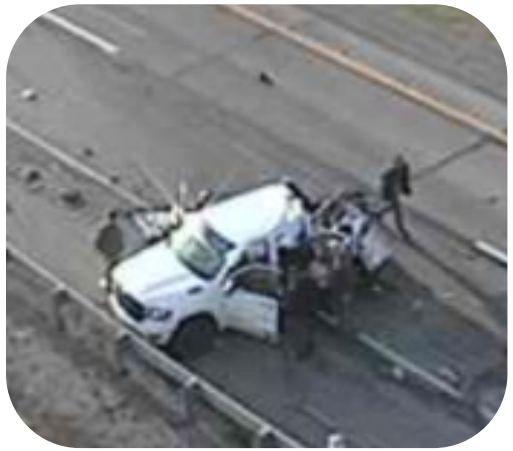
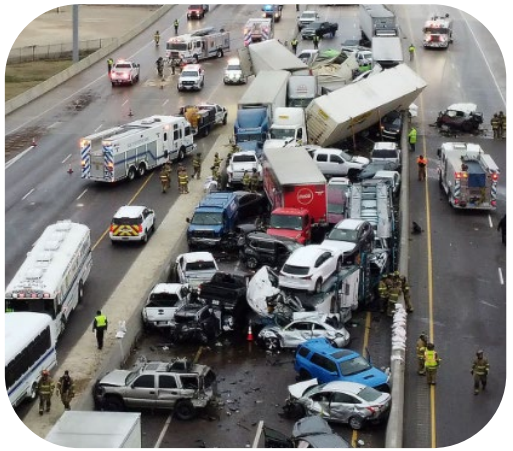
Crash Types



Out of Control

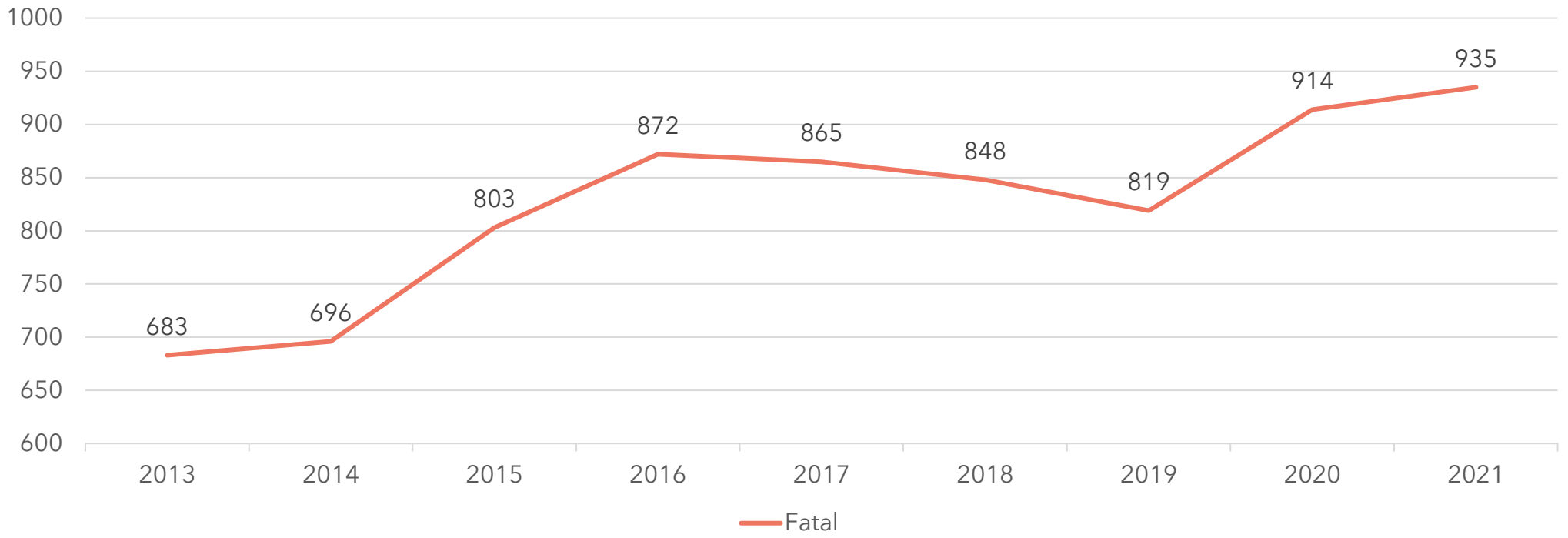
Passing

Rear End



Others

Fatal Crashes in Missouri



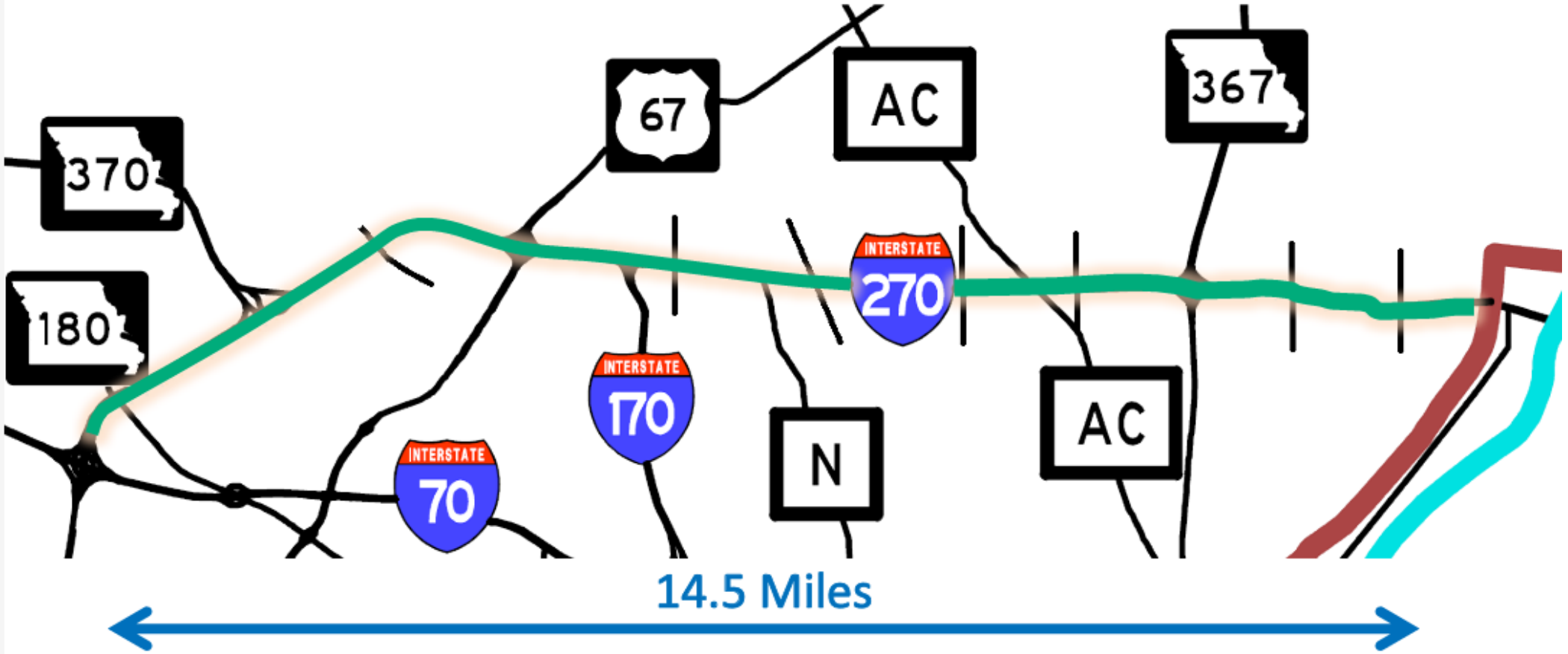
I-270 Predictive Layered Operation Initiatives

Ploisongsaeng Intaratip, MoDOT
Mike Dolde, WSP

I-270 North Project

- $278 million
- Safety, reliability, deteriorated infrastructures, and Non-motorized users
- Largest work zone area in the St. Louis
- 4 years duration

I-270 North Project



I-270 North Project

tives

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Federal Highway Administration

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FHWA Office of Public Affairs - Nancy Singer
U.S. Department of Transportation, Federal Highway Administration, Office of Public Affairs
1200 New Jersey Avenue, SE
Washington, DC 20590
United States

Email: Nancy.Singer@dot.gov
Phone: 202-366-0660

If you are deaf, hard of hearing, or have a speech disability, please dial 7-1-1 to access telecommunications

U.S. Department of Transportation Awards $1 Million to Missouri's I-270 Predictive Layered Operations Initiative

Tuesday, June 16, 2020

FHWA10E-20
Contact: Nancy Singer
Tel.: (202) 366-0660

WASHINGTON – The U.S. Department of Transportation's Federal Highway Administration (FHWA) today awarded a $1 million Advanced Transportation and Congestion Management Technologies Deployment (ATCMTD) grant to the Missouri Department of Transportation for its Predictive Layered Operation Initiative (PLOI) on I-270. The ATCMTD program this year awarded grants valued at $43.3 million to ten projects that use cutting-edge technologies to improve mobility and safety for America's travelers.

"This $43.3 million in federal funding will advance innovative technologies that will improve mobility and safety in America's transportation network," said U.S. Transportation Secretary Elaine L. Chao.

The Missouri project will deploy a predictive analytics platform that uses complex algorithms based on traffic, weather and incident data to improve response and operations. The system will use predictive models that consider several different factors, traffic volumes, weather or special events, to determine the likelihood of crashes and identify response times. The project aims to improve public safety by modeling, for example, whether crashes would increase as the result of traffic increases from a major sporting event.

FHWA's ATCMTD program funds early deployments of forward-looking technologies that can serve as national models. This year, the grants will fund projects that use advanced real-time traveler information, vehicle communications technologies, artificial intelligence, regional approaches and bicycle-pedestrian safety features.

