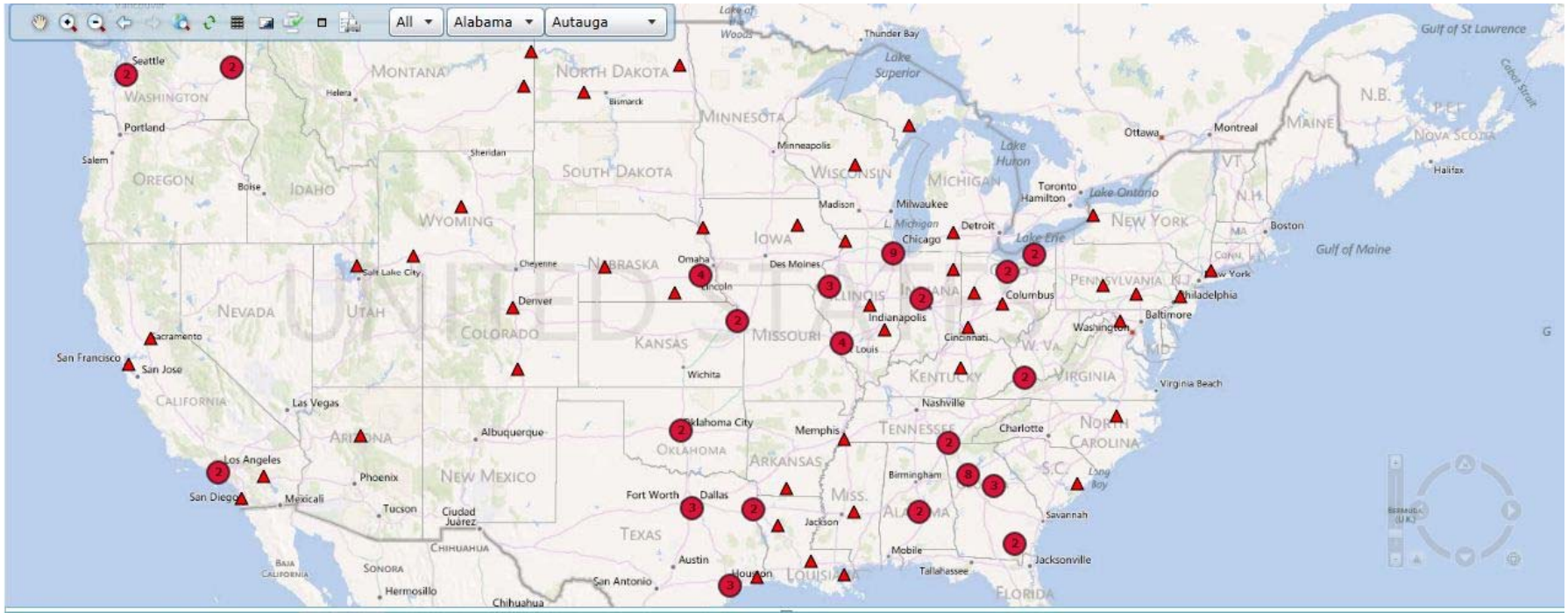
GIS Track Inspection Dashboard

- Internal Application to view
  - Inspection Reports
  - Inspection Defects
  - Accidents
  - Automated Track Inspection Program (ATIP) Exceptions

- All filters can be queried by time and type

Basic Overview





Inspection Reports | Inspection Defects | Accidents | ATIP Exceptions

☑ Filters | Start Query | Clear Results | Save Query | Load Query | Stop Rendering | Rendering completed. Elapsed:0

