



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

## Task 3 Technical Memorandum (Commercial Motor Vehicle Driving Behavior Profile Interactive Map User Guide)

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Texas A&M Transportation Institute  
Center for Transportation Safety





# COMMERCIAL MOTOR VEHICLE DRIVING BEHAVIOR PROFILE INTERACTIVE MAP USER GUIDE

## 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. Data sources for high-risk driving behaviors include truck telematics / in-vehicle monitoring system data from six oil and gas companies operating across Texas and connected vehicle data for passenger cars from Wejo, a data aggregator company. Findings from the data analysis is used to improve employer and truck driver knowledge of high-risk behaviors and associated roadway characteristics. Materials are provided to law enforcement officers to help them conduct more targeted enforcement to prevent risky behaviors among CMV drivers and the passenger vehicles driving around them.

In addition to the development of profiles of high-risk CMV driving at statewide and regional levels, another project objective is to:

- Develop a prototype interactive map for visualization of different large truck driving behaviors and associated attributes.

## INTRODUCTION

The CMV driving behavior profiles developed at the statewide and regional level provide stakeholders overviews of how driving behavior attributes are distributed across roadway segments. In addition, the team developed an interactive large truck driving behavior profile map, which helps users visualize the behaviors and other related attributes at different levels using various filters.

A separate technical memorandum documents the development of the different truck-related driving behavior profiles statewide and at regional levels. These profiles show the overall spatial distribution of driving behaviors and CMV-related crashes. The research team has prepared the data with multiple variables (e.g., Average Annual Daily Travel (AADT), truck AADT, harsh braking and acceleration events from truck in-vehicle monitoring systems (IVMS)) in different area types (e.g., rural, urban-large, urban-medium, urban-small, fringe). The prototype interactive map illustrates and visualizes statewide and regional profiles and associated attributes.

## INTERACTIVE MAP

The interactive commercial vehicle driving profile map is at:

[https://ttishiny.shinyapps.io/FMCSA\\_CMV\\_Profile/](https://ttishiny.shinyapps.io/FMCSA_CMV_Profile/)

The landing page provides an introduction. Click on the “Profile Map” tab to access the interactive map. Using regional geography based on the six DPS regions (see the appendix for geographic boundaries):

- North Texas (1)
- Southeast Texas (2)
- South Texas (3)
- West Texas (4)
- Northwest Texas (5)
- Central Texas (6)
- All (Texas)

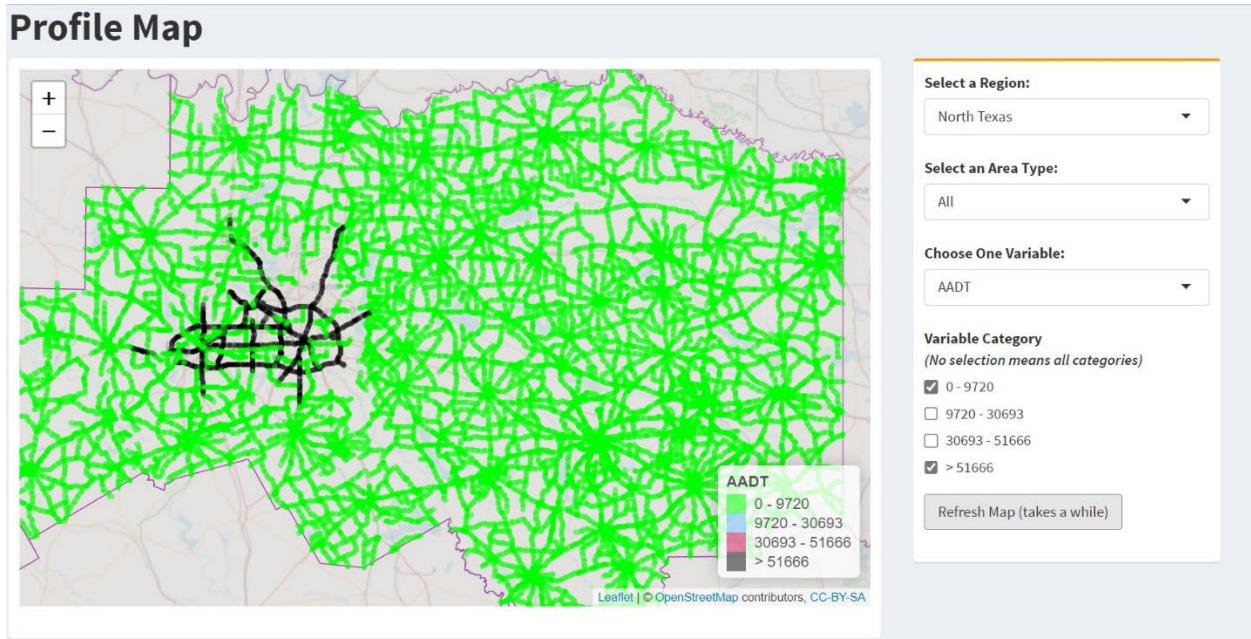
And statewide plus thirteen area types (see appendix for definitions):

- All (Statewide)
- Rural
- Urban-Large
- Urban-Large Fringe
- Urban-Medium
- Urban-Medium Fringe
- Urban-Small
- Urban-Small Fringe
- Urban-Very Large
- Urban-Very Large Fringe
- Urban-Very Small
- Urban-Very Small Fringe
- Urban-Very Very Small
- Urban-Very Very Small Fringe

Filters are provided for (see appendix for definitions):

- AADT
- Truck AADT
- Speed Limit
- Speed Differential
- Harsh Braking
- Harsh Acceleration
- Texas Department of Public Safety Citations (labeled as DPS Citations)
- Truck Crashes