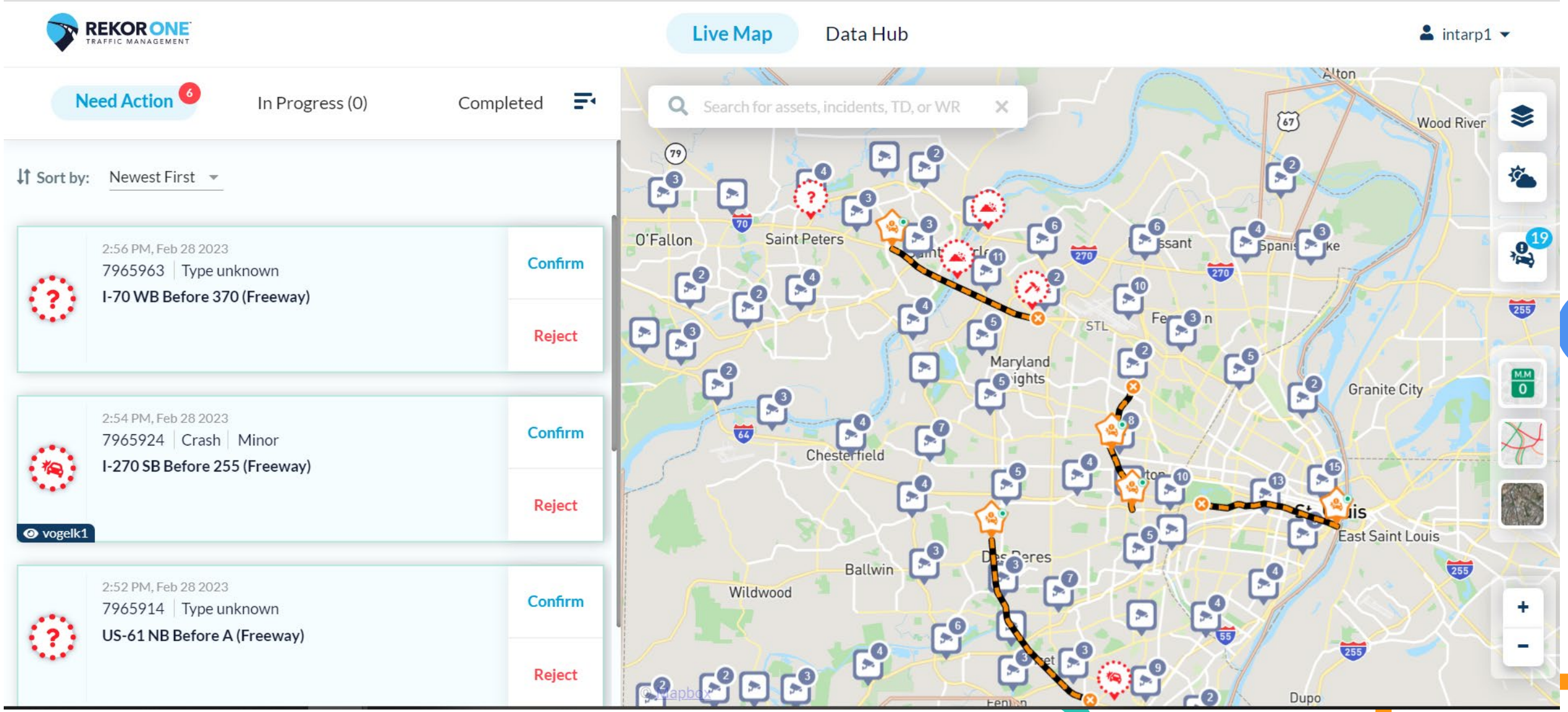
"The program selections this year aim to benefit communities across the country by improving safety and efficiency on our roads through the deployment of advanced technologies," said Federal Highway Administrator Nicole R. Nason. "State-of-the-art systems will improve winter maintenance and traffic incident management along I-270 in Missouri."

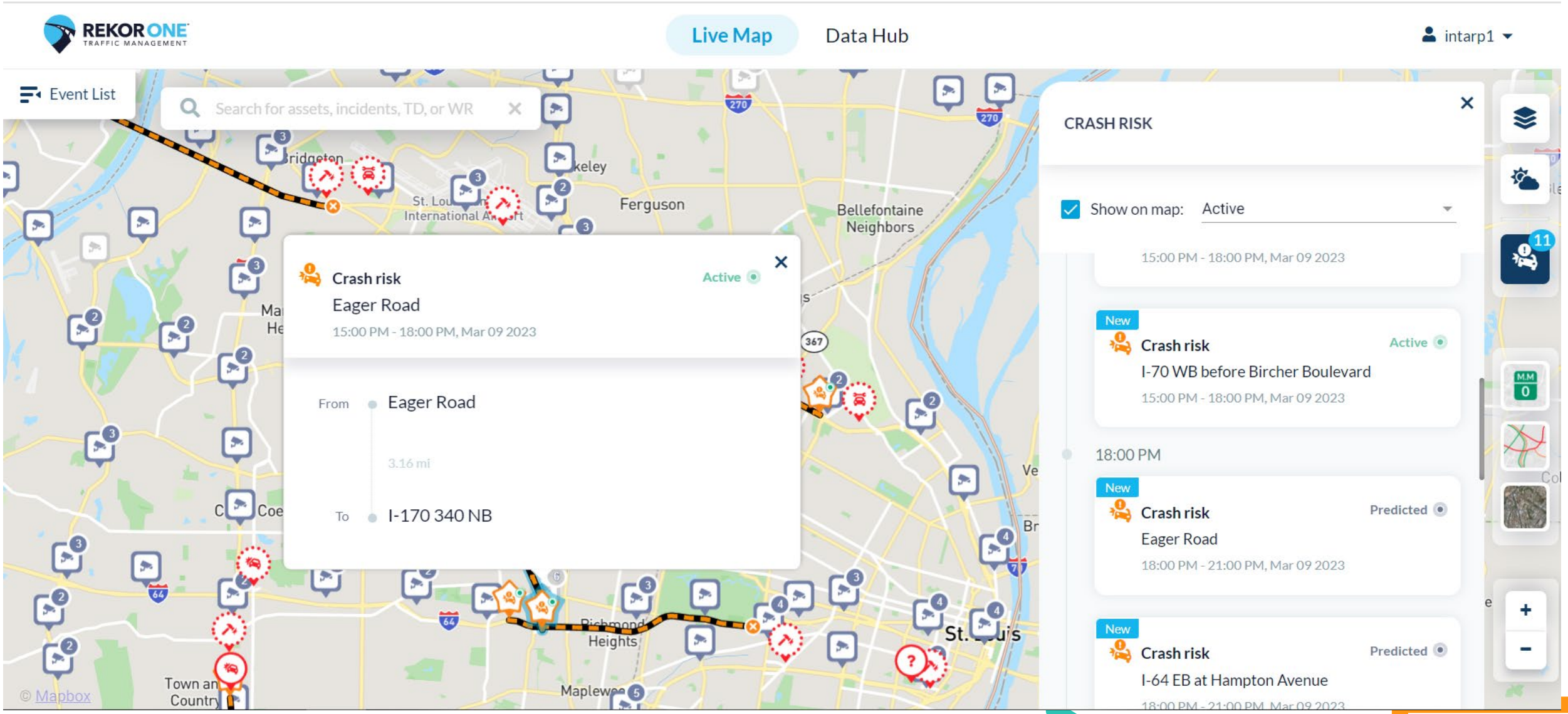
I-270 PLOI Goals

- Improve **Safety**
- Improve **Mobility**
- Improve MoDOT Emergency Response (ER) vehicle **response time**
- Improve return on **investment** and realize **cost savings**

Predictive Analytics

- Rekor
- Crash Risk Area Prediction
- Incident Identification


REKOR ONE
TRAFFIC MANAGEMENT
Live Map
Data Hub
intarp1
Need Action 6
In Progress (0)
Completed
Search for assets, incidents, TD, or WR
Sort by: Newest First
2:56 PM, Feb 28 2023
7965963 | Type unknown
I-70 WB Before 370 (Freeway)
Confirm
Reject
2:54 PM, Feb 28 2023
7965924 | Crash | Minor
I-270 SB Before 255 (Freeway)
Confirm
Reject
vogelk1
2:52 PM, Feb 28 2023
7965914 | Type unknown
US-61 NB Before A (Freeway)
Confirm
Reject
O'Fallon
Saint Peters
Maryland Heights
Chesterfield
Ballwin
Wildwood
Granite City
East Saint Louis
Wood River
Dupo
STL


REKOR ONE
TRAFFIC MANAGEMENT
Live Map
Data Hub
intarp1
Event List
Search for assets, incidents, TD, or WR
Crash risk
Active
Eager Road
15:00 PM - 18:00 PM, Mar 09 2023
From
Eager Road
3.16 mi
To
I-170 340 NB
CRASH RISK
Show on map:
Active
15:00 PM - 18:00 PM, Mar 09 2023
New
Crash risk
Active
I-70 WB before Bircher Boulevard
15:00 PM - 18:00 PM, Mar 09 2023
18:00 PM
New
Crash risk
Predicted
Eager Road
18:00 PM - 21:00 PM, Mar 09 2023
New
Crash risk
Predicted
I-64 EB at Hampton Avenue
Ferguson
Bellefontaine Neighbors
Richmond Heights
Maplewood
Town and Country
© Mapbox

REKOR ONE
TRAFFIC MANAGEMENT

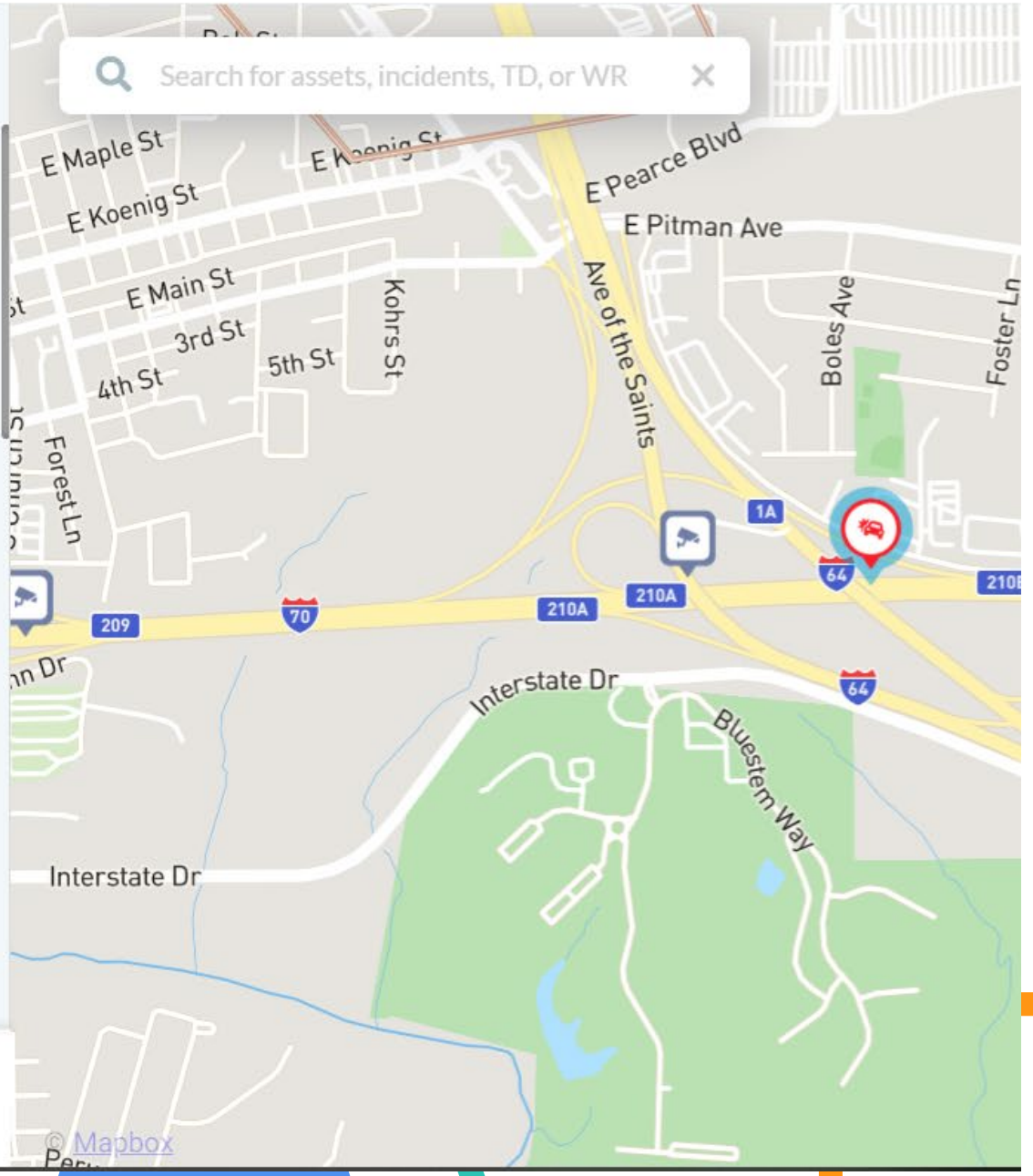
Live Map | Data Hub

CCTV (6) | DASHCAMS (0)

