

Data Innovations to Reduce High-Risk Driving for CMVs on Rural Roadways in Texas & the Statewide CMV Profile Map

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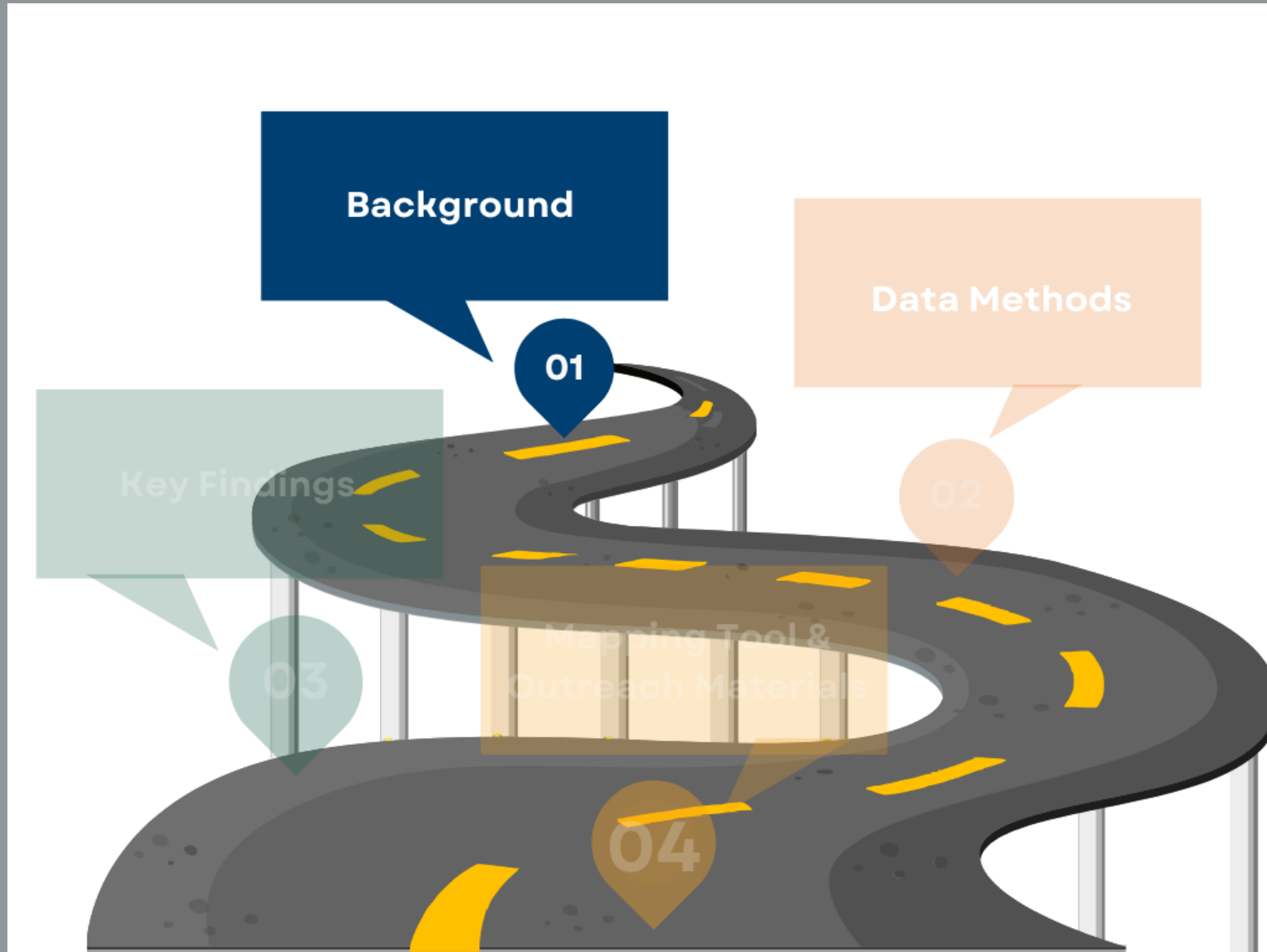


Presentation Topics



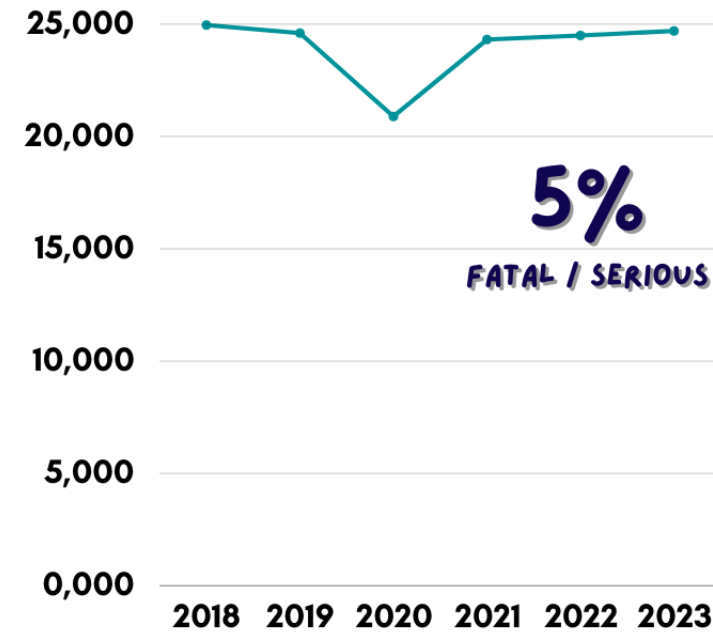


Presentation Topics





Background: Texas has a truck crash problem



Truck tractor crash count (all severities) by year



Background



Data Innovations to Reduce High-Risk Driving for CMVs on Rural Roadways in Texas

FM-MHP-0590-21



Background: Problem & Prior Research



**The Pro:
More data**

- Cell phones
- Connected vehicle
- IVMS



Background: Problem & Prior Research



**The Pro:
More data**

**The Con:
Little research**



Background: Problem & Prior Research



**The Con:
Little
research**

No vetted standards

1. Processing raw new “big data”
2. Integration: traditional & new “big data”
3. Analysis



Background: Project Objectives



1. Develop method: Integrate crash data with other large data sources
2. Better identify high-risk rural roadways for truck tractor crashes



