National Institute of Technology Rourkela

Registration Seminar

Seminar Title	: Experimental and Numerical Evaluation of Stability in Retaining Walls Filled with Iron-Ore-Tailings
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Venue	: Seminar Room, Mining Engineering Department
Date and Time	: 02 Jul 2025 (10.30 a.m.)
Abstract	: Iron Ore Tailings (IOTs), the by-product of beneficiation processes, represent a major solid waste challenge in iron ore-producing nations. With increasing mining activities globally and mounting concerns over tailings dam failures, there is a pressing need to explore sustainable disposal and utilization alternatives. This research critically investigates the potential use of IOTs as an eco-friendly and structurally competent backfill material for retaining wall systems. The study involves comprehensive characterization of IOTs sourced from Barsua and Bolani iron ore mines in India. Laboratory tests assessed physical, chemical, mineralogical, and geotechnical properties, including particle size distribution, specific gravity, compaction characteristics, permeability, and shear strength. Chemical leaching and physicochemical analyses confirmed the environmental safety of IOTs, with all toxic elements found within permissible limits. Three distinct mix designs were proposed for future analysis and a comparative analysis of 100% IOTs material with conventional sand backfill using Slide2 (LEM) and RS2 (FEM) software revealed that IOTs consistently outperformed sand in both Factor of Safety (FoS) and Strength Reduction Factor (SRF), even under saturated conditions. The findings demonstrate that IOTs can serve as a reliable substitute for natural backfill materials in retaining walls, offering high shear strength, structural stability, and environmental compliance. This contributes not only to waste valorisation and resource conservation but also to the advancement of sustainable geotechnical engineering practices in the mining sector.

Keywords: Iron Ore Tailings, Retaining Wall Backfill, Sustainable Construction, Geotechnical Properties, Numerical Modelling, Mix Design, Waste Utilization