Available online at www.CivileJournal.org

Civil Engineering Journal

Vol. 4, No. 9, September, 2018

The Effect of Soil around the Basement Walls on the Base Level of Braced Framed Tube System

Mohammad Sadegh Barkhordari [a*], Mohsen Tehranizadeh [b]

[a] *Master of Civil Engineering, Department of Civil and Environmental Engineering, Amirkabir University of Technology, Tehran, Iran.*

[b] *Professor, Department of Civil and Environmental Engineering, Amirkabir University of Technology, Tehran, Iran.*

Received 12 June 2018; Accepted 06 September 2018

Abstract

According to the 2800 standard, the Iranian code of practice for seismic-resistant design of buildings, the base level refers to the level at which it is assumed that the horizontal movement of the ground is transmitted to the structure. In cases that there are reinforced concrete walls being run by an integrative structure in the underground perimeter, and the surrounding ground is dense and compressed, the base level is considered on the top of the basement wall. In tall structures, due to strong forces and moments at the foot of the structure, examining the location of base level and its movement becomes specially important. The aim of this study was to investigate the impact of changing the properties of the soil around the underground perimeter walls on the base level, taking into account the effects of soil-structure interaction systems. In this regard, the soil-structure system was investigated in two-dimensional models and the location of the base level was identified using shear and drift changes. The results indicated that taking into account the level of the upper stories is possible through performing appropriate walls integrated with the structure even without Compacting the soil around the structure.

Keywords: Base Level; Braced Framed Tube System; Soil-Structure Interaction; Near-Field Earthquake; Finite Elements.

---

1. Introduction

The progress and evolution of dynamics of structure on the one hand and information from recorded earthquakes, on the other hand, have shown that several factors are effective in determining the force of the earthquake. Some of these factors, such as period, mode shape and the structure capacity to embrace plastic deformation, are obtained from the dynamic properties of structures. Other factors such as soil type and the local seismicity can also affect the force of the earthquake. There are three systems that the interaction between them can affect the response of the structure. These systems are: the soil underlying and surrounding the foundation, the foundation, and structure. Numerous studies have attempted to explain and evaluate the collective response of these systems to a specific ground motion. Mirzaie et al. [1] employed a probabilistic approach to study the phenomenon of dynamic soil- structure interaction (SSI). The main aims of their research were as follow: First, considering the prevailing uncertainties in order to study the inelastic response of the structure and SSI, second, evaluating the practicing SSI provisions of the current seismic design codes on the structural performance. They found that SSI increases the ductility demand of structures (built on the flexible soil in reality) designed based on the conventional fixed- based assumption. Bathurst et al. [2] revisited model type, bias and input parameter variability on reliability analysis for simple limit states in SSI problems. They derived the formulation for the true probability of failure of a simple limit state function. Their general closed-form solution considers contributions due to model type, uncertainty in estimates of nominal values for correlated and uncorrelated load, and

---

* Corresponding author: m.s.barkhordari@aut.ac.ir

http://dx.doi.org/10.28991/cej-03091139