



ANALYTICS AND DATA

TechCasts

Mapping the Way to Transportation Safety

Gerald Dildine – President, ITIS Corporation

Kristi Price - Senior Product Manager, ITIS Corporation

Helpful Links –

ORACLE ANALYTICS VIDEOS:

<https://www.youtube.com/@OracleAnalytics/videos>

OAC MAY 2023 NEW FEATURES VIDEOS BY ORACLE:

<https://www.youtube.com/watch?v=cgnJeVu-plE&list=PL6gBNP-Fr8KWZkXpZnjr7ITMfDTj9-dfK&pp=iAQB>

ORACLE ANALYTICS COMMUNITY:

<https://community.oracle.com/products/oracleanalytics>

ORACLE ANALYTICS LIVE DEMOS:

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Presented by **Roger Cressey**



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View

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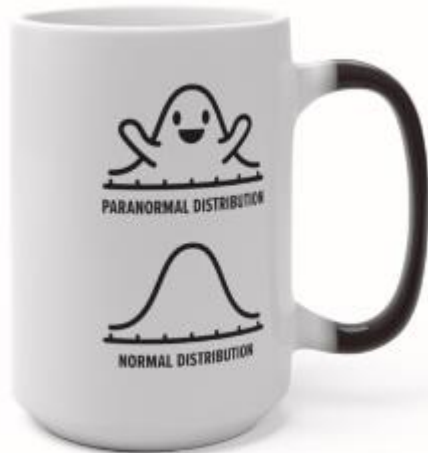
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Spatial + Graph SIG
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— June 20, 2024 Oracle Analytics and Data TechCast

Mapping the Way to Transportation Safety

Presented by: Gerald Dildine & Kristi Price



Transportation Safety Analysis with

ITIS Corporation

Est. 2003



Gerald Dildine, **President, CEO**



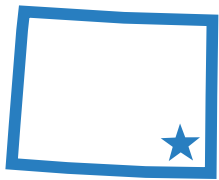
Kristi Price, **Director of Marketing**

- Specializing in government transportation information technology, software, & consulting.
- Oracle Partner, focused on developing business applications requiring geospatial content.
- ITIS' *Safety Portal*÷ consists of 25+ applications built primarily using Oracle products.

Company Overview

ITIS Corp.

Integrated Transportation Information Solutions (ITIS) Corporation is a leading software engineering consulting firm, primarily serving the Transportation and Safety industry.



Wyoming
Department of
Transportation



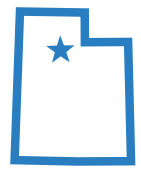
Hawaii
Department of
Transportation



Nevada
Department of
Transportation



Nevada
Department of
Public Services



Utah
Department of
Transportation

WORKING TOWARD AN AMBITIOUS LONG-TERM GOAL: ZERO ROADWAY FATALITIES

“*We cannot tolerate the continuing crisis of roadway deaths in America. These deaths are preventable, and that's why we're launching the **National Roadway Safety Strategy** today...*”

Pete Buttigieg,
United States Secretary of Transportation

Overview

Roadway Safety

Refers to the relationship between the characteristics of a roadway and the car crashes that occur on it.



How do we make roads safer?



How do we determine where to make changes?



How do we determine what changes to make?



Solve Complex Problems with the ITIS Corp.

Safety Portal

- ✓ Data Management
- ✓ Predictive Modeling
- ✓ Crash & Roadway Analytics
- ✓ Spatial Queries & Easy to Use Dashboards
- ✓ Advanced Mapping and Visualizations
- ✓ Enterprise-Level Decision Support Applications



CUSTOMER TESTIMONIAL

“ The Safety Portal provides a central location for safety analysis applications that utilize a variety of Wyoming DOT data sources to get the most accurate and timely results possible, optimizing the use of our safety resources. ”

Keri Bohlmann

Safety Management Engineer,
Wyoming Department of Transportation, Highway Safety

What are the causal factors of a crash?



Driver Behavior



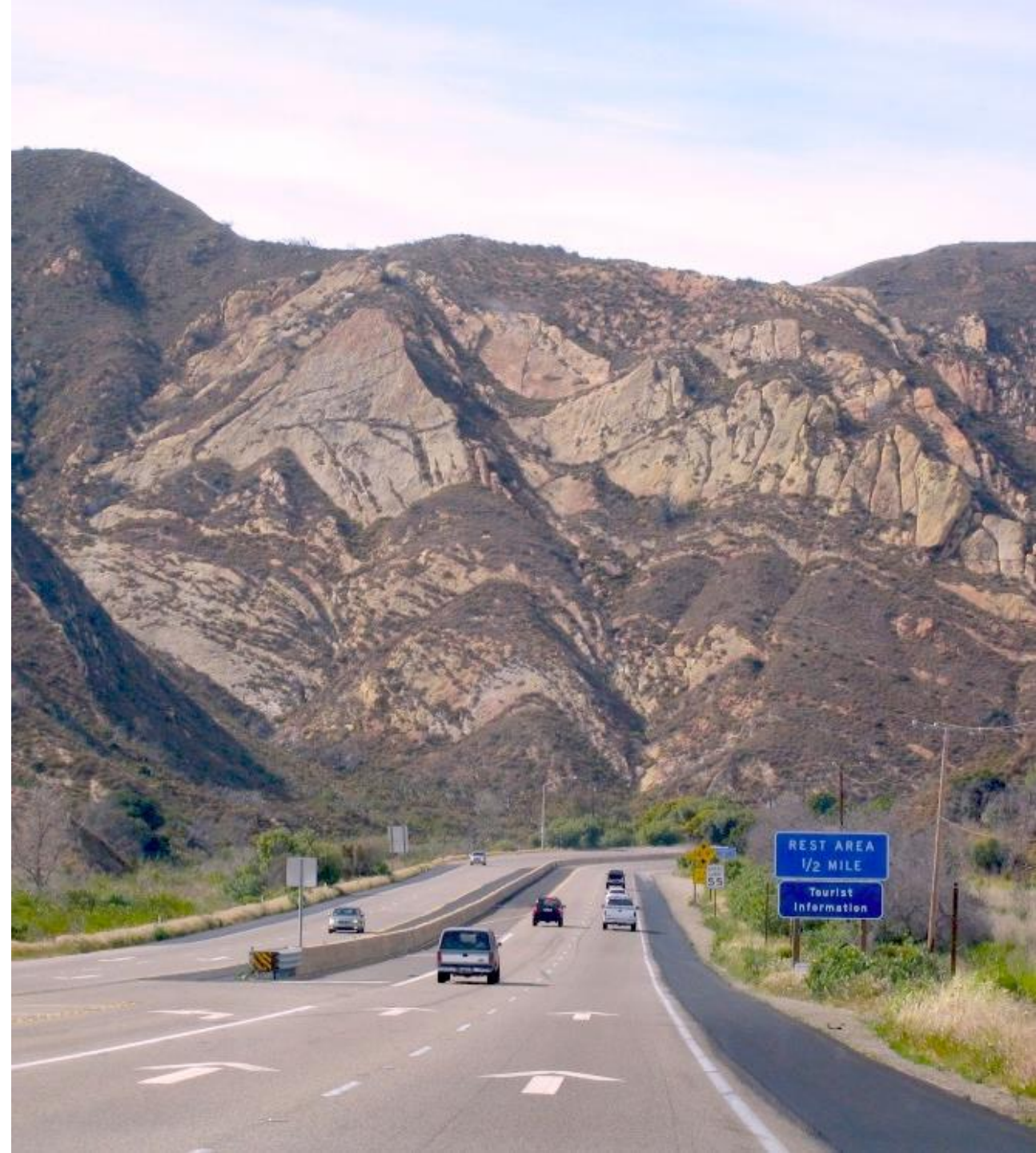
Vehicle Characteristics



Traffic Volumes



Roadway Characteristics



Roadway Safety: A problem worth solving

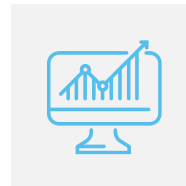
Key Issues & Safety Analysis Challenges

It is difficult to make Safety improvement decisions without a consistent framework or “scoring” method in place.

Engineers make mistakes when they rely solely on crash history to make decisions about roadway safety

