



# Connected Data Platform: GDOT's Solution to the Fire Hose Problem

ITE/ASHE Winter Workshop

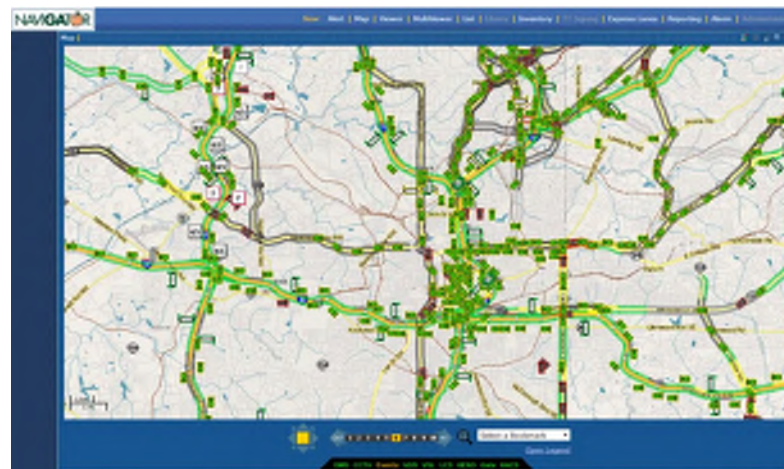
March 3, 2019



## An Engineer's Life

### Software, logins, databases, etc.

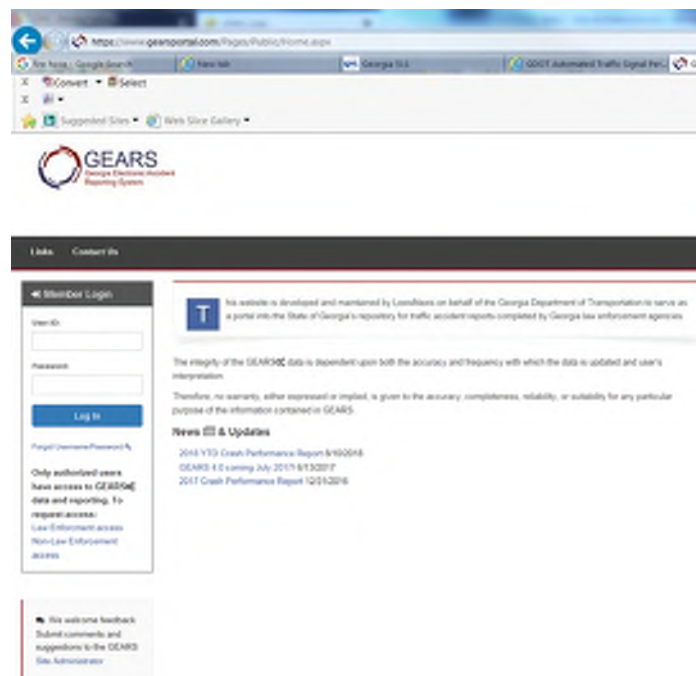
- Repetitive work tasks
- Heavy-duty spreadsheet work
- Multiple software applications
- Data cleansing, accuracy



## Plenty of Data, Not Enough Time...

There is always more to learn from the data.  
What would improve the effectiveness of an analyst?

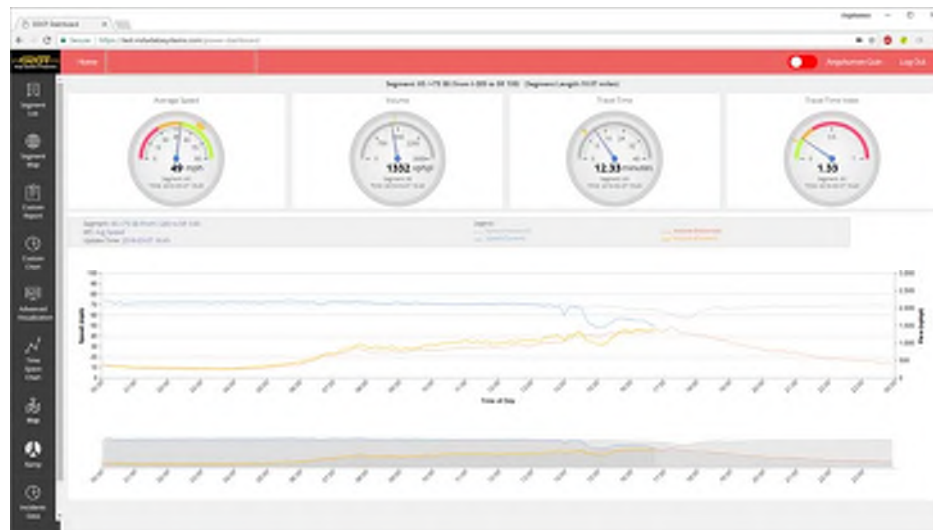
- Aggregate data from silos
- Get data on a map
- Assess data quality
- Move toward rate-based results



## How can data help make better informed decisions?

### Streamline workflow activity

- Automated alerts and alarms
- One screen monitoring
- Dashboard sharing
- Automated reports

