

# A Primer on Rapid Visual Screening (RVS): Consolidating Earthquake Safety Assessment Efforts in India

## ABSTRACTS

- The *Disaster Management Act 2005*, seeks a paradigm shift from the hitherto *Relief-centric* approach to a *Mitigation-* and *Preparedness-* *centric* approach with continued focus on *Response*, which is *proactive, holistic* and *integrated*.
- In keeping with this *Act*, an assessment of *earthquake risk* of the existing built environment was identified as initial course of action. It was noticed that a clear understanding is required on the various *methods* of earthquake risk assessment which are currently practiced.
- Thus, NDMA charged IIIT Hyderabad with the task of deliberating on those available methods of preliminary screening, providing a road map and consolidating earthquake safety assessment efforts in India.
- Preliminary screening which is known as *Rapid Visual Screening (RVS)* of buildings has caught momentum and the attention of the decision makers in India. There is a need to clarify RVS in clear and tangible terms, so that the end users are made aware of the outcomes.
- The *Primer*, prepared by IIIT Hyderabad gives clear understanding of RVS methods and its uses. It is also a guide for screening various kinds of buildings for their structural stability.

## LEVELS OF ASSESSMENT

- **Level 1:** Simplified QUALITATIVE Assessment (or Rapid VISUAL Screening) for determining pre-earthquake assessment and post-earthquake assessment of occupancy of damaged buildings;
- **Level 2:** Detailed QUALITATIVE Assessment (or Conceptual VISUAL Survey) for undertaking pre-earthquake typology study along five domains (namely siting, architectural form, structural system, material condition, and construction details) that affect the degree of damage in buildings and post-earthquake assessment;
- **Level 3:** Simplified QUANTITATIVE Assessment (or Horizontal Shear Capacity) for estimating pre-earthquake the overall horizontal safety of buildings, and further prioritize buildings for retrofiting;
- **Level 4:** Detailed QUANTITATIVE Assessment (or Complete Structural Safety) for identifying deficiencies in components & overall building, and arriving at details of retrofiting to be undertaken (namely type, location and level of retrofiting).

## CONFLICTS

- A major conflict arises when different RVS methods are used to assess the same group of buildings.
- A particular study showed that, although the objective of these RVS methods is the same, these results differed significantly. The reasons include:
  - List of factors considered in assessing the vulnerability of building,
  - Procedure adopted for assigning score to each factor, and
  - Weights assigned to each vulnerable factor that contributes to the overall damage of the building

## METHODOLOGY

- The notion of an Ideal House is employed to benchmark the performance of buildings normally built. During strong earthquake shaking expected at the site, the Ideal House is expected to sustain damage that is: (a) of an acceptable type, (b) within acceptable range, and (c) at pre-determined locations; this ensures zero fatality in the building.
- Departures in structural features and other aspects leads the building to become vulnerable; the extent of vulnerability depends on the number and criticality of such departures.
- The RVS methods employ the notion of an Ideal Building, by ascribing the Base Score to such an Ideal Building, and then assigning penalties to each departure
- This RVS PRIMER recommends the following building typology forms which is developed for Pre and Post Earthquake Rapid Earthquake Safety Assessment: (i) **Reinforced concrete building**; (ii) **Burnt clay brick building**; (iii) **Confined masonry building**; (iv) **Random rubble masonry building**; (v) **Mud house**; (vi) **Dhajji Dewari** and (vii) **Ekra house**

## SCOPE

- The primer will serve as a pioneering document to screen various kinds of buildings for their structural stability. Structural status of buildings before and after the earthquake will shape our preparedness and guide our response.
- The document will surely provide an effective checkpoint for government institutions, industries, private organisations and local bodies against the threats posed by earthquakes.