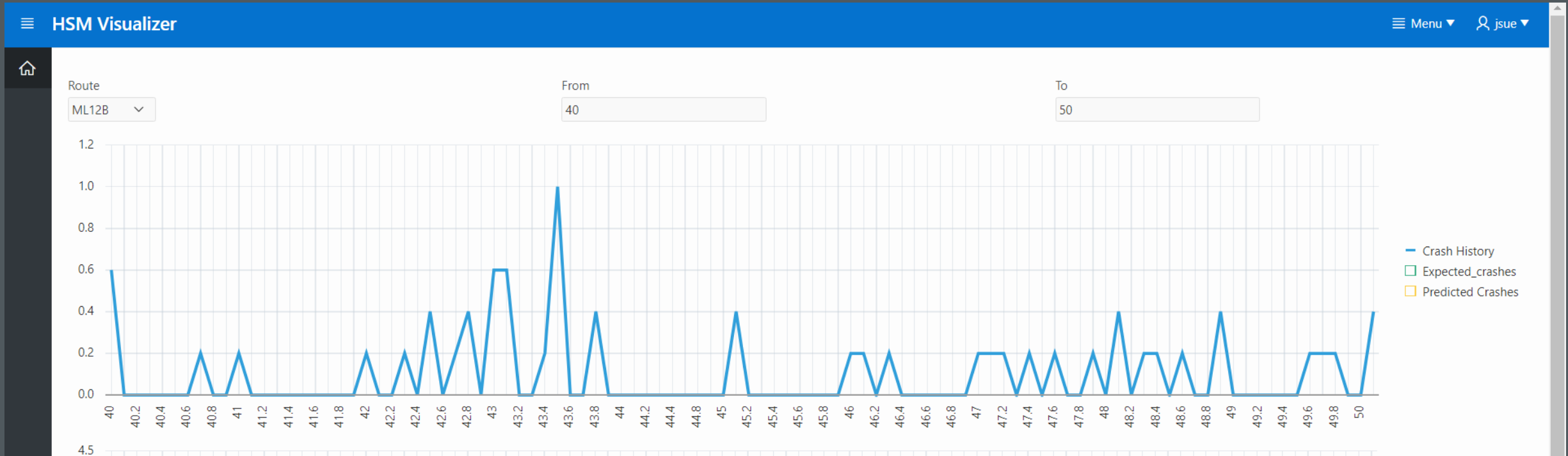


Sparse Data

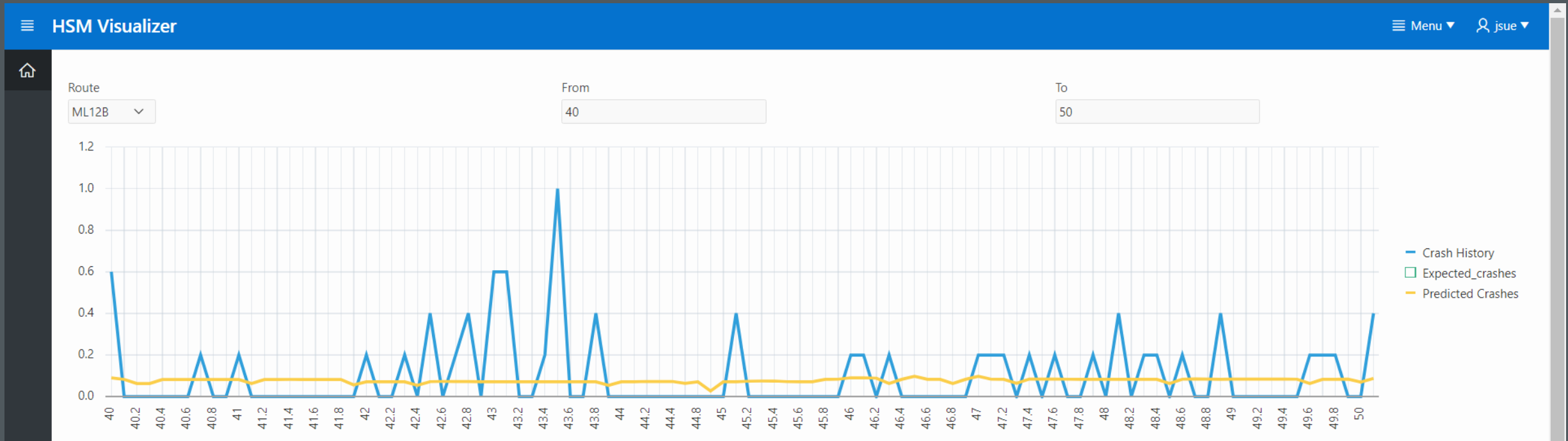


Spikes in Data

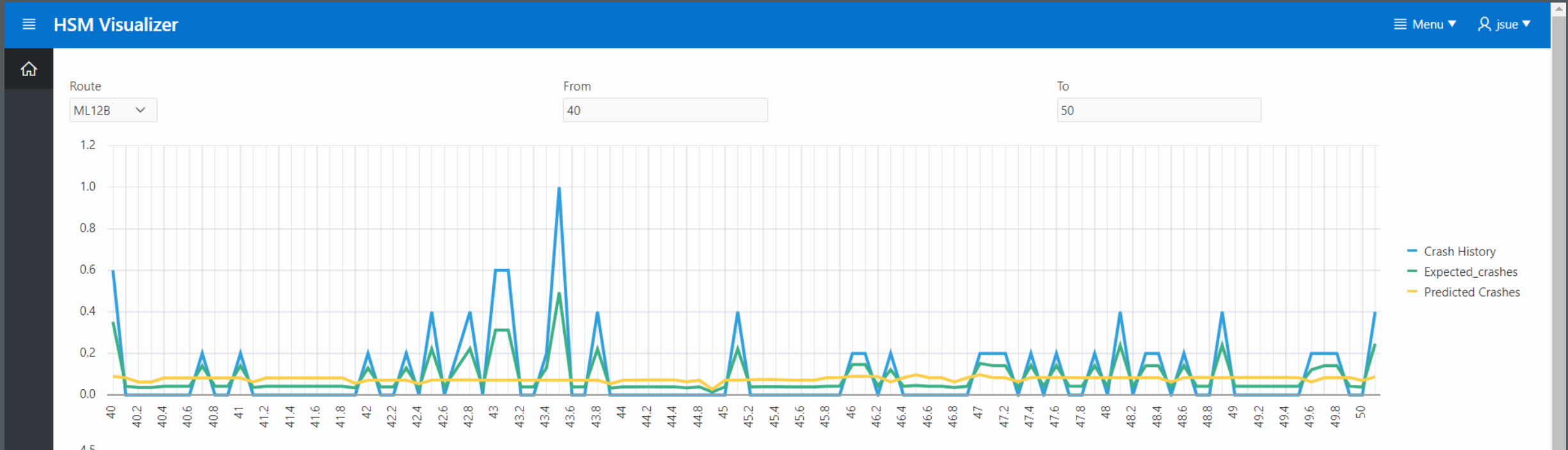
Crash History (actual/observed data)



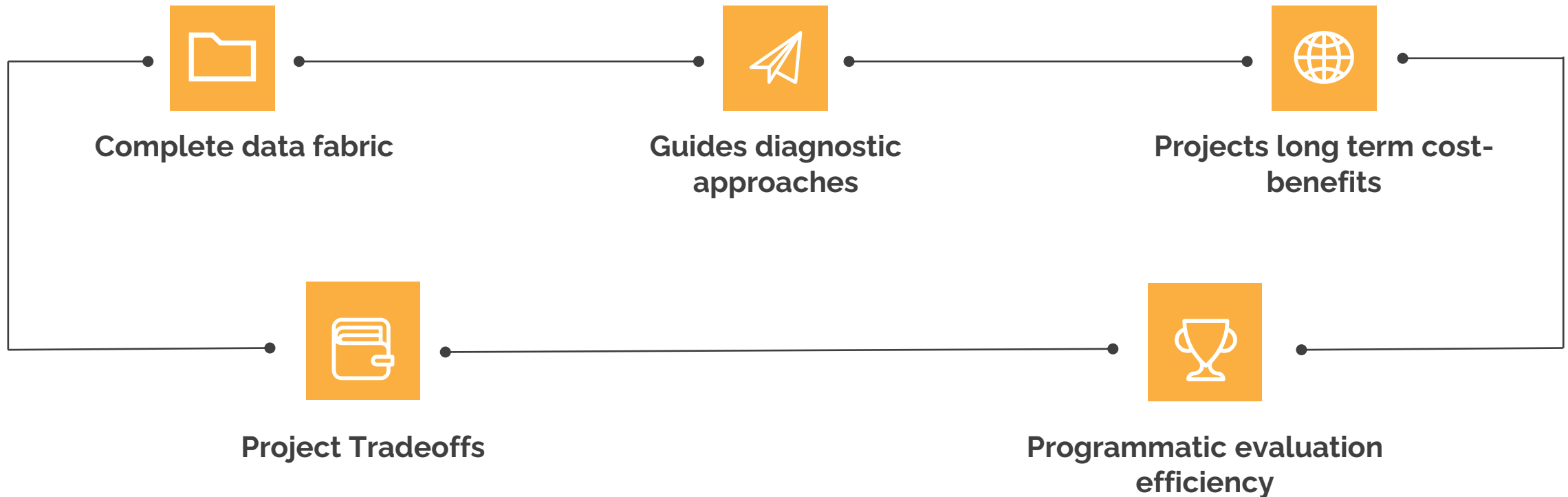
Predicted Future Crashes (using HSM model)



Expected Crashes (Empirical Bayes corrected model)