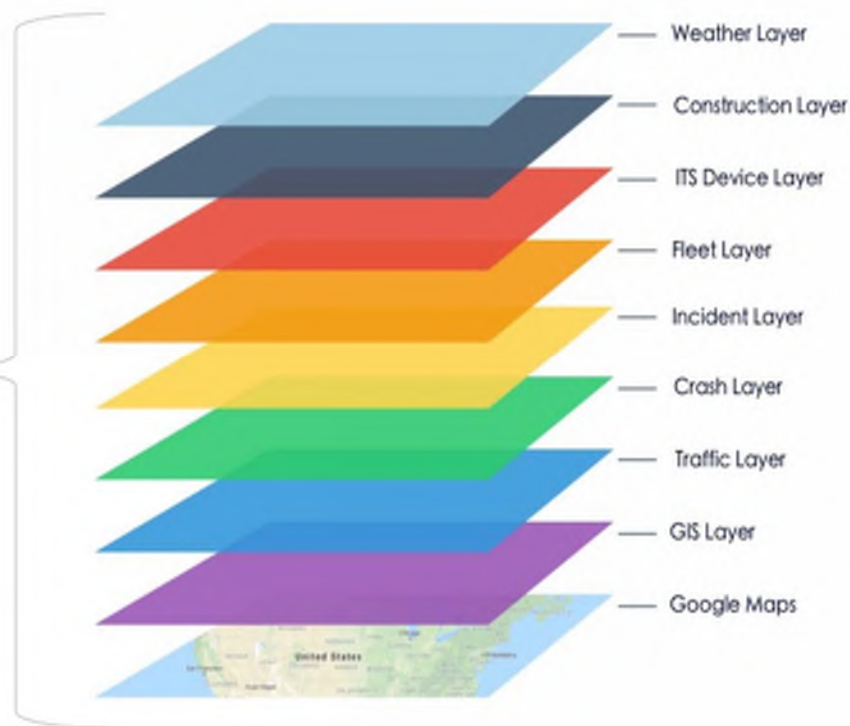


## Introducing the Connected Data Platform (CDP)

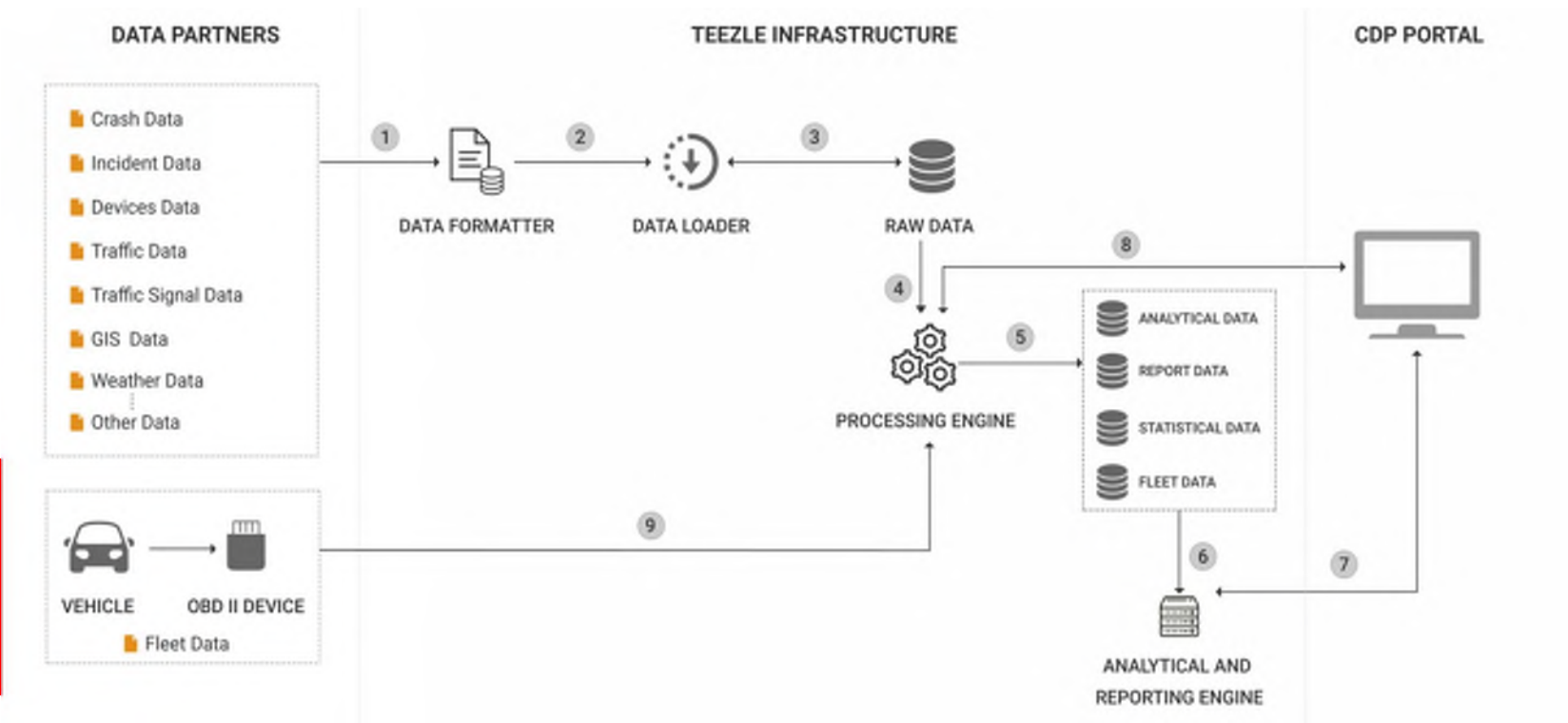
- A **discovery-based approach** maintains relevance with staff and maximizes incremental benefit
- Partially **mitigates the proliferation** of software used by staff
- Simplifies and enhances **repetitive work** processes by analysts
- Improves **quality of decision-making** information for managers
- Provides access control for **sharing select data** with external stakeholders
- Facilitates comparing data from **multiple sources** (including data quality)
- Prepares for **migration** from legacy data sources to CV-generated data

## CDP Platform and Data Elements

- I. Dashboard portal
- II. Reporting
- III. Notifications & alerts
- IV. Pattern identification
- V. Predictive analytics
- VI. "What If" simulation



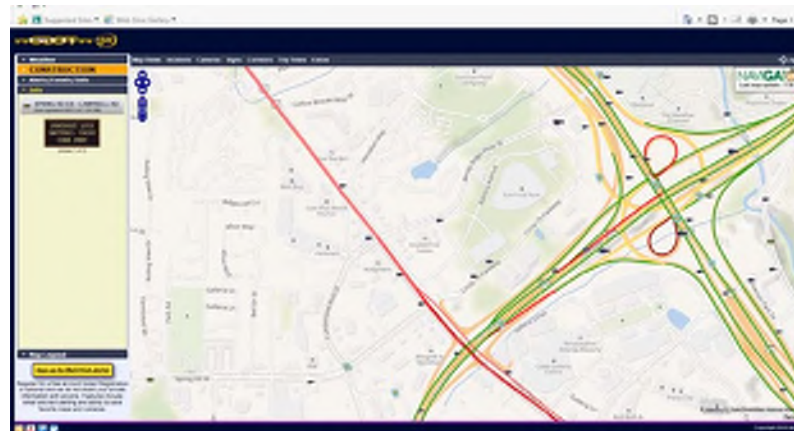
# High Level Architecture



## Phase 1 Focus Areas

### Safety and ITS Device Applications

- Vehicle and pedestrian crash reporting
- Crash data visualization
- ITS device uptime status
- ITS device reliability tracking

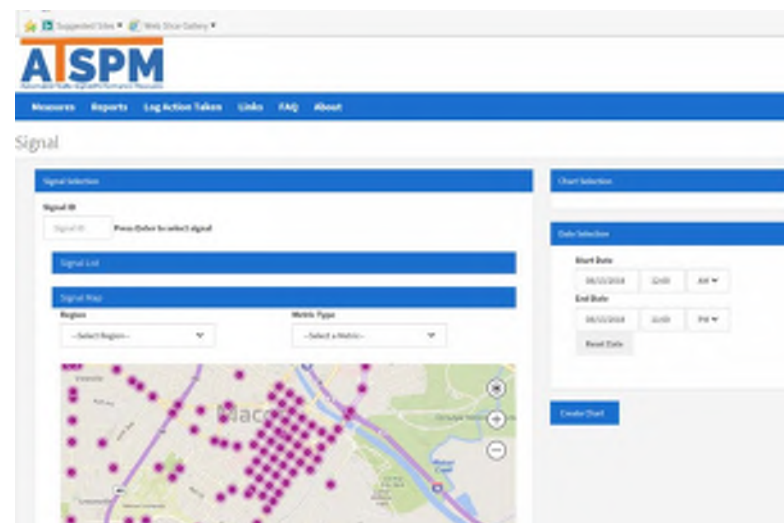




## Shadowing and Process Review

What are we doing? How do we do it?

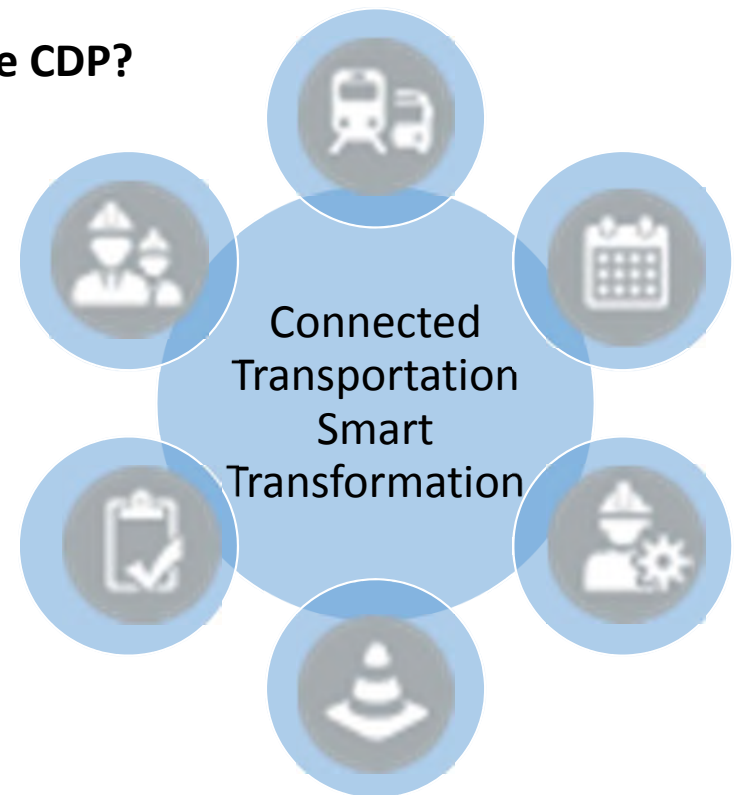
- Spreadsheets!
- Data management
- New questions, same data sets
- Survival tactics



