# Understanding Crashes Involving Large Trucks on Rural Roads in Texas

## Static Rural Roadway Truck Tractor and Heavy Truck/Pick-Up Crash Risk Map Tool USER GUIDE


Texas A&M Transportation Institute

Center for Transportation Safety
Safety Research and Outreach

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Texas A&M Transportation Institute | Center for Transportation Safety

## PROJECT OVERVIEW

The goal of this project is to prevent crashes and reduce crash severity on rural roads involving large trucks by improving law enforcement and driver knowledge of hazardous roadways and behaviors on rural roads. This will be accomplished through an innovative analysis of crash and roadway data, and the production and dissemination of outreach and educational materials (e.g., fact sheets, data dashboards, and high-risk roadway maps).

In addition to the compilation of rural large truck crash data and development of crash profiles, another project objective is to:

- Develop a method for visualizing roadway segments disproportionately prone to crashes known as roadway segments with a potential for improvement (more commonly referred to as risk), and
- Create a rural roadway CMV crash risk visualization tool accessible to critical stakeholder groups (law enforcement and fleet operators).

## INTRODUCTION

The traditional hotspot identification approaches (the safety performance approach described above) are based on crash occurrences. Under this approach, high crash-potential sites (defined as sites that experience more crashes than expected) are identified through network screening, and investments are then decided based on the observed crash frequencies. However, this traditional approach may not provide adequate results when crashes are more sporadic, such as the case with large truck crashes in rural areas. As a result, transportation agencies would have trouble meeting safety performance goals by only investing in high-crash locations when traditional techniques are employed.

The systemic approach to safety involves identification and implementation of countermeasures that address high crash-potential roadway factors, (i.e., factors with potential for improvement), through system-wide analysis of specific target crash types (in this case, it is truck tractor and heavy truck/pick-up crashes). Since systemic improvements focus on high crash-potential roadways rather than specific locations, it is possible to use the roadway characteristics that are associated with truck tractor and heavy truck/pick-up crashes to identify the factors with potential for improvement. The proportion of truck tractor and heavy truck/pick-up crashes for a specific range or value of a variable are then compared to the proportion of existing vehicle miles traveled (VMT) (VMT is calculated as a product of roadway segment length and the ADT) within the respective range or value. A total of 121,186 truck tractor crashes and 44,158 heavy truck/pickup crashes were identified using this process.[1]

[1] This final sample size used in the analysis only included crashes with viable latitude and longitude coordinates. Multi-vehicle crashes were classified giving the highest priority to truck tractors and then to heavy trucks/pickups.

## VISUALIZING LARGE TRUCK CRASH RISK ON RURAL TEXAS ROADWAYS

The final step in the application of the systemic approach is visualizing the potential for improvement on Texas roadways using Google Earth. **Figure 1** illustrates the potential for improvement classifications for truck tractor and heavy trucks/pick-ups for the on-system roadway segments in Texas based on the systemic approach just described.