Predictive Modeling in Action

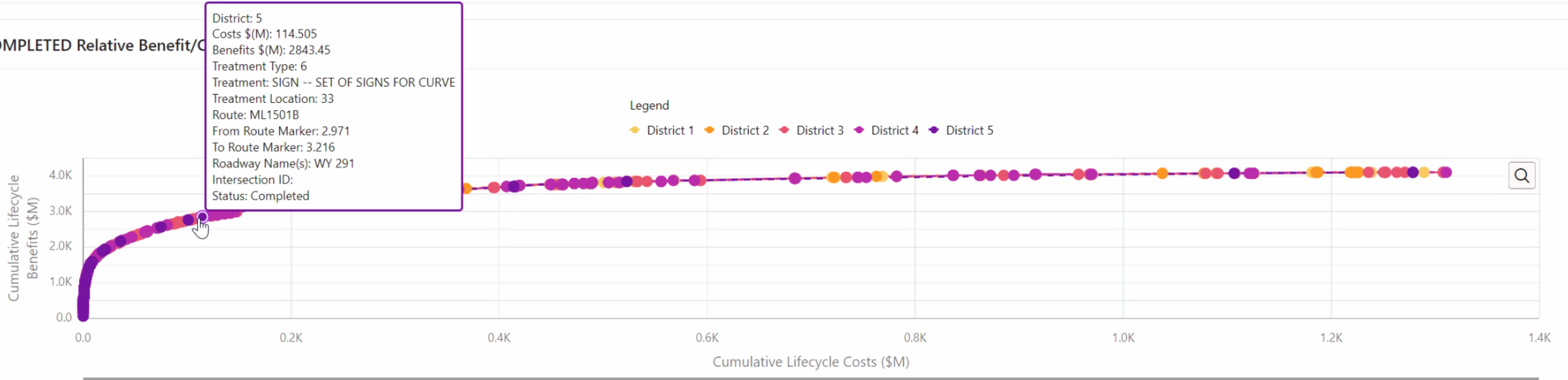


Predictive modeling is used throughout the *Safety Portal*:-

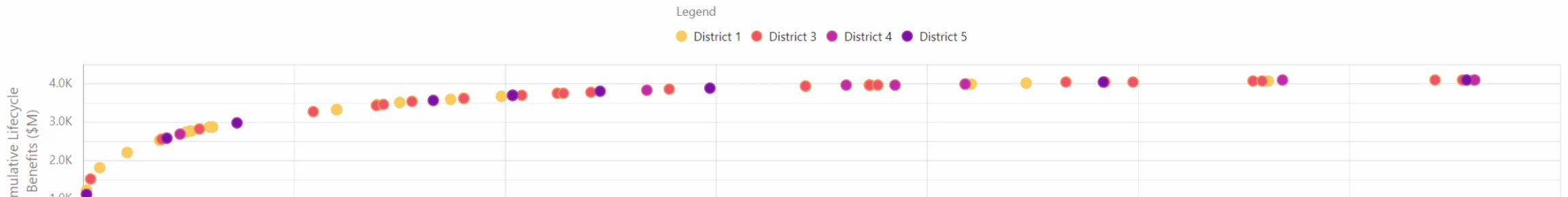
Statewide Safety Status

Treatments Economic Summary

COMPLETED Relative Benefit/Cost



PLANNED Relative Benefit/Cost of Treatment Locations



Building an Enterprise Transportation Safety Management System



+



Database + Spatial • APEX • MapViewer • Spatial Studio •

ORACLE SPATIAL STUDIO

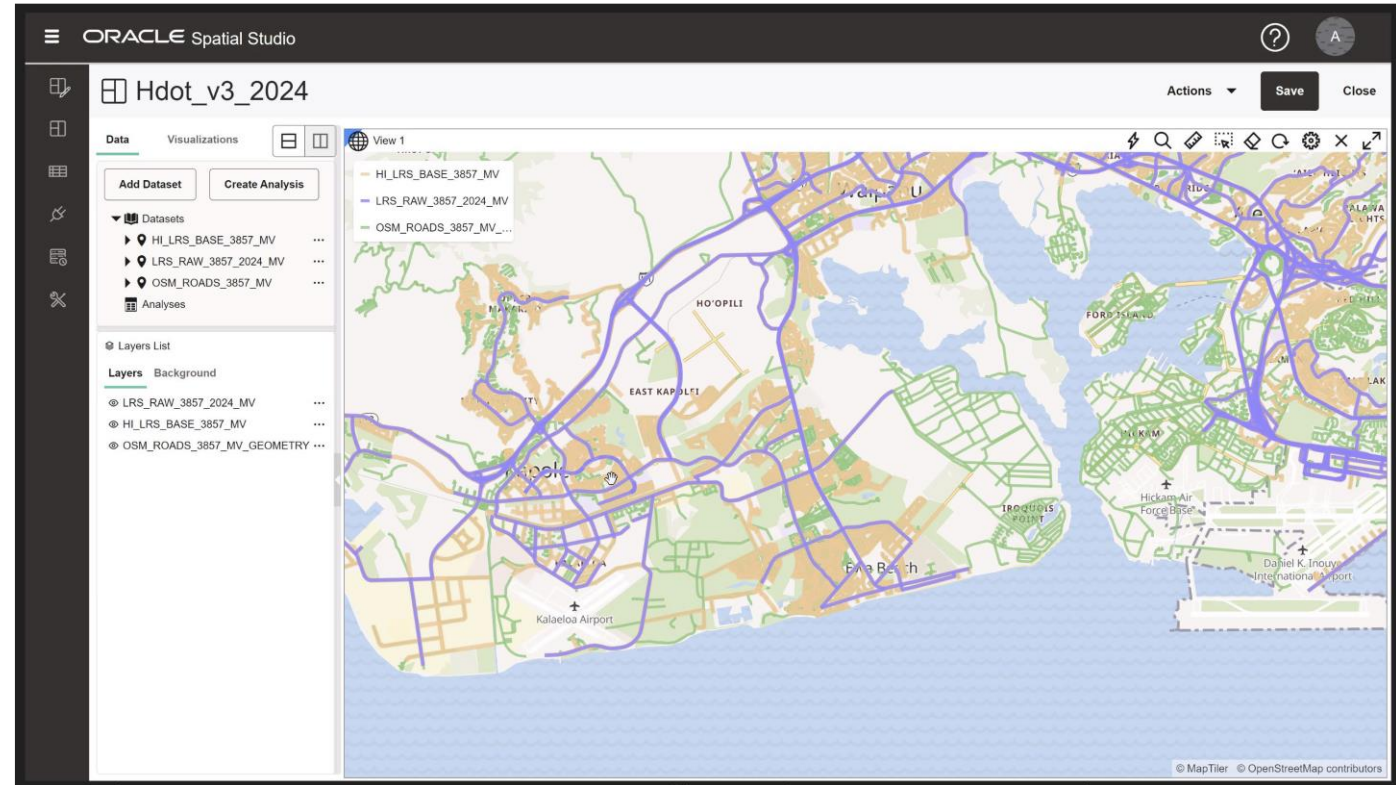
The screenshot shows the Oracle Spatial Studio web application interface. At the top, the browser address bar displays the URL `dev.itis-map.com/spatialstudio/?root=home`. The application header includes the Oracle logo and the text "ORACLE Spatial Studio". A sidebar on the left contains navigation icons for home, projects, layers, and other functions. The main content area is titled "Projects" and features two buttons: "Create Project" and "Import Project". Below these buttons is a search bar and a refresh icon. The projects are displayed in a grid of ten thumbnails, each with a map preview and a title:

- wydot_dev19_general_06-14... Created by: admin
- Tulare County Created by: admin
- crashes near schools Created by: admin
- wydot_07162023 Created by: admin
- wydot_dacs_082023 Created by: admin
- elrs_rv Created by: admin
- wydot_ixns_08042023 Created by: admin
- markers Created by: admin
- STM 09012023 Created by: admin
- wydot_ixns_12012023 Created by: admin



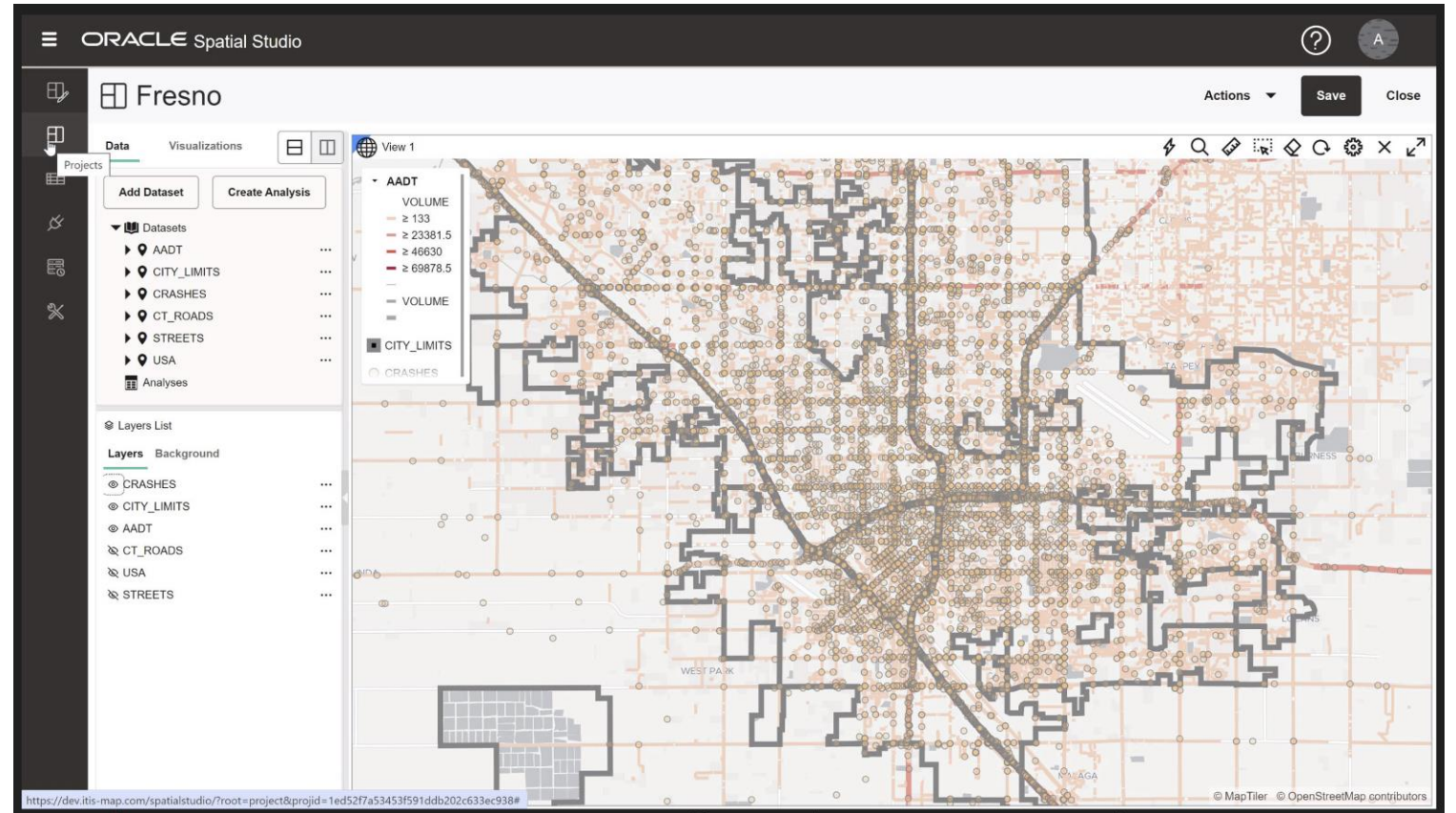
Benefits of Using Oracle Spatial Studio

- ✓ Use of vector map tiles
- ✓ Integration capabilities with MapBox and MapLibre
- ✓ Integration with Oracle DB & Autonomous DB
- ✓ Integration with Oracle APEX / RESTful Data Services (ORDS)