## Key Considerations

**What is the value of aggregating another data set into the CDP?**

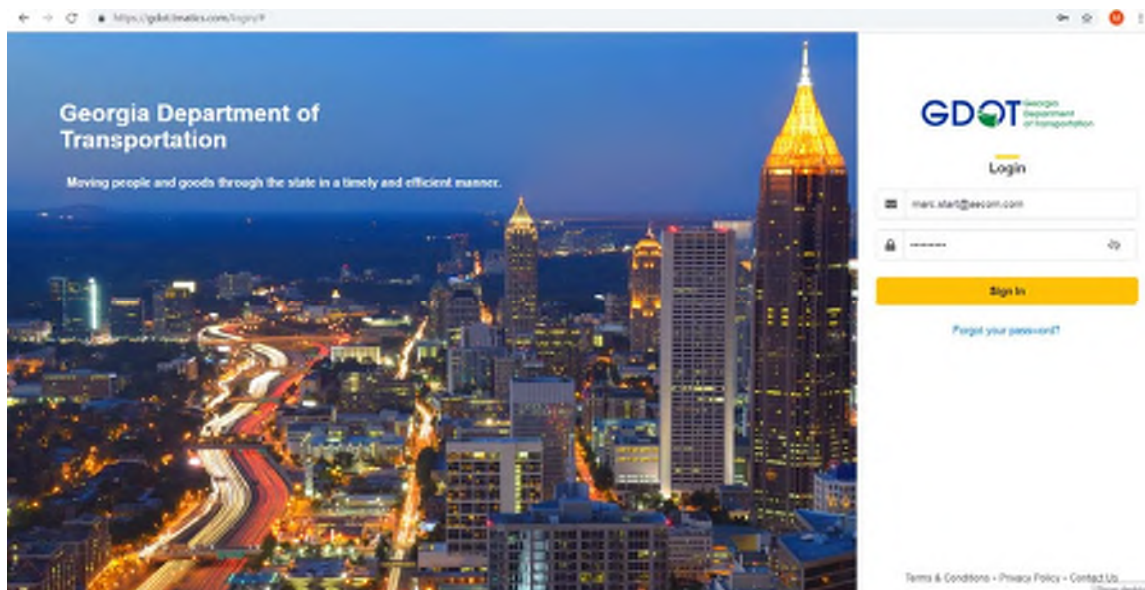
- Behaviors vs outcomes
- $X + Y \rightarrow X*Y$  benefit
- Number of users
- Value of comparability (rates)



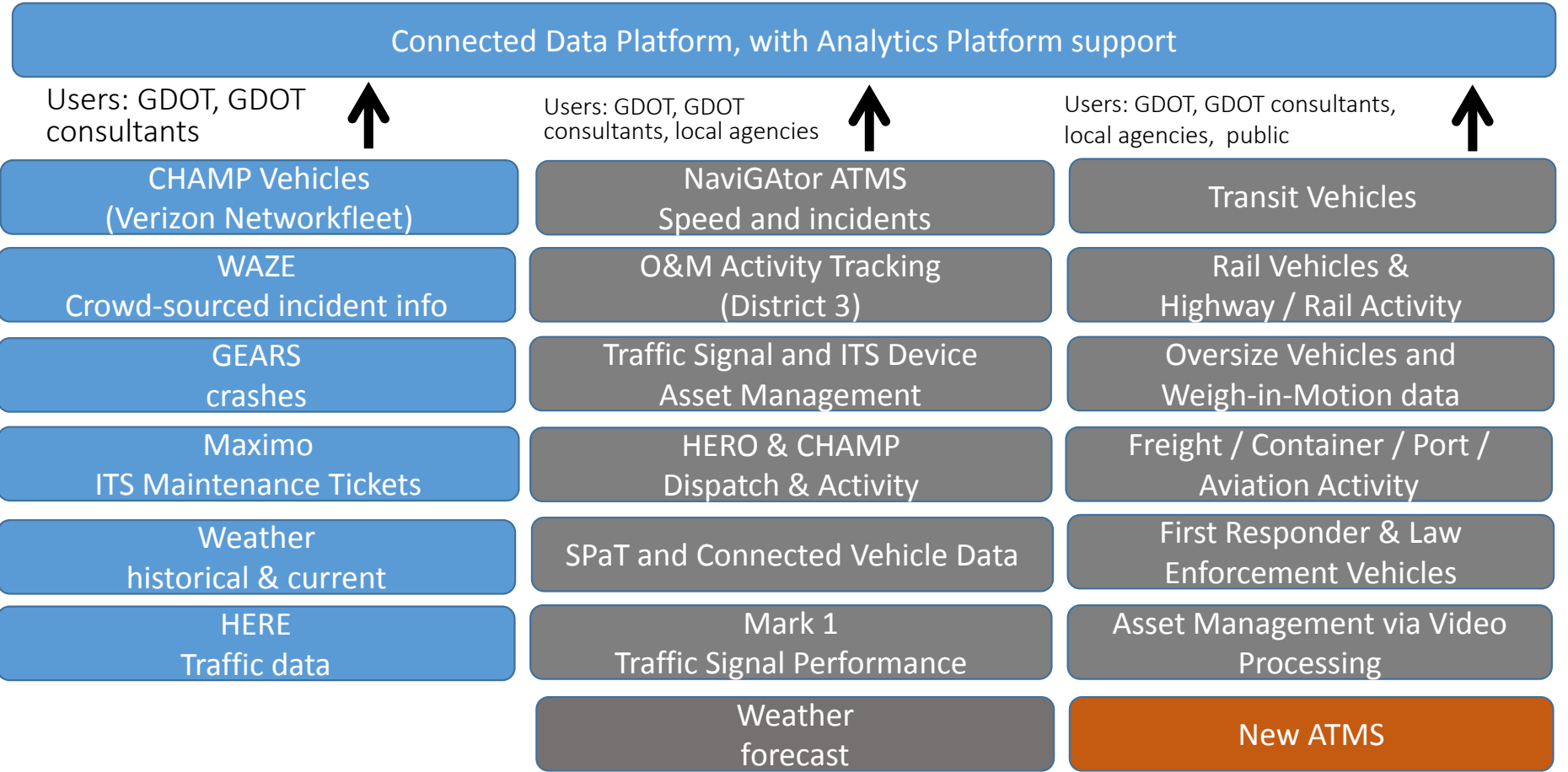
## The CDP Vision

### How will we do work in 5 years?

- Autonomous and connected vehicles
- Additional vehicle data sources
- New field devices
- Closer to “mission critical” status



# GDOT Data Aggregation Master Plan



Phase 1

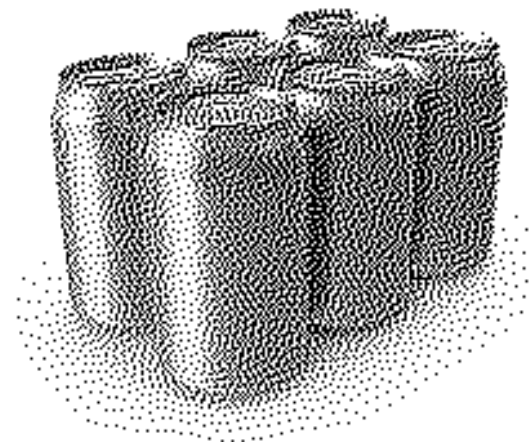
Phase 2

Phase 3

*For Discussion Purposes Only*

## NHTSA “6-Pack” of Data Quality

- Timeliness → How quickly is the data available?
- Accuracy → Does the data match reality?
- Completeness → Is anything missing?
- Uniformity → Is the data coded consistently?
- Integration → How easily can the data be combined with each other?
- Accessibility → How easy to get to and use the data?



Analytics / Crash Layer

2017

### Driver Behavior

DUI	11,995
Seat Belt	26,328
Distracted	8,033
Drowsy	2,729

### Vehicle Distribution

Car	640,025
Truck	113,243
Bicycle	732
Motorcycle	4,407
Bus	39,571
Tractor/Trailer	20,285
Other	5,483
Unknown	61,135

### Location at Impact

On Roadway	122,199
Off Roadway	44,067
On Shoulder	20,752
Median	2,384
Ramp	0
Gore	0
Unknown	271,871

### Total Crashes

**461,273**

Fatal	1,555 (0.34%)
Injury	41,125 (8.92%)
PDO	418,593 (90.75%)

Disclaimer: Crash information represents data from the State of Georgia crash database. Crash data coding errors that are inherent to the crash reporting system have not been addressed.