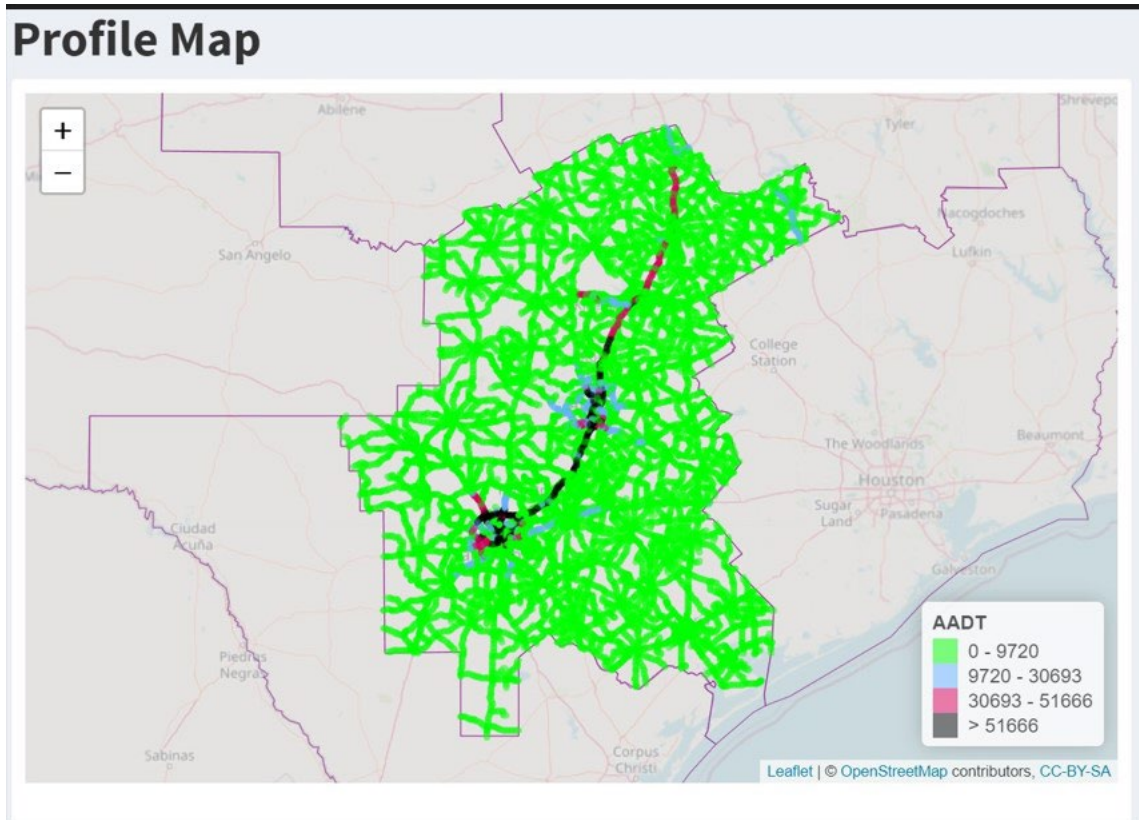
Users can select a Texas Department of Public Safety (DPS) region, the area type, and the variable/attribute of interest. If the user hovers over a specific segment, details of all variables for that segment are displayed. Figure 1 shows the layout of the map graphic and the adjacent filter selection boxes using the Central Texas DPS region and AADT as an example. The AADT ranges are color coded and defined in the lower right-hand corner of the map. Multiple ranges can be selected to display on the map, as shown. The map itself can zoom in or out to provide as much detail or as wide a perspective as desired.



**Figure 1. Filter Selection Box Example.**

Subsequent figures illustrate the use of the various options and filters.

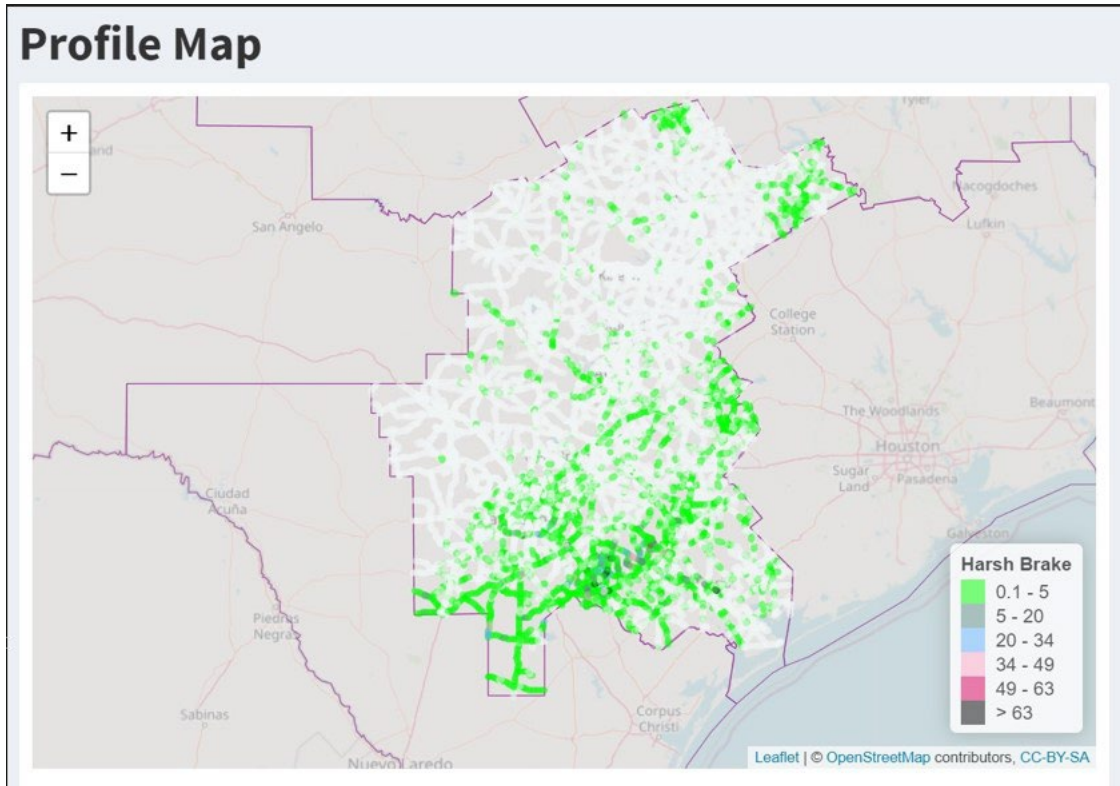
Figure 2 shows the basic map of AADT for the Central Texas Region (Region 6) for all area types. The AADT ranges are color coded and defined as noted. Note that the map can zoom to provide as much detail or as wide a perspective as desired.



