

EVALUATION OF THE EFFECTIVENESS OF RISK REDUCTION MEASURES FOR EARTHQUAKE ASSOCIATED GEO-HAZARDS IN TEHRAN

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ABSTRACT

Tehran is located in a seismic prone zone in north central part of Iran along Alpine-Himalayan orogenic belt. The city has experienced many destructive earthquakes in its history and it is expected to be affected by strong earthquakes in future as well. Considering the geological setting of this city, it is expected that any potential earthquake in Tehran may associate with some geological instabilities. In this paper, the potential geo-hazards that may associate with earthquake in Tehran including ground motion amplification due to site effects, slope instabilities (landslides and rock-falls), liquefaction and land subsidence due to collapse of existing Qanats (underground irrigation tunnels) will be introduced. In addition some measures to reduce the potential impacts of such hazards will be presented and discussed. Furthermore, the criteria for controlling the growth of the city towards hazard zone that have been reflected into the Master Plan of Tehran will be also introduced.

INTRODUCTION

Tehran, the capital of Islamic Republic of Iran, is located in a seismic prone zone along the Alpine-Himalayan Orogenic belt. As shown in Figure 1, the city has been surrounded by several active faults and experienced numbers of strong earthquakes in its history. Seismologists believe that a strong earthquake may occur in Tehran during the coming years. On the other hand, most of the researches carried out during the recent years; depict the high vulnerability of buildings and infrastructures to potential earthquakes. Therefore, in case of occurrence a strong earthquake, considerable loss and damage can be expected (CEST and JICA, 2000).

Besides of vulnerability of the built environment in Tehran to potential earthquakes, geological hazards such as liquefaction, landslide and rock fall which can be induced or triggered by earthquake motions; may also increase the damages of urban fabrics in the city. Considering the geological setting and topographical condition of Tehran and this fact that many buildings in the city are constructed on unstable ground, and based on what experienced in recent earthquakes in Iran (especially in Manjil, 1990 and Firouz Abad-Kojour, 2004 earthquakes), it seems that the potential impacts of geo-hazards associated with earthquake in Tehran can be destructive.

Ground motion amplification due to site effects, slope instabilities and rock-falls, ground subsidence due to collapse of underground openings and Qanats (underground irrigation tunnels) and even liquefaction are some of the main features of geo-hazards that can be expected at different parts of Tehran.