### Crash Trends

Crash Trends: Fatal (red), Injury (yellow), PDO (green)

### Manner Of Collision

Angle Left	20,713
Angle Right	47,102
Angle	60,469
Head On	12,237
Rear End	171,018
SS Same	52,502
SS Opposite	10,378
No Collision MV	67,402

# Traffic Safety – Non-Motorized (State-wide)

Analytics / Crash Layer

### Driver Behavior

DUI	99
Seat Belt	574
Distracted	108
Drowsy	4

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### Vehicle Distribution

Car	2,920
Truck	580
Bicycle	732
Motorcycle	17
Bus	224
Tractor/Trailer	56
Other	58
Unknown	395

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### Location at Impact

On Roadway	1,110
Off Roadway	473
On Shoulder	152
Median	5
Ramp	0
Gore	0
Unknown	2,325

**2017**

## Total Crashes

# 4,065

Fatal	268 (6.59%)
Injury	1,954 (48.07%)
PDO	1,843 (45.34%)

Disclaimer: Crash information represents data from the State of Georgia crash database. Crash data coding errors that are inherent to the crash reporting system have not been addressed.

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### Crash Trends

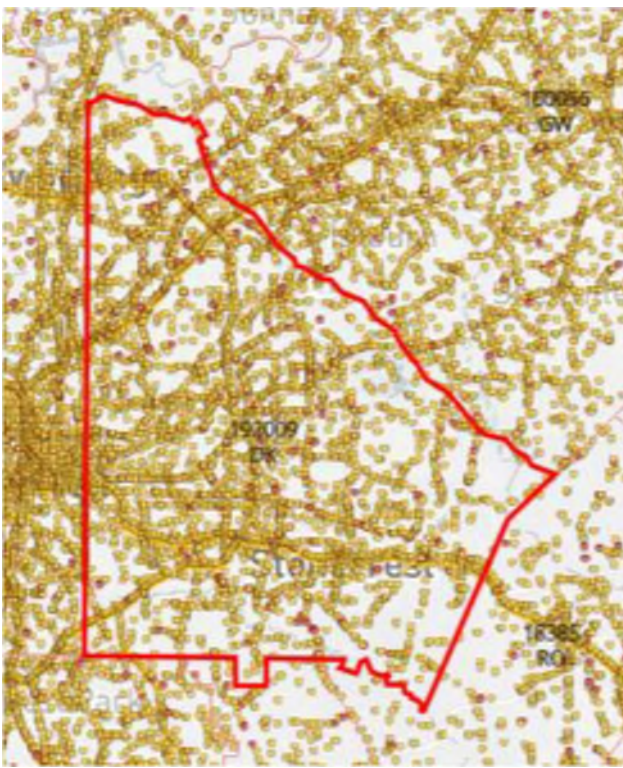
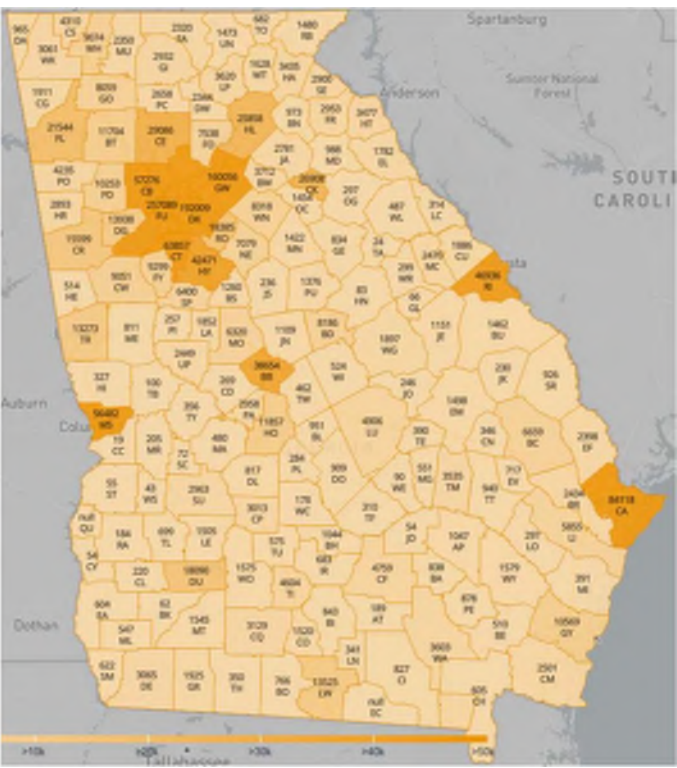
Legend: Fatal (Red), Injury (Yellow), PDO (Green)

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### Manner Of Collision

Angle Left	61
Angle Right	215
Angle	247
Head On	122
Rear End	90
SS Same	119
SS Opposite	21
No Collision MV	3,180

