



# AASHTOWare Safety Software

Jeff Murphy | TDOT  
Audra Engle | Numetric, Inc.  
November, 2022





# Background

- AASHTOWare Safety powered by Numetric
- Implemented (over 150 new users added)
  - Crash Query
  - Dashboards
- Crash Data - TITAN → TRIMS DB → AASHTOWare Safety (Cloud)
- Crash Data available from January 1, 2015 to current (over 1.5 million crashes)
- Implementation continues
  - Safety Analysis
  - Network Screening

# Roadway Safety Management Process

## HSM Part B - Roadway Safety Management Process

1. Network Screening
2. Diagnosis
3. Countermeasure Selection
4. Economic Appraisal
5. Project Prioritization
6. Safety Effectiveness Evaluation

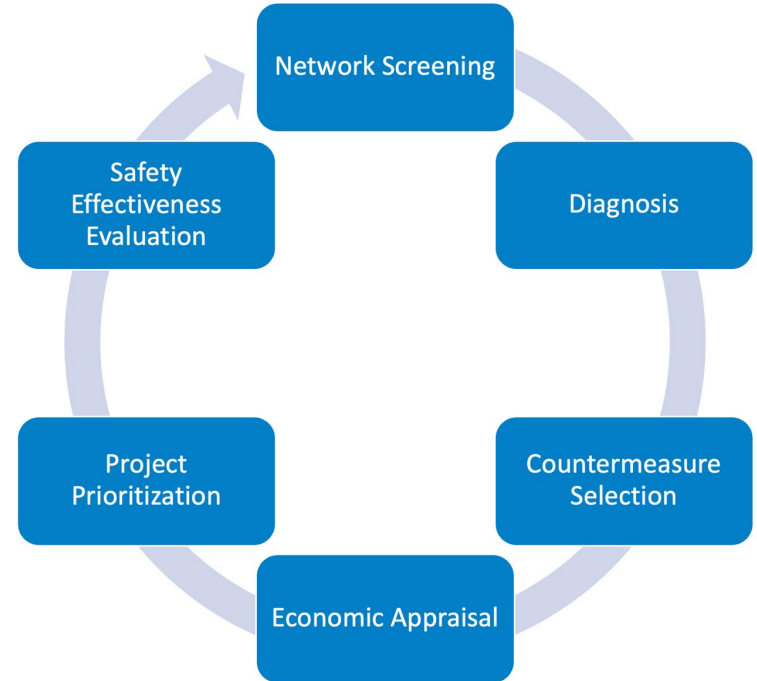


Figure 1. HSM 6-step Roadway Safety Management Process

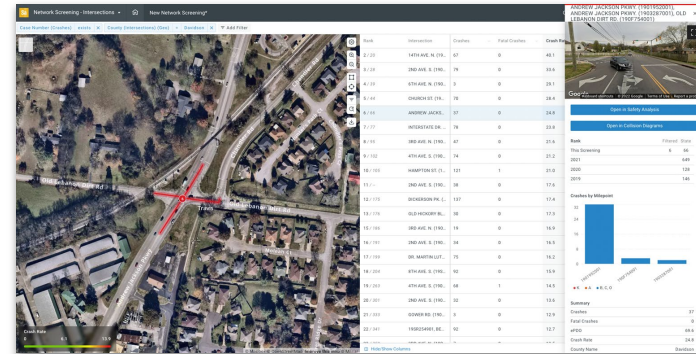
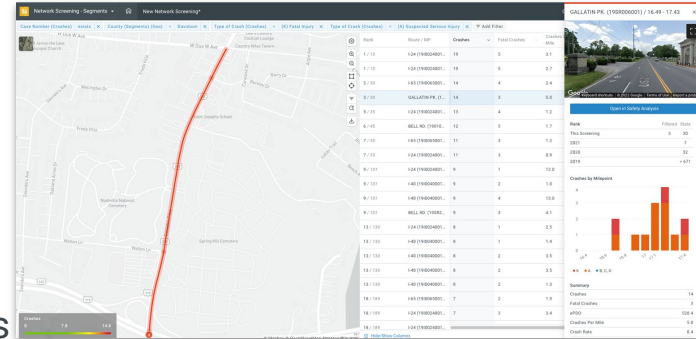
# Network Screening + Predictive Analysis

## Purpose of Network Screening

- Conduct a Segment, Intersection, or Sliding Window Analysis
- Rank by observational performance measures (crashes, fatalities, crash rate, etc.)
- Rank by predicted or expected performance measures (expected crash rate, PSI, LOSS, etc.)

