ABSTRACT

The vast world population growth necessitates development of infrastructures such as buildings, bridges, and railways. Concrete, which is a composite material, due to it high durability, versatility and strength is highly preferred for construction of such structures. Concrete is primarily composed of water, cement, and aggregates. While aggregates control the volume stability of the concrete cement binds the materials and controls the strength. Although cement is an important ingredient, its production is associated with emission of carbon dioxide gas, the gas which is linked to the climate changes. Carbon dioxide is formed from decomposition of limestone to produce clinker and burning fuels at about 1450oC for the process. It is therefore important to find alternative binder systems which require low clinker and energy demand without compromising the resulting low clinker cement products. Researchers suggest that above lowering the cement content (clinker factor) the cement content may further be reduced by optimizing the mix design, particularly the particle parking. The research will focus on performance assessment of a reduced clinker factor ternary mixes. Calcined clay and low-grade limestone will partly replace cement in concrete and the mechanical and durability aspects of the resulting concrete will be examined. The assessment will base on both laboratory testing and the environmental exposure of the specimens.