Year 2010 | Month - ANY - | ☐ Date Range

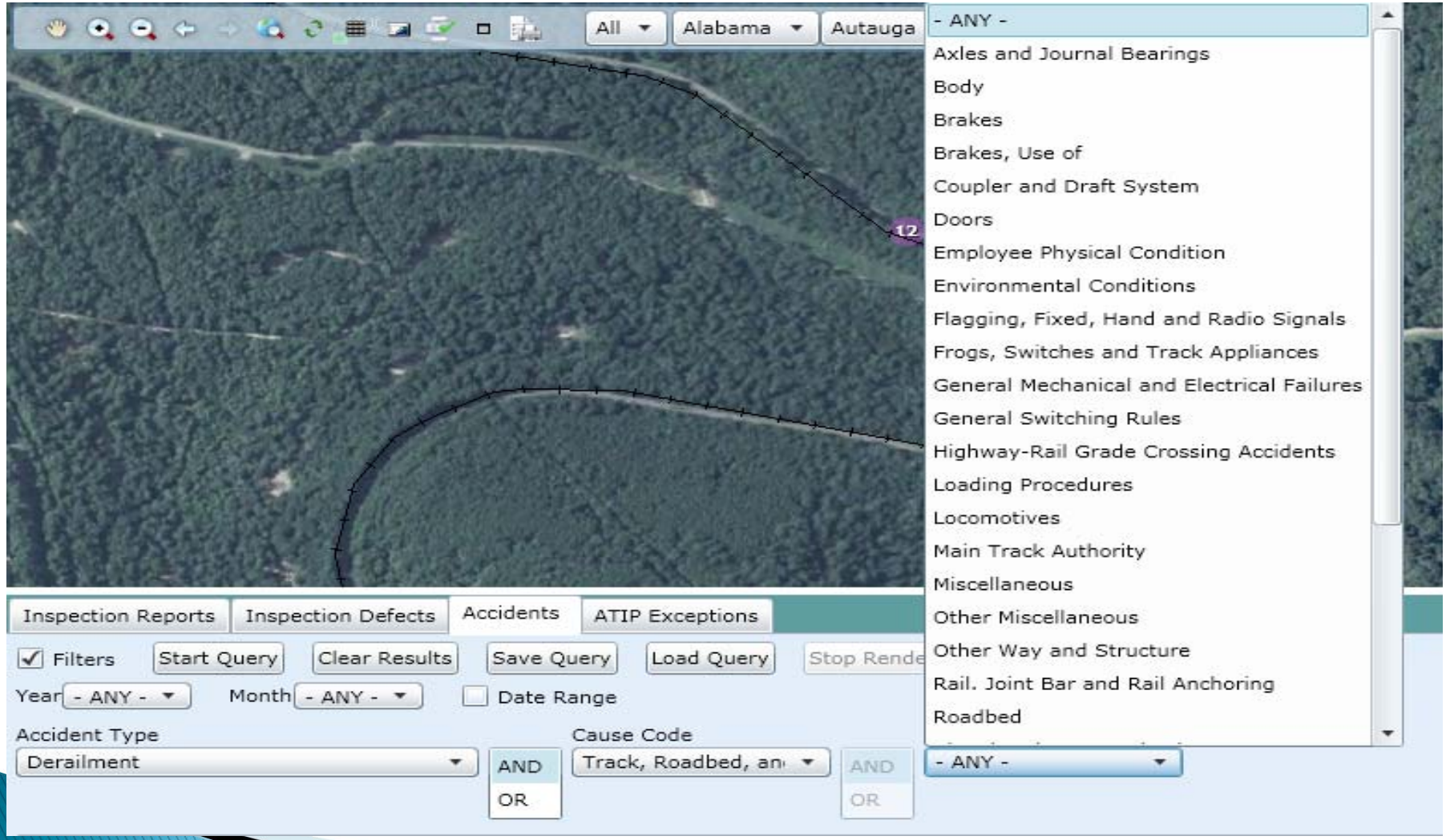
Accident Type: Derailment | AND / OR | Cause Code: ration - Human Factors | AND / OR | Sub Cause Code: - ANY -

UNIQUEID	INCDTNO3	RR3	TYPE_ACC	CARSHAZNO	CARHAZDAM	CARSHZREL	STATION	TYPE_CONSI	ANN_DEN	TRKCLASS	TYPETRK	CAUSE	CAUSE_ACC
1004000074900CSX	000074900	CSX	Derailment	8	1	0	ROCKY MOUNT	Freight Train	0	1	Yard	H525	Independent (engine) brake,
1004000075160CSX	000075160	CSX	Derailment	0	0	0	CLEVELAND	Freight Train	0	1	Yard	H702	Switch improperly lined
1004000075231CSX	000075231	CSX	Derailment	0	0	0	ATLANTA	Yards/Switching	0	1	Yard	H702	Switch improperly lined
1004000075277CSX	000075277	CSX	Derailment	0	0	0	GAINESVILLE	Freight Train	0	1	Industry	H514	Failure to allow air brakes to
1004038933NS	038933	NS	Derailment	0	0	0	NEW ORLEANS	Freight Train	18	1	Main	H601	Coupling speed excessive

