POST-EARTHQUAKE RAPID AND DETAILED ASSESSMENT OF BUILDINGS BASED ON QUALITATIVE AND QUANTITATIVE CRITERIA

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In recent years, progress in the engineering science has led to several improvements in seismic codes and therefore, considerable undertakings have been received in the realm of better evaluation of seismic performance of building. One of the topics which has recently caught attention of researches is seismic performance and maintaining serviceability of structures after earthquakes. In this regards, there are few investigations by far on assessment of buildings in order to evaluate the functionality of such buildings in Iran. To answer to this need, State Organization of Schools Renovation, Development and Mobilization of I. R. Iran (SOSRDM) has initiated a project in order to propose a guideline for post-earthquake assessment of school buildings in Iran (PASBI). As the part of this guideline, in this paper the qualitative and quantitative criteria of rapid and detailed assessment of school buildings has been presented, masking use of several available earthquake observations and previous related studies.

Speaking of post-earthquake assessment of buildings, NOAA (The National Oceanic & Atmospheric Administration (NOAA)) and then with the cooperation of EERI (The Earthquake Engineering Research Institute (EERI)) in US took the first steps in 1971(John A. Blume & Associates, 1973). Soon after Loma Prieta earthquake in 1989, ATC published several documents including ATC20 (1991), ATC20-1(1991), ATC20-2(1995) and ATC20-3 (1995) for post-earthquake assessment of buildings which has been and still are updating based on the recent earthquake observations. In seismic prone countries like Italy, Greece, New Zealand and US, there are various applications of ATC-20 documents for assessment of building after earthquakes. Moreover, with the aid of EU, European countries published a report on structures classification and the related post-earthquake damage assessment (EPPO & Greece, 2008). ATC-52-4 (2010) is published for rehabilitation and retrofitting based on criteria of earthquake structural damages. From 1949, EERI performed several studies on post-earthquake assessment of buildings (EERI, 1996). Other authentic references on this topic are FEMA reports (FEMA-355E, 2000), (FEMA-352, 2000), (FEMA154, 2002), (FEMA E-74, 2011), seismic-prone European countries for identification of damages and the related safety measures.

In this study, the procedure of assessment of school buildings is divided into two parts; rapid and detailed assessment. Immediately after earthquake, considering the damages and the psychic-related effects and possible after-shocks, it is not possible to perform in-depth assessment of the buildings. However, it is necessary to have an initial assessment of the affected building with the aim of managerial and large-scale decision-makings. In this scope, affected buildings are categorized into three groups; safe, unsafe and unknown. The "safe" buildings can surely maintain their serviceability afterwards; on the other hand, the functionality of "unsafe" buildings cannot be relied on after earthquakes and the "unknown" buildings are required further more precise assessment. In order to take into account the engineering judgment and visiting experts in determination of extent and severity of damages to each of the structural elements, the systematic procedure for scoring is proposed. This procedure makes it possible for reducing the personal judgment and subjective conclusions.

After completing of the aftershocks and based on the experts' judgments, the detailed assessment as the precise evaluation is performed. In this step, damages to each of the structural and non-structural elements are determined. The results of this step are used in decision making about permission of use, selection of rehabilitation method of buildings. Moreover, the results of the assessment are utilized in further quantitative evaluation of the studied buildings.

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