Research on long-term pavement performance earns PhD student first place honors

PhD student Muhamad Munum Masud, and his advisor Associate Professor Syed Waqar Haider, of the Department of Civil and Environmental Engineering earned an international award in the Transportation & Development Institute of the American Society of Civil Engineers-LTPP International Data Analysis Contest. The competition is also sponsored by the Federal Highway Administration (FHWA).

The authors won first place in the graduate category and will be recognized at the 2019 Transportation Research Board (TRB) 98th annual meeting in Washington, D.C. in January.

Masud will also be awarded $1,000 and all travel expenses to attend and present the research paper on long-term pavement performance at the TRB meeting. FHWA will publish the paper and make it available to researchers worldwide.

The title of the paper is “Use of LTPP SMP Data to Quantify Granular Base Moisture Impacts on Fatigue Cracking in Flexible Pavements.”

Paper Abstract

Moisture increase in pavement subsurface layers has a significant influence on granular materials properties and affect expected pavement performance. The moisture variations over time in the base layer significantly depend on water infiltration after precipitation and pavement surface conditions.

Consequently, base layer resilient modulus (MR) is decreased considerably, which leads to premature failure and reduced service life. This paper presents Long-term Pavement Performance (LTPP) data analyses for quantifying the effect of moisture infiltration through surface cracking on flexible pavement performance.
Subsurface moisture data obtained through the Seasonal Monitoring Program (SMP) time domain reflectometry (TDR) instrumentation are an excellent source to quantify the moisture-related damage in different climatic regions.

The MR of the base decreases with an increase in the moisture. However, the reduction in base MR is about 2 to 13 percent and 93 to 175 percent for the pavement sections located in the dry freeze (DF) and wet freeze (WF) regions, respectively.

The primary reason for higher moisture variations in WF climates is more surface cracking coupled with higher precipitation levels. Due to increased moisture and corresponding base MR values, the performance of pavement sections located in WF climates is adversely affected.

The findings imply that adequate and timely preservation techniques such as a crack sealing can enhance the pavements service life significantly, especially in WF climates. Therefore, cracks should be sealed when the extent of wheel path (WP) fatigue cracking is below 6 to 7 percent.

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