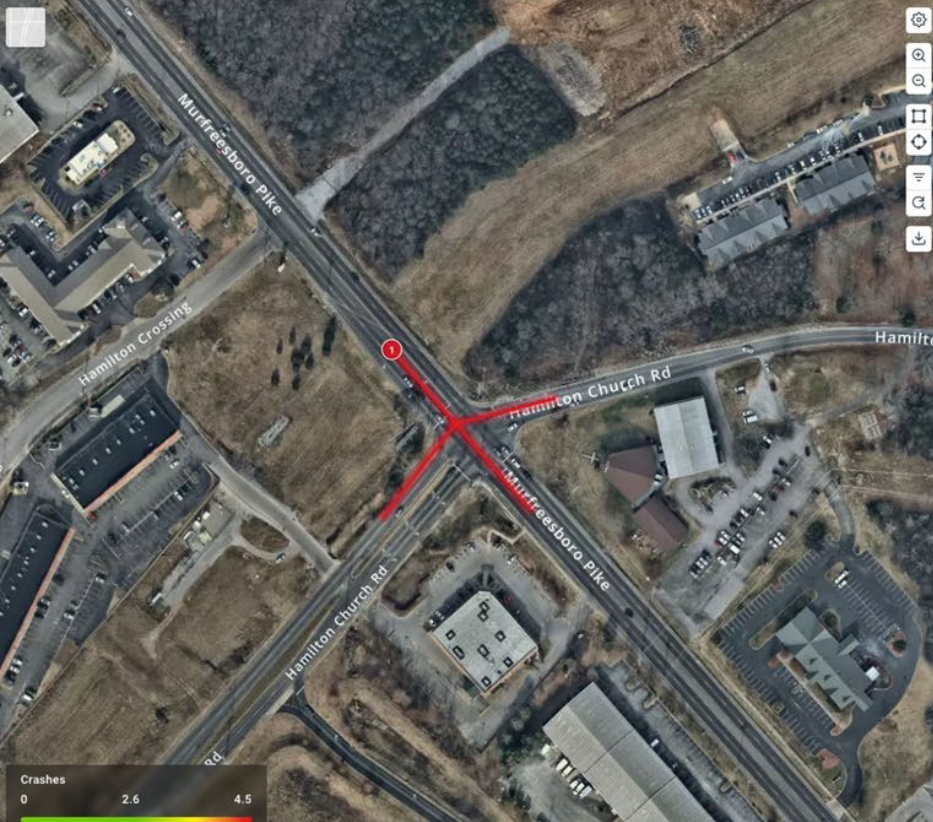
## Network Screening Deliverables

- On-demand Network Screenings
- Network Screening Reports
- Spreadsheet downloads





Case Number (Crashes) exists | County (Intersections) (Geo) = Davidson | Type of Crash (Crashes) = (K) Fatal Injury | Type of Crash (Crashes) = (A) Suspected Serious Injury | Add Filter