# Navigation





# Crash Filtering

## Advanced Filter

All of these conditions must be met

Choose a filter

Search

Choose a filter

**GEOGRAPHICAL FILTERS**

- GDOT District
- County
- City

**CRASH FILTERS**

- Severity
- Manner of Collision
- Driver Behavior

## Advanced Filter

All of these conditions must be met

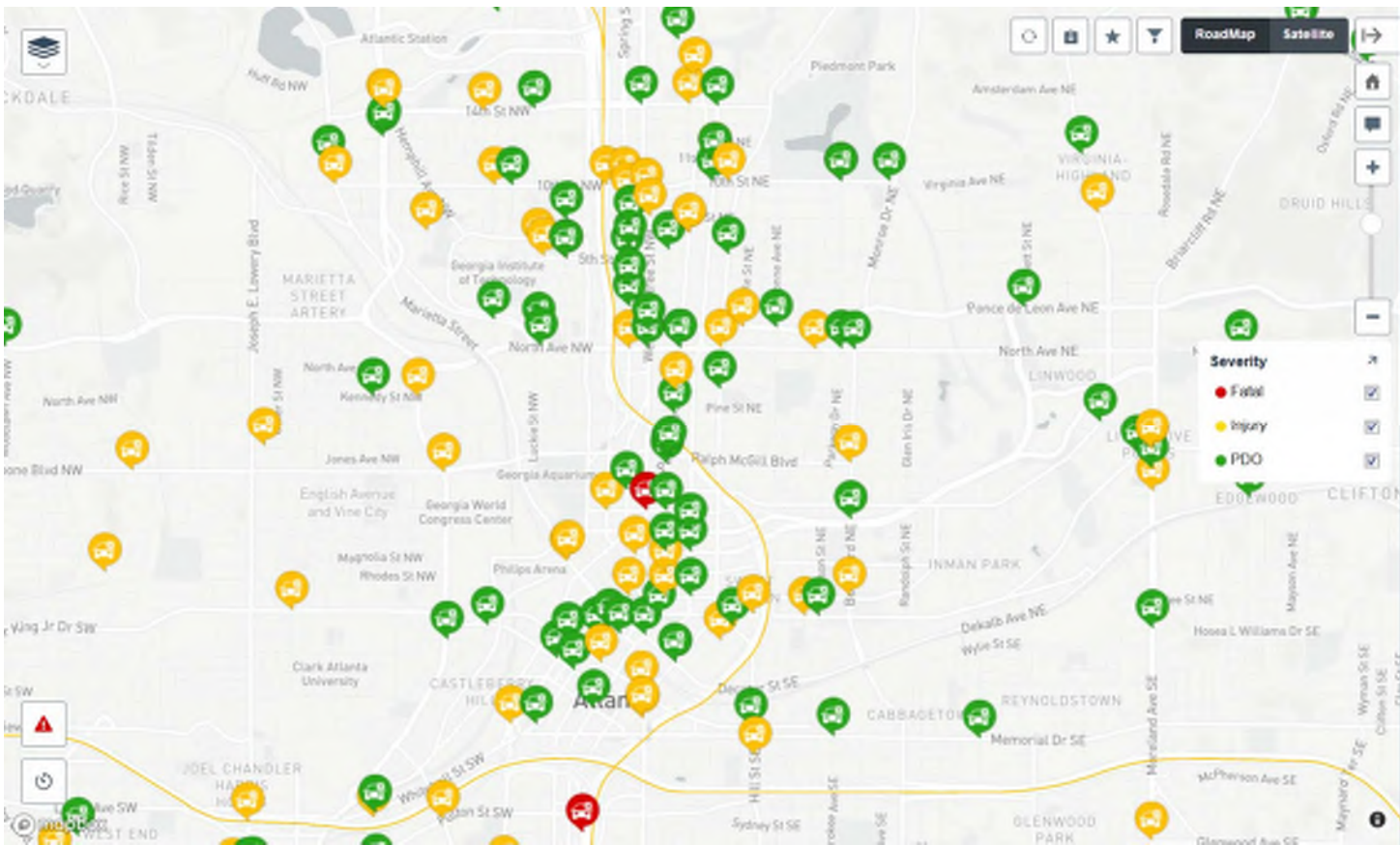
County in Gwinnett x

Choose a filter

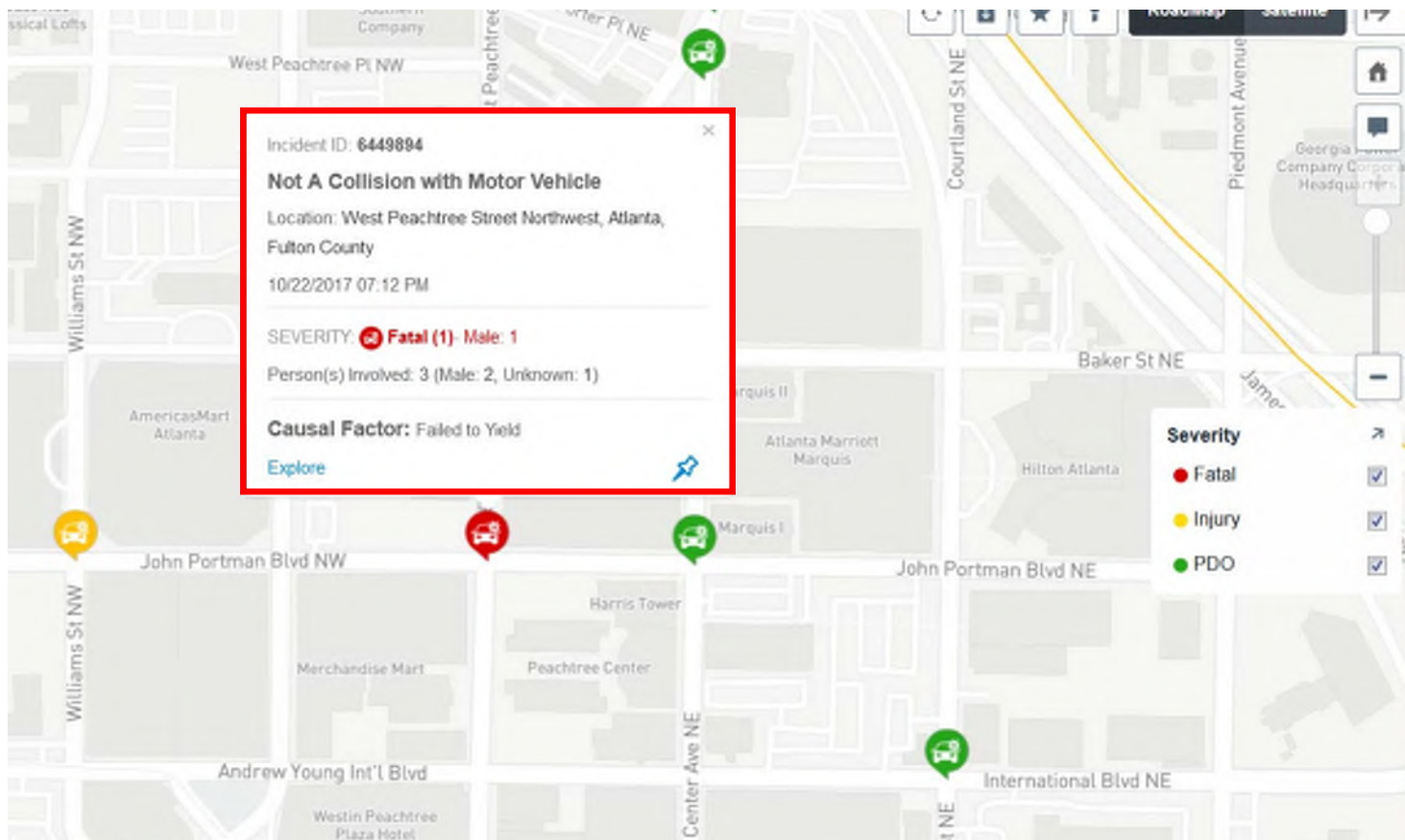
Search

- Driver Behavior
- Location at Impact
- Workzone
- Road Surface
- Weather Condition
- Light Condition
- Persons
- Vehicle Type
- Persons Involved
- Vehicles Involved

# Pedestrian and Bicycle Crashes in Downtown Atlanta (2017)



## Crash Data Details



# Crash Icon Management

Reports / Intersection / 6013

John Mathre

137

**Severity**

- Fatal
- Injured
- PDO

**Angle**

- ▶ Angle Left
- ▶ Angle Right
- ▶ Angle
- ▶ Head On
- ▶ Rear End
- ▶ Sideswipe - Same
- ▶ Sideswipe - Opposite
- ▶ Single Vehicle
- ▶ No Collision MV
- ▶ Other

**View Report**

Intersection: Memorial Drive  
 Intersection ID: 6013  
 County: DeKalb  
 City: Stone Mountain

**Total Crashes**

137

Severity	Count	Percentage
Fatal	0	0%
Injury	07	(5.109 %)
PDO	130	(94.890 %)

Disclaimer: Crash information represents data from the State of Georgia crash database. Crash data coding errors that are inherent to the crash reporting system have not been