IS070W210.5_I64 Main

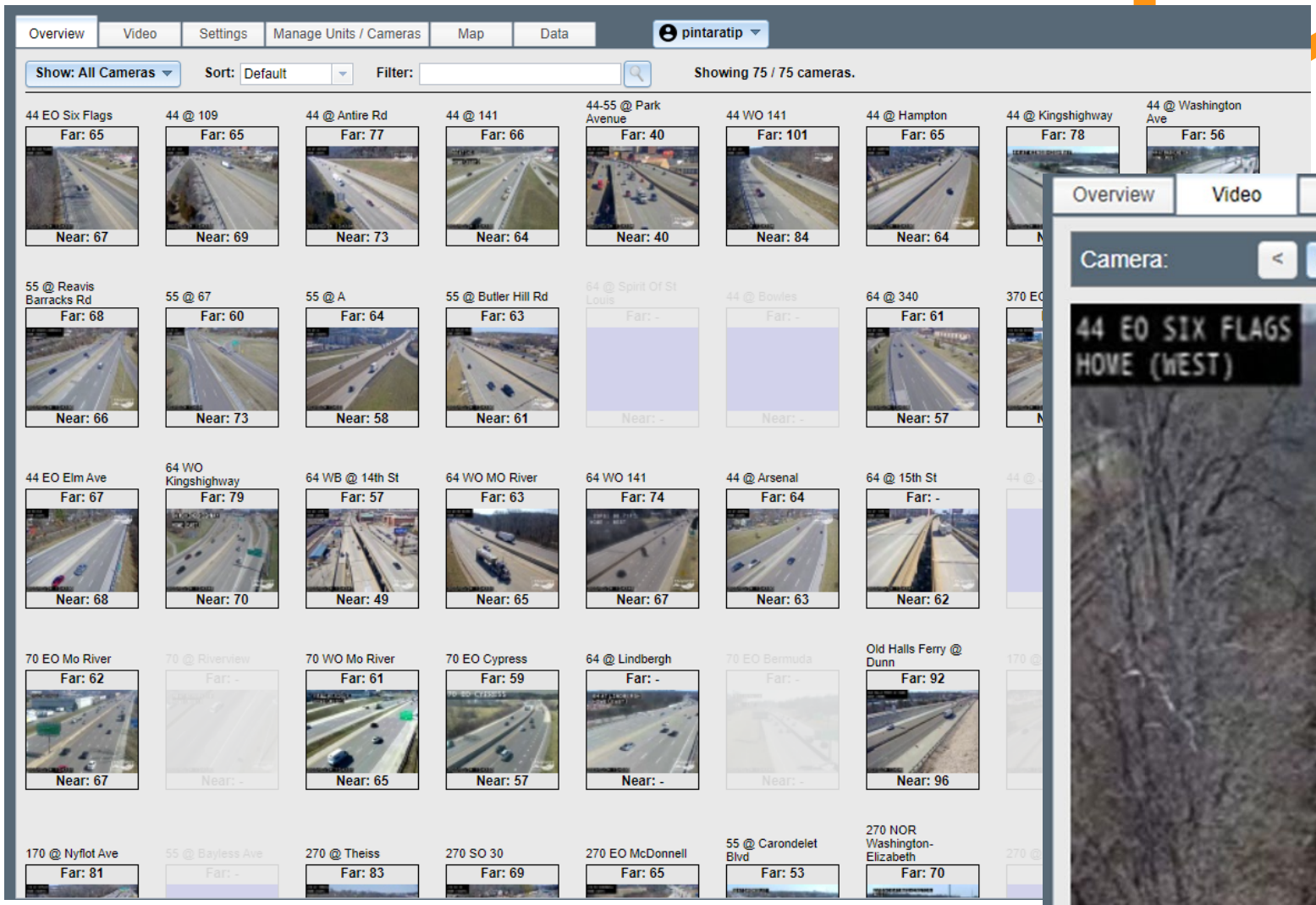
Share options

Edit



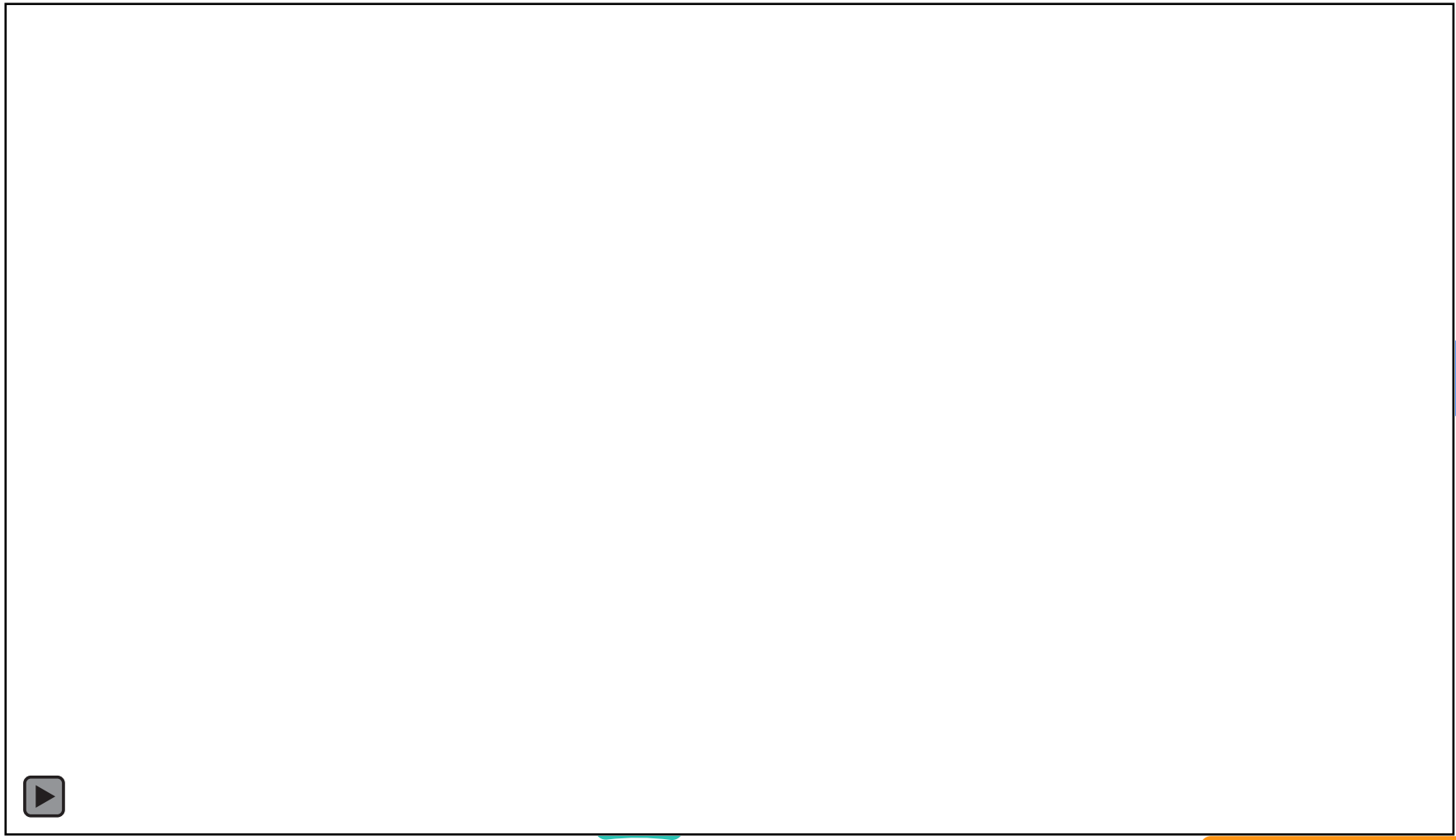
Video Analytics

- Traffic Vision
- Incident Identification and Detection

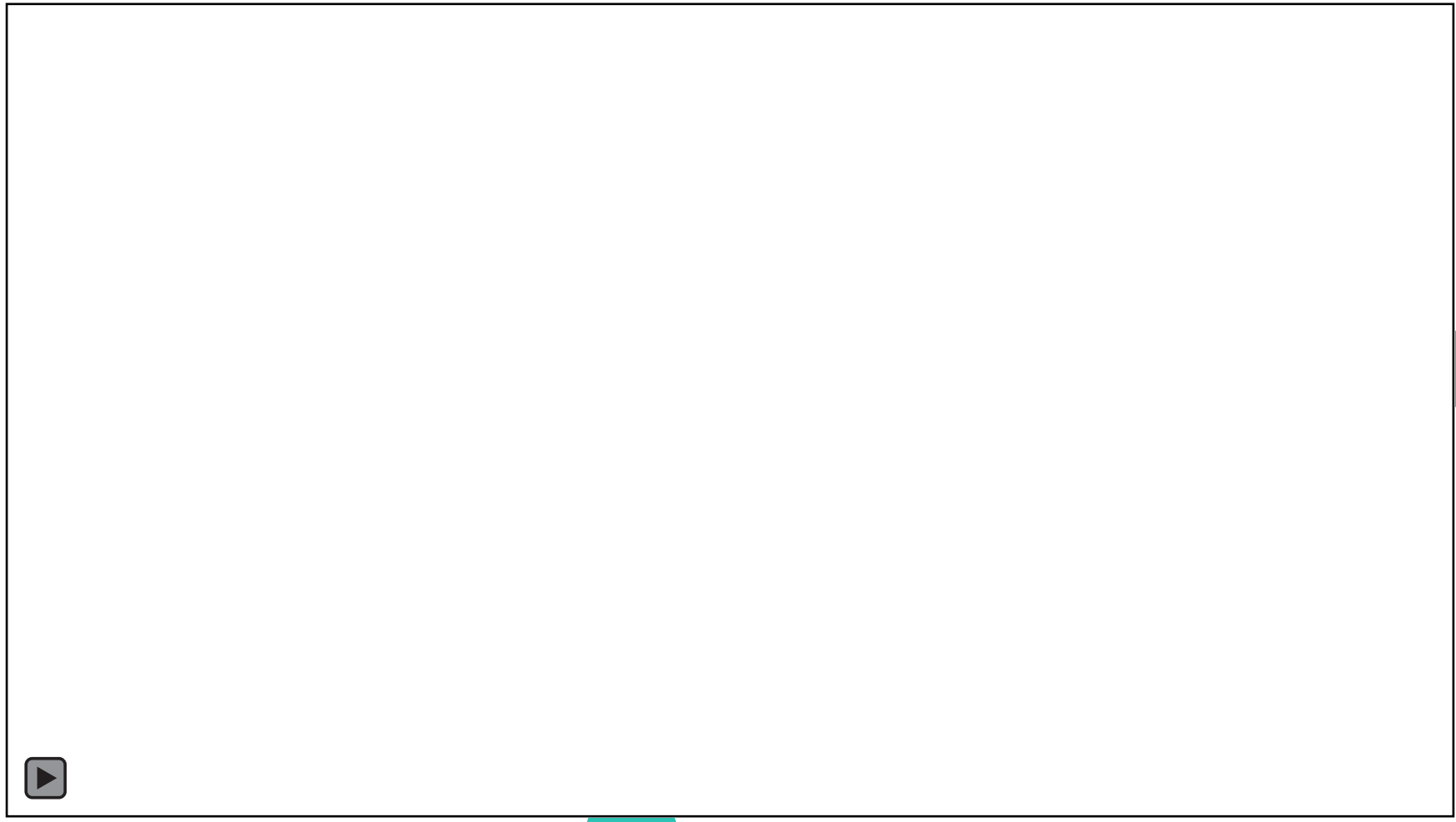

Overview
Video
Settings
Manage Units / Cameras
Map
Data
pintaratip
Show: All Cameras
Sort: Default
Filter:
Showing 75 / 75 cameras.
44 EO Six Flags
Far: 65
Near: 67
44 @ 109
Far: 65
Near: 69
44 @ Antire Rd
Far: 77
Near: 73
44 @ 141
Far: 66
Near: 64
44-55 @ Park Avenue
Far: 40
Near: 40
44 WO 141
Far: 101
Near: 84
44 @ Hampton
Far: 65
Near: 64
44 @ Kingshighway
Far: 78
44 @ Washington Ave
Far: 56
55 @ Reavis Barracks Rd
Far: 68
Near: 66
55 @ 67
Far: 60
Near: 73
55 @ A
Far: 64
Near: 58
55 @ Butler Hill Rd
Far: 63
Near: 61
64 @ 340
Far: 61
Near: 57
44 EO Elm Ave
Far: 67
Near: 68
64 WO Kingshighway
Far: 79
Near: 70
64 WB @ 14th St
Far: 57
Near: 49
64 WO MO River
Far: 63
Near: 65
64 WO 141
Far: 74
Near: 67
44 @ Arsenal
Far: 64
Near: 63
64 @ 15th St
Far: -
Near: 62
70 EO Mo River
Far: 62
Near: 67
70 WO Mo River
Far: 61
Near: 65
70 EO Cypress
Far: 59
Near: 57
64 @ Lindbergh
Far: -
Near: -
Old Halls Ferry @ Dunn
Far: 92
Near: 96
170 @ Nyflot Ave
Far: 81
270 @ Theiss
Far: 83
270 SO 30
Far: 69
270 EO McDonnell
Far: 65
55 @ Carondelet Blvd
Far: 53
270 NOR Washington-Elizabeth
Far: 70

Overview
Video
Settings
Manage Units / Cameras
Map
Data
pint
Camera:
44 EO Six Flags
44 EO SIX FLAGS
HOVE (WEST)
MoDOT
6
5
4
1
2
3
2023/02/24 12:44:43
AutoLearn: Disabled
Presets: Active
View Quality: 77
Drift: 4

