

## Application of Composite Soil Nailing Structure

Danial Hadizadeh Bazzaz<sup>1</sup>, Mahmood Vafaeian<sup>2</sup>, Masoud Mirmohammad Sadeghi<sup>3</sup>

1- Young Researchers Club, Najafabad Branch, Islamic Azad University, Najafabad, Isfahan, Iran

2- Professor of Isfahan University of Technology, Dept. of Civil Eng.

3- Assistant Professor of Isfahan Higher Education and Research Center of Water and Power

### ABSTRACT

At the present one of the important concerns in urban constructions includes the safety of adjacent buildings next to the excavation sites. Composite soil-nailing combined soil nails with other forms of supporting measures has avoided the soil-nailing technology from excessive dependence on the soil and expanded its application field. Among the different kinds of composite soil-nailing forms, the anchor composite soil-nailing support method is widely applied for its powerful location adaptability and easy construction. Soil nailing as a method of soil reinforcement in situ has been increasingly used to stabilize steep slopes in open deep excavations. There are several methods, based on the limit equilibrium approach, available for the analysis and design of nailed soil structures. A prestressed grouted ground anchor is a structural element installed in soil or rock that is used to transmit an applied tensile load into the ground. Grouted ground anchors, referenced simply as ground anchors, are installed in grout filled drill holes. The prestress was applied in prestressed anchor cables of composite soil nailing supporting structure. To a certain extent, the effect of stress releasing was offsetted for the slope of the soil excavated, the soil was compressed, shear strength of the soil improved, and the soil deformation was limited effectively. The aim of the present study is paying attention to this new concept. In the present article, after a brief introduction for both methods of nailing and anchorage, and also some primary discussion on the combinatory method, then the results of our present analyses on the different types of combinations are presented and discussed. Horizontal displacement of composite soil nailing supporting structure with prestressed anchor cable was reduce, without apparent instantaneous excavation effect, it was more helpful to reduce deformation of foundation pit slop for closer to anchor cable.

**Key Words:** nailing method, anchorage method, the composit soil nailing method, optimization

### 1 INTRODUCTION

At the present one of the important and greatest concerns in urban constructions includes the security and protecting the adjacent buildings next to the excavation sites. If the necessary appliances or procedures are not used or considered in protecting the excavation and the adjacent structures, then irreparable losses will arise, such as the reduction of loading capacity, great subsidence and the deformation. In order to prevent such problems it is needed to provide a secure and stable condition for protecting the adjacent construction, first. The nailing method has remarkable advantages. With its performance rapidity, reasonable costs, quick and easy adaptability with the conditions in different sites, no need to heavy machineries, this is one of the stabilizing methods. Among the other methods of stabilizing of the earth wall is using the stabilizing method with anchorage. The procedure which has been focused in recent years for stabilizing trenches and deep walls is the combinatory method of nailing and anchorage procedures. This combinatory method is a new one in which, both nailing and anchorage are contemporary applied in the excavation walls. By using this method a greater safety factor is obtained, less deformation and