**Figure 2. Central Texas Region – All Areas – AADT.**

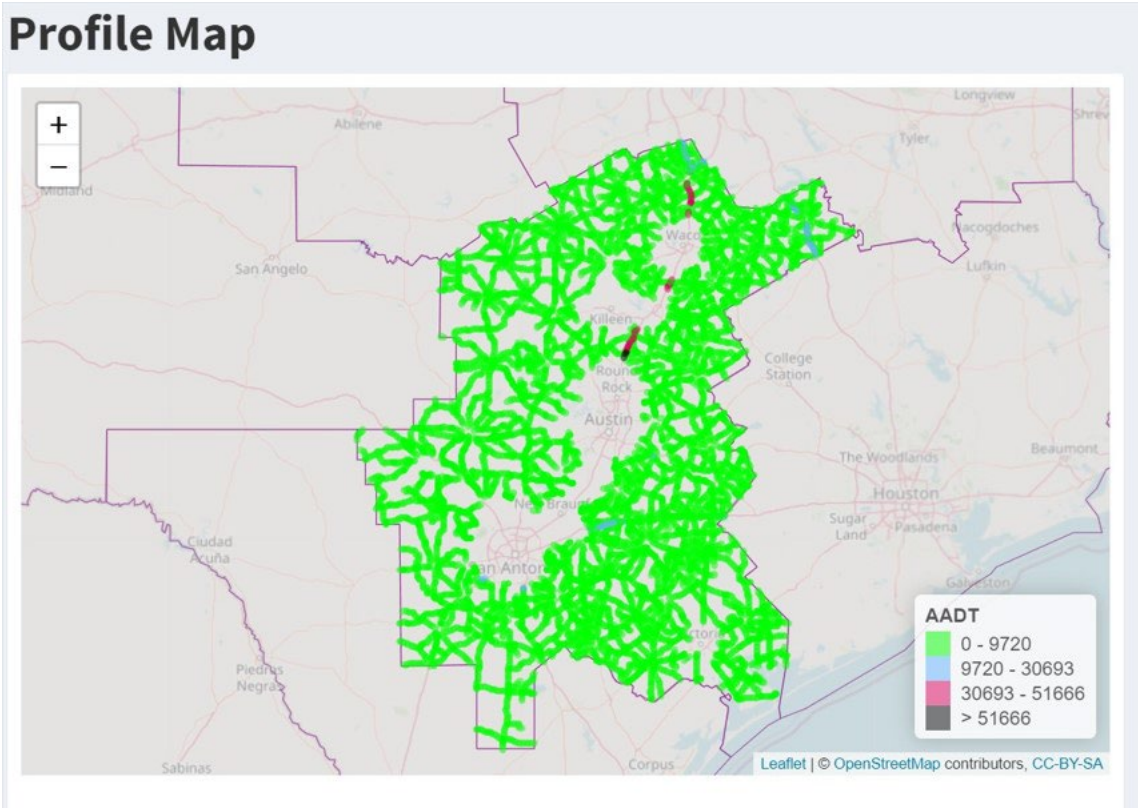


Figure 3 shows harsh braking for the entire Central Texas Region (all area types). The harsh braking ranges are color coded and defined as noted. The map can zoom as needed to provide more detail or a wider perspective.



**Figure 3. Central Texas Region – All Areas – Harsh Braking.**

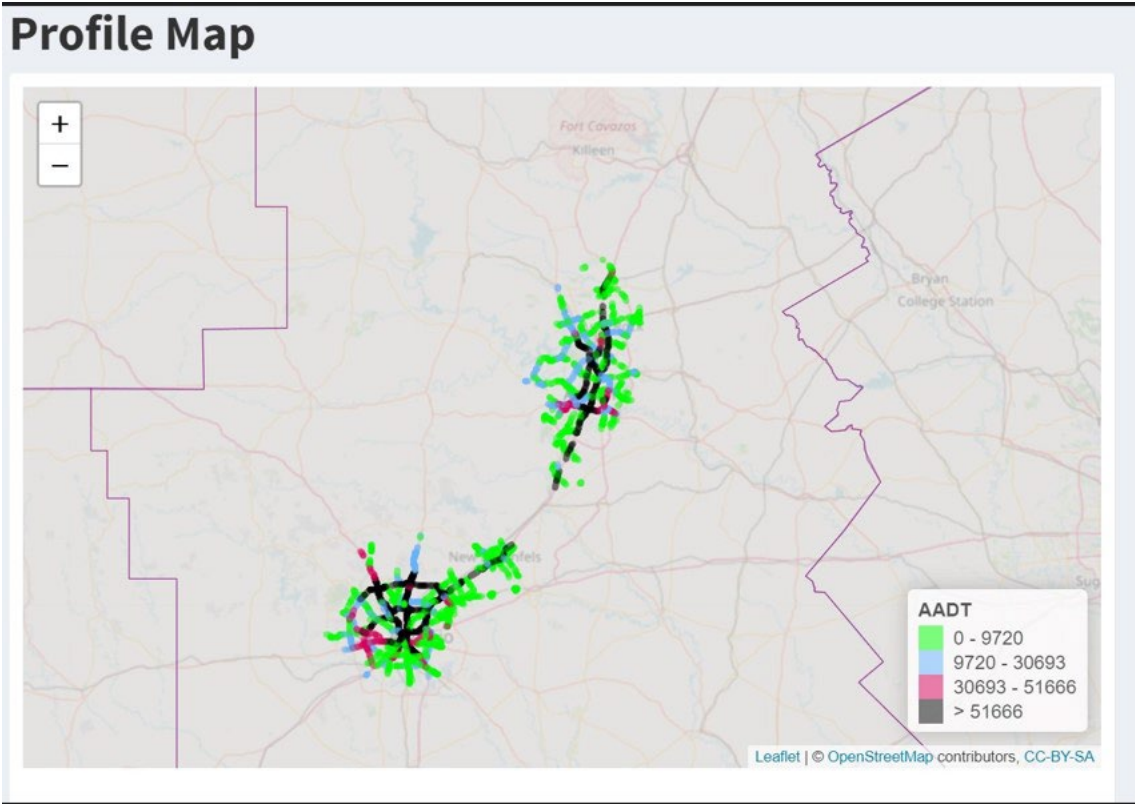
Figure 4 shows the Central Texas Region rural areas AADT. The AADT ranges are color coded and defined as noted. The map can zoom as desired.