Pedestrian Detection

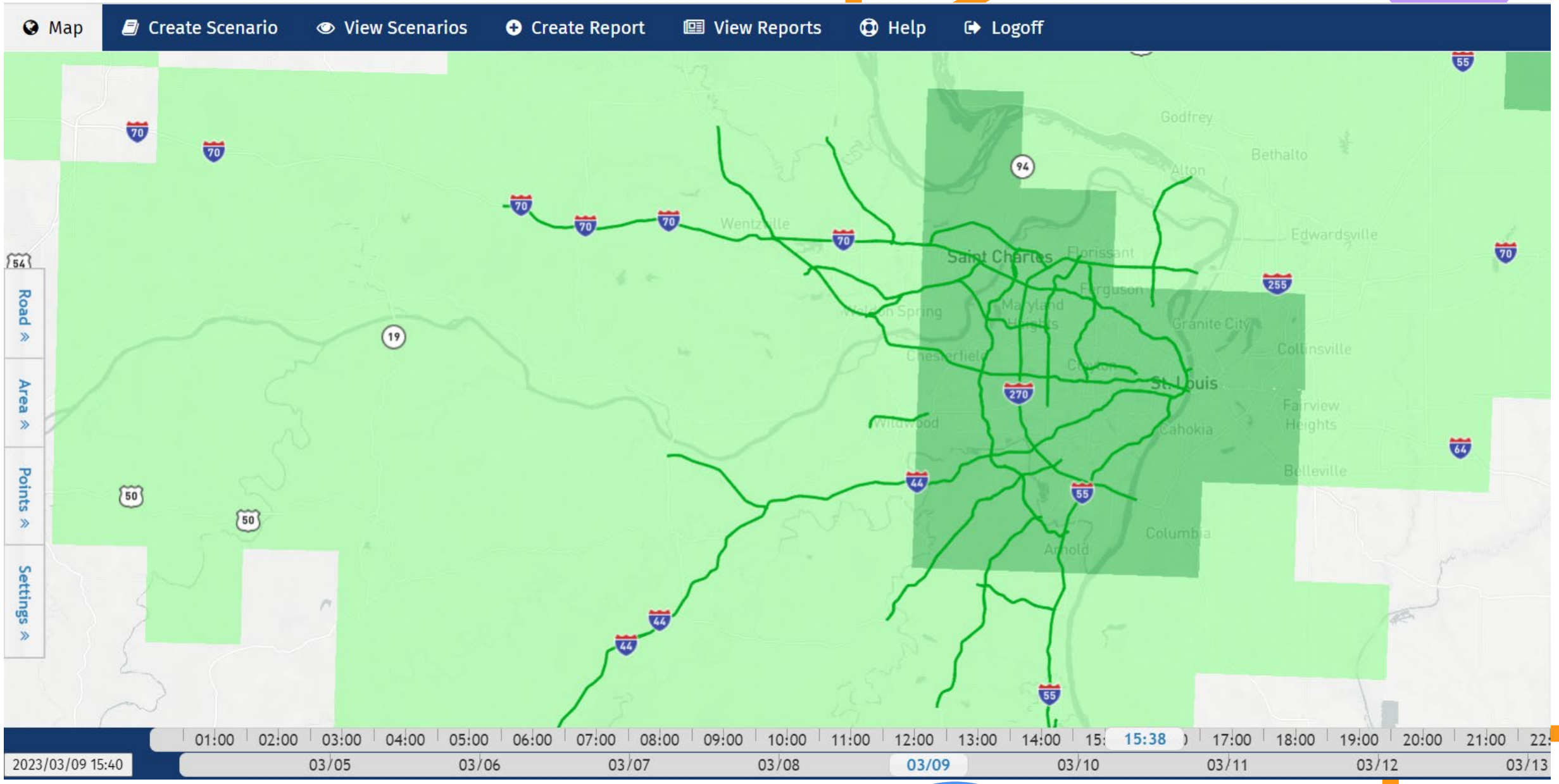


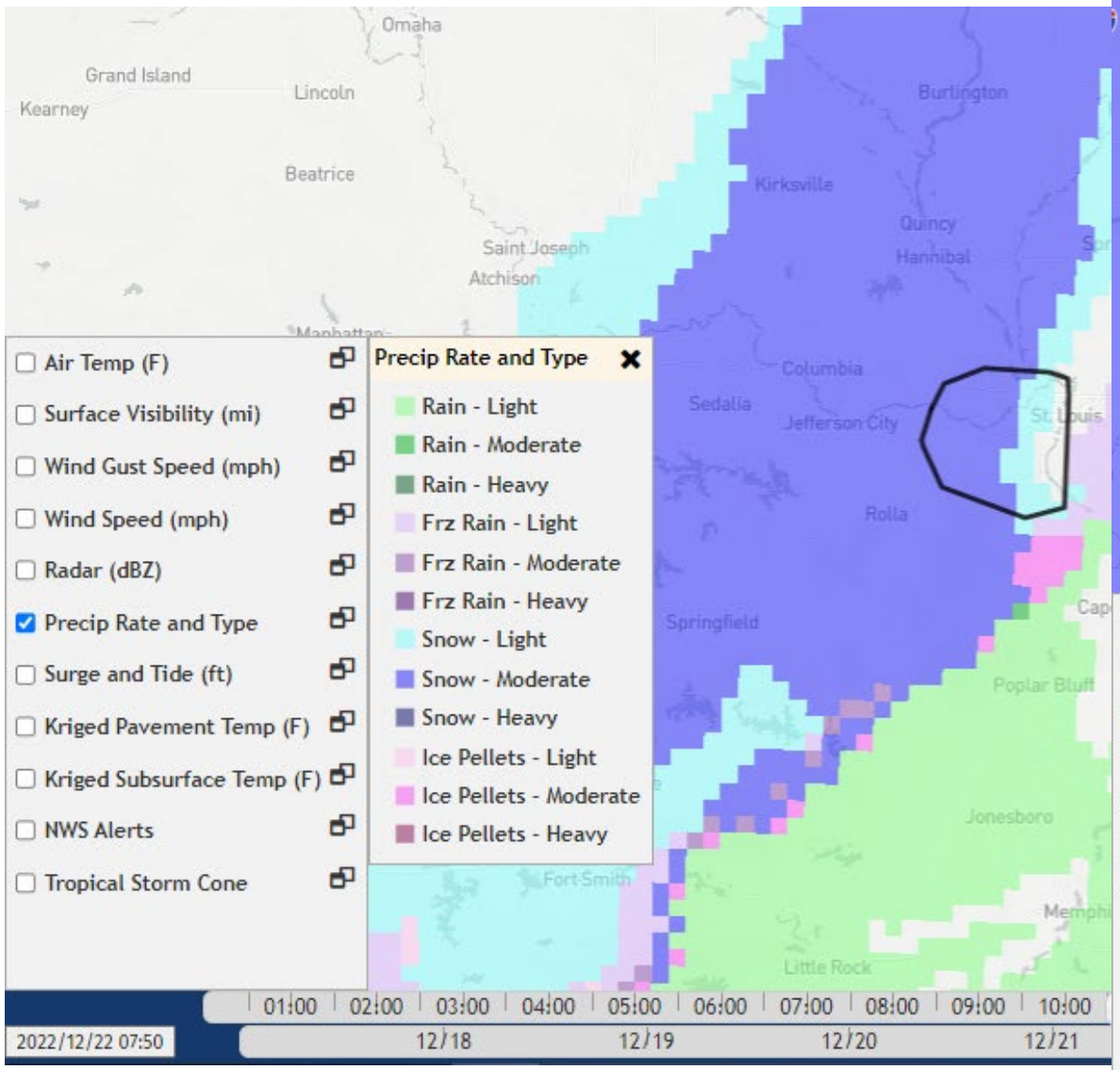
Stopped Vehicle Detection

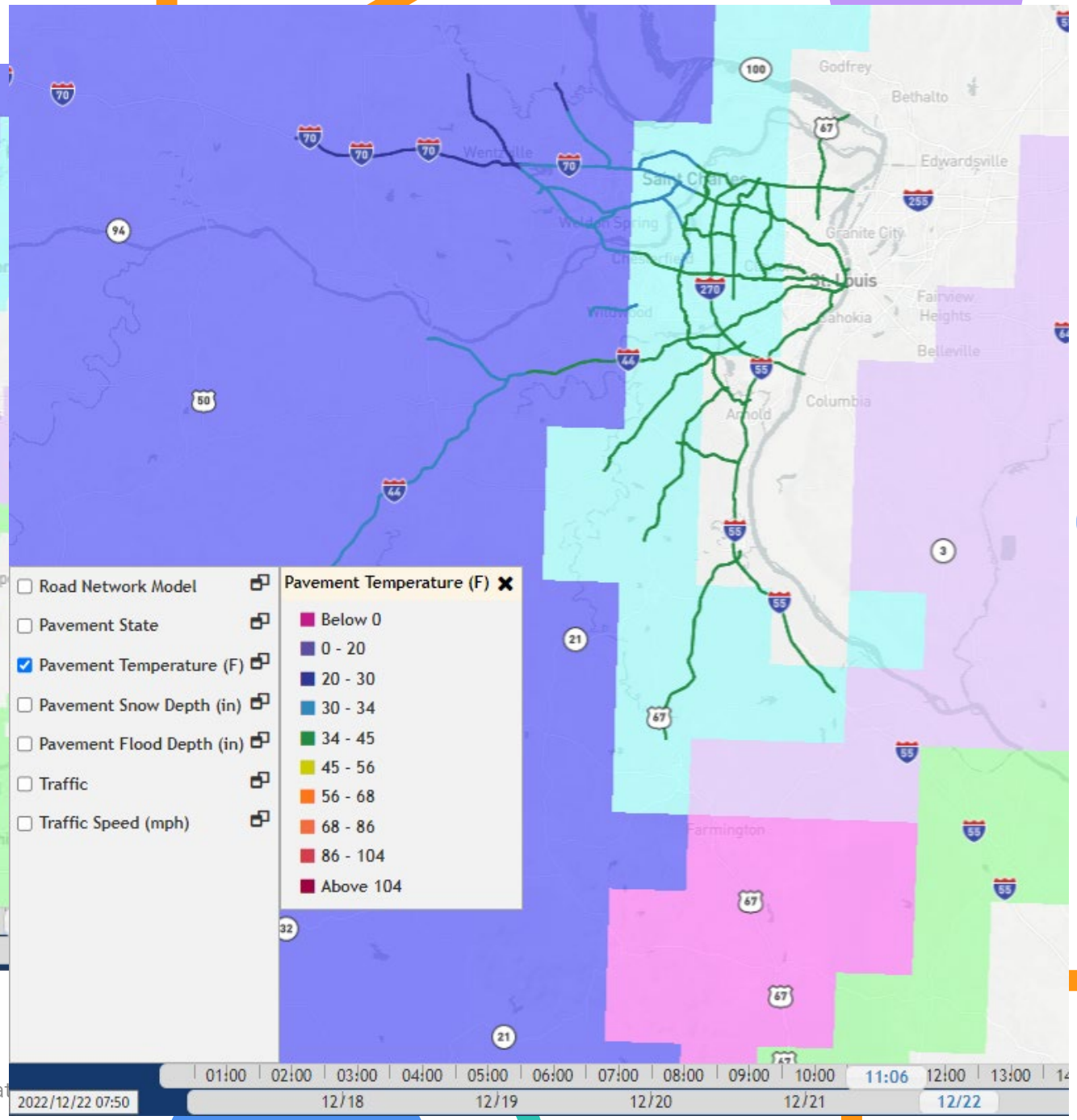


