



*Enhancing Geotechnical Properties of Expansive
Soil through Geopolymer Blended with Rice Husk
Ash and Metakaolin:
A Sustainable Approach for Soil Stabilization*

Zeeshan Adib Ahmed^{1*}, Dr. Sunil B. Somani²

*¹Ph. D Scholar, Department of Civil Engineering,
Babasaheb Naik College of Engineering, Pusad, Maharashtra, India
E-mail: zeeshan1794@gmail.com*

*²Principal, Shri Sant Gajanan Maharaj College of Engineering,
Shegaon, Maharashtra, India*

<https://zenodo.org/deposit/7997285>

** Corresponding author: Zeeshan Adib Ahmed*

Abstract:

Soil stabilization involves enhancing soil's stability and engineering characteristics, which can be achieved through mechanical or chemical methods. Extensive research has been conducted to explore traditional and modern techniques for stabilizing soil subgrade, particularly in road construction projects where a large surface area interacts with the soil. Geopolymers have emerged as a promising alternative for soil stabilization, offering the potential to reduce resource exploitation and environmental pollution while improving the engineering performance of expansive soils. This study focused on investigating the effects of a geopolymer mixture consisting of rice husk ash and metakaolin on various geotechnical properties of natural and admixed black cotton soil. Experimental tests were conducted by replacing the soil with varying proportions of the geopolymer blend, ranging from 0% to 30% by weight. The findings consistently demonstrated that the incorporation of geopolymer as a soil stabilizer effectively enhanced the geotechnical properties of problematic soil. Moreover, geopolymer exhibits sustainable characteristics and cost-effectiveness, which can lead to cost savings in road construction projects.

Keywords:

Soil Stabilization, Geopolymer, Rice Husk Ash, Metakaolin, Expansive Soil