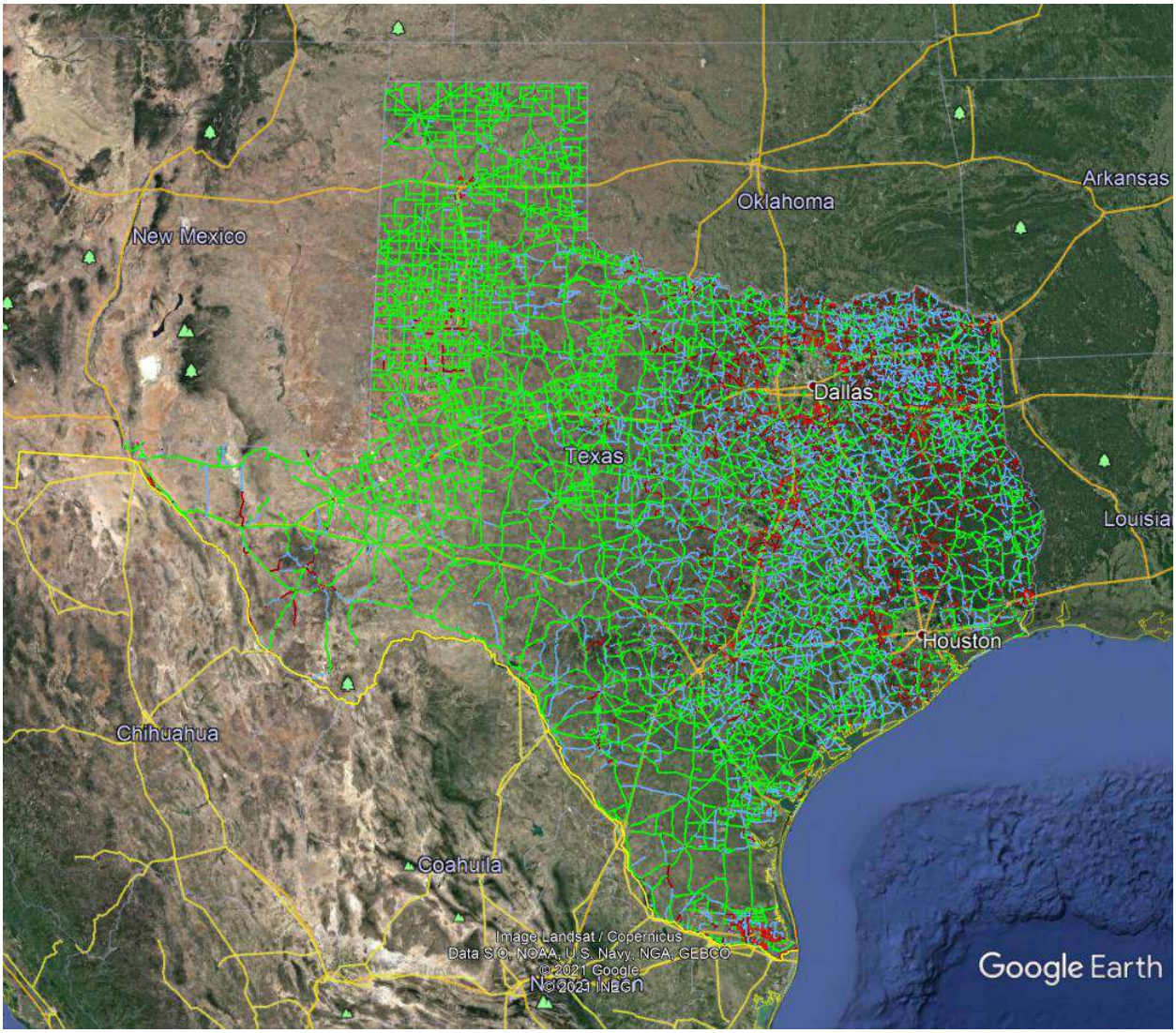


**Figure 1. Statewide On-System Potential for Improvement Classifications.**

## GOOGLE EARTH VISUALIZATION

### Google Earth Pro

Google Earth Pro (version 7.3.3.7786, Google LLC) is a data visualization and mapping tool. It is available at: https://earth.google.com/web/. Google Earth can be accessed via a web-based application, or it can be downloaded to a computer. Google Earth is powerful because any location in the world can be viewed at varying degrees of granularity from individual roadways and structures to a high-level global overview. Additional data can be imported into Google Earth Pro for tailored visualizations. Steps to using Google Earth Pro to use the visualization tool are listed below. Please note that it can take a while to load Google Earth Pro.

### Using the Potential for Improvement Mapping (PIM) / Risk Visualization Tool

The bullets below outline the steps for using the PIM tool from downloading Google Earth Pro to zooming in on specific roadway segments.

#### *Set up and Launch*

- Download & Install Google Earth Pro to your computer by navigating to: https://earth.google.com/web/. This may take a minute or two, depending on your machine configuration and internet connection **Figure 2** shows the download button.