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**Crash Trends**

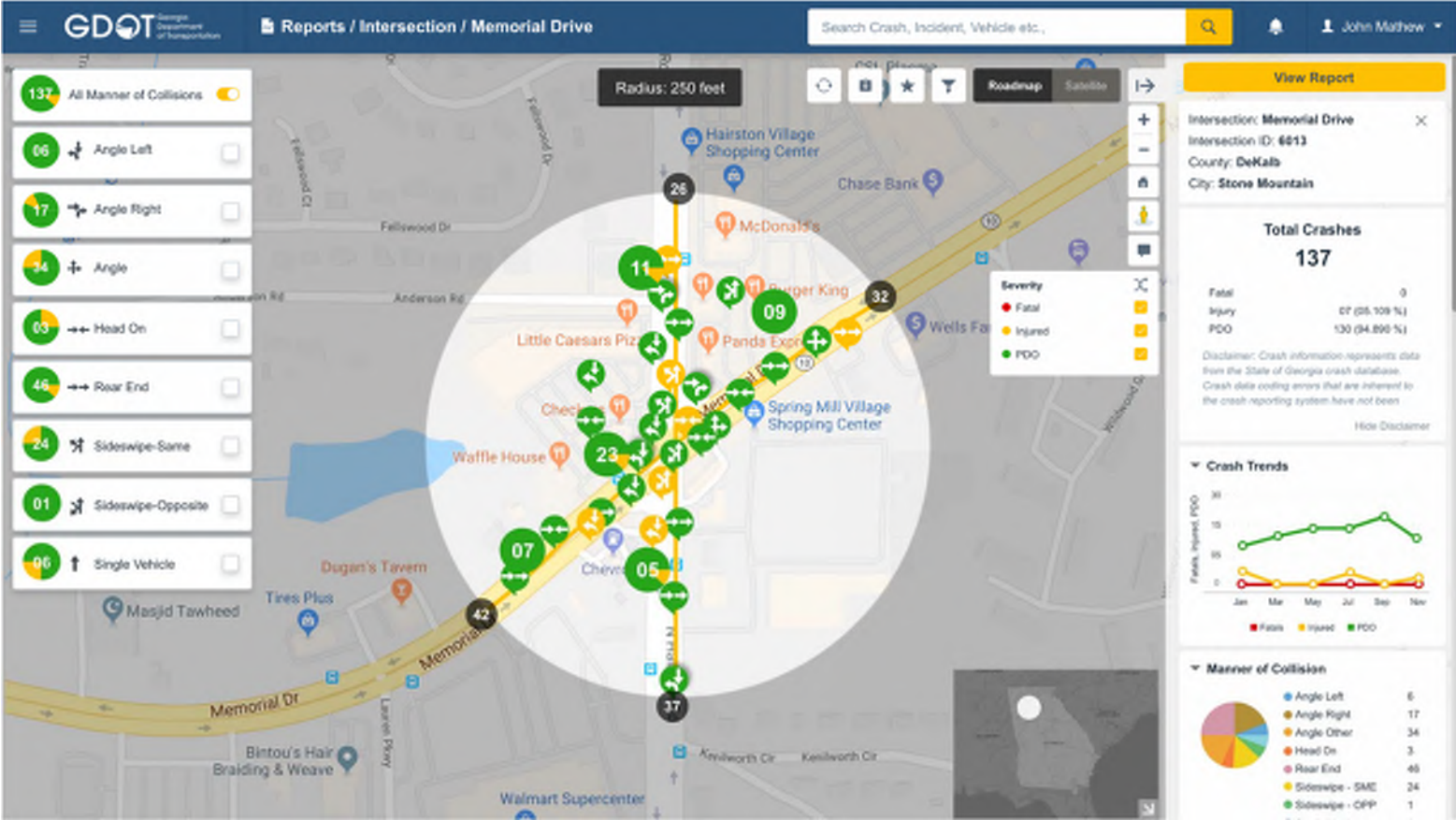
Fatal, Injured, PDO

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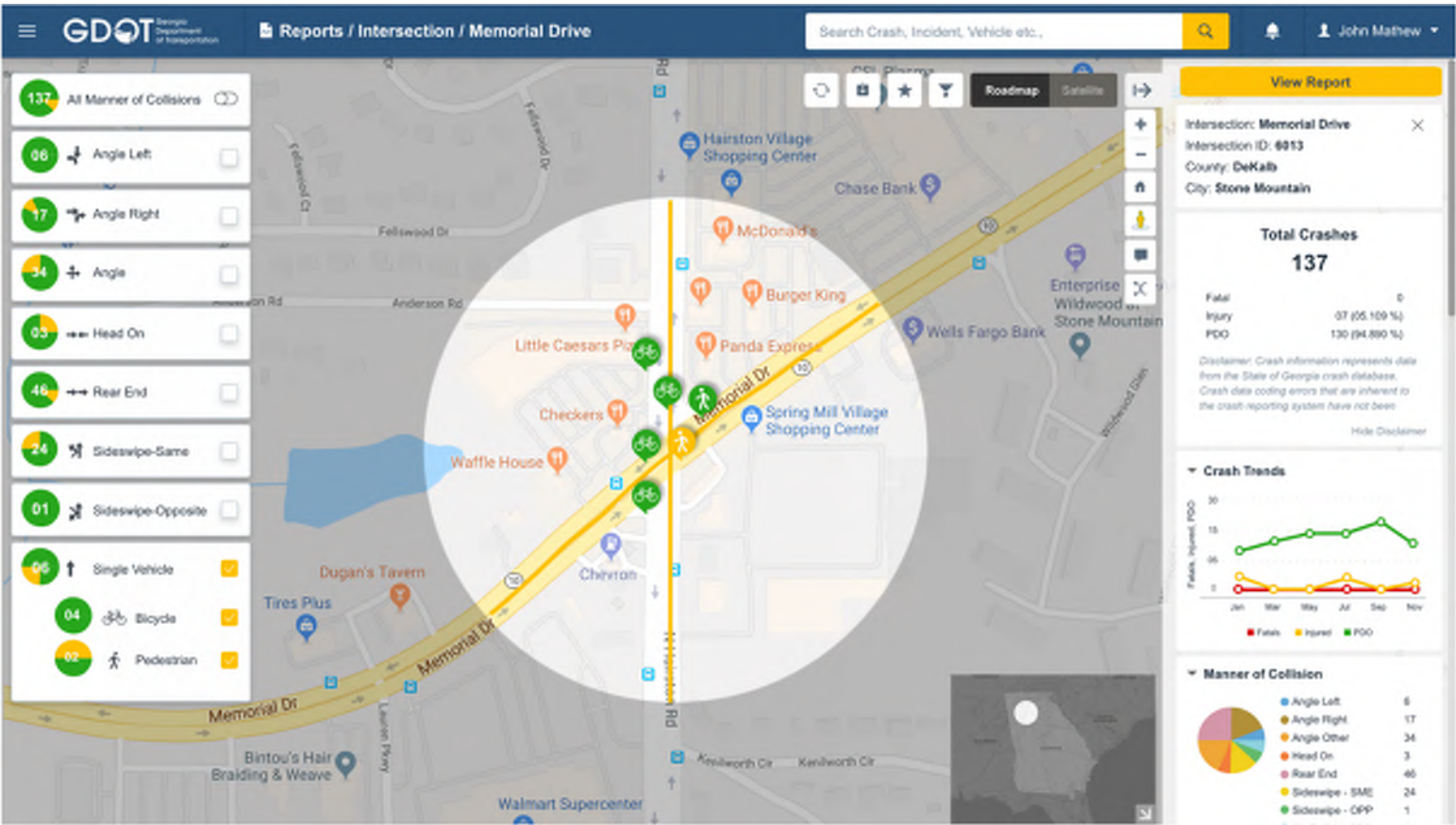
**Manner of Collision**

Angle Left	6
Angle Right	17
Angle Other	34
Head On	3
Rear End	48
Sideswipe - SME	24
Sideswipe - OPP	1

