ON THE NECESSITY TO ESTABLISH LOCAL SEISMIC HAZARD MAPS FOR URBAN REGIONS

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ABSTRACT

In order to manage urban developments, it is necessary to define the design basis accurately. In urban regions with high earthquake risk, local seismic hazard maps are necessary to properly plan new developments and to ensure that upgrading of existing buildings and infrastructure be carried out properly. The local hazard maps will take into account the following information:

- Effects of local faults
- Effects of local soils conditions, including the thickness of the soils layers

The main usages of this information are:

- Definition of design basis for new buildings
- Definition of necessary earthquake strengthening of existing buildings
- Identification of necessary emergency measures like firewater and access by fire equipment and ambulances
- Definition of locations of safe shutdown valves for gas
- Identification of muster points for local population to avoid hazards caused by jet fires etc.

A case study is presented where particulars of a mayor mega city (Tehran) and a smaller densely populated city (Oslo) are compared. The requirements of both cities are spelled out and suggestions for use of the local seismic hazard maps are presented.

INTRODUCTION

Damages due to earthquakes can be huge and it is of most importance that all efforts are made to reduce the consequences of earthquakes. It is 20 years since the Kobe earthquake (M = 7.3 on 17th January 1995) and the city infrastructure was not designed for such a quake, although numerous quakes larger than this magnitude have struck Japan. Consequence reduction efforts have to be implemented where the risk is highest, i.e. where the probabilities are highest and the consequences of damages are largest and where the effects on spending funds are given the most benefits.

Mapping of the most vulnerable areas represents a good guideline to where one should implement risk reducing measures. For urban areas this is achieved through preparation of seismic zonation maps. The most vulnerable areas are normally the areas close to known faults and for buildings and infrastructure on softer soils. Damages during historical earthquakes shall also be taken into account and specific resonance frequencies should be identified. Reference is made to the Mexico City earthquake of 19th September 1985 (M = 8.1) where the lakebed has an Eigen period of around 2.5s; in resonance with mid height buildings.