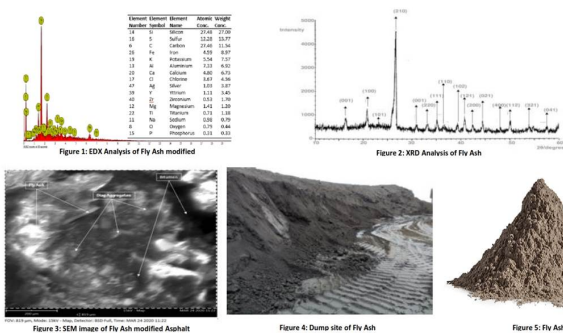


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Research Paper

Performance of Fly Ash as Replacement for Non-Renewable Constituent in Asphaltic Concrete for Road Development

Chukwuka E, Olugbenga O, Olufikayo A and Isiaka OO.

J. Civil Eng. Urban., 11(4): 25-33, 2021; pii:S225204302100004-11

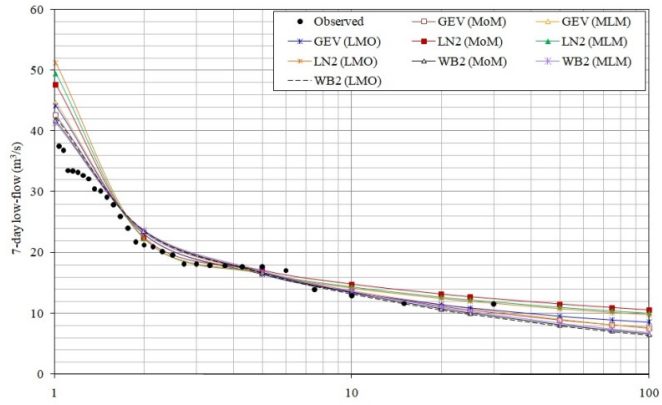
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Abstract

The non-renewable constituent used in asphalt concrete consumed large amount of materials resulting an increase in the price of asphalt mixture and consequently the cost of road development. On the other hand, huge industrial waste being generated daily from human activities causes environmental degradations. Thus, the study evaluates the performance of fly ash (FA) in asphalt concrete development targeted for road application. The aggregate, bitumen, and fly ash were characterized before being used. The stone dust in asphalt mixture was replaced with FA in predetermined proportions of 2, 4, 6, and 8% to produce a cylindrical specimen of asphalt mixture concrete. Marshal stability test, flow test, X-ray diffraction (XRD), X-ray Fluorescence (XRF) and Scanning Electron Microscope (SEM) was conducted on the composite samples. From the results, stability values of 7.39, 7.70, 7.90 and 8.22 KN was obtained at 2, 4, 6 and 8% replacements, respectively. Hence, the optimum value of 8.22 KN obtained from 8% partial replacement with FA is adequate for heavy traffic while other partial replacement from 2- 6% with stability within the range of 7.39-7.90 KN is suitable for medium traffic in accordance with the criteria for the marshal mix design method provided by Asphalt institute (1997). Corresponding values of 3.7, 3.5, 3.3 and 3.0 mm was obtained for the flow. The flow, air void, void in mineral aggregates and void filled with bitumen results all satisfied Nigeria general specification for road and bridges (1997). Therefore, fly ash can be used as partial replacement in asphaltic concrete to enhance the performance of the mix with a reduced cost for pavement construction.

Keywords: Asphalt Concrete, Fly Ash, Road, Stability, Transportation

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