Accelerated Load Testing of Full-Scale Flexible Pavements Constructed of CCPs under Adverse Environmental Conditions

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Abstract: Increasing environmental concerns and diminishing landfill space coupled with the rising costs of natural resources consumed in road construction have encouraged researchers to investigate the use of recycled materials in pavement design. In this investigation, three full-scale asphalt pavement sections, two sections made with recycled Coal Combustion Products (CCPs) and one conventional section were tested under accelerated loading. In the previous phase of this study, both ambient temperature and moisture were controlled throughout the loading period. It was found that the two CCP sections showed similar or better performance than the control section while all three sections performed well after one design life equivalent to 20 years of traffic on a typical state route in Ohio. In this study phase, adverse environmental conditions (moisture infiltration, freeze-thaw cycling, and elevated temperature) were introduced to all three sections to simulate the effects of climatic conditions typical for Ohio. Pavement response, performance, and environmental conditions were monitored. Based on the data collected, the two CCP sections showed better resistance to the adverse environmental conditions than the control section. At the most intrusive environmental conditions, the backcalculated moduli of base/subbase of CCP#1 and CCP#2 sections from Falling Weight Deflectometer testing were more than four (CCP#1) and eight (CCP#2) times higher than that of the control section. At the end of test program, the rut depth of the control section was more than twice as high as that measured in the CCP sections.

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