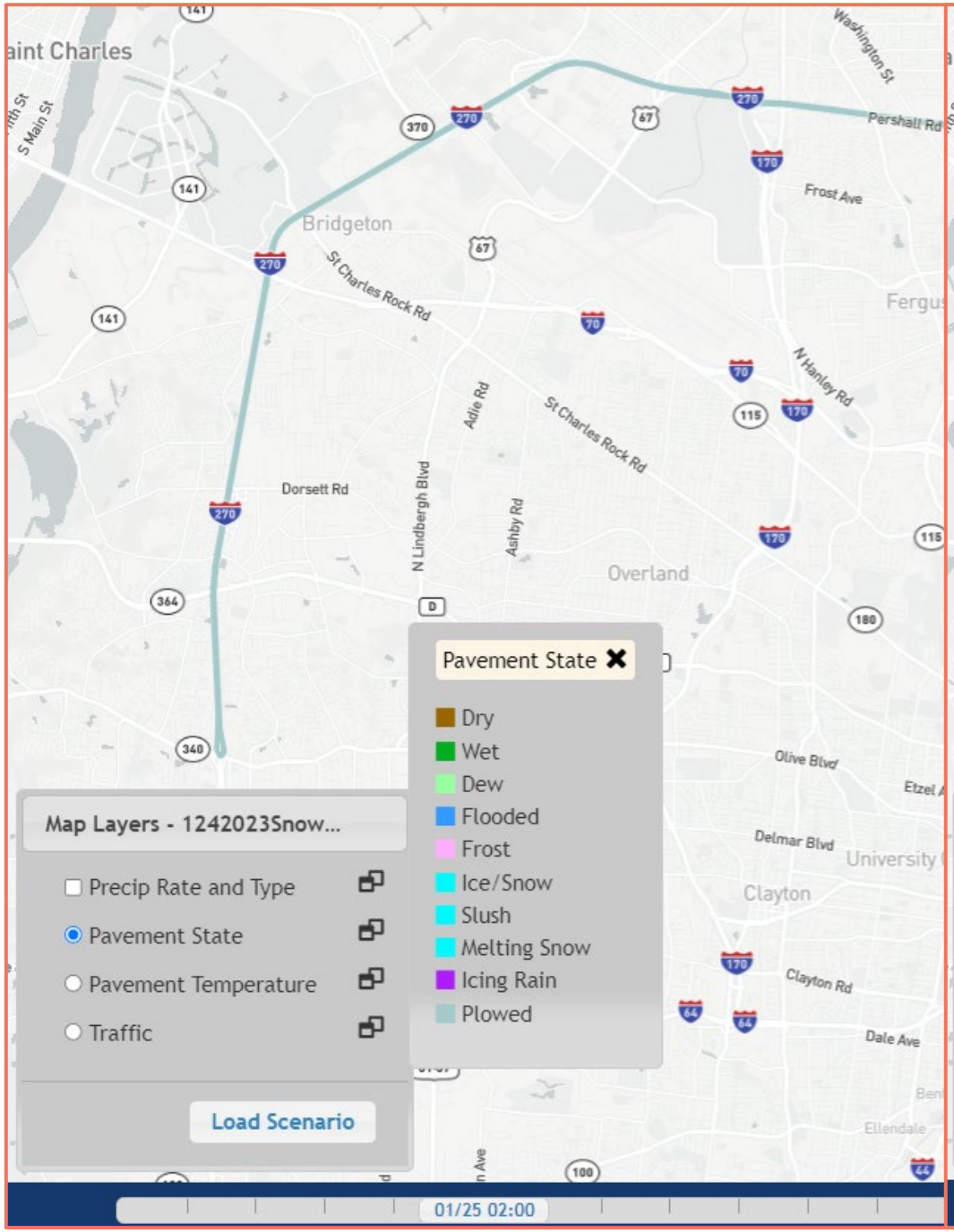
Weather Analytics

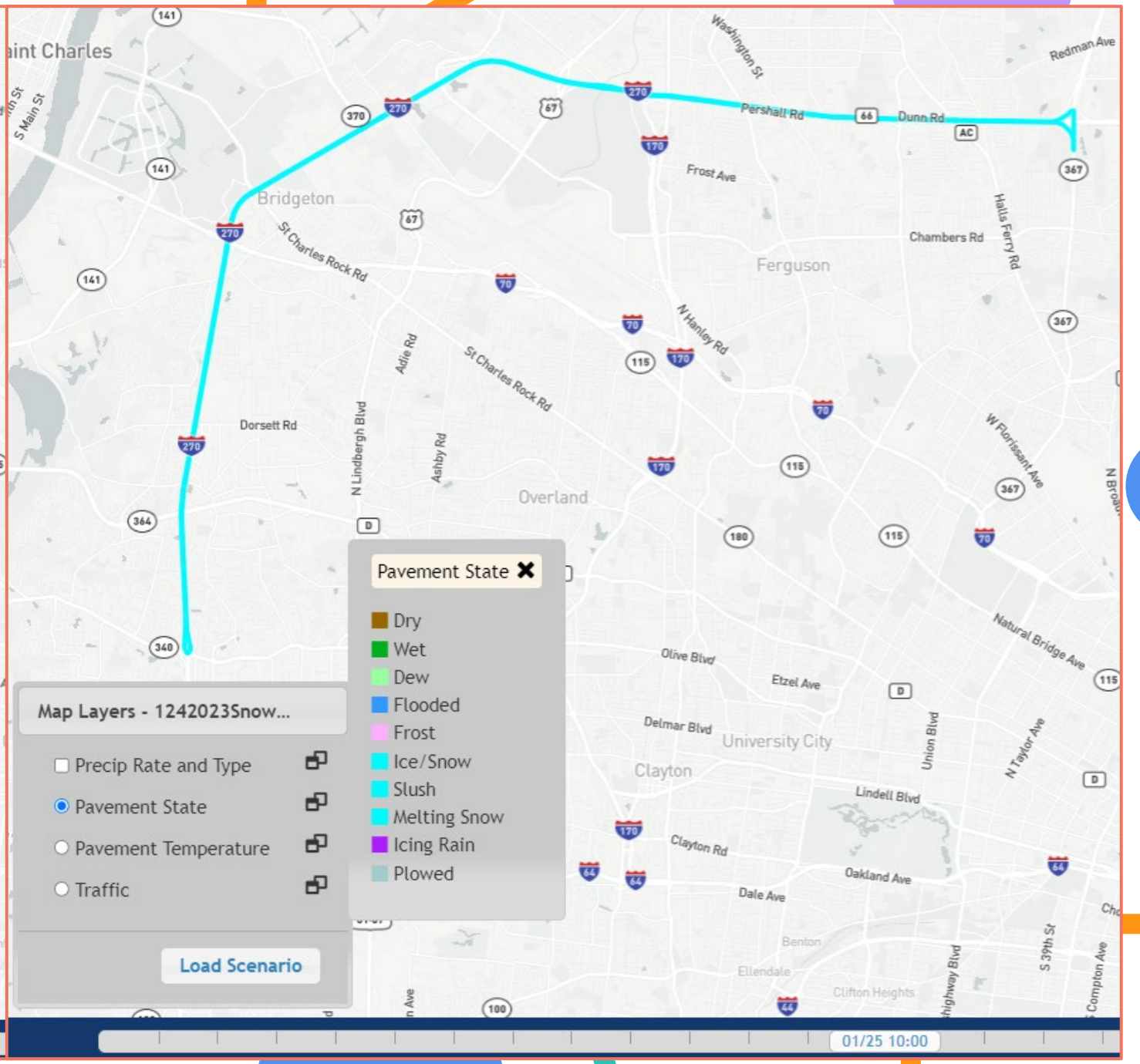
- Synesis
- Integrated Modeling Road Condition Prediction (IMRCP)

