

# **Geotechnical Properties of Power plant Ash and Re-cycled Plastic Waste Modified Bitumen on Asphalt Pavement**

**Felix Okonta and Langeriwa Mthombeni**

Department of Civil Engineering

University of Johannesburg

South Africa, 2000

fnokonta@uj.ac.za, lmthombeni@jra.org.za

## **Abstract**

The study reviewed various Asphalt performance modes to identify key failure modes and possible mitigation mechanism. The failure modes are analyzed on both high and low weather conditions. The main failure modes under discussions are rutting and cracking which arises under two weather conditions hot and cold weather respectively. A research site (for the development of instrumented pavement test strips) of 3.4 m lane road of 0.5km has been identified on two strategic regions to gather data under various traffic conditions for both winter and summer. The preliminary laboratory results indicate between 10-15 % reductions in Bitumen quantity per ton of Asphalt which approximately equate to 8 – 12% reduction in costs. (0.625 plastic -fly ash ratio)The elastic modulus improves by 5-8% due to Fly Ash enhancing the asphalt flexibility, its temperature range and susceptibility to thermal cracking. The plastic increases rheological properties of Asphalt. The study focuses on sustainable alternatives or combinations of innovative materials which are cost effective and environmentally friendly to improve the performance and durability of Asphalt materials for various application i.e. design, construct and maintenance. The instrumented pavement test strips are vital for field performance simulation and evaluation.

## **Keywords**

Fly Ash, Thermal Cracking, Rutting, Plastic Waste, Green economy.

## **Acknowledgements**

Prof Felix Okonta for the academic mentorship, Pro Naidoo, Rami Kobela and City of Johannesburg for the opportunity and support, Mr Muziwandile Nkonyane for constant support and guidance, Mr Siyabonga Nodu for motivation ,Mr Erick Tshikhudo and Mr Puleng Mokgohloa for teamwork, Mmabatho Mothoa for encouragement and Johannesburg roads agency A/CEO Musa Mkhacane for inspiration.