



Transportation Consortium of South Central States

Key Points

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\$79,000

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Tran-SET
University of Texas at Arlington

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\$157,999

The Impact of Hurricane Harvey on Pavement Structures in the SE Texas and SW Louisiana

Brief Project Description

This study will evaluate the damage caused by Hurricane Harvey to road structures in the SE Texas and SW Louisiana by comparing the strength of pavement structures before and after the hurricane, as reflected by material properties and surface deflections. The damage evaluation will provide a quantitative estimate of the increased maintenance and rehabilitation costs for pavement structures in the regions, and will indicate the pavement structural configurations and material most affected by flooding. This will help highway, county, city and airport authorities in flood prone areas in their process of estimating maintenance and rehabilitation costs and of planning and designing a more resilient infrastructure.

Problem Statement

Hurricane Harvey is considered the worst natural disaster in the history of Texas. Harvey brought one of the most intense rainfall recorded in continental United States. In a four-day period, many areas received more than 40 in of rain as the system meandered over eastern Texas and adjacent waters, causing catastrophic flooding. With peak accumulations of 51.88 in, Harvey is the wettest tropical cyclone on record in the contiguous United States. The resulting floods inundated hundreds of thousands of homes, displaced more than 30,000 people, and prompted more than 17,000 rescues. Economic losses are preliminarily estimated at between \$70 to \$200 billion, with a large portion of the losses being sustained by uninsured homeowners.

Harvey induced major damage to the built transportation infrastructure, including roadways, street and airfield pavements. The pavements were damaged by the flood, which weakened and softened the unbound foundation layers of the pavement structures, and by the increased heavy truck traffic brought by the recovery effort; the SE Texas and SW Louisiana regions are home to many oil refineries, gas and oil extraction sites, chemical plants and many other industrial units.

Objectives



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The main objective of this study is to evaluate the damage caused by Hurricane Harvey to road structures in the SE Texas and SW Louisiana by comparing the strength of pavement structures before and after the hurricane. This will be accomplished through:

- *Literature search* – a literature search will be conducted to gather detailed information on previous and current studies that investigate the damaging effects of storms on pavement structures.
- *Planning of data collection* – this study will use pavement deflection data and material characterization data to evaluate pavement damage. It will require the collaboration of Texas DOT and Louisiana DOTD to identify pavement sections for which this information is available, to provide access to the data.
- *Field data collection* – the collection of deflection data, and all other information needed for evaluating the damage induced to the pavement structures by Hurricane Harvey.
- *Laboratory data collection* – laboratory tests to determine the properties of the subgrade soils will be conducted.
- *Data analysis*

Intended Implementation of Research

An important component of the implementation process will be the dissemination of findings through several seminars or webinars that will present the findings and discuss their significance to the transportation agencies. The use of the findings from this research will not require any additional resources or testing to be implemented by various transportation agencies. Therefore, the proposed methodology has a great potential to be easily transferred to practitioners at the state and local level.

Anticipated Impacts/Benefits of Implementation

The outcome of this study will help the south-central state DOTs and local agency officials make more informed decisions about the pavement structural configuration that are more resilient to the damaging action of hurricanes. It will allow a proper design of pavement structures, which will lead to longer life of road and street networks and of pavements used in General Aviation airports. Furthermore, it will provide solid evidence towards a risk-informed decision making process that will lead to more rational allocation of funding for the repair and maintenance of these pavements. This is urgent, given the climate changes recorded in recent years, that are expected to continue generate hurricanes in the Gulf region of the United States.

Weblinks:

- [Tran-SET's website \(http://transet.lsu.edu/research-in-progress/\)](http://transet.lsu.edu/research-in-progress/)
- [TBR's Research in Progress \(RIP\) database \(https://rip.trb.org/View/1505460\)](https://rip.trb.org/View/1505460)