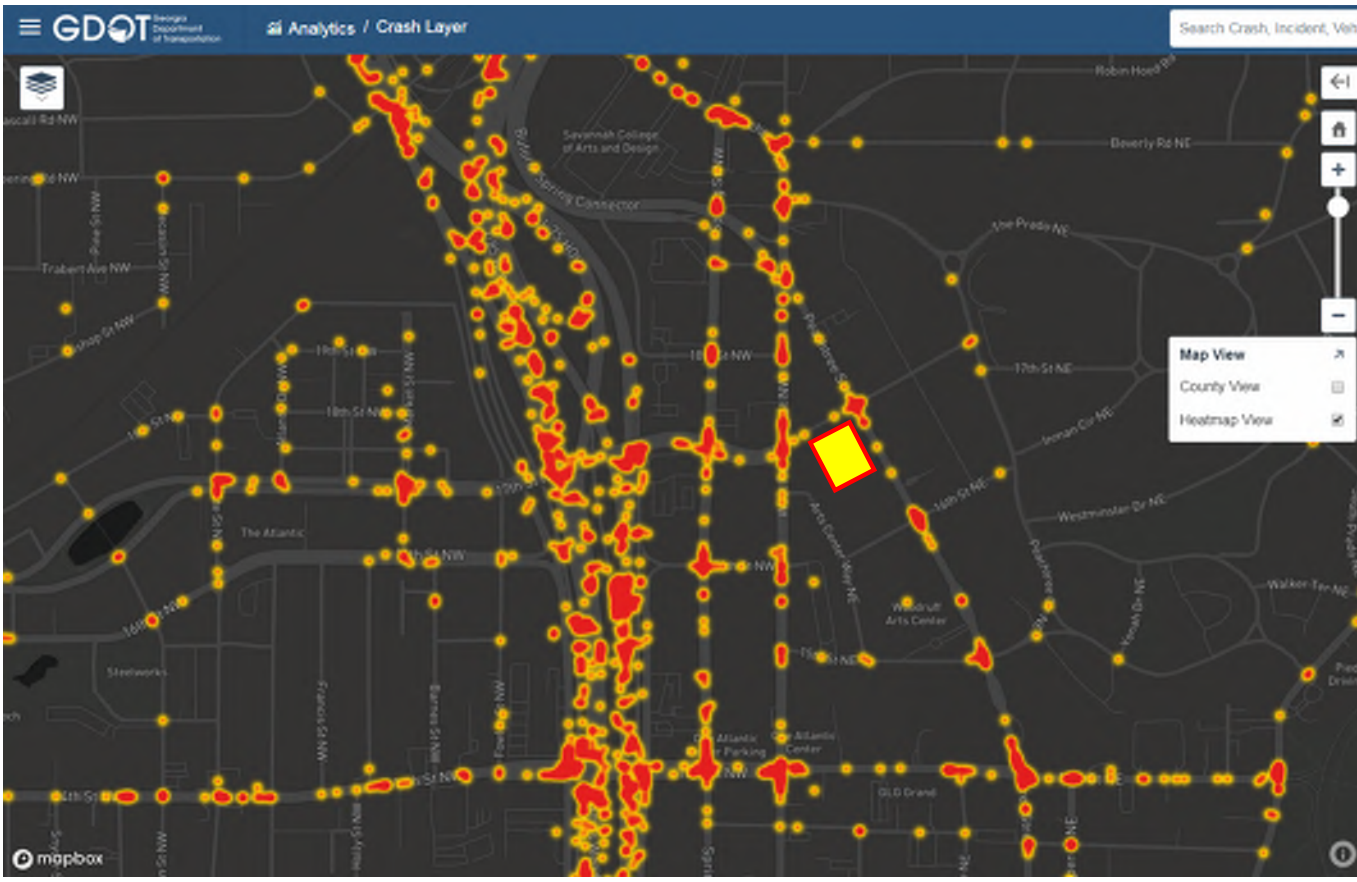
# Vehicle Crash Diagram



# Non-Motorized Crash Diagram

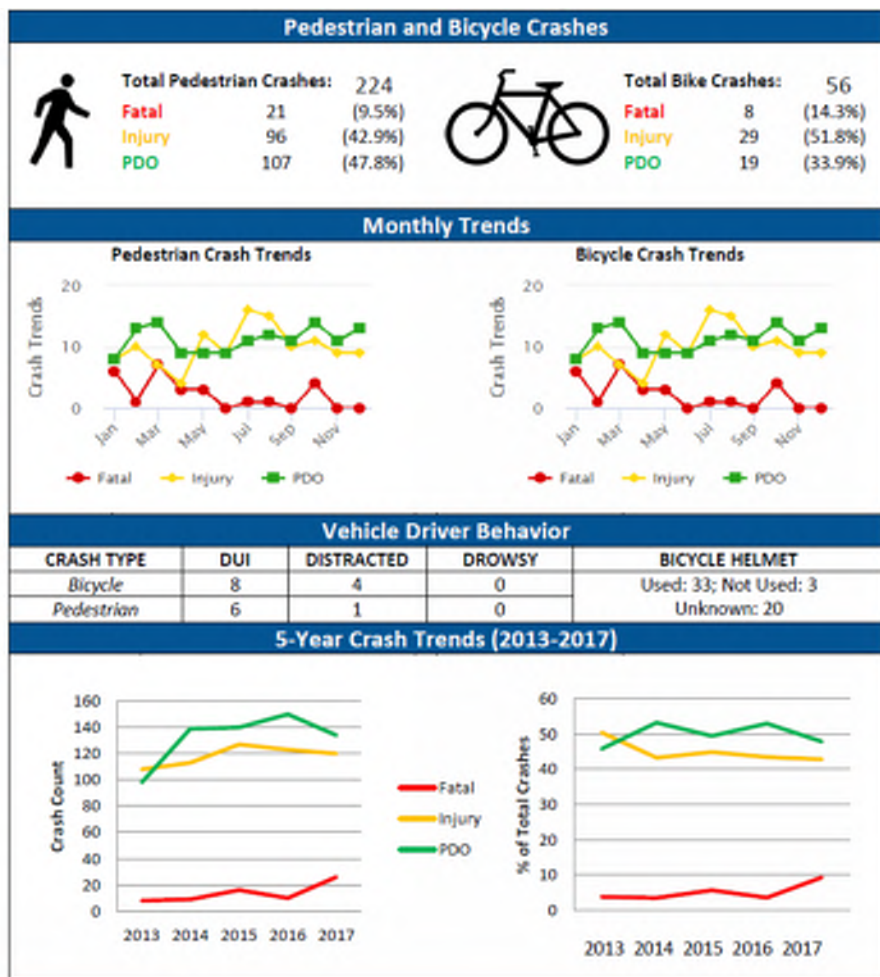


# Heat Diagram



## Standard Reports

- Vehicle safety report
- Non-motorized safety report
- GDOT ITS Device report





# Traffic Management Device Reliability

Analytics / ITS Device Layer
Search Crash, Incident, Vehicle etc.,

### Subcontractor Devices

BBH-M	2,242
Serco	29
BBH-R	545
CCS-M	1,535
Unknown	3

### Top 10 Frequent Down Devices

Show Failure Devices on Map

GDOT-RWIS-I-20-126.00	4
GDOT-CMS-055	3
GDOT-CMS-023	3
GDOT-CAM-I-20-130	3
GDOT-CAM-I-20-105	3
GDOT-RWIS-I-75-276.50	2
GDOT-RWIS-I-20-005.00	2
GDOT-RMS-A52	2
GDOT-GATE-NWC-WG-135	2
GDOT-CAM-I-20-138	2

### Uptime 95%

Overall devices **4,354**

*Note: Uptime % is based on Operating devices to the Overall devices.*

### Device Status

Operating	4,144
Decommissioned	0
Down	44
Other	166

### Critical vs Down Devices

**Device Name: GDOT-CAM-009**

Device Type: CCTV

Status: ● **DOWN**

Critical Devices: N

Description: I-75/85 at MLK Jr Dr

Location: Jesse Hill Junior Drive Southeast, Atlanta, Fulton County

Direction: SB

Last Updated Time: 02/28/2019 12:05 PM

[Explore](#)

# WAZE

**Shoulder Hazard**

Cause: HAZARD\_ON\_SHOULDER\_CAR\_STOPPED

Reliability:  5 of 10

Location: Georgia 24, Sandersville, Washington County

Start Time: 02/26/2019 05:35 PM

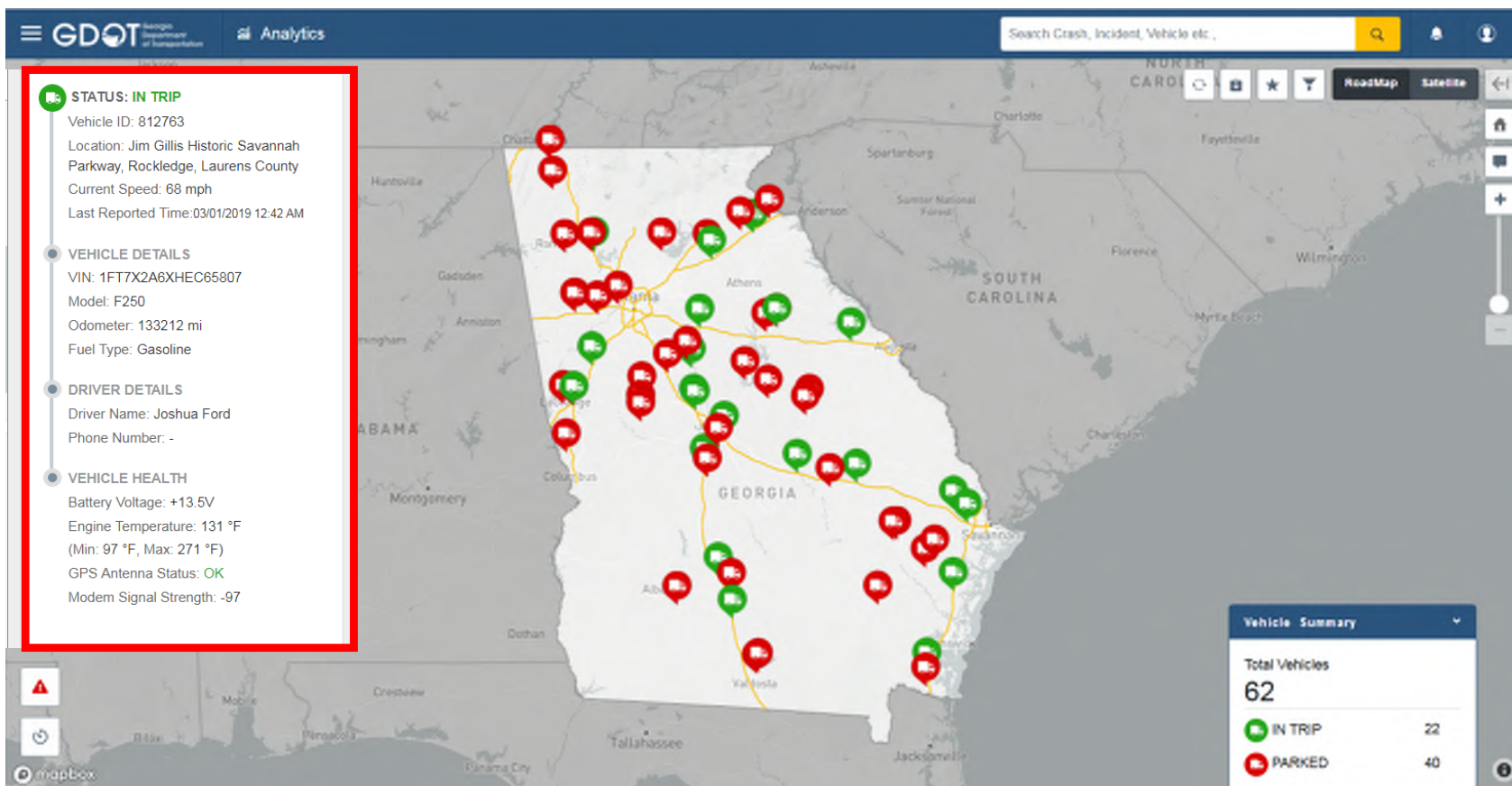
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Last Reported Time: 02/26/2019 05:57 PM