Presentation Topics





Data Methods: GIS approach to “knit” these data together

TRADITIONAL

“BIG DATA”

Roadway Inventory
(GRID)

CRIS CRASH Records

DPS Citations

NPMRDS¹

IVMS
(6 Oil & Gas Companies)

Wejo
Passenger CV

Vehicle Miles,
Geometric, etc.

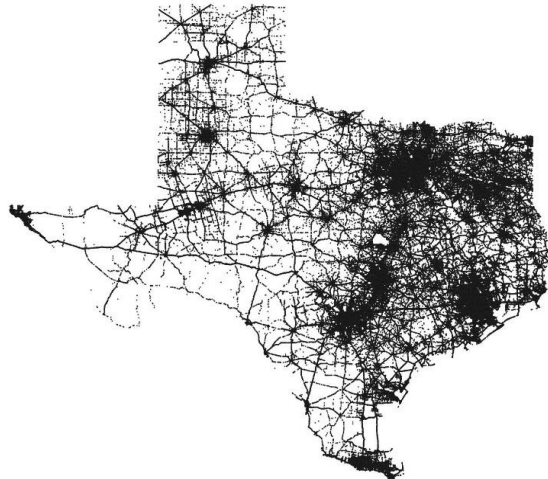
Truck Tractor Crashes
2017-19; 2021

Citation & Type
(e.g., speed)

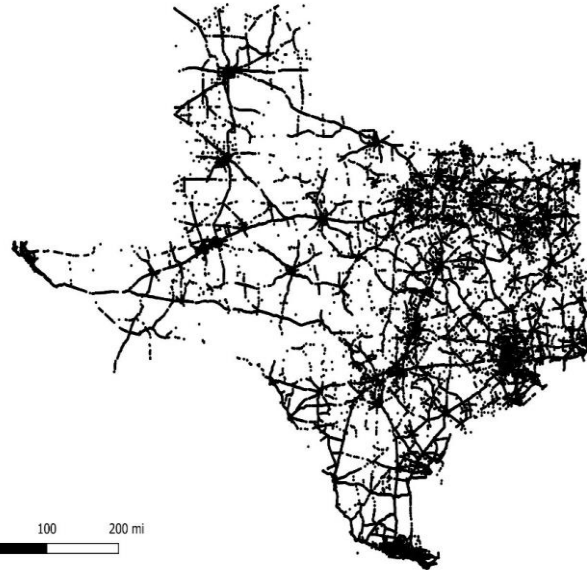
Speed:
Overall Traffic

Speed, Harsh Braking
Harsh Acceleration

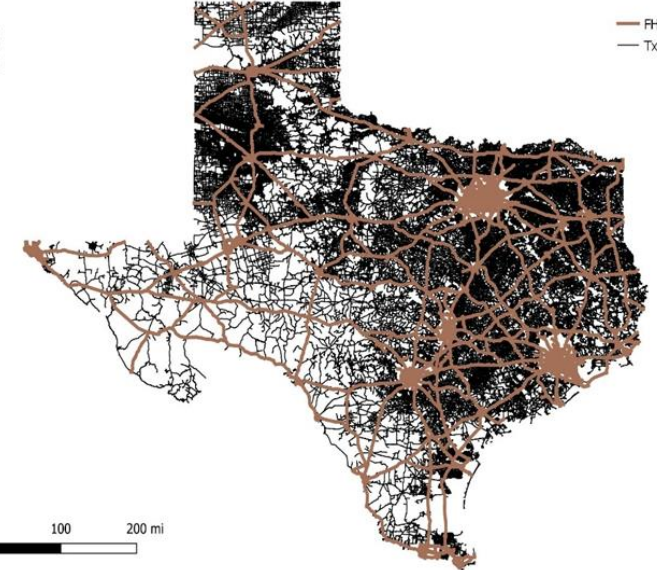
1. NPMRDS: FHWA National Performance Management Research Data Set



