

Seismic Vulnerability Assessment of Existing Buildings

NSET Information Kit | 005 | 2011



BACKGROUND

Main cause of huge loss of lives as observed during past earthquakes is due to the collapse of buildings. Referring the earthquakes of Bhuj(2001), Bam (2003) and Pakistan (Oct 2005) when most of the building of typologies similar to the ones prevalent in Nepal, suffered catastrophic damage causing large scale life and property loss, NSET realized, seismic vulnerability assessment and retrofit of weak buildings as a pressing need against impending future earthquake in Nepal. Therefore, NSET started providing service of the seismic vulnerability assessment to start the process especially with those who are convinced and who could convince others by taking a lead in such assessment and subsequent retrofitting.

'Seismic Vulnerability Assessment of Office Buildings and Residences' is an ongoing program of NSET under which residential and office buildings of various national and international organizations located in Kathmandu are assessed for their seismic vulnerability. Since, there are not many institutions or consulting firms having experience and knowledge in such assessment and vulnerability reduction works, NSET has been carrying out such works and trying to transfer the knowledge and technology to the concerned institutions and consultancies in Nepal.

OBJECTIVES

The main objective of this program is to assess the seismic safety of existing buildings (Qualitatively and Quantitatively)

Some specific objectives are as follows:

- To assess seismic vulnerability (structural and non-structural) of buildings.
- To suggest appropriate strengthening measures to improve earthquake performance of the building structures.
- To identify relatively safe and unsafe places
- To create earthquake awareness in institutions and families

ACTIVITIES / METHODOLOGY

The assessment is carried out in two phases:



First Phase

- Assessment of structural and non-structural earthquake vulnerability of the buildings by qualitative method
- Identification of relatively safe and unsafe places inside the building and within building premises
- Identification of best retrofitting option if retrofitting is required

Second Phase

- Detail design of retrofitting by quantitative method (Structural analysis & data/design)
- Cost estimate for retrofitting work

Seismic Vulnerability Assessment of Existing Buildings

NSET Information Kit | 005 | 2011

ACHIEVEMENTS

There is an increasing and high level of demand for providing expert services on assessing seismic vulnerability and implementing vulnerability reduction measures from various national and international organizations and even from the individuals.

NSET has so far carried out vulnerability assessment of around 200 buildings belonging to or proposed to be rented out by many diplomatic mission, international organizations and Nepalese agencies. Alarmingly the assessment showed most of the assessed buildings would suffer damage grade 3 during a major shaking in Kathmandu Valley. Interestingly most of the assessed buildings were engineered whereas 90% of the buildings in the valley are non-engineered ones that may further suffer severe damage.



Similar assessment was done for 26 masonry buildings of the British Embassy in Tehran, Iran in 2004. NSET assisted UN Habitat to undertake similar assessment for buildings to be rented out by UN agencies in earthquake affected areas of Pakistan.



NSET has been assessing the seismic vulnerability of office and resident buildings of diplomatic missions in Kathmandu and other agencies

DIFFICULTIES ENCOUNTERED AND LESSONS LEARN

Clients who opt for doing the building assessment are mostly those who take the building on rent. Generally, the first phase of assessment is enough for them to decide whether the building is safe to occupy or not. If the building assessment process does not produce satisfactory result they simply leave the building and look for another safe building rather than implementing strengthening measures. As the first phase of building assessment work is based on available drawings and visual inspection, there is always a doubt if the actual construction is as per the drawing provided by the client. Many buildings don't have as-built drawings which add further difficulty in visual assessment.