**Figure 4. Central Texas Region – Rural Areas – AADT.**

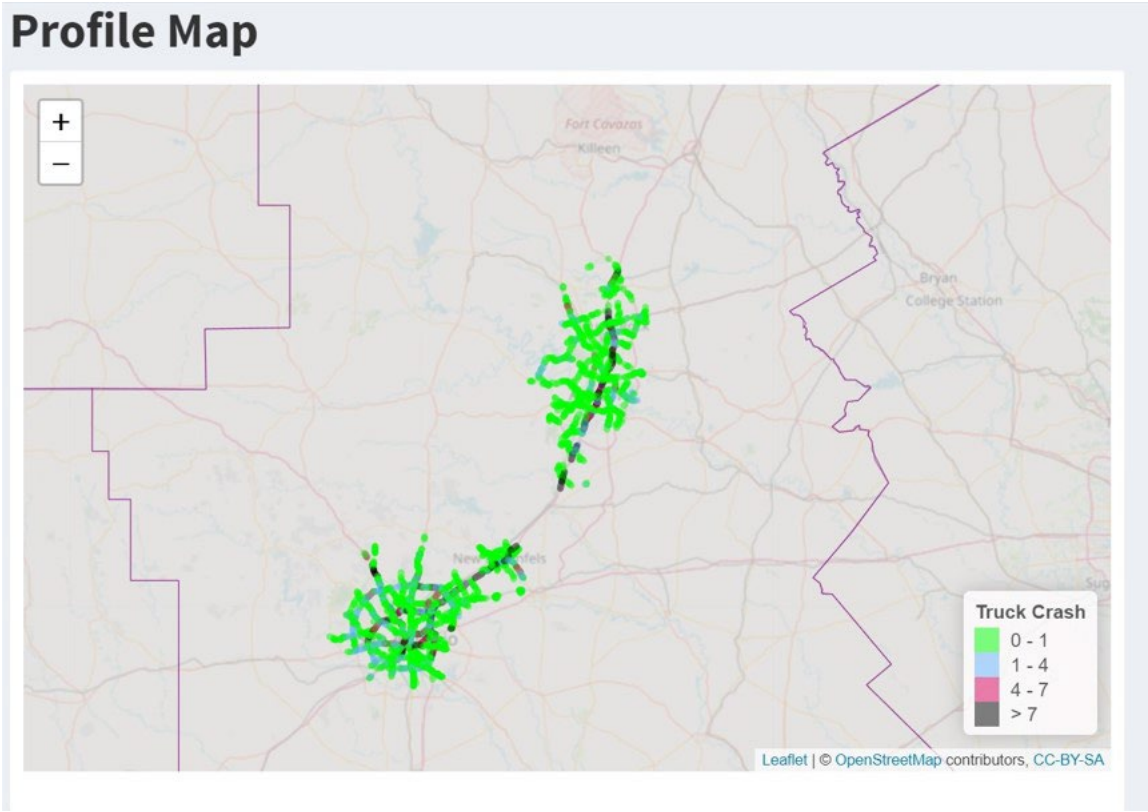


Figure 5 shows the Central Texas Region very large urban areas AADT. The AADT ranges are color coded and defined as noted. The map can zoom as desired.



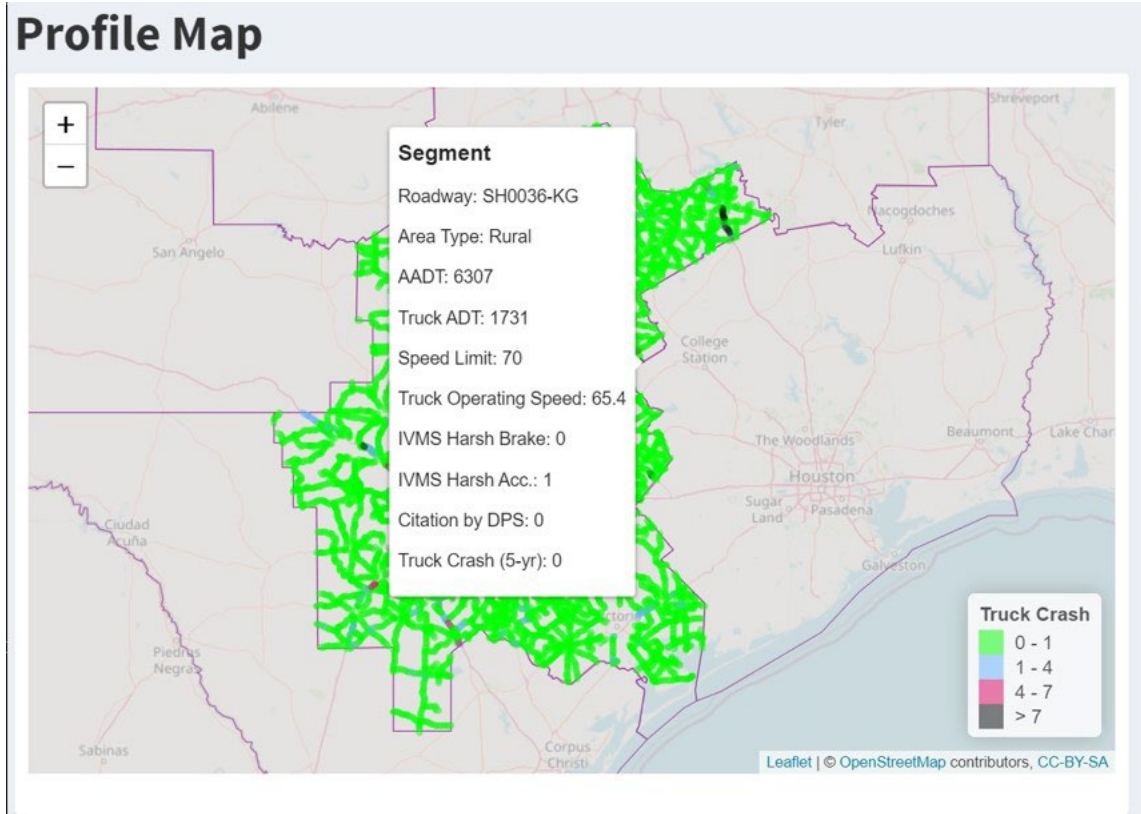
**Figure 5. Central Texas Region – Very Large Urban Areas – AADT.**