0 100 200 mi



0 100 200 mi



0 100 200 mi



Data Methods: The “special sauce” identifies associations

Data processing & integration

Flavor of associations

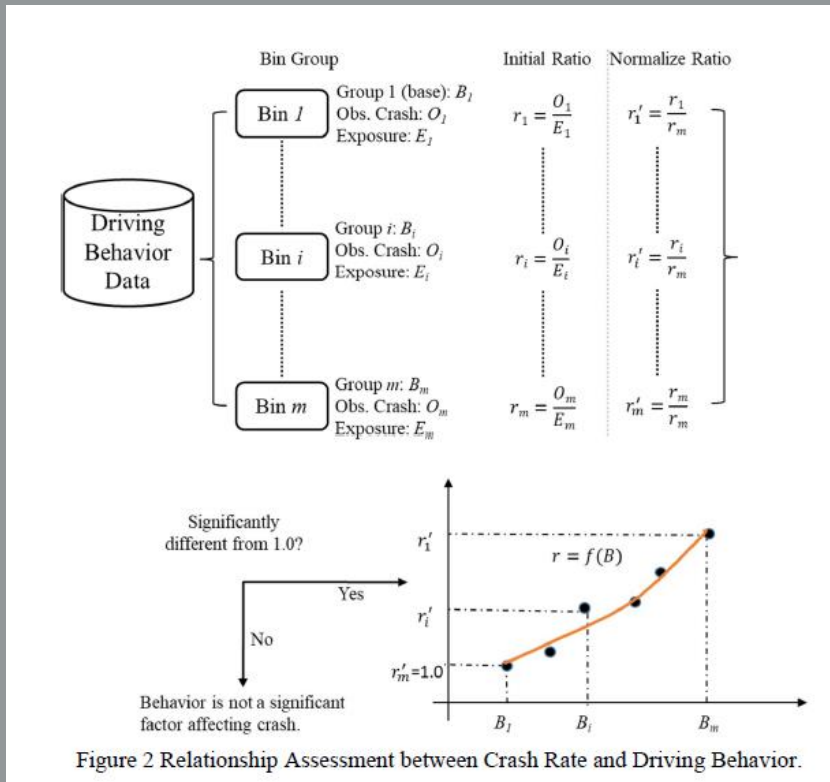
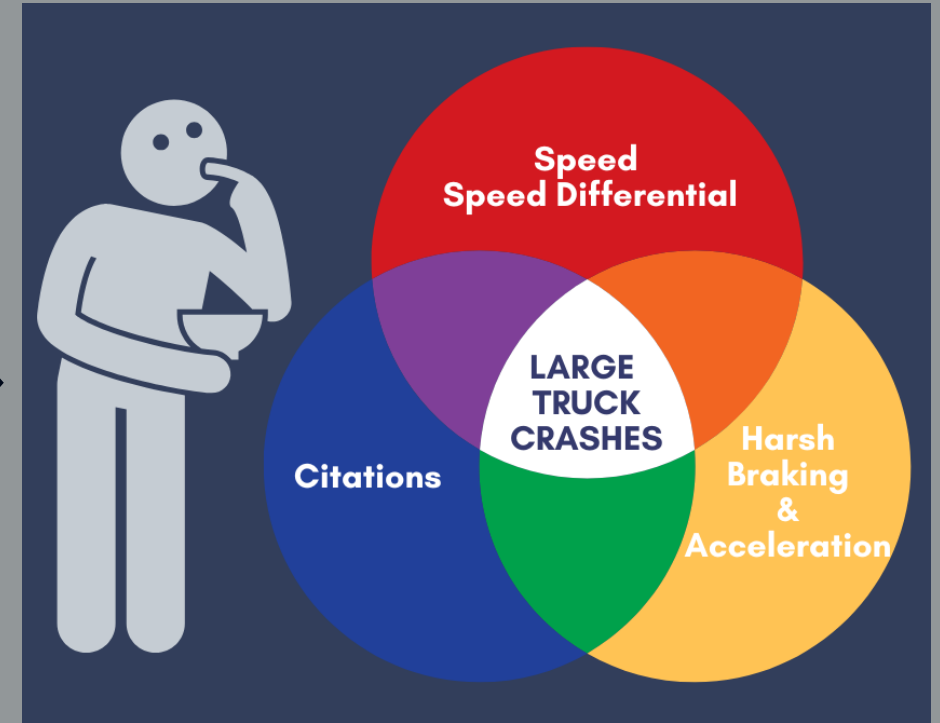
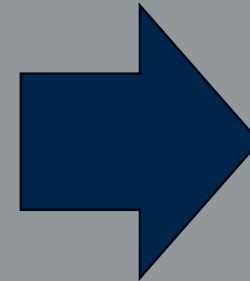


Figure 2 Relationship Assessment between Crash Rate and Driving Behavior.