**Figure 2. Downloading Google Earth Pro.**

- Once you have downloaded Google Earth Pro, close Google Earth Pro completely.
- Download and save all eight of the PIM Tool files into the *same folder* on your computer:
  - Region 1 – North
  - Region 2 – Southeast
  - Region 3 – South
  - Region 4 – West
  - Region 5 – Northwest

    - Region 6 – Central
    - Statewide
    - Legend File
- Click on one of the Region files to launch the PIM tool in Google Earth Pro. This may take several seconds to fully launch. It may at first appear to not be opening.

***Basic Operation***

Google Earth provides the platform for the visualization tool. Once installed as described above, the visualization tool itself can be accessed via a web-based application, or it can be downloaded to a computer. The visualization tool is available at:

Static Roadway Map Tool — Center for Transportation Safety (tamu.edu)

There are eight files for download, six region files replicating the six DPS Regions (described in the dashboard), a statewide file, and a Legend file.

For users whose interest is focused on a single DPS Region (i.e., law enforcement officers and agencies), the individual Region files load and respond more quickly. For a statewide focus, the statewide file includes the entire state. Either way, launching the file brings up the risk coded roadway network. However, there is no provision to select specific risk levels (hence "static"). All the Google Earth features are available including place names and searching capabilities. For quick reference, roadways are color coded to indicate risk level as noted previously.

**Figure 3** displays the location of the search field where locations can be entered and the layers section where layers can be turned on and off by selecting the check box. Leaving "terrain" turned and the other layers turned off is recommended.

- The tool operates on the Google Earth platform with all available search tools and layers.
    - The "Roads" layer adds yellow roadway segments on the road network with no PIM assessment (e.g., some county and city roads that are not on-system).
    - Be careful with the "More" layer. It has many sub-categories, slows Google Earth Pro down considerably and creates visual clutter.