Rank	Intersection	Crashes	Fatal Crashes	ePDO
1 / 5	HAMILTON CHUR...	6	1	189.8
2 / 13	EMMITT AVE. (1...	5	0	51.1
2 / 13	19SR001901, GL...	5	1	179.5
2 / 13	GALLATIN PK. (1...	5	0	51.1
5 / 26	ARDEE AVE. (190...	4	1	169.3
5 / 26	BELL RD. (19SR2...	4	1	169.3
5 / 26	19SR001901, MU...	4	0	40.9
5 / 26	MONROE ST. (19...	4	1	169.3
5 / 26	MURFREESBORO...	4	1	169.3
10 / 59	DICKERSON PK. (...)	3	1	159.1
10 / 59	CAMPBELL RD. (...)	3	0	30.7
10 / 59	CHARLOTTE PK. (...)	3	1	159.1
10 / 59	GALLATIN AVE. (...)	3	0	30.7
10 / 59	HARDING PL. (19...	3	0	30.7
10 / 59	LAFAYETTE ST. (...)	3	0	30.7
10 / 59	NOLENSVILLE P...	3	1	159.1
10 / 59	BRINK HAVEN A...	3	0	30.7
10 / 59	CLARKSVILLE PK...	3	1	159.1
10 / 59	JEFFERSON ST. (...)	3	0	30.7
10 / 59	MYATT DR. (190...	3	3	415.9

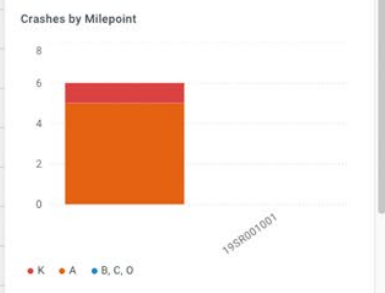
HAMILTON CHURCH RD. (1904965001),  
HAMILTON CHURCH RT. (190H833001),  
MURFREESBORO RD. (19SR001001)



[Open in Safety Analysis](#)

[Open in Collision Diagrams](#)

Rank	Filtered	State
This Screening	1	5
2021		13
2020		1226
2019		263



Summary

Crashes	6
Fatal Crashes	1
ePDO	189.8

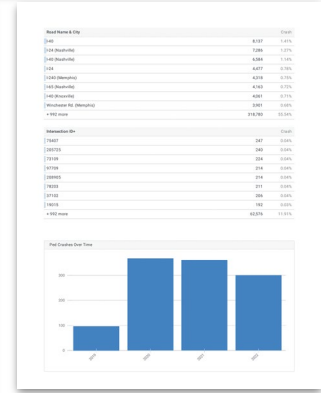
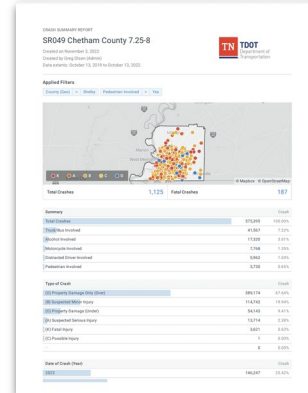
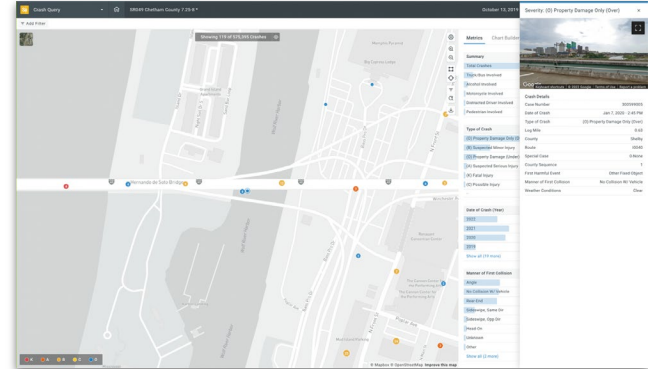
# Crash Query