Figure 6 shows the Central Texas Region very large urban areas truck crashes. The truck crash ranges are color coded and defined as noted. The map can zoom as desired.



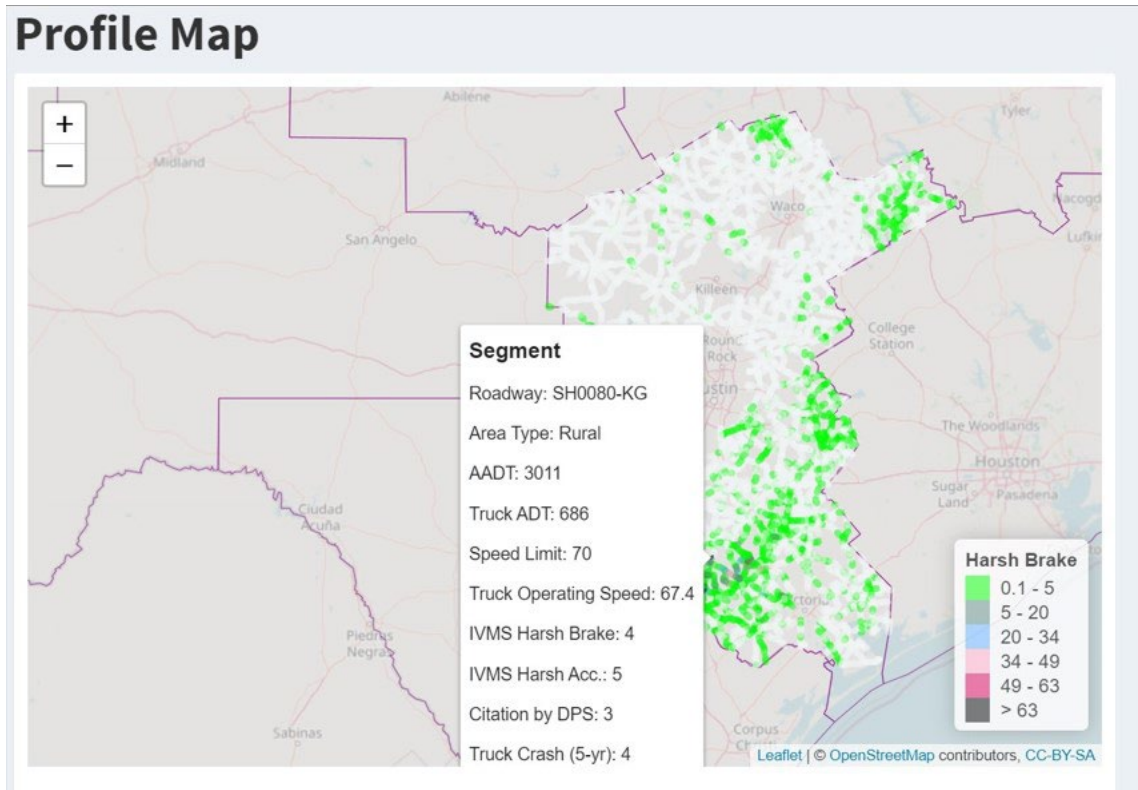
**Figure 6. Central Texas Region – Very Large Urban Areas – Truck Crashes.**

Figure 7 shows the Central Texas Region rural areas truck crashes for a specific segment using the pull-down segment details feature by hovering over the segment. Note that the map can zoom as desired to display truck crash counts for adjacent or contiguous segments.