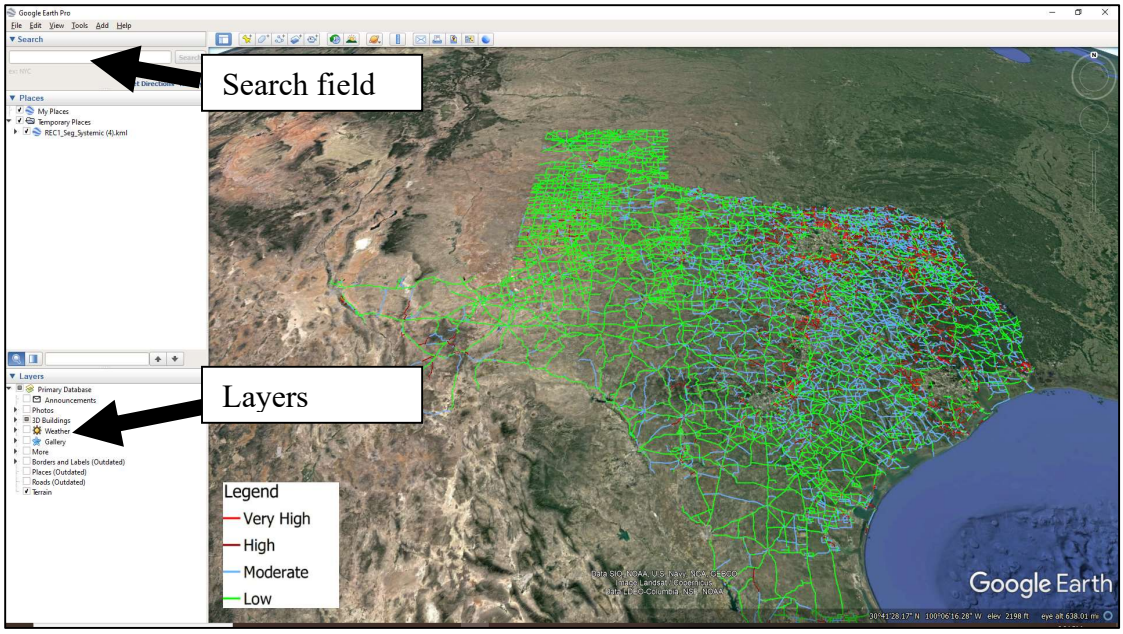


**Figure 3. Google Earth Pro Screen Showing Layers and Search Field.**

- The legend (**Figure 4**), at the bottom left of the screen, shows the roads with the assigned four color coded PIM score or risk categories. Roadway sections in the red categories of "Very High" and "High" could be prioritized for countermeasures including increased enforcement or engineering controls.

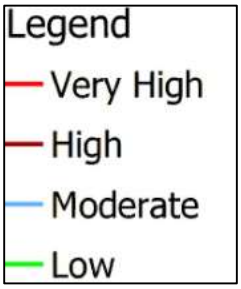


**Figure 4. PIM Score / Risk Categories.**

- Searches can be by cities, counties, roads, and other features. Google Earth Pro navigates to the search target and shows it in context of the surrounding area.
- Zoom in for additional geographic detail. Zooming in can be accomplished by scrolling the wheel on a mouse or by pushing the "+" sign on the keyboard. Similarly, pushing the "-" sign will allow for zooming out.
- The map can be moved to the left or right by pressing and holding the left mouse key and dragging the map or by pushing the right and left arrow keys on the keyboard.

*Examples*

- **Figure 5** displays the imagery that Google Earth Pro provides in response to searching on "Seguin". The Seguin area has roadway segments belonging to all five categories.

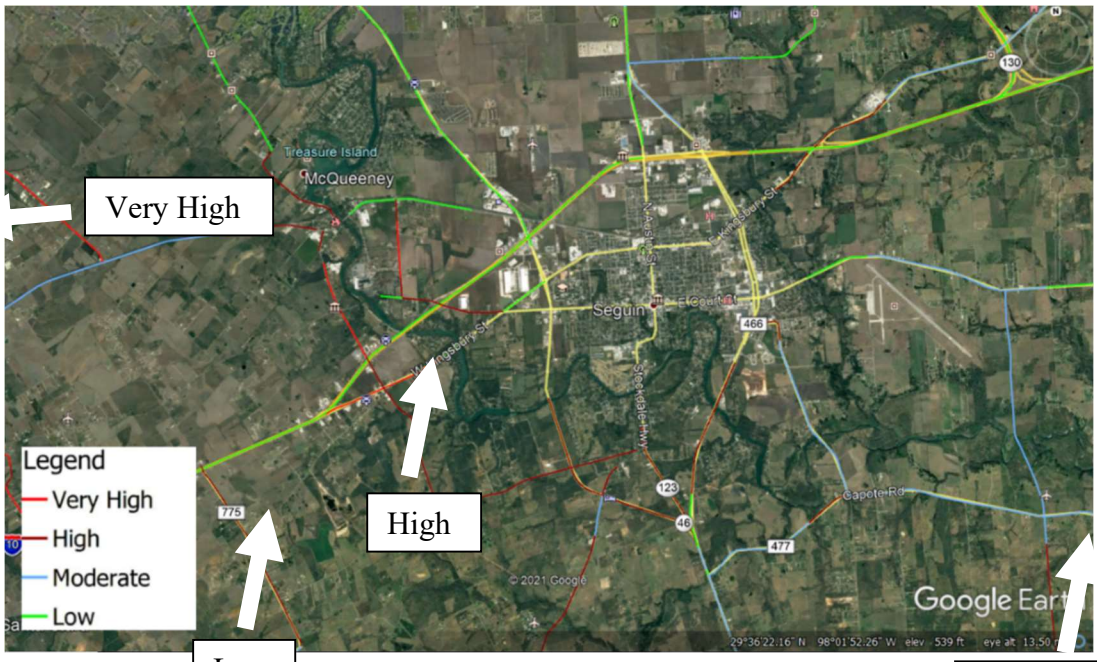


**Figure 5. Seguin Mapping Example.**

**Figure 6** shows an example of a pop-up for State Highway 46 near Boerne, Texas. Clicking on a color-coded roadway opens a pop-up with the key information for that segment, including:

- Segment identification code,
- DPS District,
- Roadway name,
- Area type,
- Truck average daily traffic (ADT),
- Truck ADT percentage,
- Number of lanes,
- Lane width,
- Posted speed limit, and
- Risk level category.

