

## Chapter 14

# Effect of Slope Inclination on $V$ - $H$ and $V$ - $M$ Capacity Envelope of Strip Foundation on Undrained Clay Slope



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## Introduction

The shallow foundations are generally subjected to a combined action of gravity (axial) and wind or earthquake or tidal wave (lateral) loads, depending upon the construction environment. A complex interdependency between these loads, vertical load,  $V$ , horizontal shear force,  $H$ , and moment,  $M$ , make the bearing capacity estimation even more complex. Current code of practice and standards [1–4] recommend traditional method for the bearing capacity estimation of shallow foundations and to incorporate the effect of shear force and bending moment along with vertical force; different correction factors ‘load inclination factor’ and ‘eccentricity’ are used, respectively [5].

To deal with the shallow foundation under complex interactive loads, the capacity envelope method has been generally preferred to check the stability of foundation located on flat ground [6]. Initially, Ukritchon et al. [7] estimated the undrained capacity and failure patterns of shallow strip footing placed on flat ground which consists of cohesive soil using finite element limit analysis (FELA). Later on, the capacity envelope of a shallow foundation on flat ground was estimated by several researchers [6, 8–12]. In reality, the shallow foundations are frequently placed on or near the slope to support the connecting structure like buildings, bridges, etc., and are subjected to complex planar interactive loads. In the past, Georgiadis [13] has performed a numerical study using finite element (FE), upper-bound plasticity and stress field methods to develop  $V$ - $H$  capacity envelope of foundations located on top

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