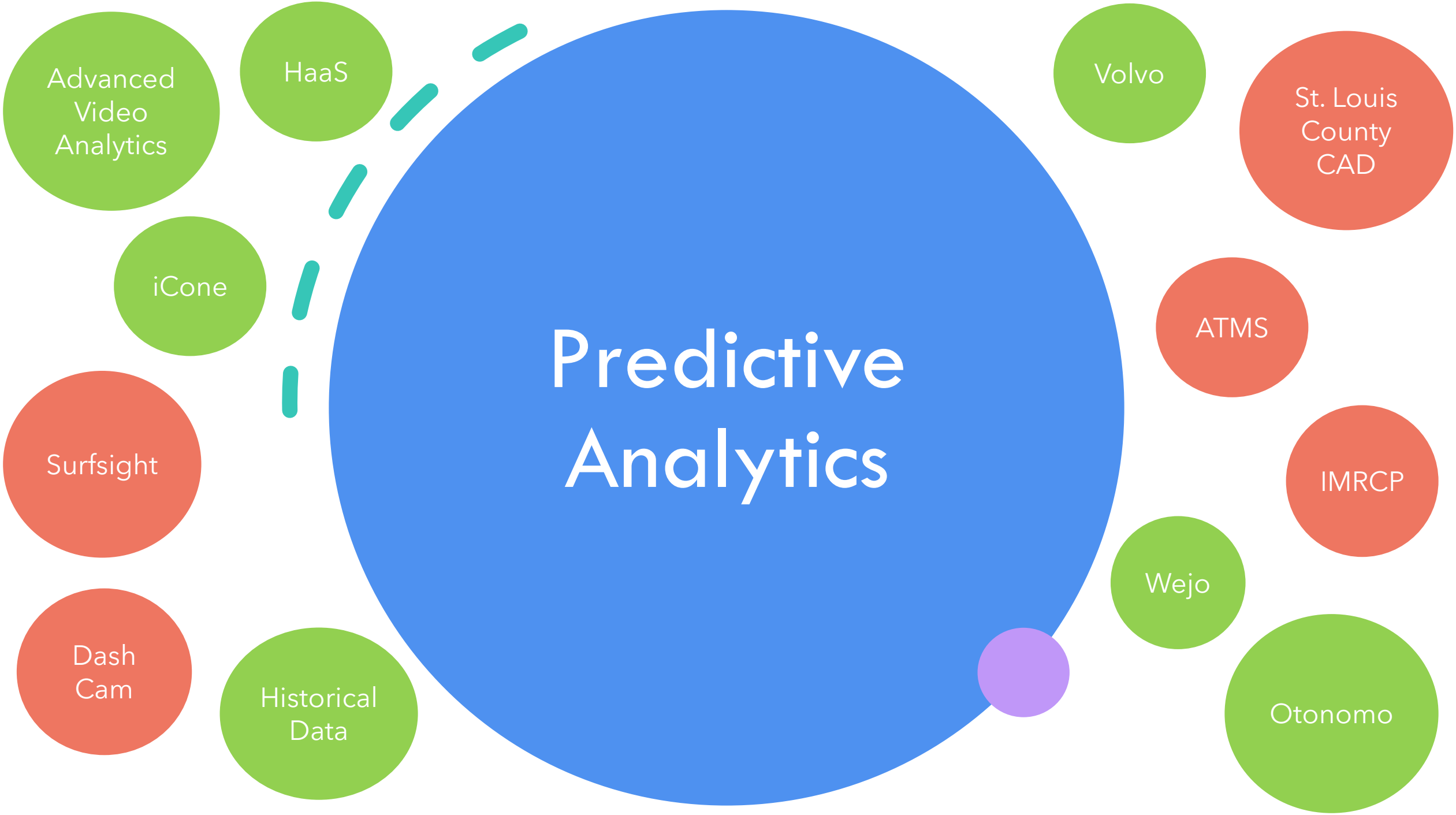

Map
Create Scenario
View Scenarios
Create Report
View Reports
Help
Logoff
Road
Area
Points
Settings
Godfrey
Bethalto
Alton
Edwardsville
Wentzville
Saint Charles
Florissant
Ferguson
Maryland Heights
Granite City
Collinsville
Chesterfield
Clayton
St. Louis
Fairview Heights
Cahokia
Belleville
Columbia
Arnold
01:00 02:00 03:00 04:00 05:00 06:00 07:00 08:00 09:00 10:00 11:00 12:00 13:00 14:00 15:38 17:00 18:00 19:00 20:00 21:00
2023/03/09 15:40
03/05 03/06 03/07 03/08 03/09 03/10 03/11 03/12 03/13


Omaha
Grand Island
Lincoln
Kearney
Beatrice
Burlington
Kirksville
Quincy
Hannibal
Saint Joseph
Atchison
Columbia
Sedalia
Jefferson City
St. Louis
Rolla
Springfield
Poplar Bluff
Jonesboro
Fort Smith
Little Rock
Air Temp (F)
Surface Visibility (mi)
Wind Gust Speed (mph)
Wind Speed (mph)
Radar (dBZ)
Precip Rate and Type
Surge and Tide (ft)
Kriged Pavement Temp (F)
Kriged Subsurface Temp (F)
NWS Alerts
Tropical Storm Cone
Precip Rate and Type
Rain - Light
Rain - Moderate
Rain - Heavy
Frz Rain - Light
Frz Rain - Moderate
Frz Rain - Heavy
Snow - Light
Snow - Moderate
Snow - Heavy
Ice Pellets - Light
Ice Pellets - Moderate
Ice Pellets - Heavy
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
2022/12/22 07:50
12/18
12/19
12/20
12/21


Godfrey
Bethalto
Edwardsville
Granite City
St. Louis
Fairview Heights
Belleville
Columbia
Arnold
Farmington
Road Network Model
Pavement State
Pavement Temperature (F)
Pavement Snow Depth (in)
Pavement Flood Depth (in)
Traffic
Traffic Speed (mph)
Pavement Temperature (F)
Below 0
0 - 20
20 - 30
30 - 34
34 - 45
45 - 56
56 - 68
68 - 86
86 - 104
Above 104
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:06
12:00
13:00
2022/12/22 07:50
12/18
12/19
12/20
12/21
12/22


Pavement State
Dry
Wet
Dew
Flooded
Frost
Ice/Snow
Slush
Melting Snow
Icing Rain
Plowed
Map Layers - 1242023Snow...
Precip Rate and Type
Pavement State
Pavement Temperature
Traffic
Load Scenario
01/25 02:00


Pavement State
Dry
Wet
Dew
Flooded
Frost
Ice/Snow
Slush
Melting Snow
Icing Rain
Plowed
Map Layers - 1242023Snow...
Precip Rate and Type
Pavement State
Pavement Temperature
Traffic
Load Scenario
01/25 10:00


Advanced Video Analytics
HaaS
Volvo
St. Louis County CAD
iCone
ATMS
Surfsight
IMRCP
Predictive Analytics
Wejo
Dash Cam
Historical Data
Otonomo

Verification & Evaluation

- Verify **accuracy** of each platform
- Evaluate **effectiveness** of each platform
- Calculate return on **investment** and realize **cost savings**
- Document **lessons learned**
- Make **recommendation** for continued use of technologies

Verification

Rekor

- Accuracy of Crash Risk Areas
- Accuracy of Incident Detection

TrafficVision

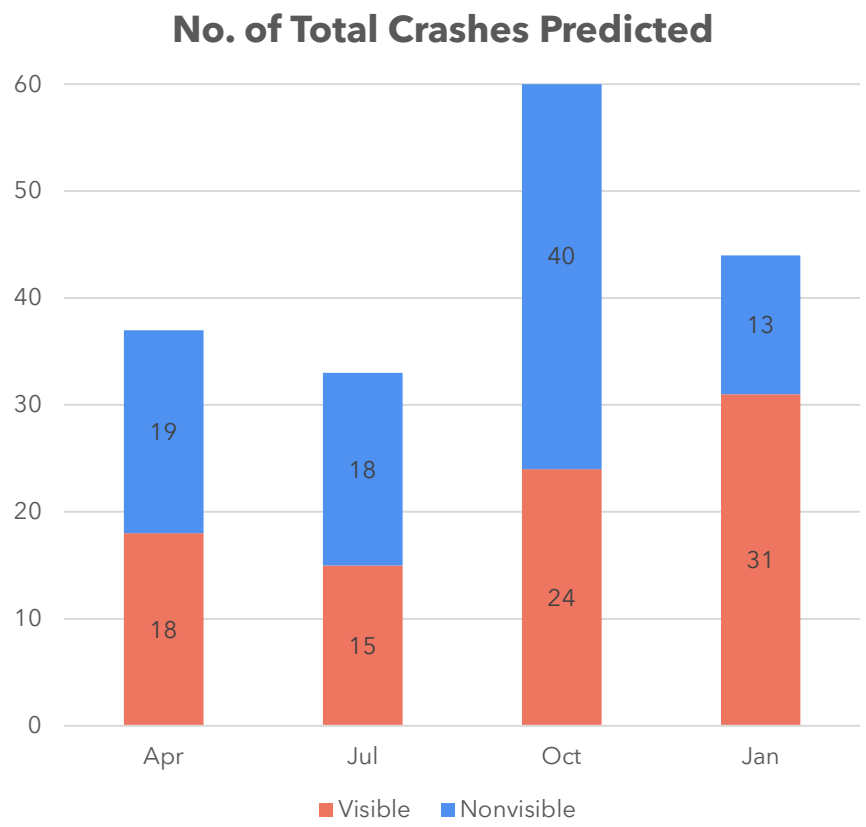
- Accuracy of Each Alert Type
- Identification of Locations with Most Alerts