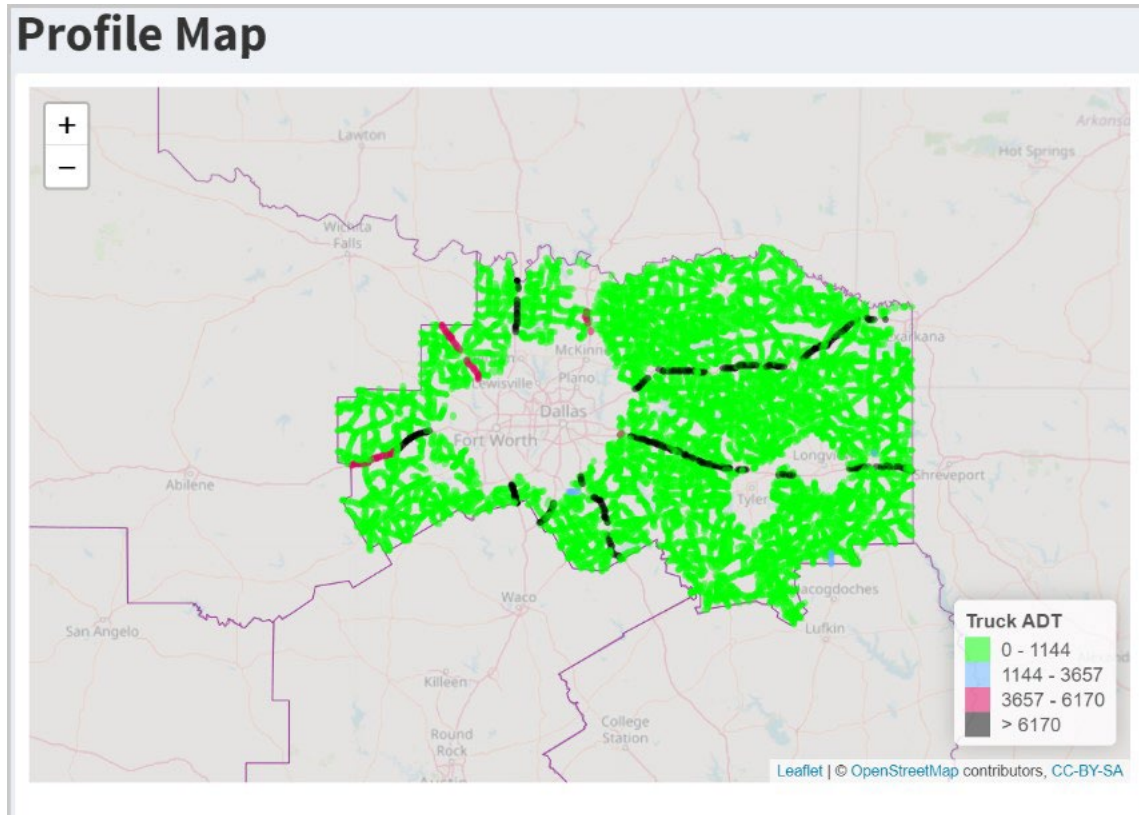
**Figure 7. Central Texas Region – Rural Areas – Truck Crashes (Pull Down Segment Detail).**

Figure 8 shows the Central Texas Region rural areas harsh braking for a specific segment using the pull-down segment details feature by hovering over the segment. Note that the map can zoom as desired to display truck harsh braking counts in more detail, for adjacent or contiguous segments.



**Figure 8. Central Texas Region – Rural Areas – Harsh Braking (Pull Down Segment Detail).**

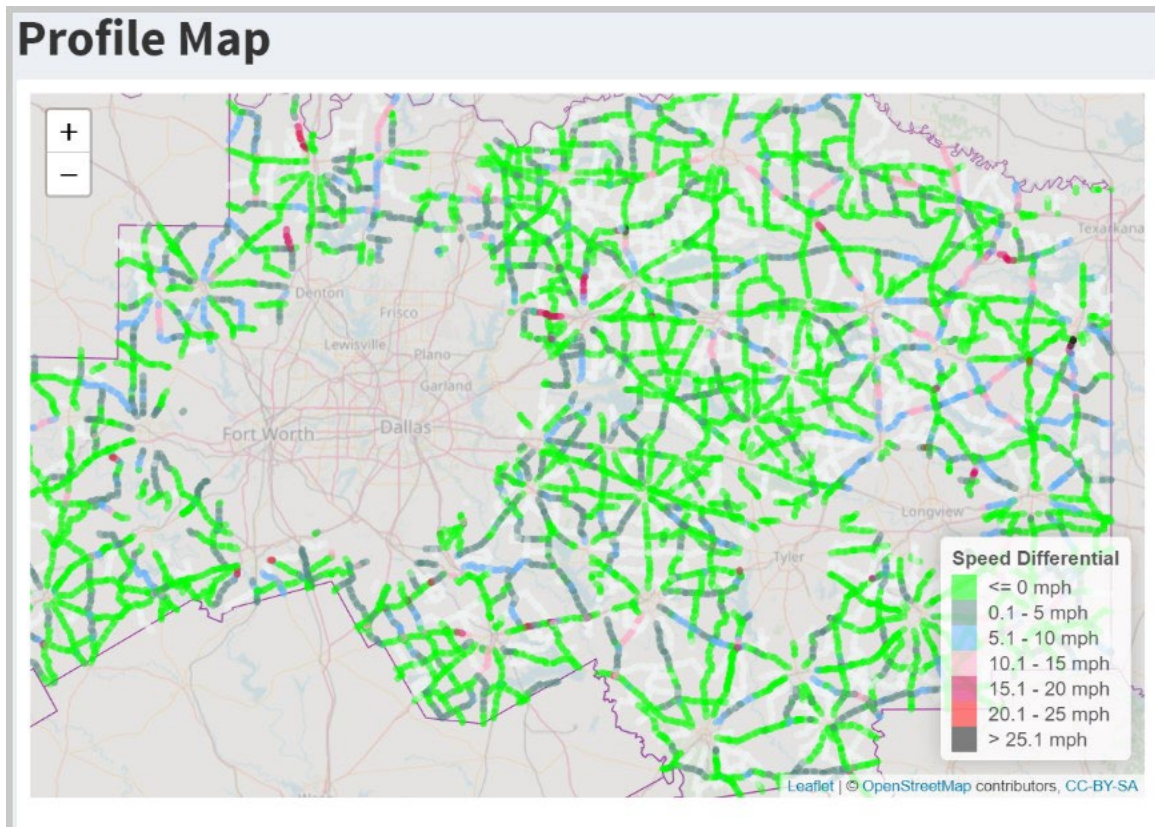
Figure 9 shows the North Texas Region rural areas truck ADT. The truck ADT ranges are color coded and defined as noted. The map can zoom as needed to provide more detail or a wider perspective.