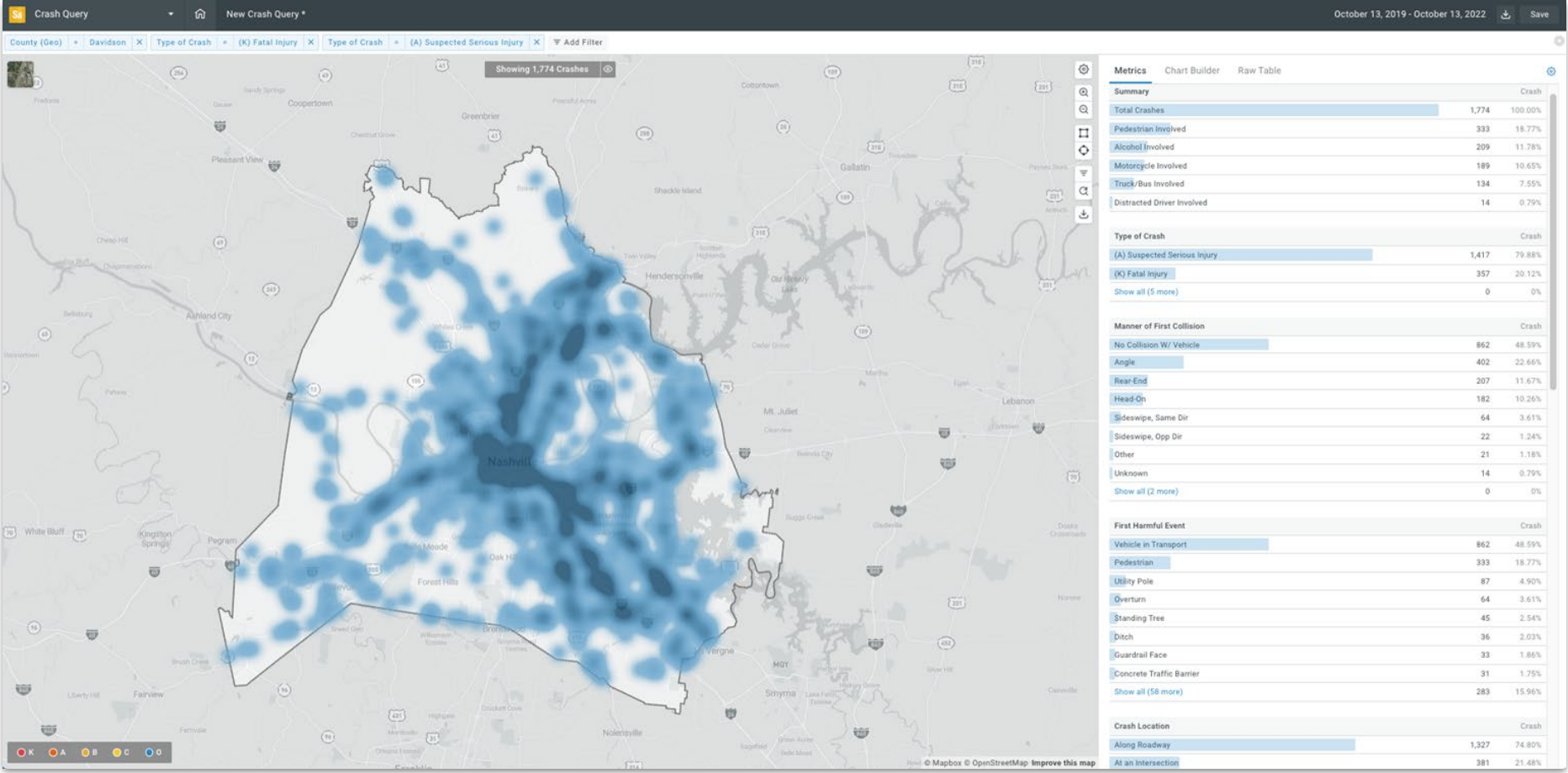
## Purpose of Crash Query

- Ability to Query and view Crash, Vehicle, and Occupant Level Data across Tennessee
- Explore crashes in a GIS interface
- Natural-language search bar

## Crash Query Deliverables

- Crash Reports
  - Summary
  - Overrepresentation
  - Comparison
- Charts
- Raw Table Download