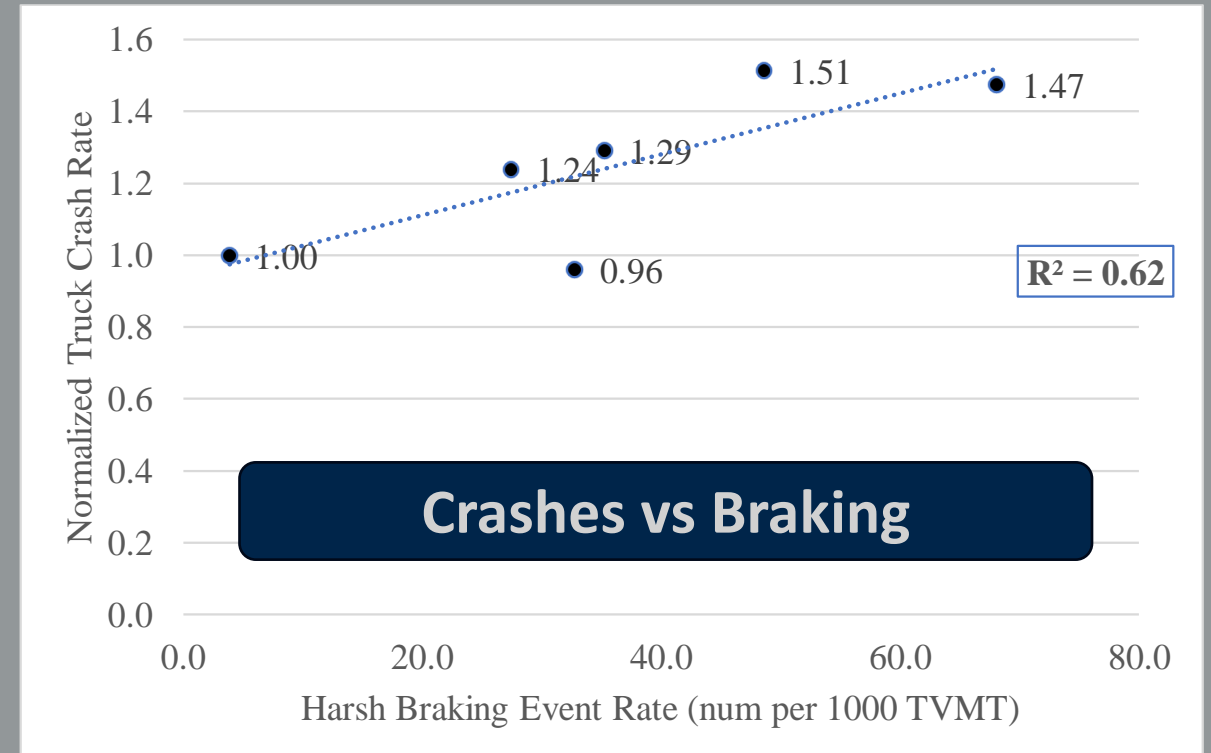
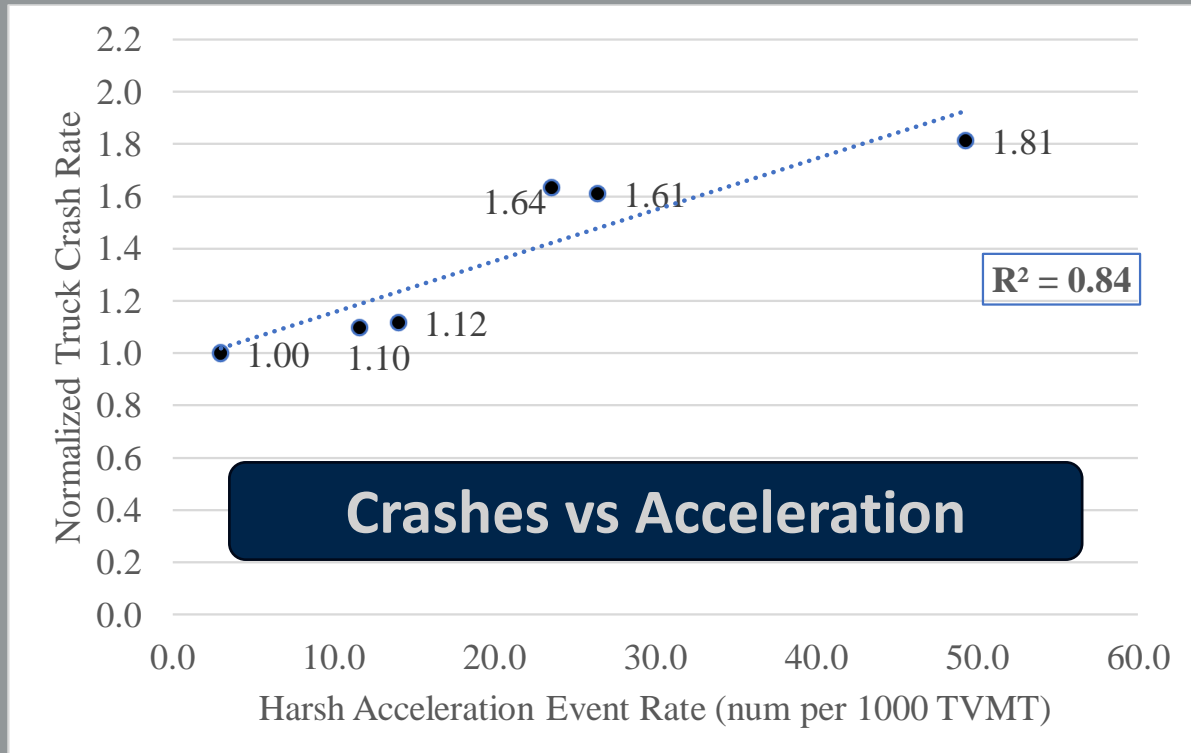


