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UPLIFT RESISTANCE OF GRANULAR ANCHORS IN CLAY UNDER UNDRAINED CONDITION

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EXTENDED ABSTRACT

Granular anchors (GAs) are a relatively new concept in ground engineering and can be used to resist uplift/pullout forces and compressive forces in addition to the ground improvement provided. The GA consists of three main components: a base plate; tendon and compacted granular backfill. Under direct pullout loading, the vertical centrally-located tendon transmits the anchor load applied at the ground surface to the column base via the base plate, compressing the granular column, causing significant dilation of the granular material to occur, thereby forming the anchor. In this study, experimental field tests in intact lodgement till and numerical analysis were performed to investigate the load–displacement behaviour, modes of failure and ultimate pullout capacity of these anchors for the undrained (short-term) condition. The pullout capacity is increased by increasing the anchor surface area either by increasing the anchor length L and/or diameter D. The GAs displaced

significantly under loading, with pullout failure generally occurring for anchor displacements of ≥ ~ D/2. The numerical analysis confirmed that the applied tension load was simultaneously resisted by localised bulging in the vicinity of the column base and by shaft resistance mobilised along the column length, with the dominant failure mode governed by the column L/D ratio. Short GAs (L/D < ~7) principally failed in shaft resistance whereas structural failure of the column occurred for deep GAs (L/D > 7) by localized end-bulging, concentrated over a length of approximately 2–3 D from the column base.

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