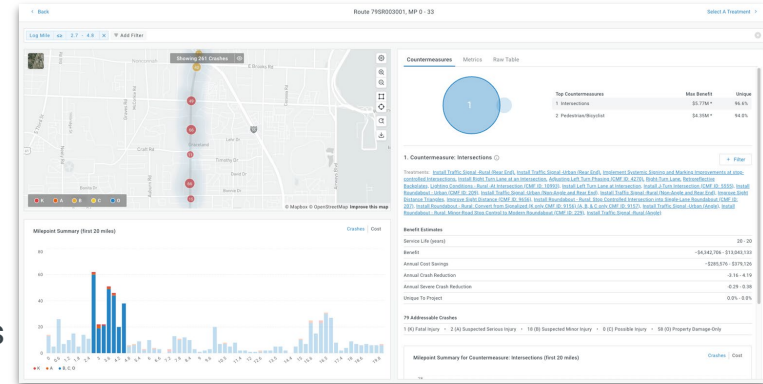
# Safety Analysis

## Purpose

- Conduct a diagnosis of crash patterns
- Identify potential countermeasures
- Calculate Benefit Cost for selected and custom treatments

## Deliverables

- Raw Table Downloads
- Safety Analysis Reports
- Benefit Cost Calculations



Total Benefit	Total Project Cost	Total Benefit Cost Ratio
\$7,487,424	\$1,000,000	7.49

Route 79SR003001, MP 0 - 33					
Treatment	Location	Benefit	Construction Cost	Maintenance Cost	B/C Ratio
Improve Sight Distance Triangles	MP 2.7 - 4.8	\$7,487,424	\$1,000,000	\$0	7.49
<b>Total</b>		<b>\$7,487,424</b>	<b>\$1,000,000</b>	<b>\$0</b>	<b>7.49</b>

[Explore Treatments](#)

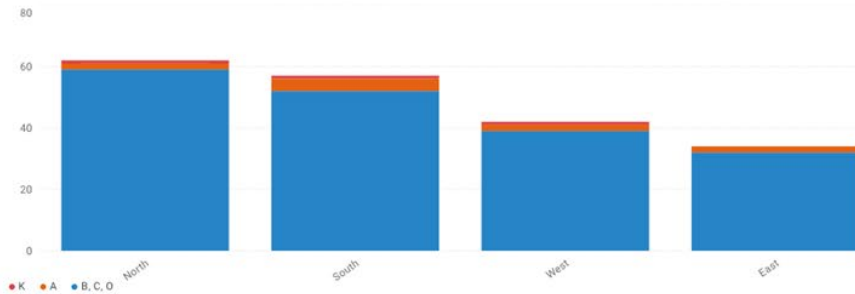


Add Filter

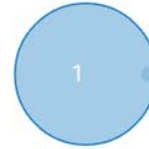


Travel Direction Summary

Crashes Cost



Countermeasures Metrics Raw Table



Top Countermeasures	Max Benefit	Unique
1 Intersections	\$16.3M	97.3%
2 Pedestrian/Bicyclist	\$271k	0.0%

1. Countermeasure: Intersections

+ Filter

Treatments: [Install Traffic Signal -Rural \(Rear End\)](#), [Install Traffic Signal -Urban \(Rear End\)](#), [Implement Systemic Signing and Marking Improvements at stop-controlled Intersections](#), [Install Right Turn Lane at an Intersection](#), [Adjusting Left Turn Phasing \(CMF ID: 4270\)](#), [Right-Turn Lane](#), [Retroreflective Backplates](#), [Lighting Conditions - Rural -At Intersection \(CMF ID: 10993\)](#), [Install Left Turn Lane at Intersection](#), [Install J-Turn Intersection \(CMF ID: 5555\)](#), [Install Roundabout -Urban \(CMF ID: 209\)](#), [Install Traffic Signal -Urban \(Non-Angle and Rear End\)](#), [Install Traffic Signal -Rural \(Non-Angle and Rear End\)](#), [Improve Sight Distance Triangles](#), [Improve Sight Distance \(CMF ID: 9656\)](#), [Install Roundabout - Rural: Convert from Signalized \(K only CMF ID: 9156\) \(A, B, & C only CMF ID: 9157\)](#), [Install Roundabout - Rural: Stop Controlled Intersection into Single-Lane Roundabout \(CMF ID: 207\)](#), [Install Traffic Signal -Urban \(Angle\)](#), [Install Roundabout - Rural: Minor-Road Sign Control to Modern Roundabout \(CMF ID: 229\)](#), [Install Traffic Signal -Rural \(Angle\)](#)

