

BEHAVIOR OF SOIL NAILED WALLS UNDER CYCLIC DYNAMIC LOADS WITH FINITE ELEMENT METHOD, CASE STUDY

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ABSTRACT

Soil nailing is a very versatile excavation retaining system suitable for deep excavations in urban areas surrounded by major structures. In this study the behaviour of a deep excavation of a huge structure in the East of Tehran that stabilized by combination methods of nailing and anchoring system has been studied.

Soil nail wall used on this projects are subjected to harmonic dynamic loads due to heavy machinery and industrial plants nearby soil nail wall. The behavior of soil nail wall is investigated in the following sections with respect to the variations frequency. Effects of the pretention force in anchors on the maximum displacement and effects of the amplitude on the maximum displacement are evaluated.

INTRODUCTION

Soil nailing is an innovative and cost-effective retaining system for deep excavations in steep slopes. The native soil is strengthened by placing steel rods into holes drilled into the walls and grouted. When compared to the conventional retaining wall system, soil nail wall construction requires less space and hence suitable for an urban area where excavations are surrounded by structures. It does not have any potential impact on environment during and after construction. The soil nailing technique can also be used for underground construction. The case histories are available in literature which shows the successful application of the soil nailing for in-situ ground modification.

In the present study the behaviour of a deep excavation of a huge structure in the East of Tehran that stabilized by combination methods of nailing and anchoring has been studied. The height of soil nail wall is 16 m as shown in Figures 1. Soil nail wall used on this projects are subjected to different loads during their service life. Typical applied loads are dead loads which include weight of the soil nail wall system, lateral earth pressure and the harmonic dynamic loads due to heavy machinery and industrial plants nearby soil nail wall. The dynamic loads applied with different frequencies and determine the resonant frequency of soil nail wall.

Many investigators (Chin, 2005 and Dodagoudar, 2010) have proposed soil nailing technique as a suitable method for stabilising vertical/nearly vertical excavations. Carla and Donatella (2008), Muthukumar and Premalatha (2009) and Gosavi et al. (2009) presented an overview of experimental studies conducted on