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STUDIES ON CORROSION OF REINFORCED GEOPOLYMER CONCRETE BEAMS

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Abstract— Geo polymer concrete production and utilization reduces the Cement production and associated CO₂ emission which pollutes the atmosphere. Corrosion of reinforcement has been established as the predominant factor causing wide spread premature deterioration of concrete construction worldwide, especially of the structures located in the coastal marine environment. Corrosion of steel reinforcement bar embedded in geo-polymer material has been an object of study to confirm its technical viability.

Reinforced cement concrete and geo-polymer concrete beams has been casted for M30 grade. After 28 days of ambient curing, RCC and GPC beams were subjected to 0 %, 5%, 7.5% and 10% of corrosion by accelerated corrosion test. Corrosion current rate was varied from 1mA/cm² to 4mA/cm². Ultrasonic pulse velocity test were conducted on RCC and reinforced GPC beams. Flexural behaviour of corrosion induced RCC beams and reinforced GPC beams were studied. Initial crack load, ultimate load & deflection were determined.

Ultimate load carrying capacity of beams was decreased with increase in degree of corrosion and maximum reduction rate was about 75% at 10% of degree of corrosion. At low degree of corrosion (5%), corrosion current density up to 2mA/cm² had negligible influence on reducing the flexural capacity of corroded beams. At a high degree of corrosion (10%) and at corrosion density of 4mA/cm², the flexural strength of corroded beams reduces by about 55% of flexural strength of control beam. Residual moment capacity of GPC beams was higher when compared to RCC beams.

Keywords— Geo polymer, Corrosion, Flexural behaviour, Ultrasonic pulse velocity, crack load, Residual moment capacity.

STUDY ON TUNNELING INDUCED GROUND MOVEMENT ON ADJACENT PILE FOUNDATION

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Abstract— Tunneling activities carried out adjacent to these pile foundations invariably cause ground movements, which in turn will impose axial and lateral forces on the pile foundations. A prediction of the ground deformation due to tunneling is necessary to assess potential damage to those existing structures. The study focuses on the estimation of ground movements induced by tunneling (only horizontal displacements) and the imposition of these soil movements on the pile and the consequent pile responses. Tunneling induced behavior of piles was compared with PLAXIS software. A experimental study was carried out for short pile in loose and dense sand. 1g model was fabricated and the pile was placed at various distances from the tunnel for each set of experiments. The pile head deflection for shorter piles is more in case of loose sand whereas it is appreciably less in case of dense sand.

Keywords—Tunnel, Pile Foundation, Ground Movements, 1g model, Pile head deflection, FEM Analysis