Presentation Topics





Truck Crash Rate & Harsh Acceleration/Braking



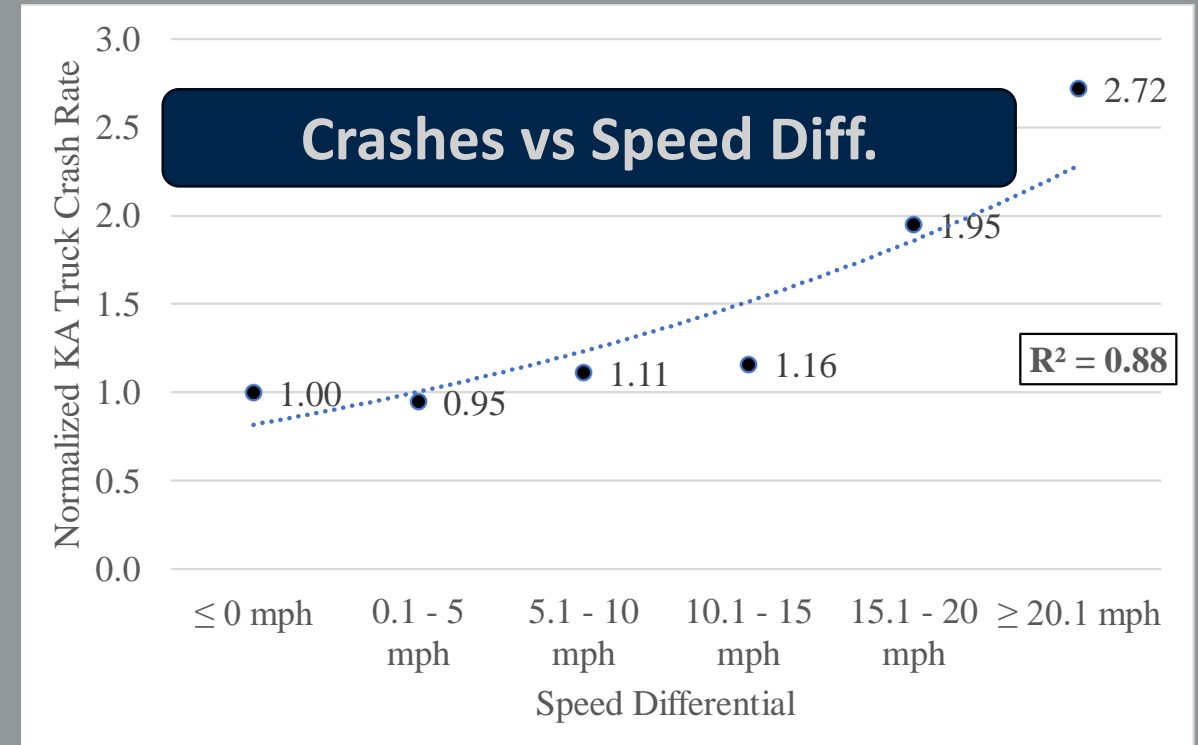
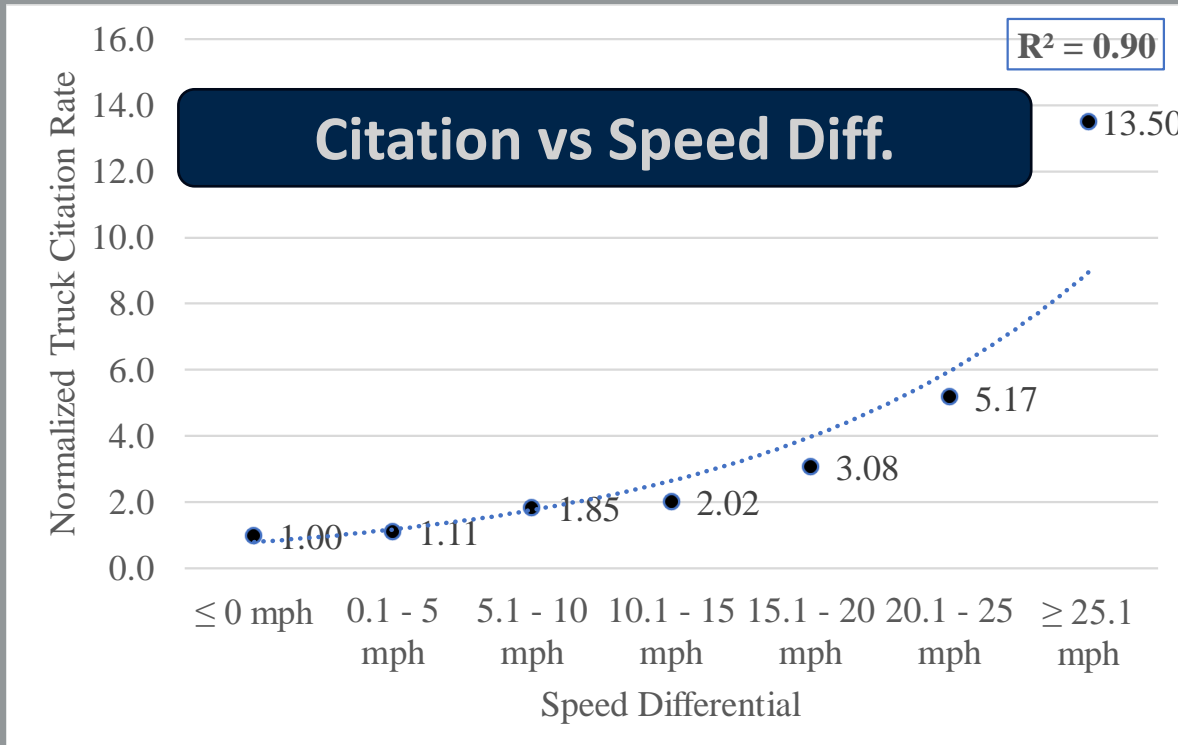
Take home points: Moderate positive correlations between truck crash rates (all severity) & (1) harsh truck acceleration events; (2) harsh truck braking events.

[Recent TTI research: Harsh Acceleration & Braking events associated with intersections]



Speed Differential Associations

**Speed differential: difference between the truck operating speed & posted speed limit.*



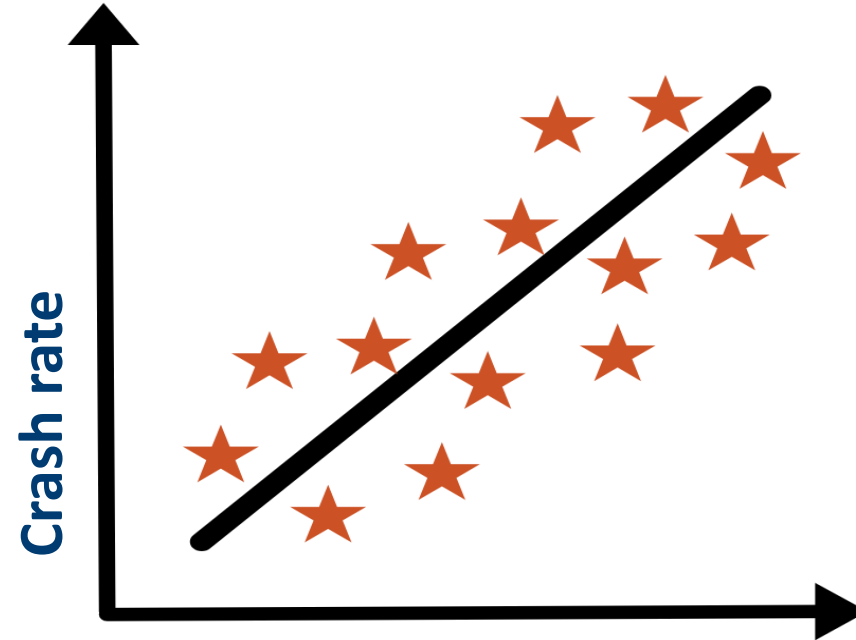
Take home points: Strong positive correlations between speed differential & (1) selected truck citations; (2) fatal & serious truck crash rate.



