Investigating the Impacts of Truck Platooning on Transportation Infrastructure in the South-Central Region Dataset

Dataset available at: https://digitalcommons.lsu.edu/transet_data/84/

(This dataset supports report **Investigating the Impacts of Truck Platooning on Transportation Infrastructure in the South-Central Region**)

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The related final report **Investigating the Impacts of Truck Platooning on Transportation Infrastructure in the South-Central Region**, is available from the National Transportation Library's Digital Repository at https://rosap.ntl.bts.gov/view/dot/56563

Metadata from the LSU Digital Commons Repository record:

Document Type: Data Set

Publication Date: 10-2020

Abstract:

Truck platooning is an essential application of connected and autonomous vehicles, where several trucks are connected to each other forming a platoon. It is envisioned that truck platooning can assist in minimizing transportation challenges related to freight movements in the US by improving traffic operation, safety and reducing fuel consumption and emission. One of the most valuable truck corridors in the US is in the South-central region. This study investigates the impacts of truck platooning on US highways in that region using both corridor and network-level simulation analysis. Also, the impact of truck platooning on the pavement was quantified using finite element modeling.

A microsimulation model was developed in Vissim to model the operational, environmental (fuel savings, and emission), and safety impacts of various truck platooning scenarios at the corridor level. An economic feasibility study was also performed to quantify the impacts of truck platoons in monetary terms. The results of the analysis were compared with a base scenario with human-driven trucks. The microsimulation results suggest that truck platooning improved traffic operation, traffic safety, minimize vehicular emissions and fuel consumptions during off-peak hours. However, it deteriorates the traffic performance in the peak period if the truck platoon contains more than two trucks. Recommendations for the best truck platooning configurations during peak and off-peak hours were also provided based on the economic analysis.

In addition to the microscopic analysis, a large-scale analysis of the impacts of truck platooning on congestion and traffic flow dynamics is conducted. Accordingly, a simulation model of I-35 is developed and the impacts of various market penetration rates of truck platooning as well as the size of the platoon on traffic flow dynamics were explored. The findings show that smaller platoons and higher market penetration rates results in less scatter in flow-density diagram and smoother traffic flow.

Finally, the impact of truck platooning on pavement were also addressed using the elastic and dynamic-viscoelastic finite element method (FEM) models. The mechanical response obtained from the simulations are implemented to predict the effects of platooning due to limited wandering (lateral movement of truck tires). Based on the results, it can be concluded that wandering pattern can have influential effect on the fatigue life and permanent deformation damage. Economic analysis shows that the fixed-path platooning can significantly increase the construction-maintenance cost of the pavement.
Comments: Tran-SET Project: 19PITSLSU14

Recommended citation:
Hassan, H., Dessouky, S., Talebpour, A., & Rahim, M. (2020). Investigating the Impacts of Truck Platooning on Transportation Infrastructure in the South-Central Region. Retrieved from https://digitalcommons.lsu.edu/transet_data/84

Dataset description:
This dataset contains 1 file collection described below.

Investigating the Impacts of Truck Platooning on Transportation Infrastructure in the South-Central Data.zip:

- LSU data Truck Platooning Project.xlsx
- Final 'Effect of Platooning on Pavement Dataset' (UTSA).rar
    - Analysis Folder
        - Strains-backup – Final.xlsx
    - Dataset Folder
        - Master Curve Folder
            - SMA.xls
            - RBL.xls
            - PFC.xls
            - IH 35 SA_DM Data (version 1).xlsx
            - 1inchSFHMA.xls
        - MDD Folder
            - MDD Measurements-Final.xls
        - Temperature Folder
            - San Antonio_PP Temperatures.xlsx
        - Traffic Data Folder
            - IH-35 Traffic DATA.xlsx
    - Project's FEM Data Inputs Folder
        - FEM Reports Folder
            - Dynamic Folder
                - Single9000lb.rpt
                - Single11000lb.rpt
                - 1000lb Tridem.rpt
                - 4500lb Folder
                    - 4500lb Tridem.rpt
                    - 4500lb Tandem.rpt

        - 5250lb
            - Single5250lb.rpt
            - 5250lb Tridem.rpt
            - 5250lb Tandem.rpt
    - Tandem4500 Folder
        - Tandem4500inf100middleSMA.rpt
        - Tandem4500inf100middleSFHMA12.rpt
        - Tandem4500inf100middleSFHMA1.rpt
        - Tandem4500inf100middlePFC.rpt
    - Tandem5250 Folder
        - Tandem5220inf100topRBL.rpt
        - Tandem5250inf100middleSMA.rpt
        - Tandem5250inf100middleSFHMA12.rpt
        - Tandem5250inf100middleSFHMA1.rpt
        - Tandem5250inf100middlePFC.rpt
    - Tridem 1000 Folder
        - Tridem1000inf100topRBL.rpt
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        - Tridem1000inf100middlePFC.rpt
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        - Tridem4500inf100middleSFHMA12.rpt
        - Tridem4500inf100middleSFHMA1.rpt
        - Tridem4500inf100middlePFC.rpt
    - Tridem5220 Folder
        - Tridem5250inf100middleSMA.rpt
        - Tirdem5250inf100middleSFHMA12-correct.rpt
        - Tridem5250inf100middleSFHMA1.rpt
        - Tridem5250inf100middlePFC.rpt

The .xlsx and .xls file types are Microsoft Excel files, which can be opened with Excel, and other free available software, such as OpenRefine.

A .rar file is a compressed archive format that can be opened with WinRAR, and other available software (for more information on .rar files and software, please visit https://www.file-extensions.org/rar-file-extension). NTL staff was able to open it using SecureZip.

The .rpt file extension is frequently used for various reports - output files of programs, often used for further analyze. Probably the most common type of RPT format is the one exported by Crystal Reports. Other programs might also use rpt file extension for their reports, but it is mostly not always Crystal Reports format, unless the program is using the same reporting engine (for more information on .rpt files and software, please visit https://www.file-extensions.org/rpt-file-extension).

National Transportation Library (NTL) Curation Note:
As this dataset is preserved in a repository outside U.S. DOT control, as allowed by the U.S. DOT's Public Access Plan (https://ntl.bts.gov/public-access) Section 7.4.2 Data, the NTL staff has performed ***NO*** additional curation actions on this dataset. NTL staff last accessed this dataset at https://digitalcommons.lsu.edu/transet_data/84/ on 2021-07-15. If, in the future, you have trouble accessing this dataset at the host repository, please email NTLDataCurator@dot.gov describing your problem. NTL staff will do its best to assist you at that time.