The risk level for this segment is "High"

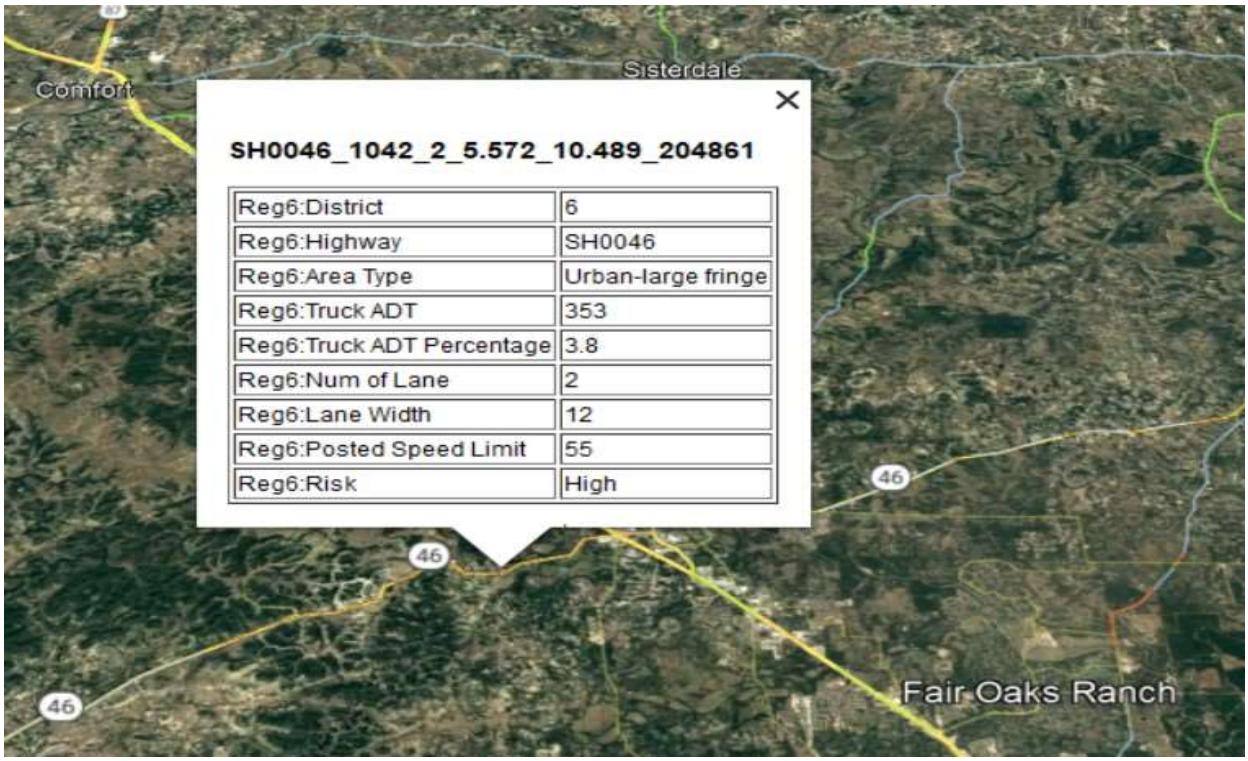


**Figure 6. Segment Pop Up Example.**

**Figure 7** shows the results of using the Google Earth search feature to locate New Braunfels, Texas. The risk level for this segment is "Very High".