**Waze**

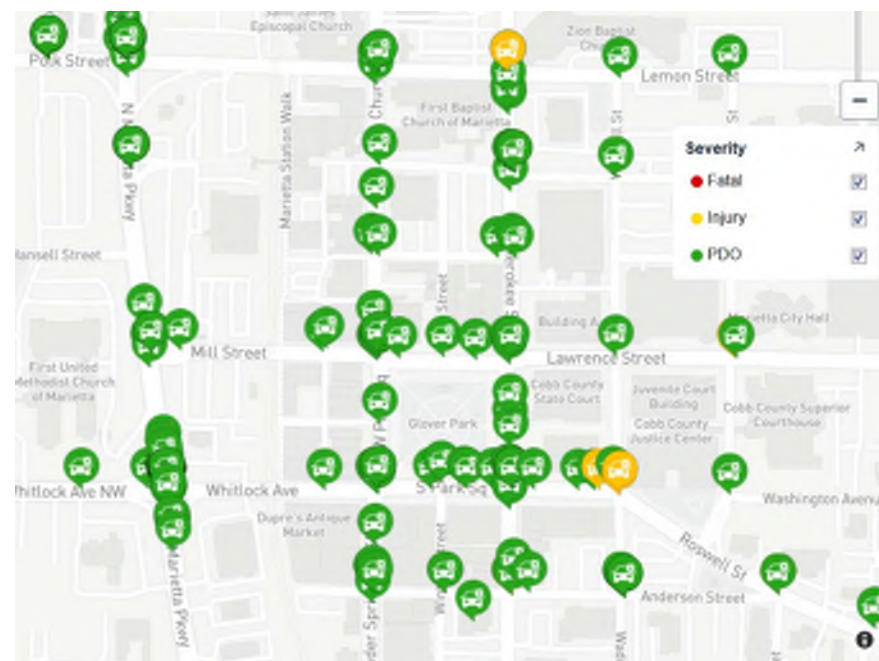
- Accident
- Traffic Jam
- Irregularities
- Construction
- Weather Hazards
- Shoulder Hazards
- Road Closed
- Road Hazard

## CHAMP Vehicles (Freeway Service and Maintenance)



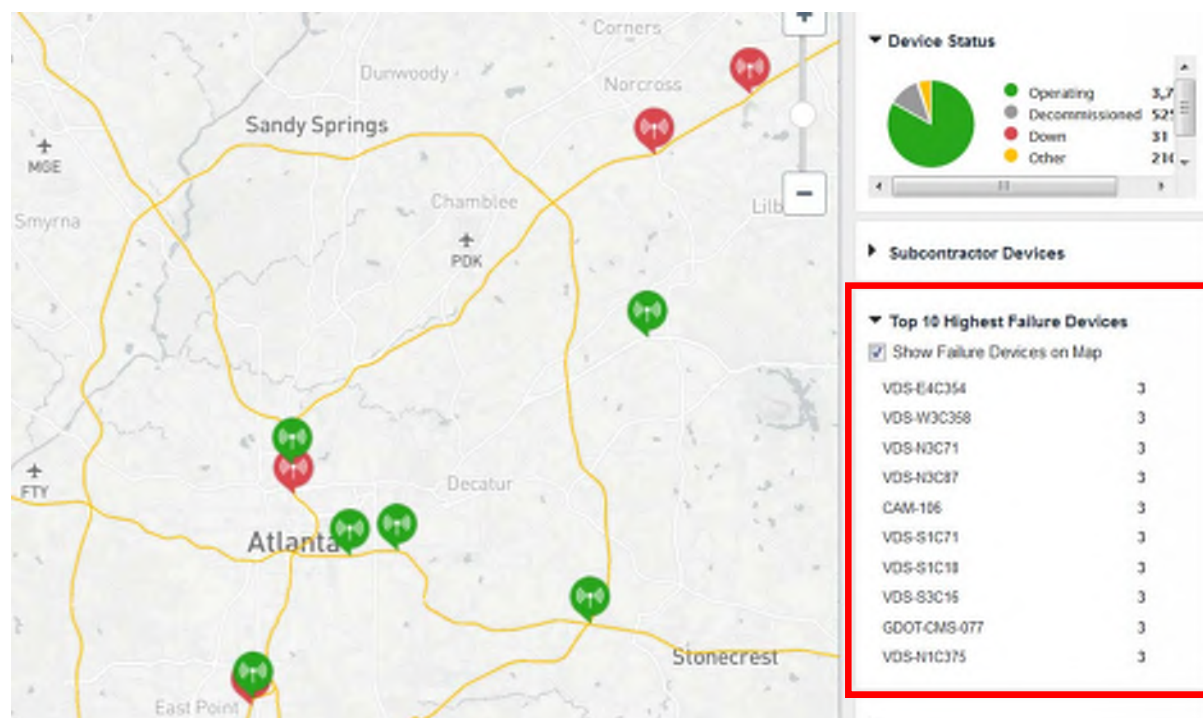
## Operations Vision: Validating Public Comments and Automated Alerts

- Automated alerts when crash rate exceeds historical rate
- Automated alerts for right angle crash density (red light running)
- Identification of unique Waze reporting or crash patterns



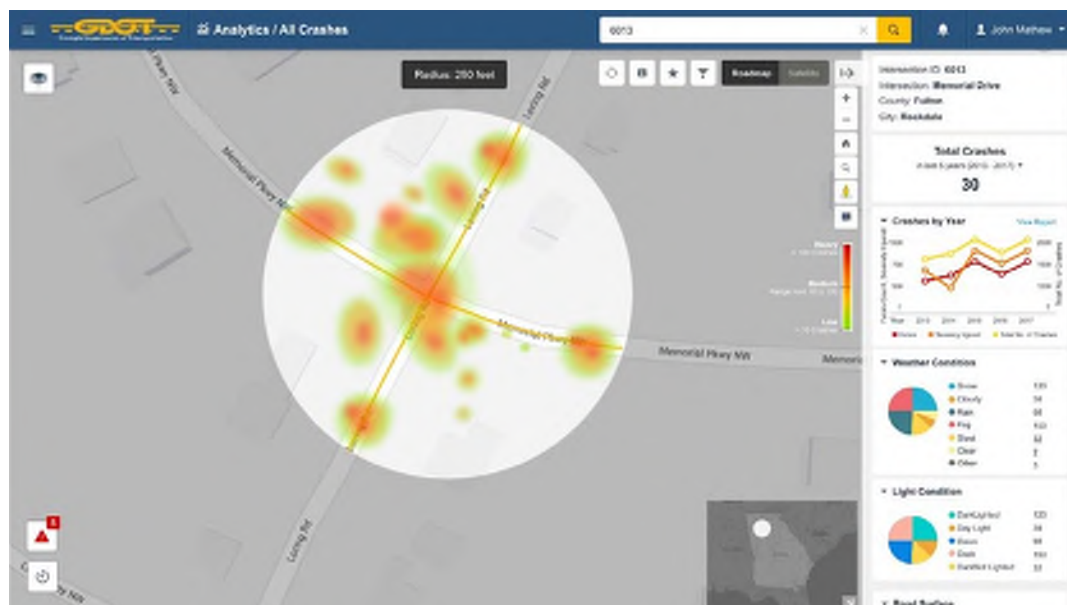
## Maintenance Vision: Prioritization and Exposure

- Guardrail repairs based on vehicle exposure
- Pavement condition rating and repair



## Program Vision: Planning and Designing for Safety

- Driver behavior factors
- Influence of environmental factors
- Emergency vehicle routes and patterns
- Crash characteristics



## Thank you!

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