Benefit Estimates

Service Life (years)	20 - 20
Benefit	-\$12,284,149 - \$16,308,267
Annual Cost Savings	-\$807,803 - \$1,072,429
Annual Crash Reduction	-16.43 - 21.81
Annual Severe Crash Reduction	-0.97 - 1.28
Unique To Project	100.0% - 100.0%

85 Addressable Crashes

1 (K) Fatal Injury • 4 (A) Suspected Serious Injury • 32 (B) Suspected Minor Injury • 0 (C) Possible Injury • 48 (O) Property Damage-Only

Travel Direction for Countermeasure: Intersections

Crashes Cost

TREATMENT

Adjusting Left Turn Phasing (CMF ID: 4... ▾)

Cost ⓘ

CONSTRUCTION COST

1,000,000

MAINTENANCE COST

0

PROJECT COST

\$1,000,000

Details

[CMF Clearinghouse](#)

SERVICE LIFE (YEARS)

20

(K) FATAL INJURY CMF ⓘ

0.862

(A) SUSPECTED SERIOUS INJURY CMF ⓘ

0.862

(B) SUSPECTED MINOR INJURY CMF ⓘ

0.862

(C) POSSIBLE INJURY CMF ⓘ

0.862

\*\* (O) PROPERTY DAMAGE-ONLY CMF ⓘ

0.862

NOTES

Add notes...



Applied Filters

Treatments = Adjust Left Turn Phasing -CMF ID 4270

Countermeasure Category = Countermeasure: Intersections

51 Filtered Crashes

1 (K) Fatal Injury · 3 (A) Suspected Serious Injury · 18 (B) Suspected Minor Injury · 0 (C) Possible Injury · 29 (O) Property Damage-Only

34 additional crashes addressed by Countermeasure: Intersections. (0 · 1 · 14 · 0 · 19)

Treatment Preview

Benefit	Project Cost	Benefit Cost Ratio
\$2,191,457	\$1,000,000	2.19

Annual Cost Savings	\$144,110
Annual Crash Reduction	2.35
Annual Severe Crash Reduction	0.18

