

Paper 2-STRENGTH BEHAVIOR OF SOIL REINFORCED WITH POLYPROPYLENE AND COIR FIBER

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ABSTRACT:The strength and compressibility characteristics of local available soil reinforced with randomly distributed discrete fibers are investigated. Polypropylene (synthetic) and coir (natural) fibers, available locally at very low cost are used as reinforcement. The lengths of fibers considered in the investigation are 15 mm, 20 mm and 25 mm which give aspect ratios of 75, 100 and 125. The investigation is made through a series of compaction tests, unconfined compression tests, direct shear tests, triaxial compression tests, CBR tests, field plate load tests and consolidation tests on unreinforced and fiber-reinforced soil, with variation in fiber content and fiber length. The optimum moisture content (OMC) and maximum dry density (MDD) of the soil reinforced with fibers (0 to 1% with an increment of 0.1% and 0.2% to 1.6% with increment of 0.2% by weight of oven-dried soil for polypropylene and coir fibers respectively) are determined in the range of fiber lengths mentioned above by standard Proctor compaction tests. It is observed that the unconfined compressive strength (UCS), the strain at failure, the shear parameters (cohesion and angle of internal friction) of fiber-reinforced soil is greater than those of the parent soil. The UCS, cohesion, and angle of internal friction of fiber-reinforced soil exhibit an initial increase followed by decrease with increase in fiber content and fiber length. Similar trend is also observed in the failure deviator stress and soaked CBR values with increase in fiber content and length. From the above investigation the optimum fiber content is found to be 0.4% and 0.8%, by weight of dry soil for polypropylene and coir fibers respectively. However, the optimum fiber length is observed to be 20 mm for both the fibers investigated. Inclusion of fibers in soil increases the strain at failure thereby making the reinforced soil matrix more ductile.

KEYWORDS: MDD, OMC, Soil, Fiber, CBR, Optimum Fiber

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