**Figure 9. North Texas Region – Rural Areas – Truck ADT.**



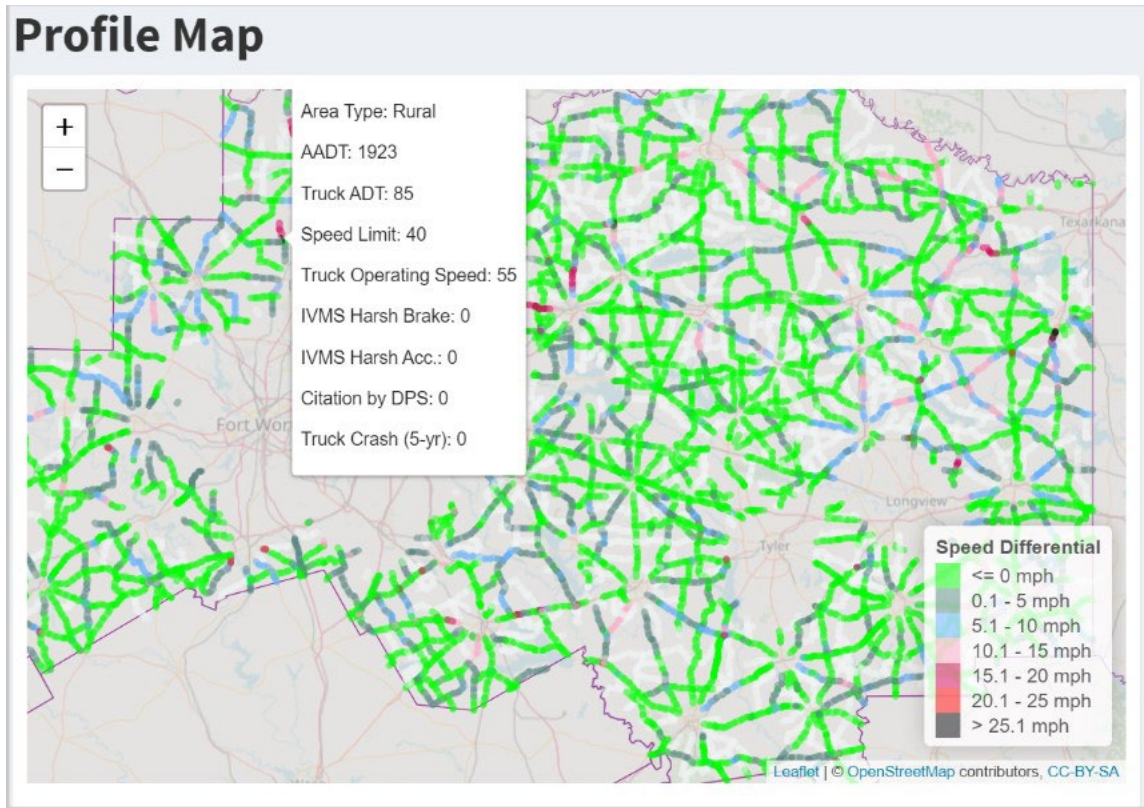
Figure 10 shows the North Texas Region rural areas speed differential for CMVs. Speed differential for a segment is defined as how much operating speed exceeds the posted speed limit on that segment. The speed differential ranges are color coded and defined as noted. The map can zoom in to show more detail as shown here compared to the previous figure for the same region.



**Figure 10. North Texas Region – Rural Areas – Speed Differential.**

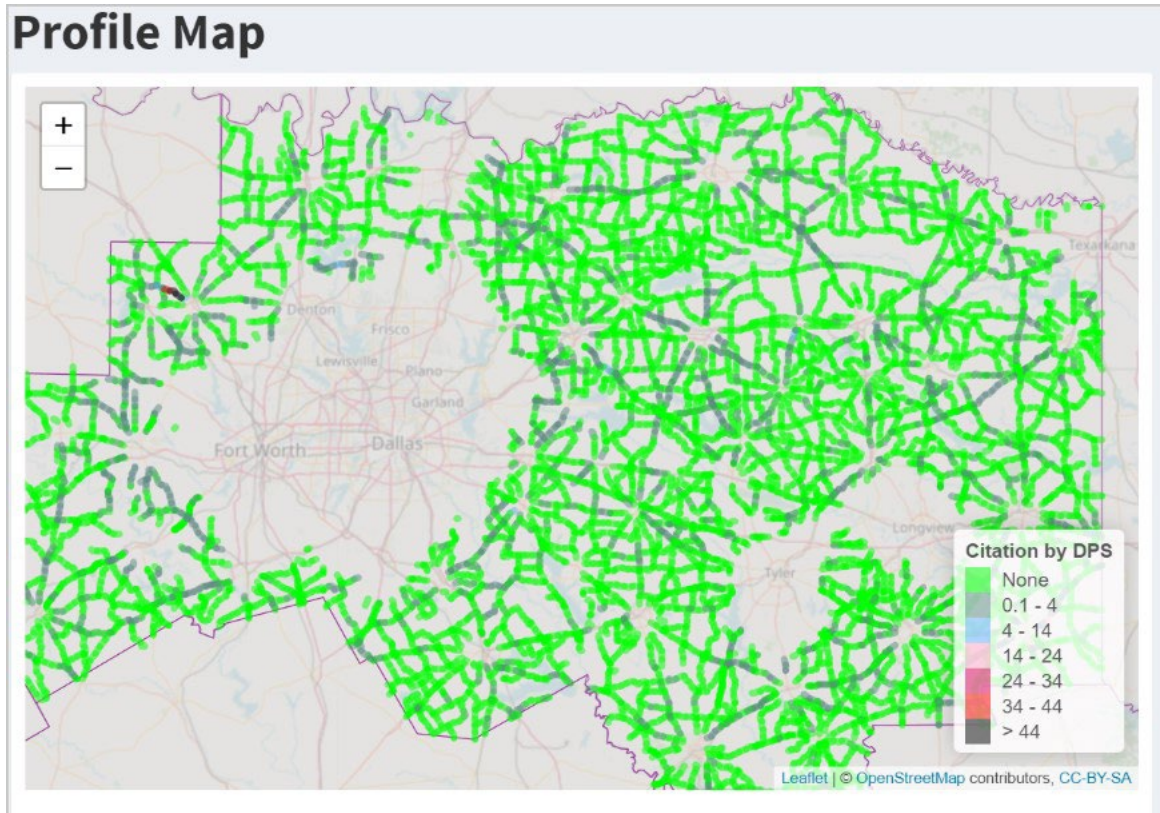


Figure 11 shows the North Texas Region rural areas speed differential for a specific segment using the pull-down segment details feature by hovering over the segment. Using the definition of speed differential noted above (as how much operating speed exceeds the posted speed limit) the pull down shows a posted speed limit of 40 mph and a truck operating speed of 55 mph, indicated by the red segment the pull down is pointing to. Note that the map can zoom in further to display the speed differentials of adjacent or contiguous segments.