Treatment Location

Intersection 19SR001001, 190H833001, 1904965001

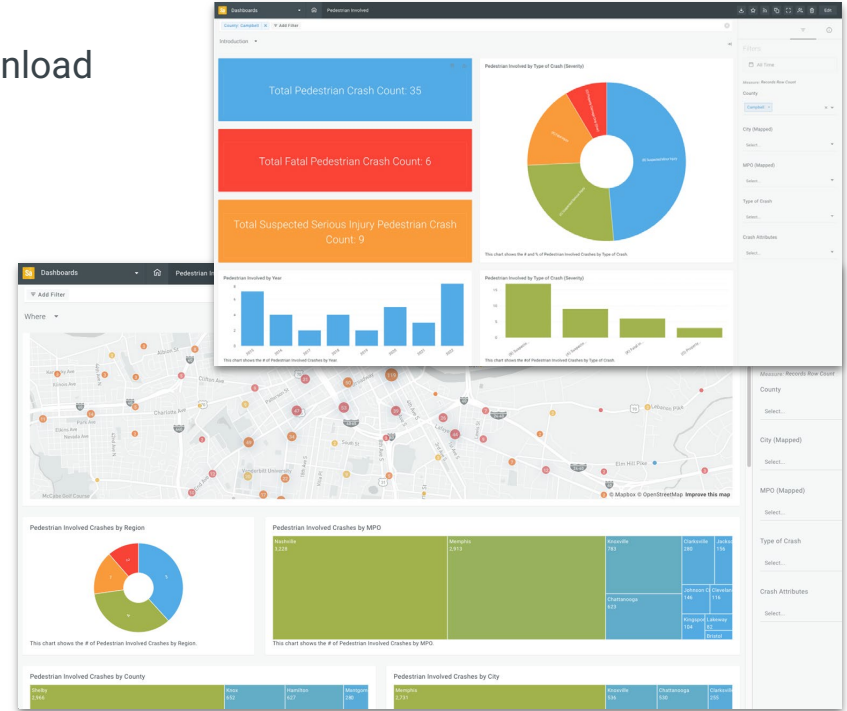
# Dashboards

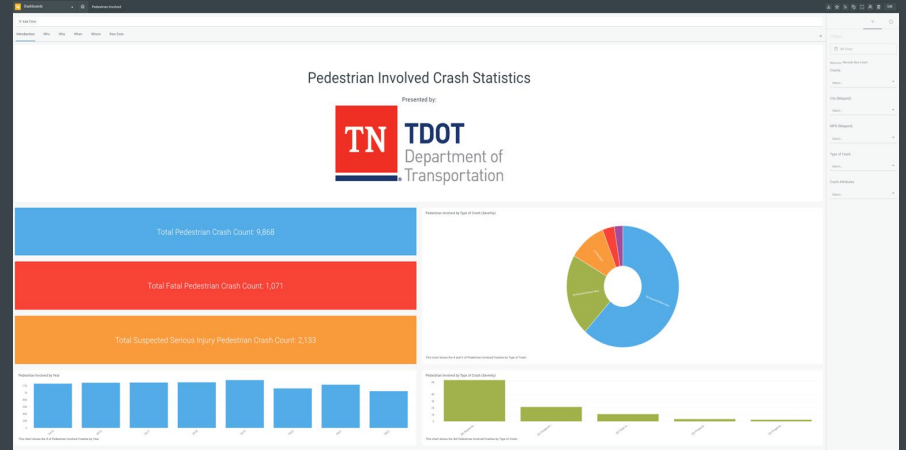
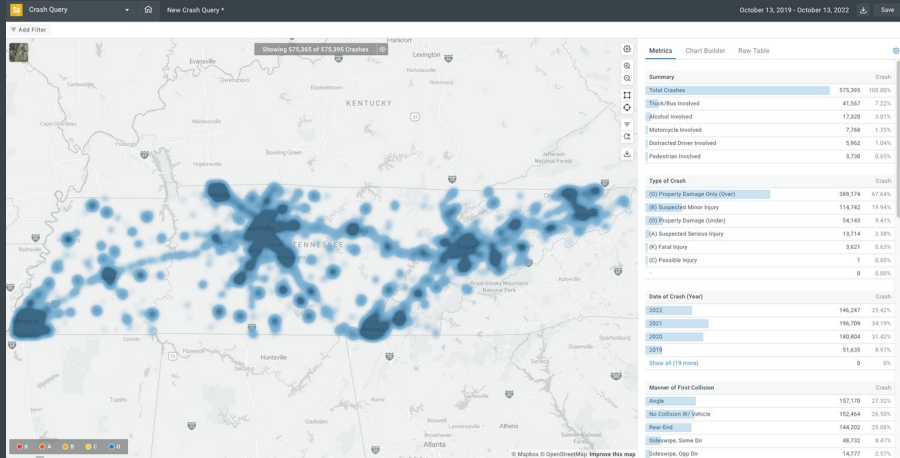
## Purpose of Dashboards

- Curated crash data exploration.
- Interactive charts with a natural-language search bar.
- Download and share metrics, charts, and graphs.

## Dashboard Deliverables

- Raw Table Download
- Chart/Metric Download
- PDF Download





Support@numetric.com



For access, please contact:  
**Jeff Murphy**  
[jeff.murphy@tn.gov](mailto:jeff.murphy@tn.gov)