IMRCP

- Accuracy of Road Predictions During Winter Weather Events

Rekor Verification Results

Crash Risk Areas



January Crash Risk Areas
752 Visible & 351 Non-Visible

Incident Detection Comparison

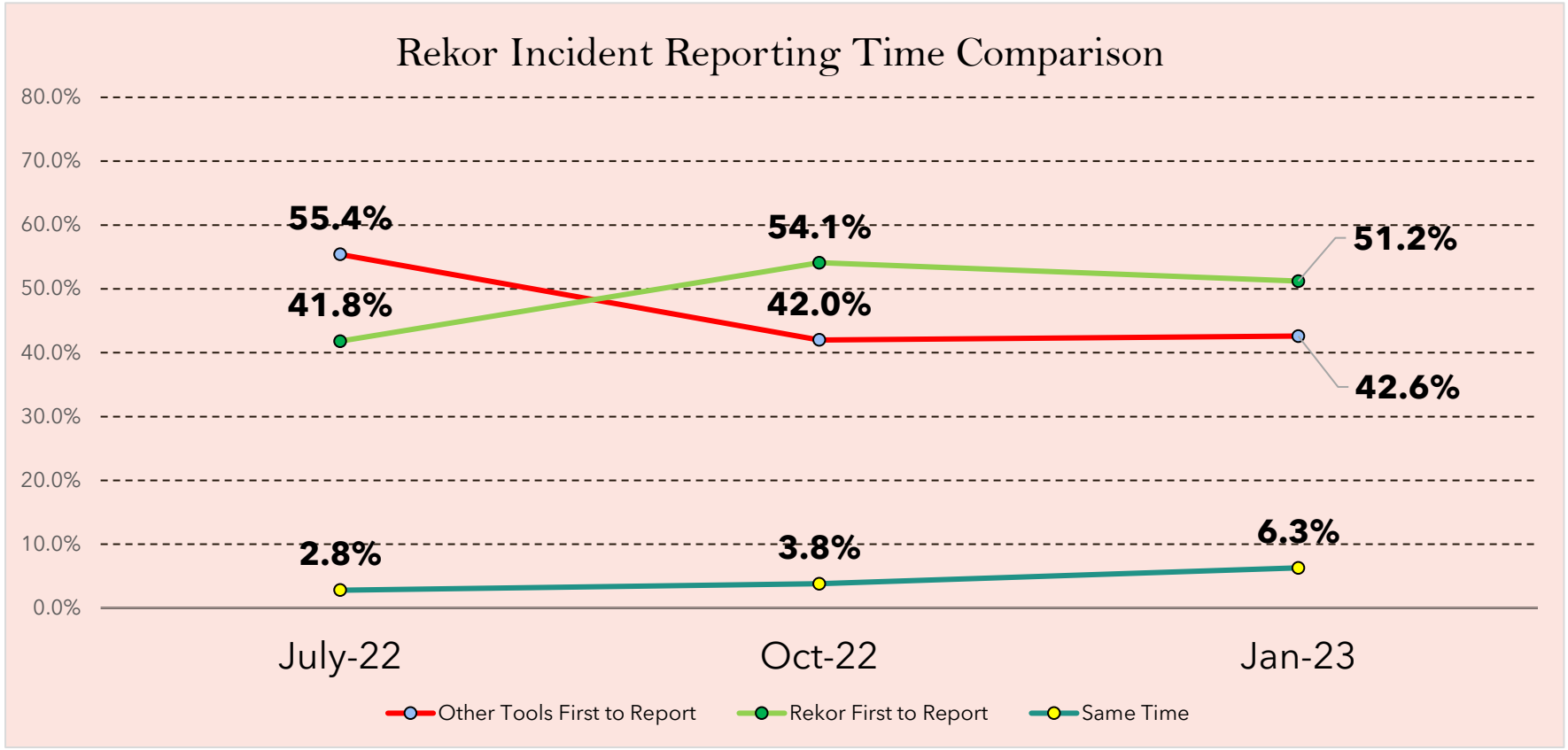
Rekor vs. Standard Operating Procedures

January 2023 Results	Incident First Reported by others tools	Incident First Reported by Rekor	Report Time (Same Time)
Average time difference	0:20	0:08	
Average for incidents below 1 hour duration	0:14	0:07	
Average for incidents above 1 hour duration	3:11	1:47	
Total Incident Count (383)	163	196	24
Total Incidents below 1 hour	157	194	
Total incidents above 1 hour	6	2	
Percent incidents first reported by other tools	42.6%		
Percent incidents first reported by Rekor		51.2%	
Percent reported same time			6.3%
Percent reported with long delay	1.6%	0.5%	