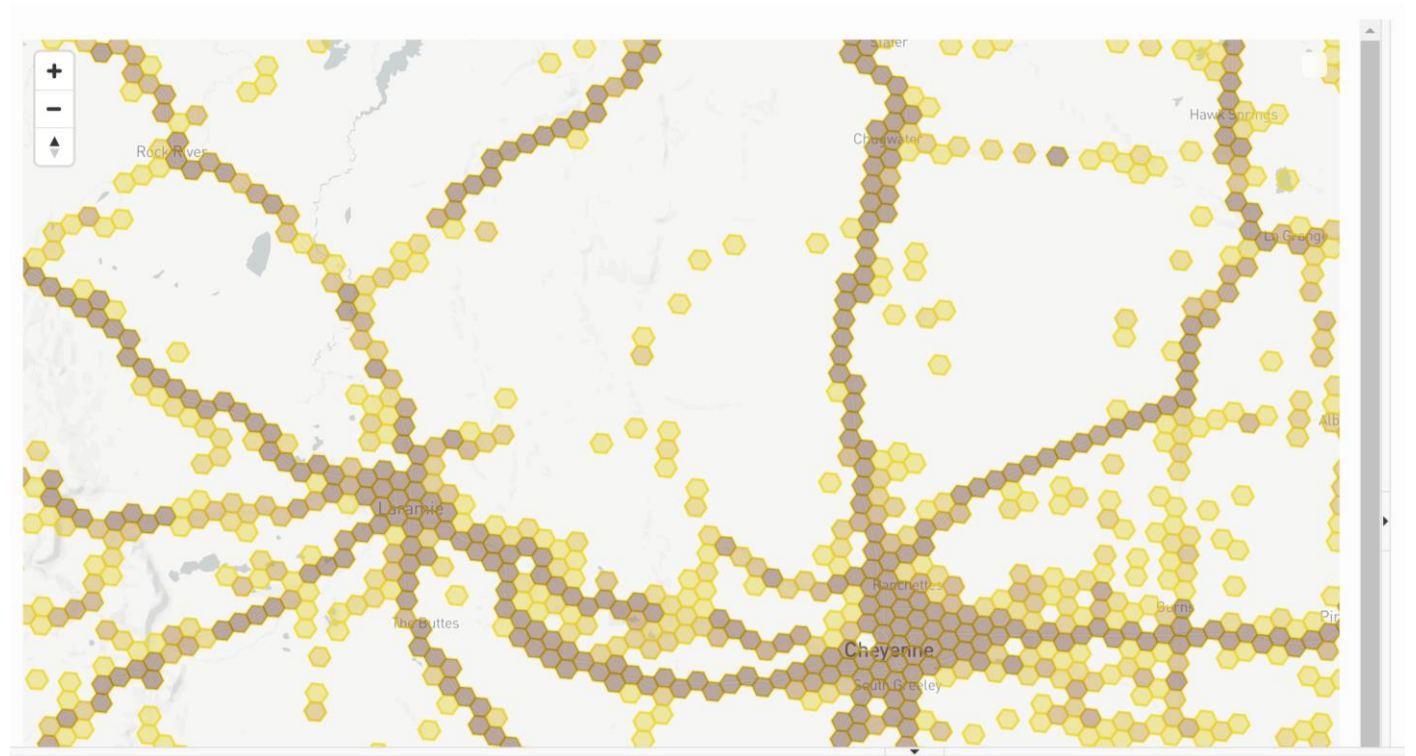
Spatial Studio: Vector Tile Benefits

- ✓ Display Performance
- ✓ 5-10x Improvement
- ✓ Example: We can now display more than 200,000 crashes in a few seconds

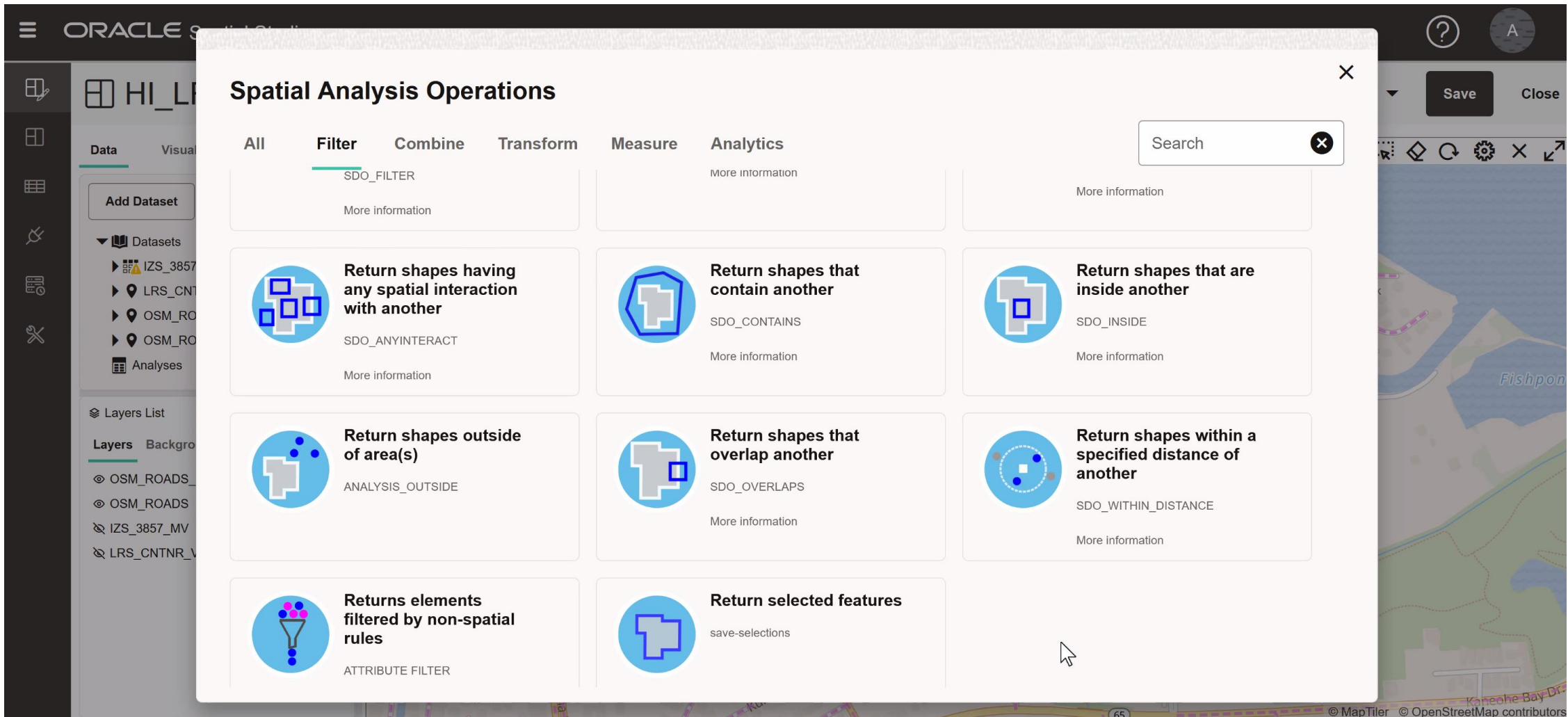


Spatial Studio: MapBox & Oracle DB Integration Benefits

- ✓ Robust JavaScript for designing attractive maps
- ✓ Simple version is included in the stack
- ✓ Link to full version of MapBox to create advanced symbology



Spatial Analysis Operations



The screenshot shows the Oracle Spatial Analysis Operations dialog box. The dialog is titled "Spatial Analysis Operations" and has a search bar at the top right. Below the search bar, there are several tabs: "All", "Filter", "Combine", "Transform", "Measure", and "Analytics". The "Filter" tab is currently selected. The dialog displays a grid of spatial analysis operations, each with an icon, a description, and a technical name. The operations are:

- SDO_FILTER**: More information
- Return shapes having any spatial interaction with another**: SDO_ANYINTERACT, More information
- Return shapes that contain another**: SDO_CONTAINS, More information
- Return shapes that are inside another**: SDO_INSIDE, More information
- Return shapes outside of area(s)**: ANALYSIS_OUTSIDE
- Return shapes that overlap another**: SDO_OVERLAPS, More information
- Return shapes within a specified distance of another**: SDO_WITHIN_DISTANCE, More information
- Returns elements filtered by non-spatial rules**: ATTRIBUTE FILTER
- Return selected features**: save-selections

