

## Accepted Manuscript

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PII: S1996-6814(16)30186-9  
DOI: <https://doi.org/10.1016/j.ijprt.2017.09.018>  
Reference: IJPRT 136

To appear in: *International Journal of Pavement Research and Technology*

Received Date: 6 September 2016  
Revised Date: 1 September 2017  
Accepted Date: 15 September 2017

Please cite this article as: V. Khan, K.P. Biligiri, Evolution of tyre/road noise research in India: Investigations using Statistical Pass-By method and noise trailer, *International Journal of Pavement Research and Technology* (2017), doi: <https://doi.org/10.1016/j.ijprt.2017.09.018>

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## Evolution of tyre/road noise research in India: Investigations using Statistical Pass-By method and noise trailer

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**Abstract:** The objective of this research study was to investigate and analyze the acoustical characteristics of asphalt concrete and cement concrete surface types by two noise measurement techniques: statistical pass-by (SPB) and Close Proximity (CPX) methods. A noise trailer was devised and manufactured as part of the CPX methodology to evaluate tyre/pavement noise interaction at source. Two national highway test sections covering over 11 km of asphalt and cement concrete surfaces were selected to carry out the noise measurements, and the effects of vehicle speeds and/or sizes on the overall noise profiles were investigated. The major contribution of this first of its kind study in India was the utilization of sophisticated tools and techniques to measure the tyre/pavement interaction noise at source through CPX, which helped correlate the influence of road surfaces on the generation of overall road traffic noise using SPB technique. The SPB method noise profiles revealed that the noise pressure levels increased with increasing vehicle speeds and weights. The noise trailer CPX findings corroborated the results obtained from the SPB method in that cement concrete surface produced a higher noise at source than that of the asphalt concrete surface by about 5 dBA. Further, there was about 5 dBA differential in noise between SPB and CPX methods for cement concrete pavement sections; also, there was about 10 dBA differential in noise between the two methods for asphalt concrete pavement stretches.

Keywords: tyre/road noise; statistical pass-by; close proximity; noise trailer; asphalt concrete; cement concrete

### 1. Introduction

The global roadway noise “quality of life” issue has not only affected the developed countries but also is becoming an important problem in the emerging economies such as India that needs immediate attention. In the region, very limited research is available that targets the various aspects of highway noise, specifically, tyre/road noise characteristics. However, as in the various other facets of fundamental research, there is certainly a need to further evolve the nuances of tyre/road noise in countries such as India that are growing at a steadfast pace in association with ever-increasing traffic and struggling to cope with the need for better and smarter infrastructures. In fact, the Central Pollution Control Board of India through the Government of India Ministry of Science and Technology has set the vehicular noise standards to be less than 82 decibels for passenger cars in the ambit of traffic noise regulations and monitoring [1].

In recent times, roadway traffic noise has been controlled in two ways [2]: (a) increasing the distance between the source and receiver, and (b) inserting an obstruction such as a noise barrier

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