☐ Auto Zoom | Zoom To All | Save | ESRI Shape File

Total Records: 109 | Page 1 of 4

Unique Queries



Inspection Reports | Inspection Defects | Accidents | ATIP Exceptions

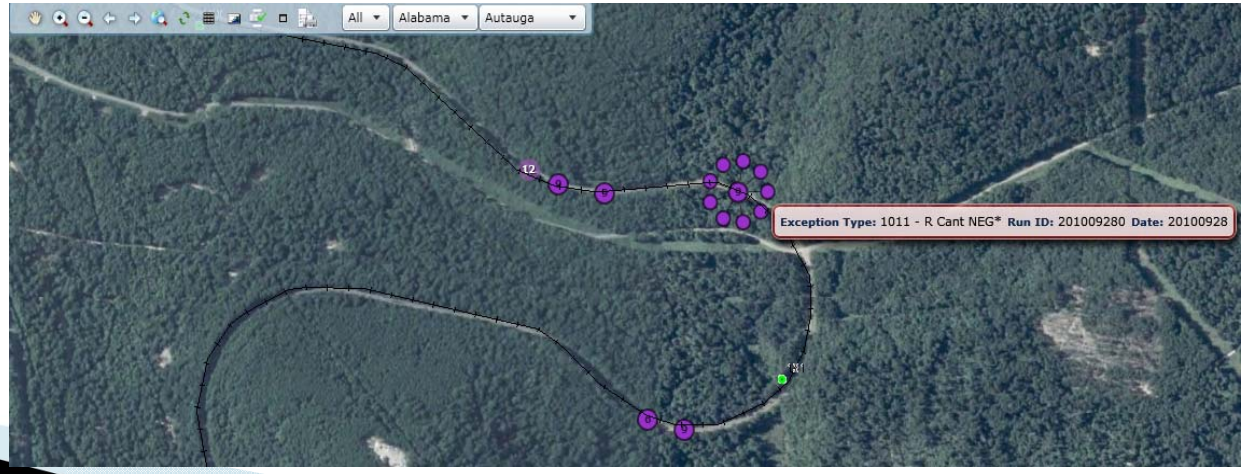
☑ Filters | Start Query | Clear Results | Save Query | Load Query | Stop Rendering | Rendering completed. Elapsed:0

Year - ANY - | Month - ANY - | ☐ Date Range

Rail Road Company(s): CSXT (AND / OR) | Subdivision(s): C&N (AND / OR) | Source Code: - ANY - | File Number: - ANY -

RrCode	RrCoName	ReportDate	PayrollID	ReportNo	Violation	Division	SubDivision	RrCoRep	RrCoTitl
CSXT	CSX TRANSPORTATION INTERMODAL	3/29/2004 12:00:00 AM	****	048	N	APPALA	KINGSPORT	PETERSON JR	
CSX	CSX TRANSPORTATION	7/22/2004 12:00:00 AM	****	071	N	LOUISV	C&N	I P DUSHARME	ROADM
CUOH	COLUMBUS & OHIO RIVER RR	1/31/2006 12:00:00 AM	****	012	N	SYSTEM	C&N	Cary Gregory	Assistar
CSXT	CSX TRANSPORTATION INTERMODAL	9/23/2010 12:00:00 AM	****	007	N	ALBANY	SYSTEM	ALLEN WENGERT	TRACK I
CSXT	CSX TRANSPORTATION INTERMODAL	9/23/2010 12:00:00 AM	****	008	N	ALBANY	SYSTEM	ALLEN WENGERT	TRACK I
CSXT	CSX TRANSPORTATION INTERMODAL	9/24/2010 12:00:00 AM	****	009	N	ALBANY	SYSTEM	ALLEN WENGERT	TRACK I
OHCR	OHIO CENTRAL RR CO.	1/11/2011 12:00:00 AM	****	009	N	SYSTEM	C&N	S. E. Bible	Track Ir

☑ Auto Zoom | Zoom To All | Save | ESRI Shape File | Total Records:7 | Page 1



Conclusion

- The FRA GIS staff has made significant advancements by providing GIS expertise, spatial data, and applications in bringing additional meaning to safety data.
- The partnership with the Office of Safety, as well as others, is essential to continue the programs that utilize the current and future GIS technology.
- It is clear that there is still a lot of spatial work to do and having one centralized GIS shop for the agency is critical to continue to grow these programs in a comprehensive manner.

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