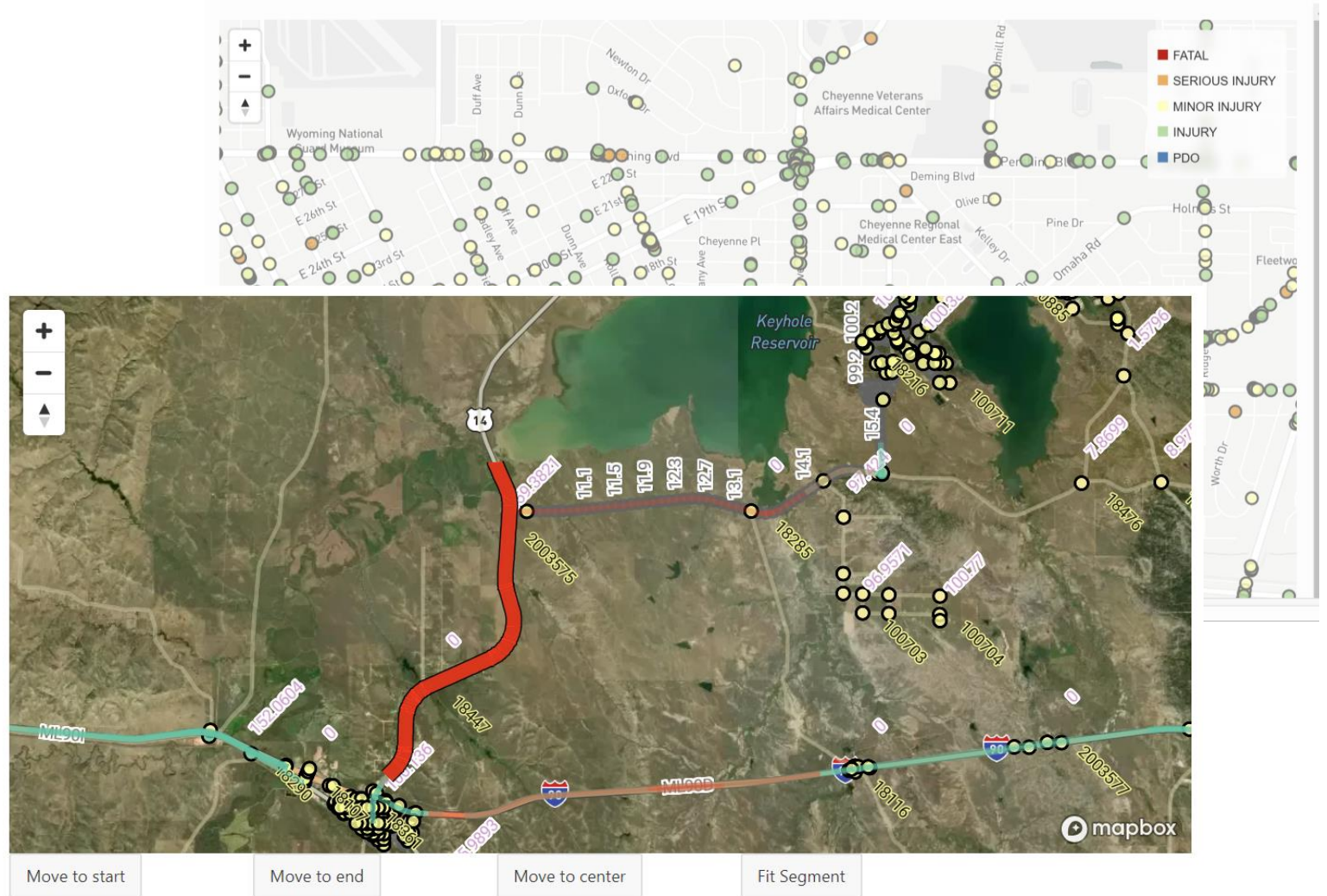
The background shows a map interface with a layers list on the left and a search bar at the top right. The layers list includes "OSM_ROADS", "OSM_ROADS", "IZS_3857_MV", and "LRS_CNTNR_V". The search bar contains the text "Fishpon".

Key Technical Approaches

- 1. Oracle Database:** Add Geometry to database table
- 2. Oracle Spatial Studio:** Add tables to Spatial Studio
- 3. Oracle Spatial Studio:** Testing displays inside Spatial Studio
- 4. Oracle APEX:** Add map to APEX application for end-user displays
- 5. Oracle ORDS:** Generates GeoJSON

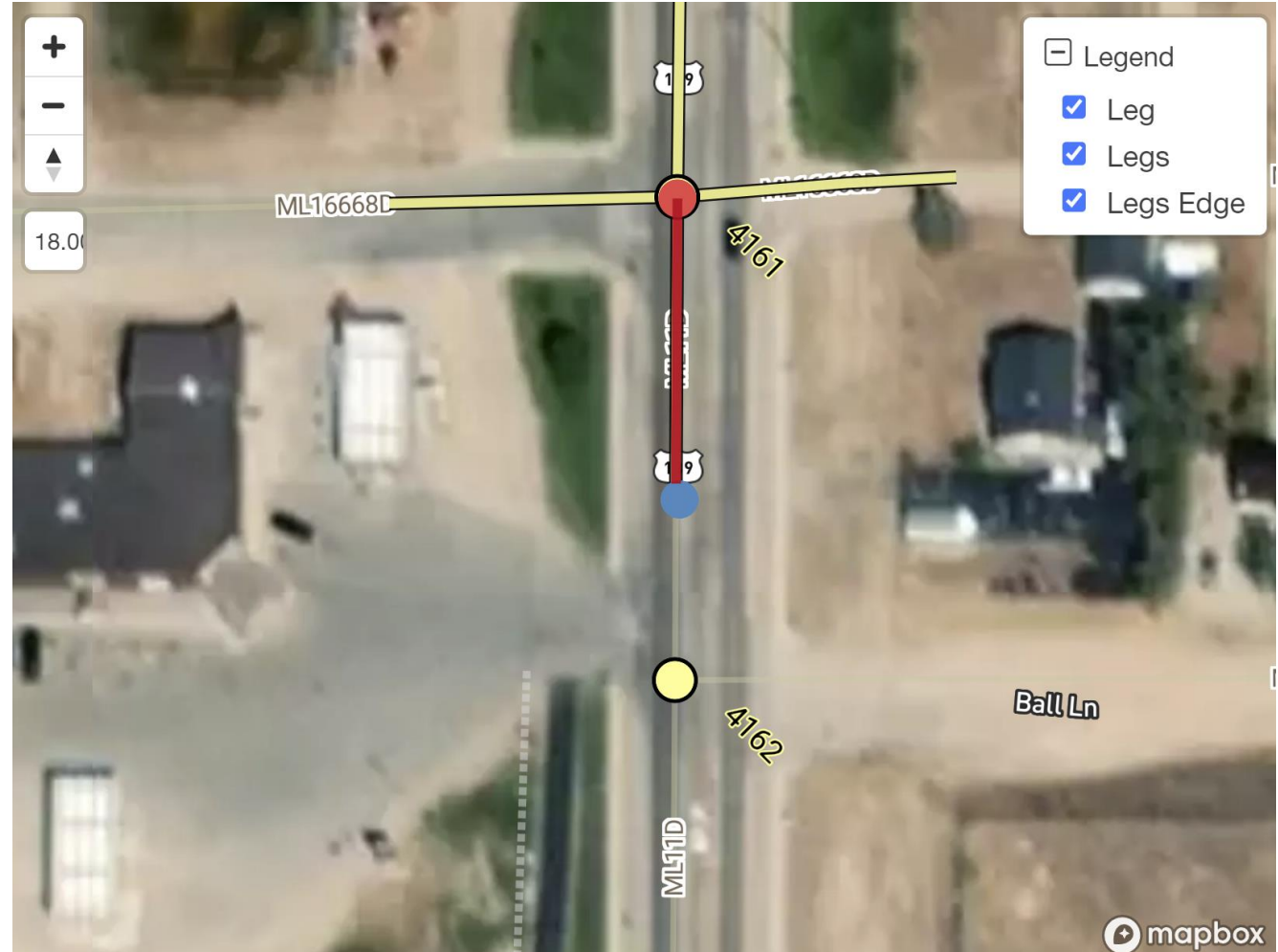
Approach: Handling the Map in Oracle APEX

- ✓ Setting a starting point
- ✓ Add necessary data layers
- ✓ Determine Layer Symbology
- ✓ Add Map Legend
- ✓ Changing Map Backgrounds



Approach: Basemaps and Editing Point & Line Features

- ✓ **Vector Background Display**
- ✓ **ORDS/GeoJSON is used for editing features on the fly**
- ✓ **Drag & Drop Functionality**



Using Spatial Studio

- ✓ **Feature Management**
- ✓ **Token Management**
- ✓ **Vector Tile Displays and Refresh Strategies**

API Use: Feature Management in Spatial Studio

- ✓ **All features are set up in Spatial Studio**
 - **Crashes**
 - **State, County, District, City polygons**
 - **Routes (roadways)**
 - **Intersections**
 - **Points of Interest**
- ✓ **Bonus: Quick visual validation that features loaded**

Linear Features

ORACLE Spatial Studio

Hdot_v3_2024

Actions Save Close

View 1

- HI_LRS_BASE_3857_MV
- LRS_RAW_3857_2024_MV
- OSM_ROADS_3857_MV...

Data Visualizations

Add Dataset Create Analysis

Datasets

- HI_LRS_BASE_3857_MV
- LRS_RAW_3857_2024_MV
- OSM_ROADS_3857_MV

Analyses

Layers List

Layers Background

- LRS_RAW_3857_2024_MV
- HI_LRS_BASE_3857_MV
- OSM_ROADS_3857_MV_GEOMETRY

Map Labels: HO'OPILI, EAST KAPOLEI, IROQUOIS POINT, Ford Island, Hickam Air Force Base, Daniel K. Inouye International Airport, Kalaeloa Airport, Ewa Beach, PALA W A LIGHTS, PALA W A BEACH, HICKAM, HICKAM AIR FORCE BASE, DANIEL K. INOUE INTERNATIONAL AIRPORT.