Recap Selected Key Findings: Taking Action



*EDUCATION
OPPORTUNITIES
LIE ON
SEGMENTS
WHERE...*



1. Harsh braking
2. Harsh acceleration
3. Speed differential



Recap Selected Key Findings: Taking Action



ENFORCEMENT
OPPORTUNITIES
LIE ON
SEGMENTS
WHERE...



Crashes



Citations



Presentation Topics





Mapping Tool: Speed Differential

- Crash visualization profiles tool

First Selection

- Region

Second Selection

- Area Type

Third Selection

- AADT

- TRUCK AADT

- Speed Limit

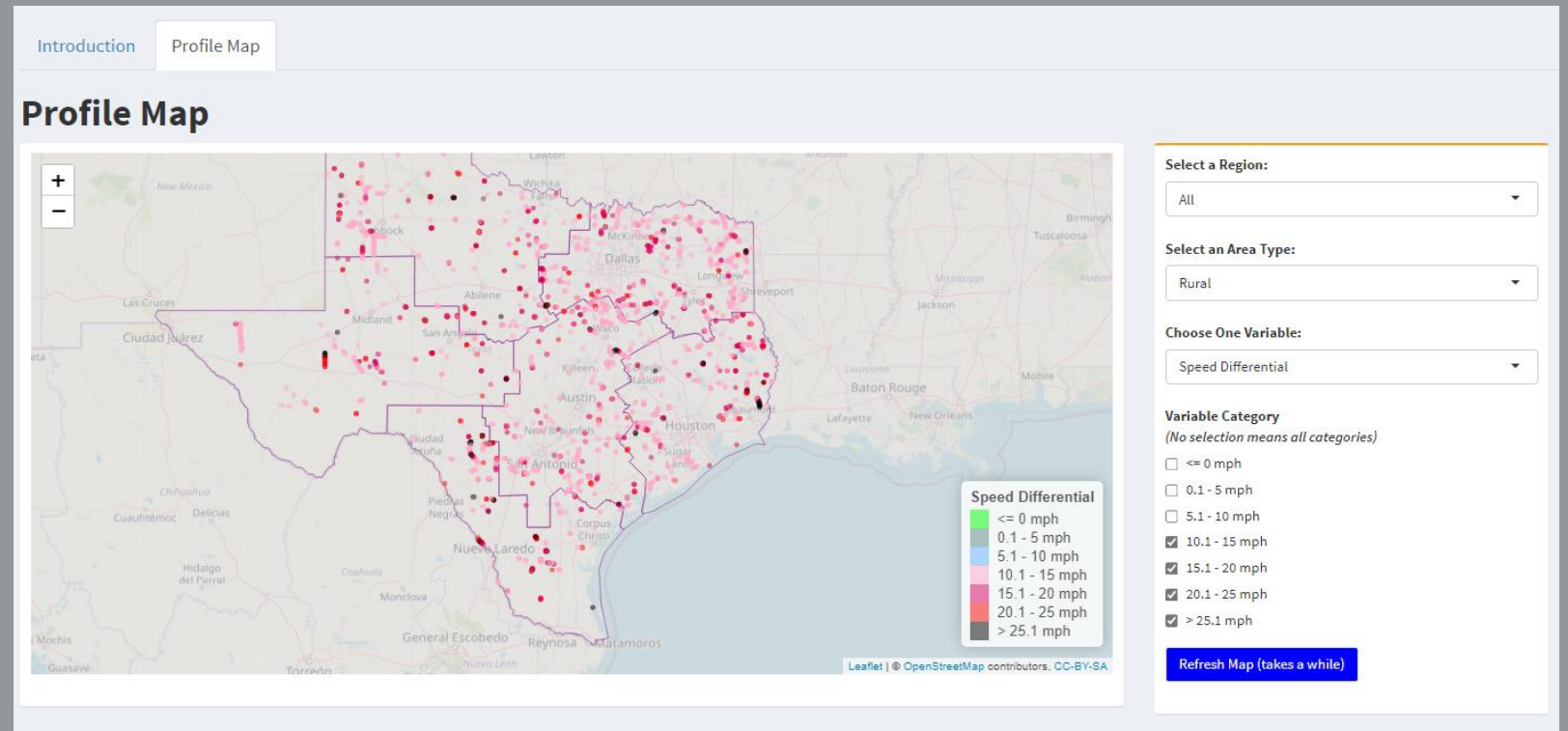
- Speed differential

- Harsh Brake

- Harsh Acceleration

- DPS Citation

- Truck Crashes

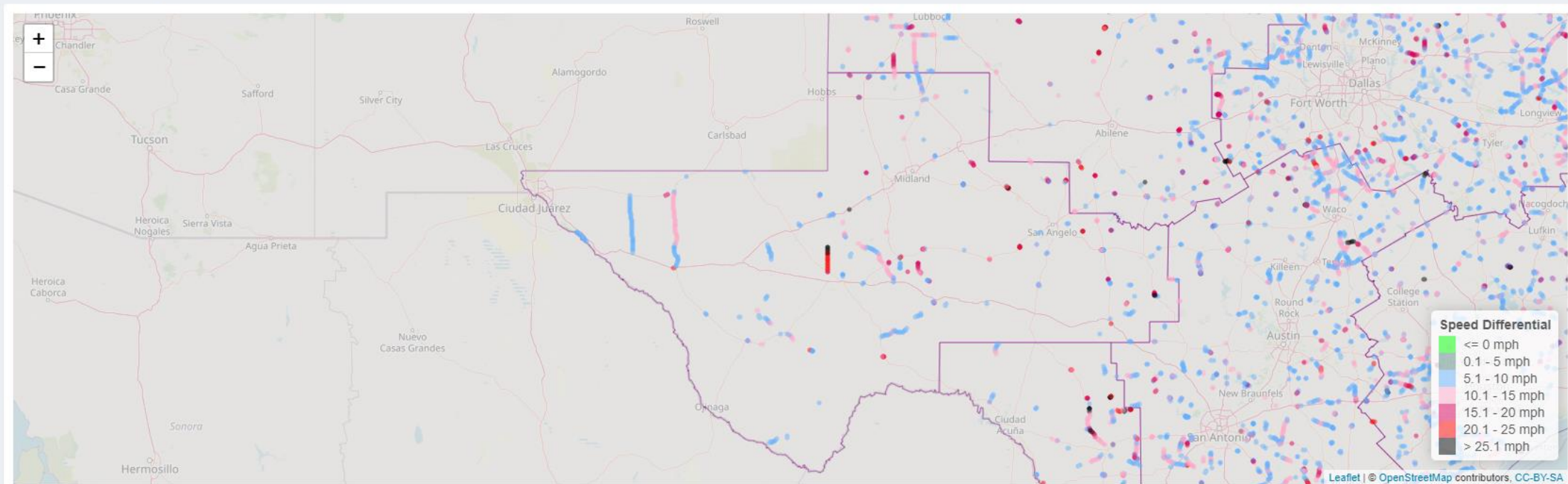