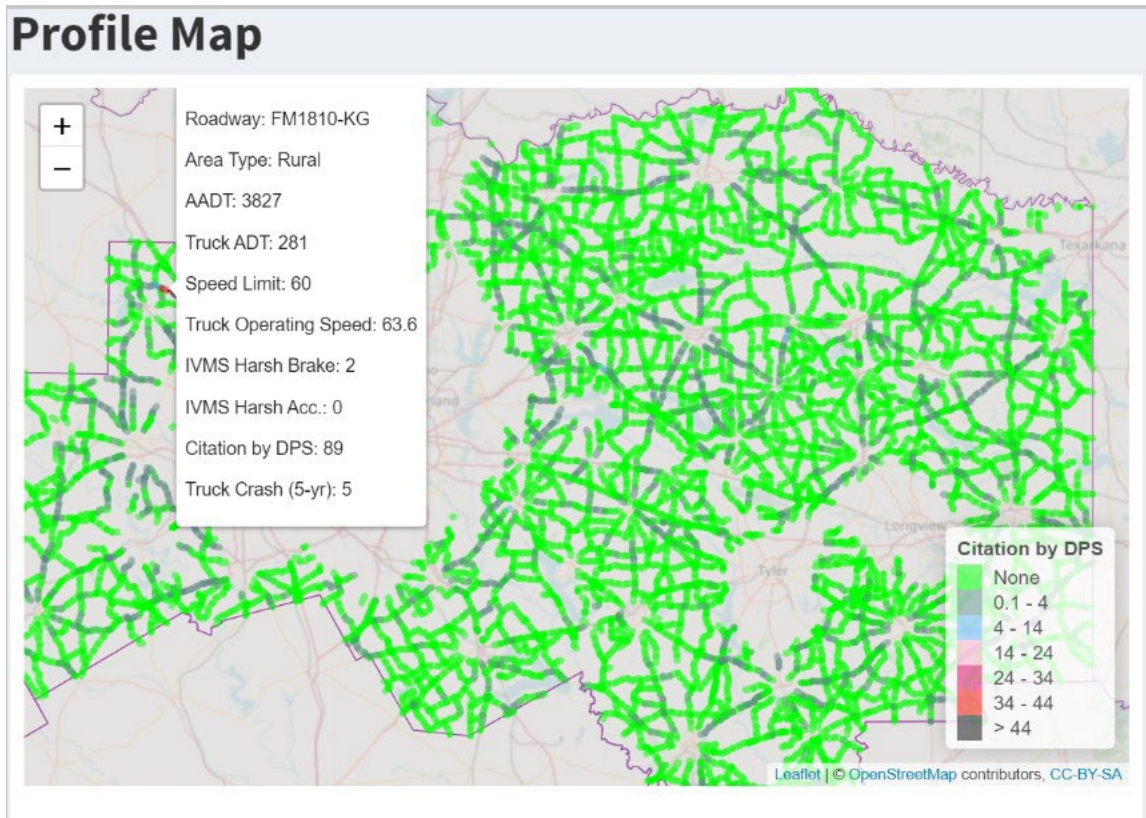
**Figure 11. North Texas Region – Rural Areas – Speed Differential (Pull Down Segment Detail).**

Figure 12 shows the North Texas Region rural areas DPS citations (moving citations issued to CMV drivers). The DPS citation count ranges are color coded and defined as noted. Note that the map can zoom as needed to provide more detail or a wider perspective.



**Figure 12. North Texas Region – Rural Areas – DPS Citations.**

Figure 13 shows the North Texas Region rural areas DPS citations for a specific segment using the pull-down segment details feature by hovering over the segment. The pull-down shows 89 DPS citations on this segment over an approximately five-year period, indicated by the black color code on the segment the pull down is pointing to. The pull-down also indicates that there have been five truck crashes on this segment. Note that the map can zoom as desired to display the DPS citation counts for adjacent or contiguous segments.



**Figure 13. North Texas Region – Rural Areas – DPS Citations (Pull Down Segment Detail).**



## APPENDIX

### DPS Regions.



### Area Type Definitions.

Label	Population Category	Fringe Buffer
Urban - Very large	> 250K population	5 miles
Urban - Large	100K-250K	5 miles
Urban - Medium	50K-100K	3.5 miles
Urban - Small	25K-50K	2 miles
Urban - Very Small	5K-25K	1 mile
Urban - Very, Very Small	<5K	0.5 mile
Rural	everywhere else	n/a

**Filter Label Definitions.**

<b>Label</b>	<b>Definition</b>
AADT	Annual Average Daily Traffic
Truck AADT	Annual Average Daily Traffic for Trucks
Speed Limit	Posted speed limit
Speed Differential	Operating speed in excess of posted speed limit
Harsh Braking	Abrupt or unanticipated braking (Number in 1-year period)
Harsh Acceleration	Rapid acceleration, above what is consistent with the normal flow of traffic (Number in 1-year period)
DPS Citations	Moving violations issued by the DPS to truck drivers (Number in 3-year period)
Truck Crashes	Number of reportable crashes involving CMV's on State maintained roads (2017-2019, 2021)