Point Features

Crashes near schools

Actions Save Close

Data Visualizations

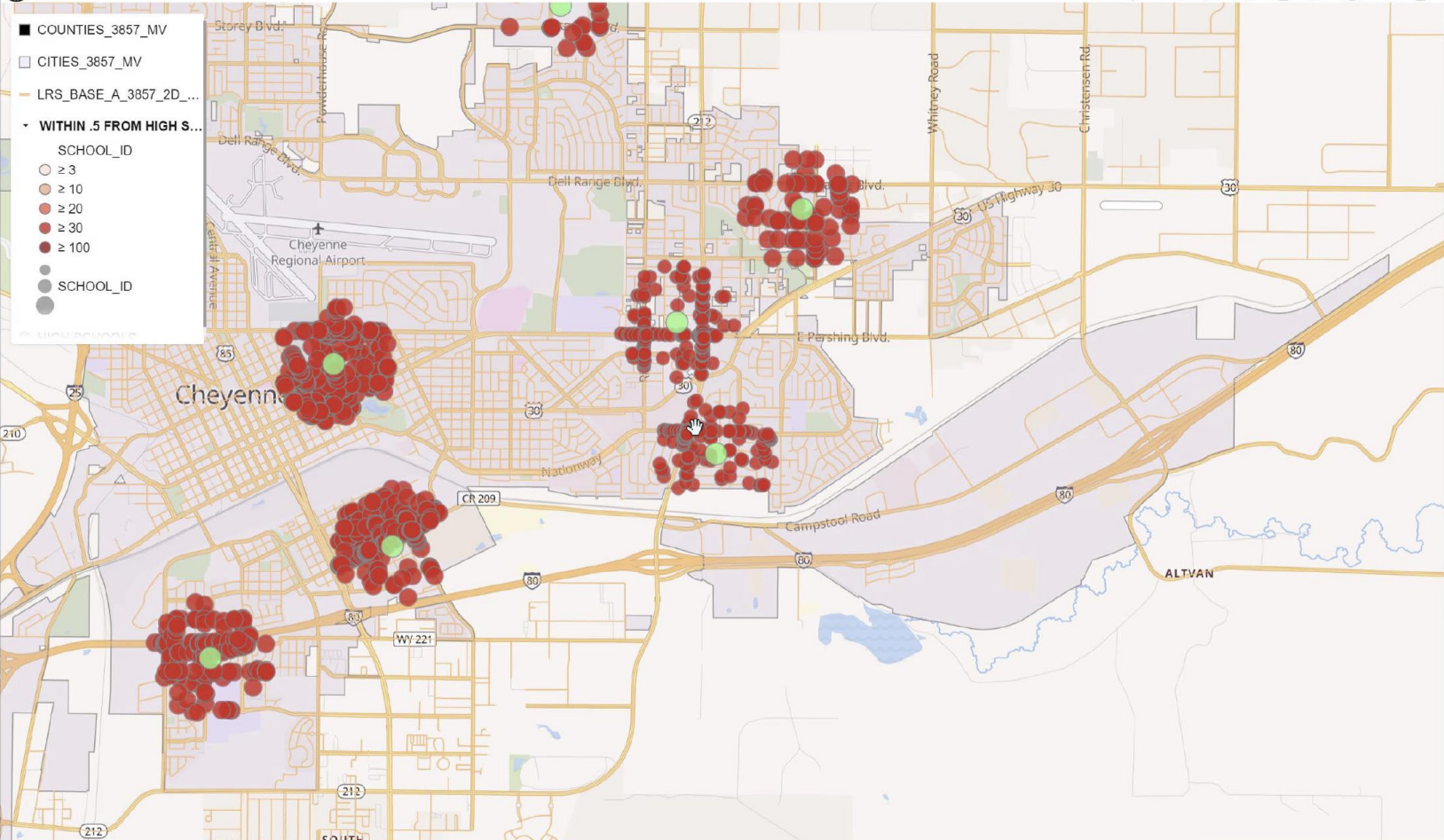
View 1



Add Dataset Create Analysis

- ▼ Datasets
 - ▶ CITIES_3857_MV ...
 - ▶ COUNTIES_3857_MV ...
 - ▶ LRS_BASE_A_3857_2D_MV ...
 - ▶ MAPVIEW_CRASHES_3857_MV ...
 - ▶ MV_TREATMENT_LOCATIONS_3857_MV ...
 - ▶ SCHOOLS_MV ...
- ▼ Analyses
 - ▶ HIGH_SCHOOLS ...
 - ▶ MV_TREATMENT_LOCATIONS_3857_MV ...
 - ▶ WITHIN_0.5_FROM_HIGH_SCHOOLS ...

- Layers List
- Layers Background
- ▶ HIGH_SCHOOLS ...
 - ▶ WITHIN_0.5_FROM_HIGH_SCHOOLS ...
 - ▶ SCHOOLS_MV ...
 - ▶ MAPVIEW_CRASHES_3857_MV ...
 - ▶ LRS_BASE_A_3857_2D_MV ...
 - ▶ CITIES_3857_MV ...
 - ▶ COUNTIES_3857_MV ...



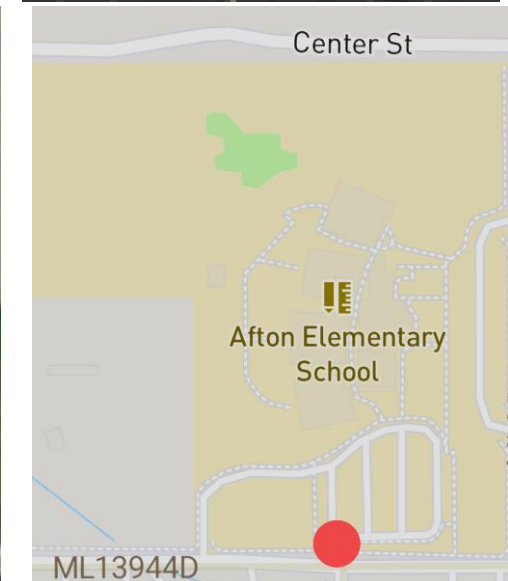
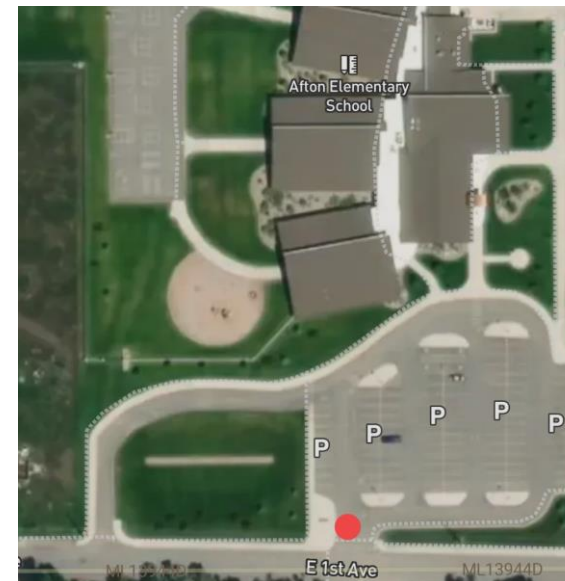
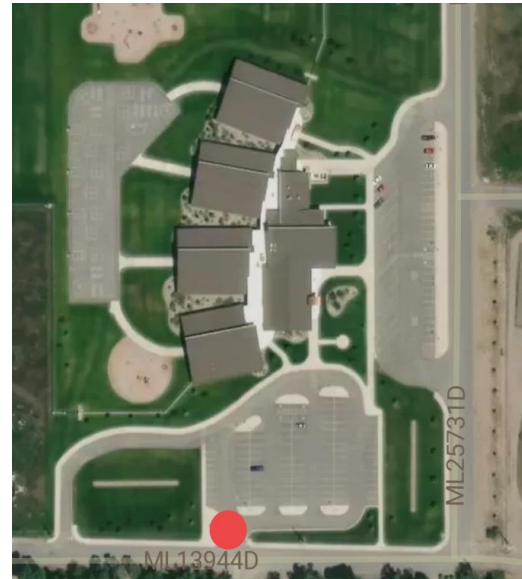
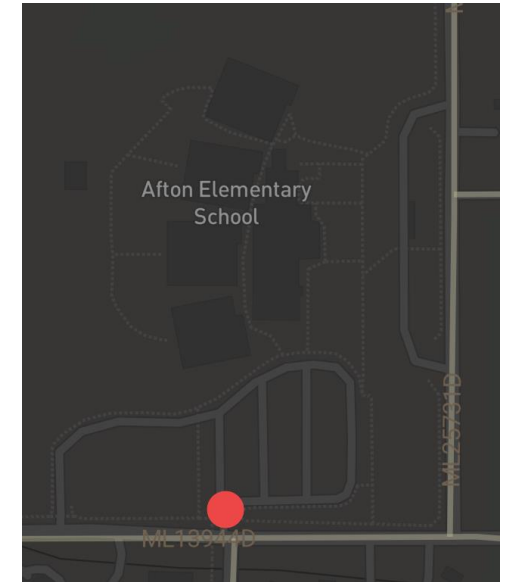
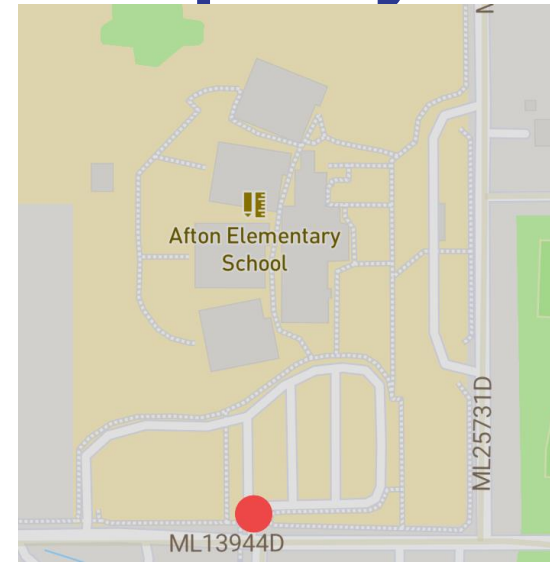
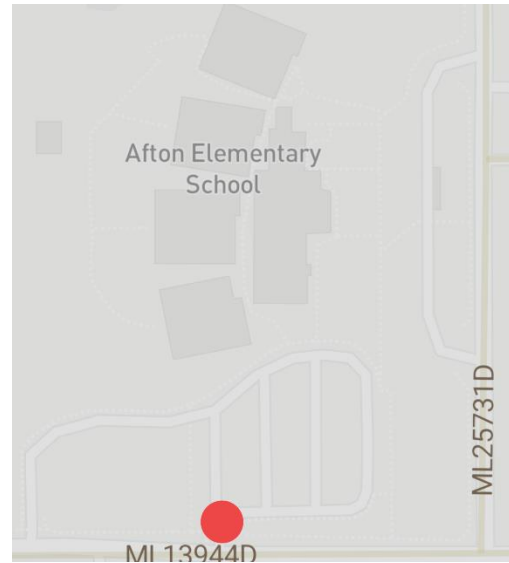
Example Use Cases