<https://cts.tti.tamu.edu/project/data-innovations-to-reduce-high-risk-driving-for-cmvs-on-rural-roadways-in-texas/>



Mapping Tool: Speed Differential

Profile Map



Select a Region:

All

Select an Area Type:

Rural

Choose One Variable:

Speed Differential

Variable Category

(No selection means all categories)

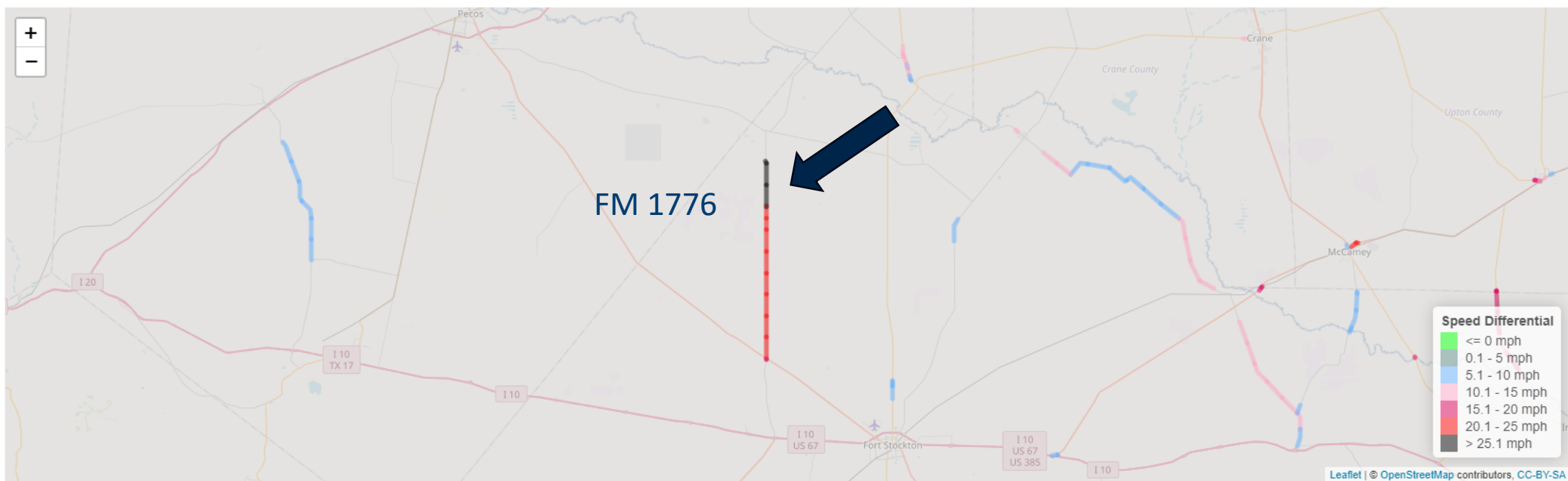
- <= 0 mph
- 0.1 - 5 mph
- 5.1 - 10 mph
- 10.1 - 15 mph
- 15.1 - 20 mph
- 20.1 - 25 mph
- > 25.1 mph

Refresh Map (takes a while)



Mapping Tool: Speed Differential

Profile Map



Select a Region:

All

Select an Area Type:

Rural

Choose One Variable:

Speed Differential

Variable Category

(No selection means all categories)