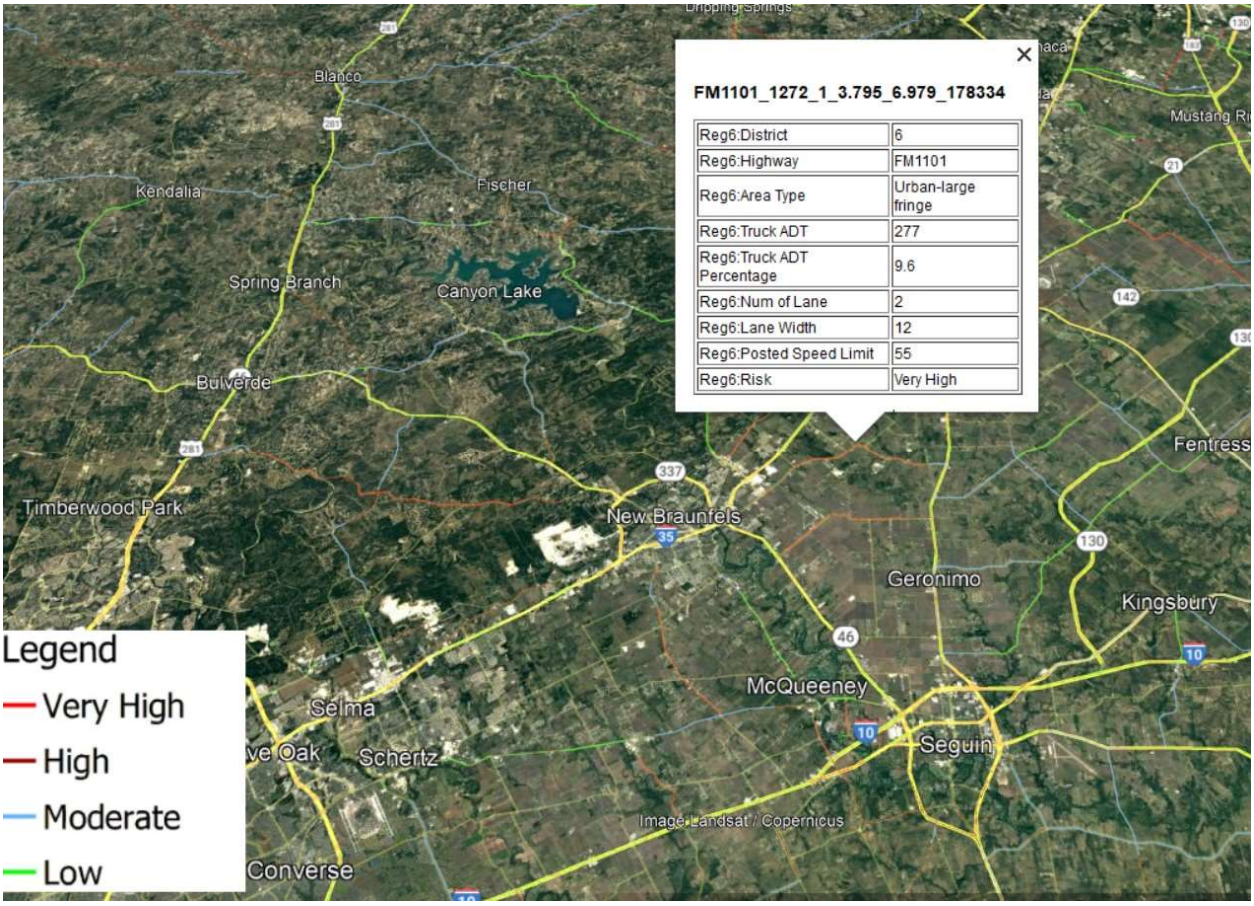


**Figure 7. New Braunfels FM-1101 Example.**

Note that, while all the features of Google Earth are available within the visualization tool, the "Save Image" feature of Google Earth does NOT capture the pop-up. Note also, when using one of the region-specific files, while the entire state is available, the risk visualization information is only available the region.