- ✓ **Schools (simple point features)**
- ✓ **Intersections**
- ✓ **Guard Rails (simple linear features)**
- ✓ **Roundabouts (complex linear feature)**
- ✓ **Collision Diagrams (diagrams / graph)**
- ✓ **Faceted Search / Smart Search**
- ✓ **Safety Gazetteer (rich displays: points, lines, polygons, charts)**
- ✓ **Rapid Mapper Dashboard (basic queries/filters, map displays, graphs, charts)**

Setup Use Case: Custom Basemap Styles

Background Options:

- ✓ Light
- ✓ Streets
- ✓ Dark
- ✓ Satellite
- ✓ Vector OSM
- ✓ Custom ...



Editing Simple Point Features (video example)

The screenshot shows a web application interface for editing school details. The top navigation bar is blue with a hamburger menu icon, the text "Schools", and a "Menu" dropdown. A user profile icon labeled "dev" is in the top right. On the left, a dark sidebar contains two home icons. The main content area is split into two panels. The left panel, titled "School Details", contains a form with the following fields: "School" (text input with "Star Valley Middle School" and a character count of "25 of 128"), "School Level" (dropdown menu with "HIGH SCHOOL" selected), "Organization" (text input with "Public School" and "13 of 128" characters), "City" (text input with "Afton"), "Longitude" (text input with "-110.94210682"), "Grades" (text input with "7-8"), "Address" (text input with "999 Warrior Way" and "15 of 128" characters), "Zip" (text input with "83110"), "Latitude" (text input with "42.7484334"), and "Active" (checkbox dropdown with "Y" selected). At the bottom of the form are "Cancel", "Delete", and "Apply Changes" buttons. The right panel shows a map view of the school location. The map is a satellite-style map with a green outline around the school building. Labels on the map include "Star Valley Middle School", "Star Valley Middle School", "Tee-Mont Ln", "Tee Mont Dr", "ML7515D", "ML7515D", "ML7515D", "ML7515D", "ML20070D", "ML14444D", and "ML14444D". A "mapbox" logo is in the bottom right of the map. Below the map is a dropdown menu set to "Vector OSM".



Editing Simple Linear Features (video example)

The screenshot displays the 'Intersection Inventory Manager - Pro' software interface. On the left, a 'Legs Details' form is shown for editing a specific leg. The form includes fields for Leg ID (991), Intersection ID (4130), County (Sublette), Leg Number (1), and Leg Direction (S). It also contains fields for Route ID (ML168201), Route Name (SUBLETTE AVE), and various traffic-related parameters such as AADT, lane counts, and traffic control. A map on the right shows the intersection of Sublette Ave and ML168201, with the selected leg highlighted in red. The bottom of the interface features a search bar and a data table.

Intersection Marker Id	Intersection Id	Route Id1	Route Id2	Rm	City	Occur	County	Active	Premerge Ixn Id	Last Modified Type Id
183	4130	ML168201	ML166661	99.7219		1	Sublette	Y		1



Collision Diagram (Complex Features + Advanced Symbology)

County: **Natrona**

City: **Casper**

District: **2**

2ND ST

Total Count: **121**

Critical Count: **0**

Serious Count: **21**

Damage Count: **100**

Facility Type: **UrSi4**

Longitude: **-106.2707891**

Latitude: **42.8489575**

Map showing intersection of 2ND ST and ML25757D. Symbols include UNK, QTH, and various directional arrows with counts. A yellow circle highlights the intersection point.

Crash Types

Crash Type	Total Crashes
REAR END	48
OTHER	41
SWIDESWIPE	12
ANGLE	5
FACING	4

Crash Type Percentages

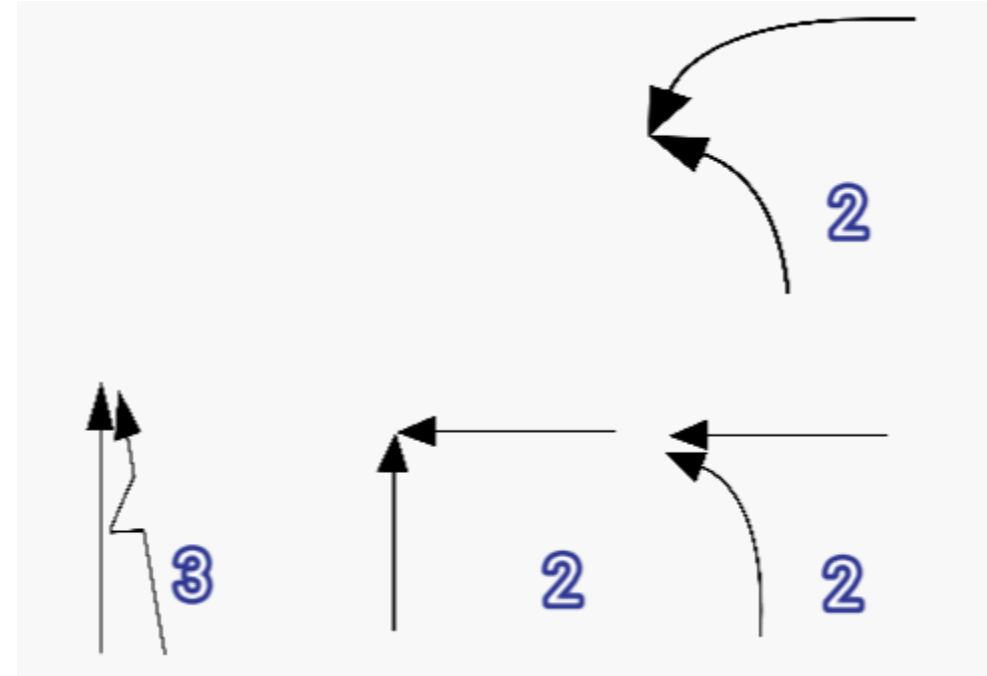
Pie chart showing crash type percentages: REAR END (largest), OTHER, and several smaller categories.



Collision Diagrams – Advanced Symbology

Crash Type Symbols Using MapBox Studio:

- ✓ Create high-end symbols from SVG
- ✓ Can use Mapbox Studio to create, house custom symbols



Roundabout (Complex Features + Feature Collections)

Roundabouts are complex features consisting of multiple parts:

Roundabout Name	Roundabout Routes
Centennial Hills Blvd @ E 21st St @ Waterfo St	ML14603 ML14692 ML15266 ML20533
County	City
Natrona	Casper
District ID	Area Type
District 2	URBAN
Number of Approaches	Number of Circulatory Lanes
4	1
Junction Traffic Control	Junction Lighting Type
Yield sign	