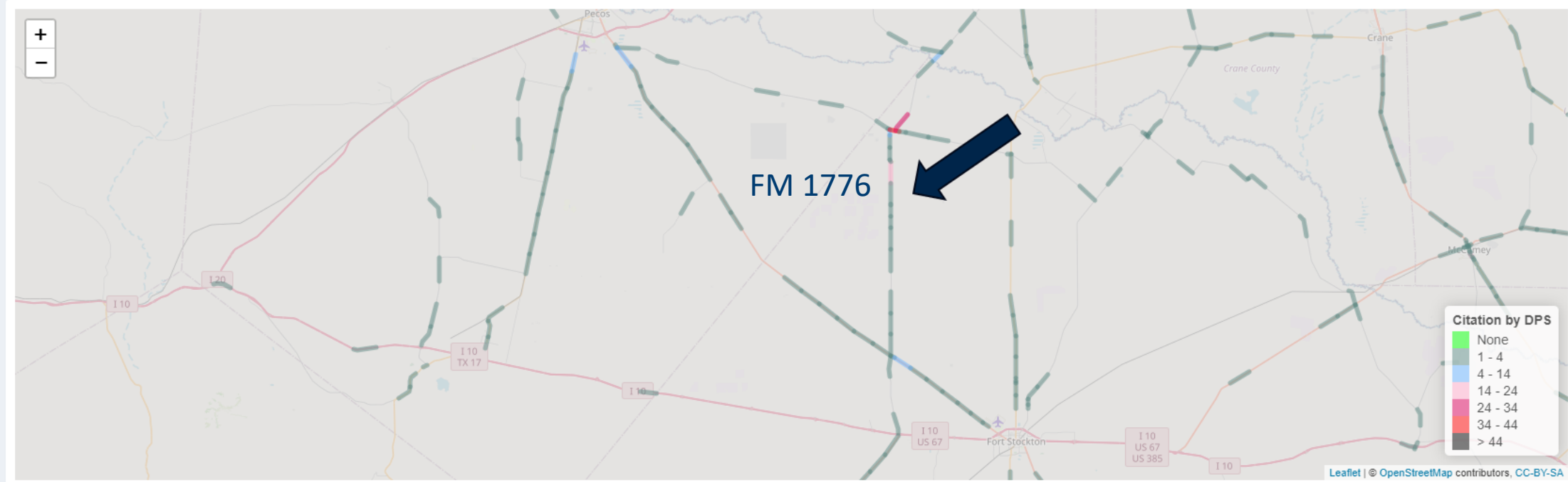
- <= 0 mph
- 0.1 - 5 mph
- 5.1 - 10 mph
- 10.1 - 15 mph
- 15.1 - 20 mph
- 20.1 - 25 mph
- > 25.1 mph

Refresh Map (takes a while)



Mapping Tool: DPS Citations

Profile Map



Select a Region:

All

Select an Area Type:

Rural

Choose One Variable:

Citation by DPS

Variable Category
(No selection means all categories)

- None
- 1 - 4
- 4 - 14
- 14 - 24
- 24 - 34
- 34 - 44
- > 44

Refresh Map (takes a while)



Mapping Tool: Crashes

Profile Map



Select a Region:

West Texas

Select an Area Type:

Rural

Choose One Variable:

Truck Crash

Variable Category

(No selection means all categories)

- 0 - 1
- 1 - 4
- 4 - 7
- > 7

Refresh Map (takes a while)



Outreach Materials

Data in the Driver's Seat:

A Look into CMV Driver Behaviors on Texas Roadways

LAW ENFORCEMENT OFFICER FACTSHEET

Texas A&M Transportation Institute | Center for Transportation Safety

Project Overview

The long-term goal of this project is to prevent crashes and reduce crash severity for events involving large truck commercial motor vehicles (CMVs) by reducing high-risk driving behaviors. This goal is addressed by capitalizing on data sources beyond solely using crash data to better understand the magnitude and locations where high-risk driving behaviors occur. Findings from the data analysis is used to improve employer and truck driver knowledge of high-risk behaviors and associated roadway characteristics. Materials like this one are also provided to law enforcement officers to help inform more targeted enforcement to prevent risky behaviors among CMV drivers and the passenger vehicles driving around them.



The Problem in Texas

Top ten state for highest number of fatal large truck and bus crashes.¹



Rural truck crashes impact nearly every part of the state.

>70% of large truck fatal crashes were on rural roads.²



24,602 large truck crashes in 2019 alone.²



Project Data

The project used four data sources to conduct association and statistical analyses between crashes, citations and driving behavior attributes:

- Large truck crashes on state maintained roadways (2017 to 2019 & 2021; 2020 excluded due to COVID-19 pandemic)
- Truck telematics/in-vehicle monitoring system (IVMS) data from 6 oil and gas companies. As you can see in Figure 1, the data is concentrated around the major Texas oil and gas hubs.
- Roadway inventory data
- Citation data from the Texas Department of Public Safety

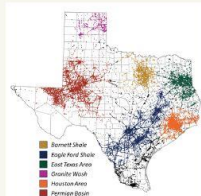


Figure 1. Texas Map of IVMS Datapoints

¹ FMCSA. 2019 CMV Traffic Safety Fact Sheet. Available at: <https://cms8.fmcasa.dot.gov/sites/fmcasa.dot.gov/files/docs/safety/data-and-statistics/473411/cmvtrafficsafetyfactsheet2019.pdf>

² Data extracted from the Texas Crash Records Information System by TTI on 3/5/2021.

CHOOSE YOUR SAFEST ROUTE: TEXAS CMV SAFETY MAP

CHECK OUT THE DETAILS OF ROADS YOU TRAVEL:

DRIVING BEHAVIORS

Find out where large trucks tend to:

- drive over the posted speed limit (speed differential)
- quickly or unexpectedly brake (harsh braking)
- rapidly accelerate, above what is consistent with normal flow of traffic (harsh acceleration)

ROADWAY FACTS

Find out details for roads maintained by the State of Texas:

- posted speed limits
- typical traffic volume (Annual average daily traffic (AADT))
- proportion of the traffic which is commercial vehicles (Truck AADT)

CRASHES & CITATIONS

Find out where large trucks:

- have crashes on roads maintained by the State of Texas
- receive moving violations from the Texas Department of Public Safety (DPS)

SO YOU CAN BE PREPARED OR RE-ROUTE



Explore the map at <http://bit.ly/TxCMVmap> or scan the QR Code.



Questions



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