Rekor Verification Results

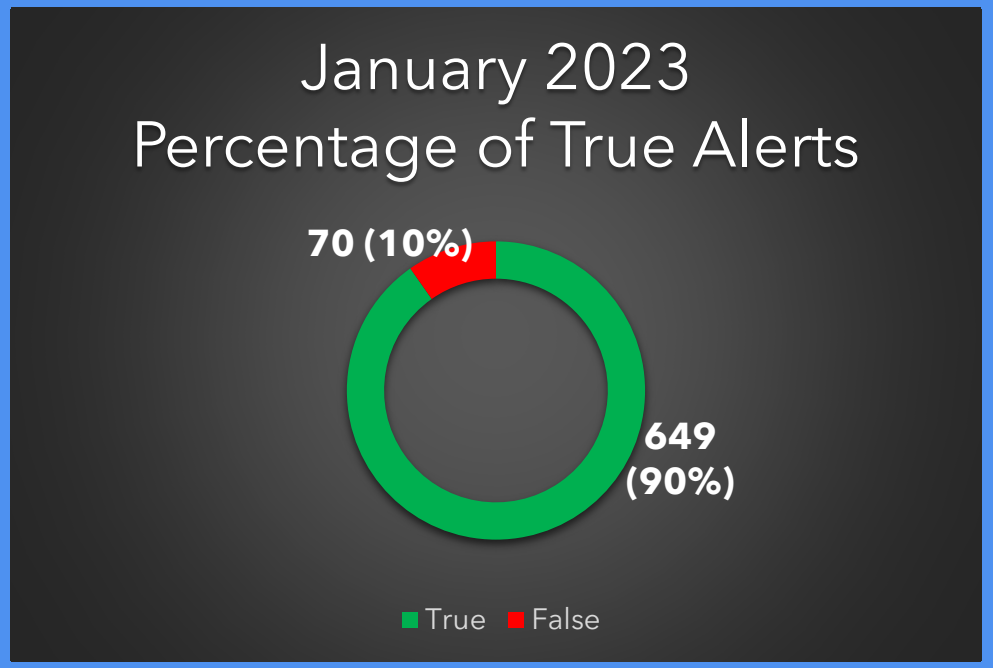
Incident Detection Comparison

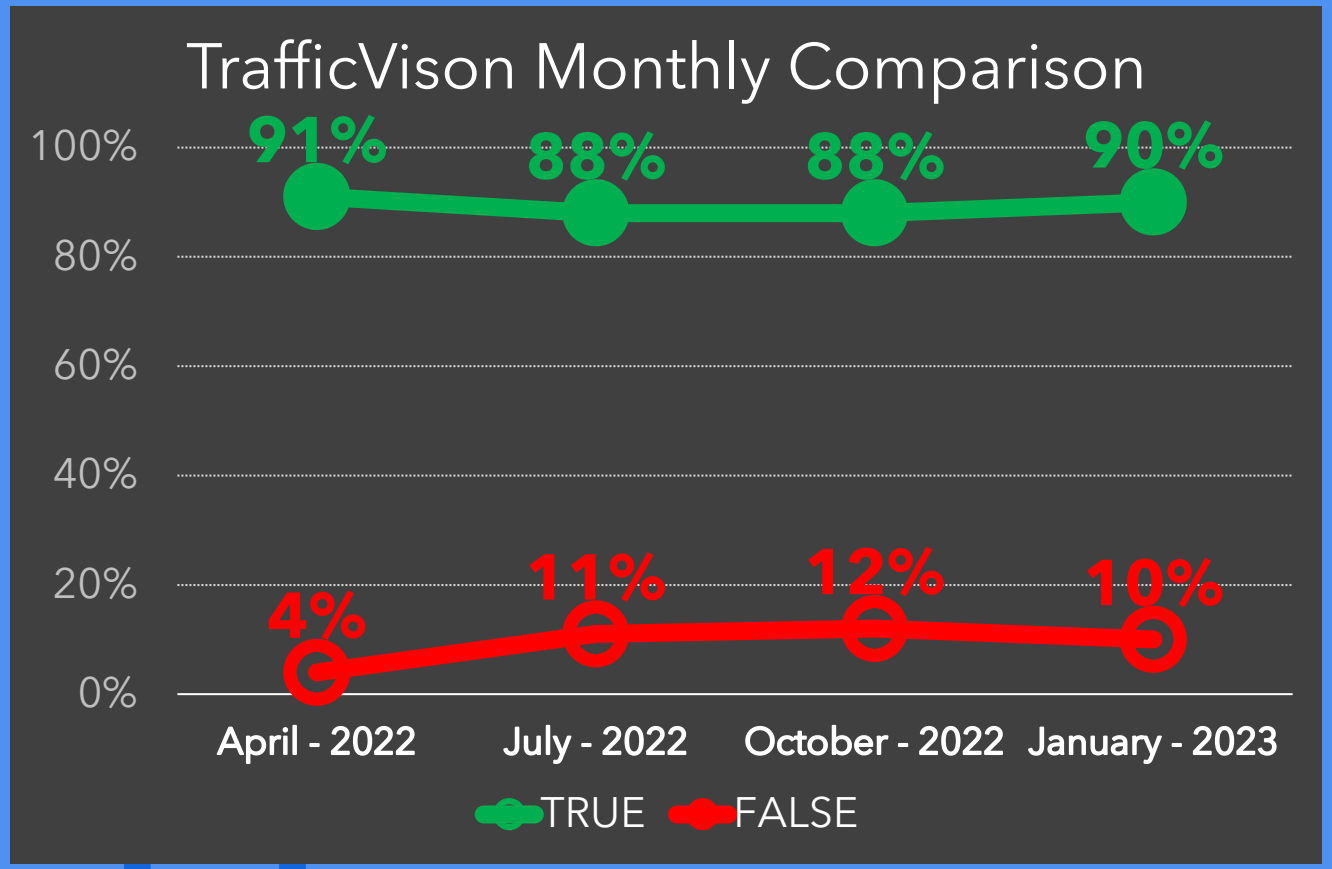
Rekor vs. Standard Operating Procedures



Rekor Verification Results

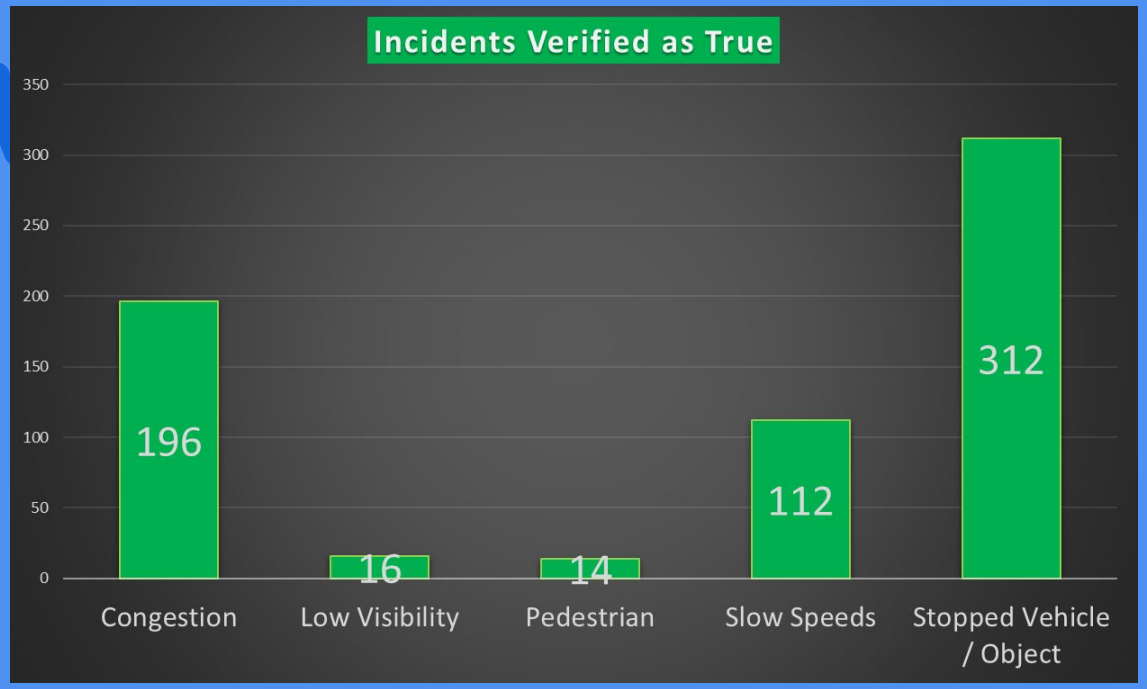
TrafficVision Verification Results

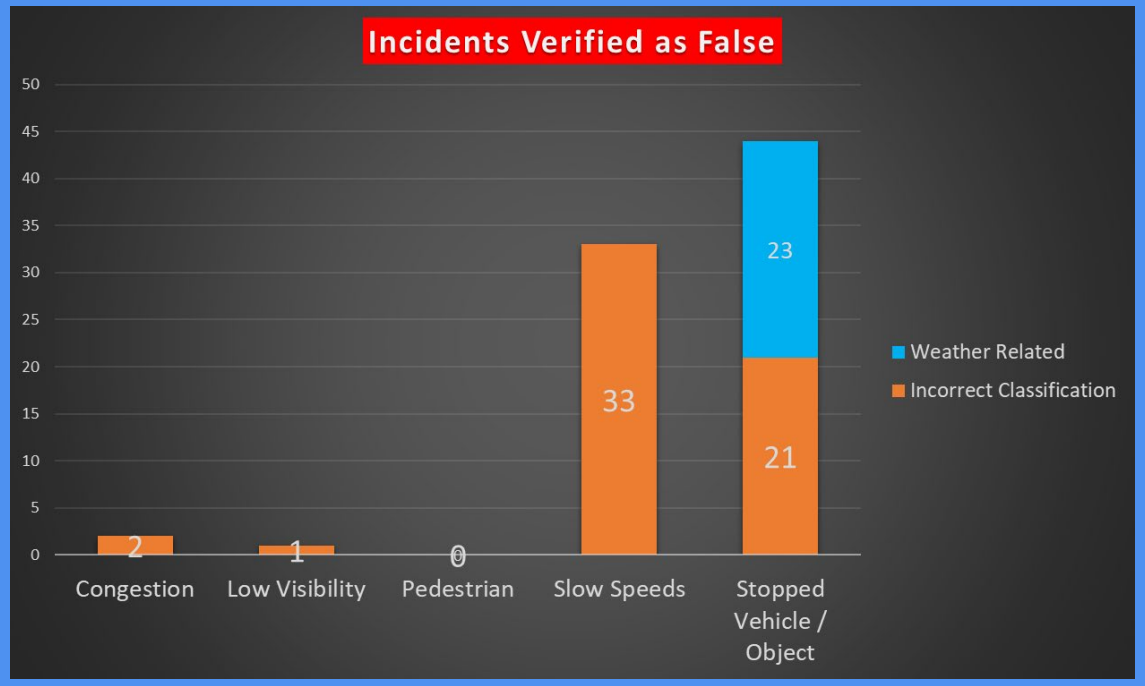




Verification of Incident Alerts

TrafficVision Verification Results

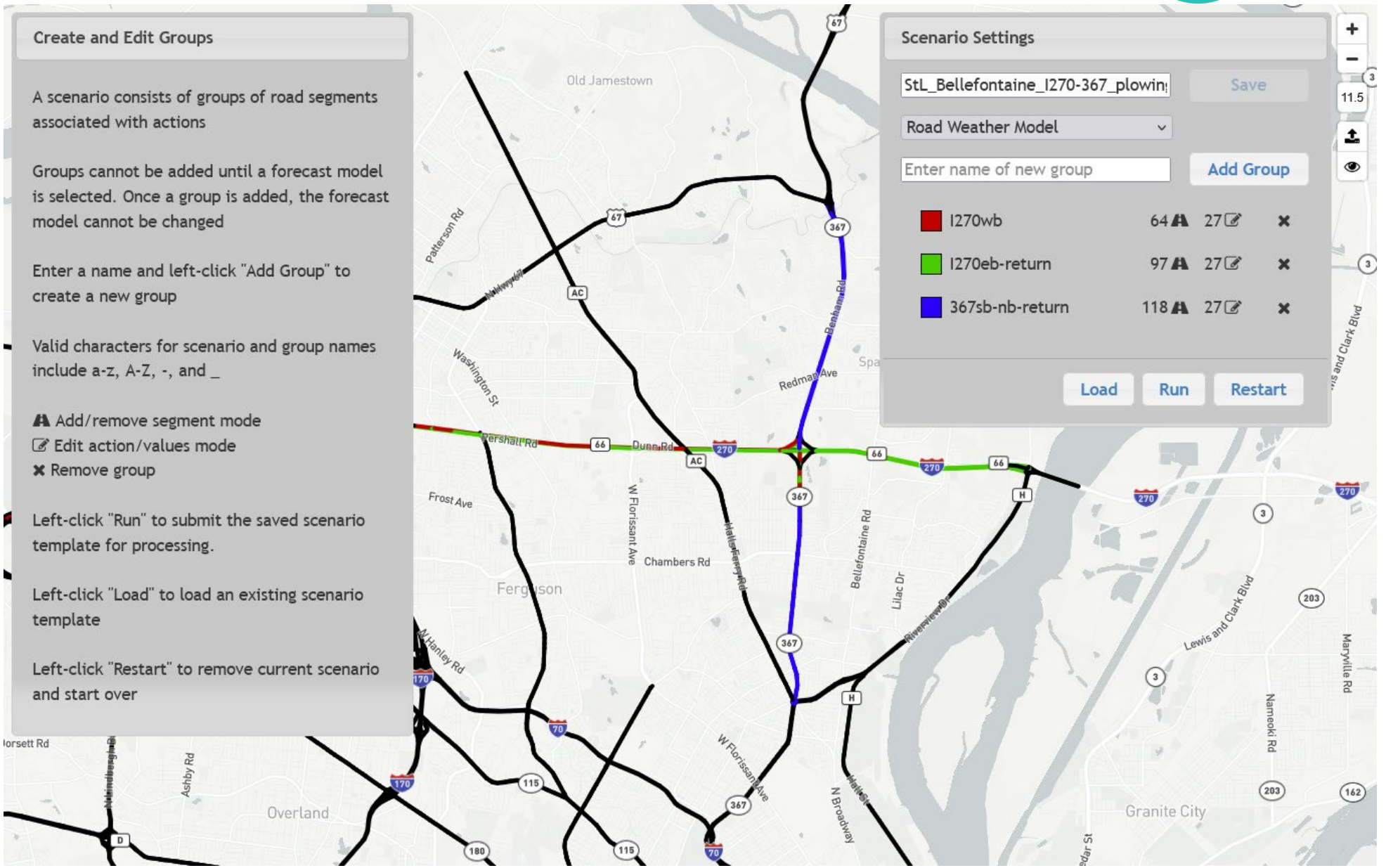




Composition of True and False Alerts – January 2023

IMRCP

1/25/2023 Winter Weather Event



Evaluation – Staff Interviews

TMC Operators

- **Benefits:**
  - Rekor and TrafficVision identify unknown incidents
  - Helps pinpoint location of incidents
- **Difficulties:**
  - Duplicate incident listings create additional work

Emergency Response Operators

- **Benefits:**
  - Gives operators map of incidents
  - Rekor reduces radio traffic
- **Difficulties:**
  - GPS location issues
  - Cannot keep tablet on while driving
  - Safety protocols prevent full use

MoDOT Supervisors and Managers

- **Benefits:**
  - Consolidated Information
  - Creates historical data
  - Provides organizational experience
- **Difficulties:**
  - Not all platforms were user ready
  - Prediction accuracy

Lessons Learned

- Internal and External knowledge and expectations
- Level of trust in data and result
- Frequency of use
- Data availability, relevance, and cost
- Limitation due to Covid
- Staffing levels
- Integration of multiple technologies
- Weather
- Rules, policies, requirements, etc.
- Duration of the project

What's next……

1. Continue evaluating results every quarter.
2. Integrate in progress data to predictive analytics.
3. Full integration between ATMS and predictive analytics.
4. Full camera stream straight from ATMS to Traffic Vision.
5. Final evaluation report and final recommendation.

Thank you

Ploisongsaeng Intaratip, MoDOT

Ploisongsaeng.Intaratip@modot.mo.gov

Mike Dolde, WSP

Michael.dolde@wsp.com