Roundabout Examples

Legacy Raster Version

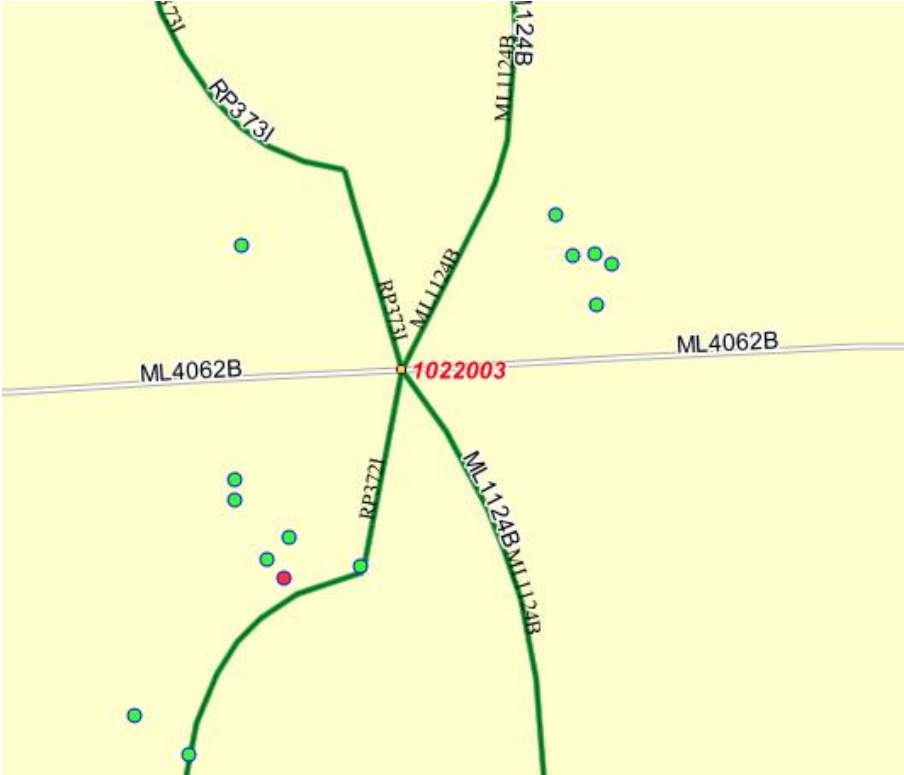


New Vector Version

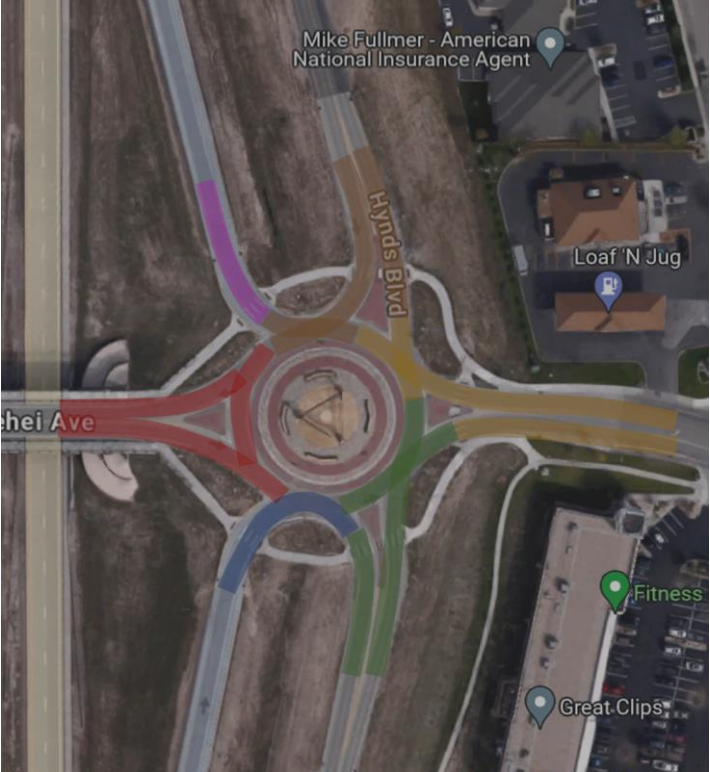


Roundabout Examples

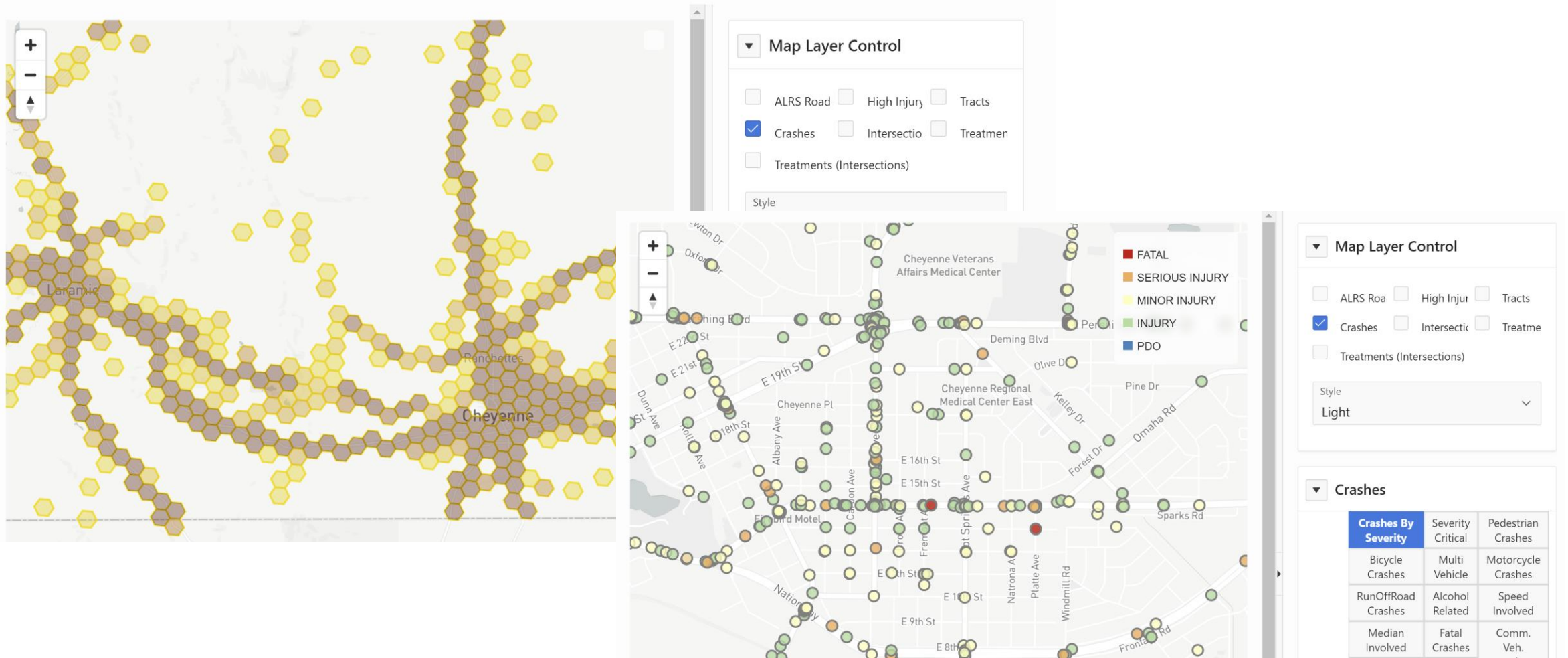
Legacy Raster Version



New Vector Version



Safety Gazetteer – Predefined Visualizations



Faceted Search

Facet Search

Search ↗

Alcohol involved Clear ⋮

N (97K)

Y (6,857)

Drugs Involved ⋮

N (5,766)

Y (1,091)

Hit and Run ⋮

N (4,645)

Y (2,212)

Runoffroad ⋮

N (1,825)

Y (5,032)

Total Row Count 6,857

Alcohol involved Y X Reset

Legend

- Ixn Labels
- Ixns
- Legs
- Legs Edge
- Route Labels
- Routes



THANK YOU

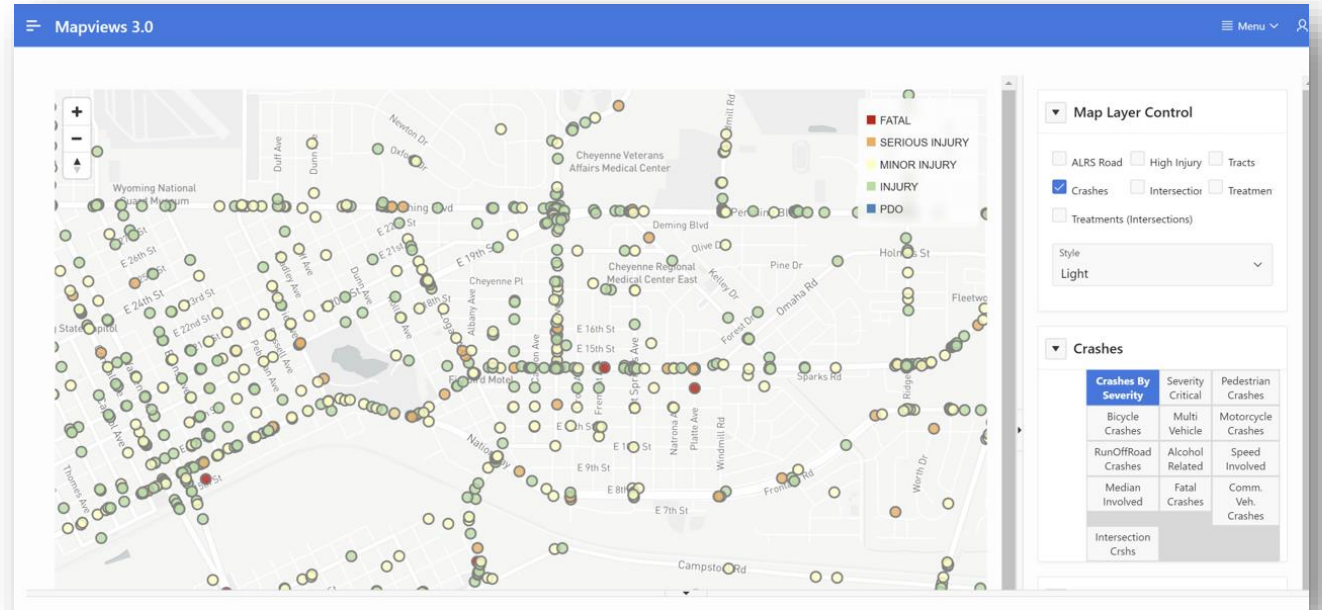
Gerald Dildine & Kristi Price

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itis-corp.com



Spatial for Developers, DBAs & Analysts Office Hours



- Topic: **Develop Custom Maps with Spatial Studio, APEX, ORDS & GeoJSON**
- Presented by: **Jerry Dildine, Kristi Price, ITIS Corp.**
- Date: **July 30, 9am US Pacific**
- Register: bit.ly/AskTOMOracleSpatial



Gerald Dildine
ITIS



Kristi Price
ITIS