

SEISMIC BEARING CAPACITY OF SHALLOW FOUNDATION WITH BASE INCLINATION

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ABSTRACT

The determination of seismic bearing capacity for strip footings with base inclination is the aim of this paper. For this purpose, a limit equilibrium based method is used. The seismic force is considered as pseudo-static forces acting on both footing and soil and determined. To obtain the ultimate bearing capacity, an imaginary retaining wall is assumed to pass the footing wedge and the lateral earth pressure exerted on the wall in active and passive conditions are determined. The bearing capacity factors are computed for various values of soil friction angle, seismic acceleration coefficients in horizontal and vertical directions, foundation inclination. The effects of various parameters on the seismic bearing capacity factors have been studied. The results obtained from the present method are compared with other available methods, confirming the reliability of the developed method.

INTRODUCTION

The determination of bearing capacity of shallow foundations basically is principle in geotechnical engineering. Limited studies have been carried out for estimating the seismic bearing capacity of strip footings with base inclination. Most of analyses were carried out for static situation.

Some researchers including Sarma and Iossifelis (1990), Budhu and Al-Karni (1993), Richards et al. (1993), Dormieux and Pecker (1995), Paolucci and Pecker (1997), Soubra (1997, 1999), Kumar and Rao (2002), Kumar (2003), and Choudhury and Subba Rao (2005) have studied the seismic bearing capacity of shallow footings for the horizontal ground. However, for sloping ground, data are very limited. Sawada et al. (1994), Sarma (1999) and Askari and Farzaneh (2003) have presented solutions for seismic bearing capacity of shallow foundations near sloping ground. Recently, Choudhury and Rao (2006) carried out the analysis for seismic bearing capacity factors of footings constructed on slopes.

The method used in the current paper was initially developed by Richards et al. (1993) for footings on homogeneous granular soil and extended to two layered granular soil by Ghazavi and Eghbali (2008), and Ghazavi and Salmani (2012) for frictional-cohesive soil. Salmani and Ghazavi (2013) have extended the imaginary retaining wall method for foundation base inclination.

This paper presents a simple method for determination of the seismic bearing capacity of strip footings with base inclination on granular soils. For this purpose, an imaginary retaining wall is assumed the vertical direction along the edge of the footing (Fig. 1). The lateral earth pressures exerted on the wall in active and