**A FEASIBILITY STUDY OF SEISMIC ISOLATION APPLICATION IN RESIDENTIAL BUILDINGS IN TURKEY**

**DOI 10.37153/2686-7974-2019-16-962-962**

Cüneyt Tüzün[[1]](#footnote-1), Bahadır Şadan[[2]](#footnote-2), Mustafa Erdik[[3]](#footnote-3),
Nobuo Murota[[4]](#footnote-4), Dr. Shigenobu Suzuki[[5]](#footnote-5), Sinan Akkar[[6]](#footnote-6)

**ABSTRACT**

The recent earthquake revealed that the main source of both casualty and economic loss is due to high vulnerable building stock in Turkey. In order to reduce the seismic risk around the country, Turkey has released a regulation for “urban renewal”. Based on this regulation huge number of vulnerable buildings have been replaced with the new once in recent years. Since the seismic design performance objective is “life safety” in current Turkish Seismic Code the new buildings has the same seismic safety level.

In order to minimize both the structural and non-structural damage in earthquakes, seismic isolation can be a rational solution to be used not only in the urban renewal applications but also the new designed residential buildings in Turkey. In order to investigate the feasibility of this application, a set of real buildings has been selected from the building available building database that reflects the basic structural system and geometric properties of the building stock in Turkey. The representative buildings that have been used in the analysis phase is grouped based on number of stories as 5,10 and 15 story that covers almost 75% of the building stock in Turkey.

The seismic isolation system using high damping rubber bearing type isolation units has been designed based on Chapter 14 of new Turkish Seismic Code that involves the analysis and design procedure of seismically isolated buildings. Additionally, alternative isolation systems have been designed using LRB and curved surface friction isolator type isolation units for comparison. The superstructure members have been optimized in terms of member dimensions and reinforcement considering the criteria given in Chapter 14 of new Turkish Seismic Code.

 As the result of this study, a set of isolation units properties has been determined for representative buildings ( 5, 10 and 15 story) and different seismic risk levels ( moderate and high). The results of the study involve the isolation unit properties, approximate cost of the isolation system and BOQ of superstructure members are determined for each building class. An economical evaluation has also been performed to compare the overall building cost with the proposed isolation system. It has also been emphasized that the seismic performance target for residential buildings should be upgraded to “minimum damage” or “continuous functionality” in next generation seismic design codes. Once this approach has been accepted in seismic design procedure, next generation residential buildings will suffer minimum damage and provide a seismically resilient building stock.

*Keywords: residential building, seismic isolation, minimum damage, resilient building stock*

1. OBS Engineering & Consulting Corp, Turkey [↑](#footnote-ref-1)
2. OBS Engineering & Consulting Corp, Turkey [↑](#footnote-ref-2)
3. Kandilli Observatory and Earthquake Research Institute, Turkey [↑](#footnote-ref-3)
4. Seismic Isolation and Vibration Control Products Development Department, Bridgestone Corp., Japan [↑](#footnote-ref-4)
5. Seismic Isolation and Vibration Control Products Development Department, Bridgestone Corp., Japan [↑](#footnote-ref-5)
6. Kandilli Observatory and Earthquake Research Institute, Turkey [↑](#footnote-ref-6)