GOVERNMENT OF INDIA
MINISTRY OF EARTH SCIENCES
LOK SABHA
UNSTARRED QUESTION No. 2364
TO BE ANSWERED ON WEDNESDAY, MARCH 11, 2015

VULNERABILITY ASSESSMENT OF BUILDINGS

2364. SHRI RAJU SHETTY:

Will the Minister of EARTH SCIENCES be pleased to state:

(a) whether any study/assessment has been done to identify structurally unsafe/ dangerous buildings in the highly earthquake prone areas in the country;
(b) if so, the details thereof along with the details of collapsible and non-collapsible buildings identified, location-wise;
(c) if not, the reasons therefore and the existing guidelines in regard to routine building audits, if any; and
(d) the steps taken/proposed to be taken to ensure construction of safe/earthquake resistant new buildings and retrofitting in old buildings?

ANSWER
MINISTER FOR MINISTRY OF SCIENCE AND TECHNOLOGY AND MINISTRY OF EARTH SCIENCES
(DR. HARSH VARDHAN)

(a-d) In a pilot mode, studies have been taken up for Guwahati and Delhi region through rapid visual screening (RVS) of assessing the structural safety of buildings due to existing complex socio cultural and built environment encompassing vide range of dwelling units from non engineered units with traditional skill to the most modern buildings. Essentially RVS procedure considers different building types that are most commonly found in India. Whereas the building categories considered for the purpose includes Type A, Type B, Type C and Type X categories as detailed in annexure-1.

By imparting professional training to the Engineers of the civic bodies, Delhi Government is enhancing the technical capabilities of field engineering wings to survey potentially weak buildings. Guidelines for improving Earthquake Resistance of Low Strength Masonry Buildings (IS 13828:1993) that covers the special features of design and construction for improving earthquake resistance of buildings of low-strength masonry are already in force to supplement these efforts.

The Delhi Government in coordination with the National Institute of Disaster Management (NIDM) and National Disaster Management Authority (NDMA) had organized 6-training programmes for training 300-Engineers of Municipal Corporation of Delhi and New Delhi Municipal Committee on the "Rapid Visual Screening (RVS)" with particular reference to the evaluation of safety criteria for dangerous buildings in Delhi. Sphere heading the RVS pilot of identifying 10000 buildings in East Delhi, NIDM in its last training programme, that concluded in the first week of November, 2012, had deliberated in detail the findings from RVS pilot study and made MCD engineers familiar with the special purpose RVS data management software. The above training programmes have kept a good balance between class room lectures and hands on exercise, along with some nondestructive testing exercises in the field.

Guidelines have also been published by the Bureau of Indian Standards (BIS), Building Materials & Technology Promotion Council (BMTPC) and Housing and Urban Development Corporation (HUDCO) etc. for the design and construction of earthquake resistant structures to minimize the loss of life and damage to property caused by earthquakes (Annexure II). These guidelines are in wide circulation amongst the public and the administrative authorities responsible for the design and construction of earthquake resistant structures in earthquake prone areas.

Ministry of Home Affairs is keen to see at least from now that all new buildings constructed under various National and State schemes should be made earthquake resistant (as per the Bureau of Indian Standards detailed at Annexure-III) in the first instant so that no new additions to the stock of existing unsafe buildings are made.

Central Public Works Department (CPWD) has prepared an Handbook of Siesmic Retrofit of Buildings for existing buildings that do not meet the seismic strength requirement. It is to be noted that the guidelines contained in the CPWDs Handbook are more to give a general sense of safe/ unsafe nature of the existing building/ structure so that individual households can take further measures to prevent loss of life and property.

Annexure-I

Building Category

Type·A	**Rural structures bamboo reinforced Biomass wall cladding, thatched/CI Sheet roof, un·burnt brick house, Assam Type Houses in timber frame.**
Type·B	**Brick Masonry Wall 6"X6" to 10"X10" Corner columns with lintel bend and tie, timber trussed CI sheet roof, buildings of the large block and prefabricated type, half-timbered structures, building in natural hewn stone**
Type·C	**Reinforced Concrete Building- Engineered & Non-Engineered With beam, column & slab construction, well built wooden structures.**
Type·X:	**Other types not covered in A, B,C.**

Brochures and Guidelines published by Housing and Urban Development Corporation (HUDCO) & Building Materials & Technology Promotion Council (BMTPC) for construction and retrofitting of buildings:

1. **Brochure for mitigating damage to dwellings (in English, Hindi, Tamil, Telugu, Oriya and Bengali by HUDCO).**

2. **Brochures on house construction in Jabalpur and Chamoli earthquake-affected areas (in Hindi, by HUDCO).**

3. **Retrofitting of stone houses in Marathwada area of Maharashtra, (BMTPC), 1994.**

4. **Guidelines for repair, strengthening and reconstruction of houses damaged in the 30 September, 1993 earthquake in Maharashtra (Government of Maharashtra), 1994.**

5. **Earthquake and Building, A guidebook to understand the relationship between the two, (TARU), 1994.**

6. **Build Your Home with Earthquake Protection, (BMTPC), 1995.**

7. **Guidelines 1 – Earthquake-resistant construction of houses in Jabalpur earthquake-affected areas (in Hindi, English, BMTPC), 1997.**

8. **Guidelines 2 – Repair and retrofitting of damaged houses in Jabalpur earthquake-affected areas (in Hindi, English, BMTPC), 1997.**

9. **Guidelines 1 – Visual Damage Identification for Chamoli earthquake-affected areas of Uttar Pradesh (in Hindi, English, BMTPC), 1999.**

10. **Guidelines 2 – Repair and retrofitting of damaged houses in Chamoli earthquake-affected areas of Uttar Pradesh (in Hindi, English, BMTPC), 1999.**

11. **Guidelines 3 – Reconstruction and New Construction of Buildings in Chamoli earthquake-affected areas of Uttar Pradesh (in Hindi, English, BMTPC), 1999.**

Annexure-III

Bureau of Indian Standards (BIS) has published various standards/codes on earthquake engineering. A list of standards is enclosed.

LIST OF RELEVANT INDIAN STANDARDS ON EARTHQUAKE RESISTANT DESIGN AND CONSTRUCTION

S.No.	IS No.	Title
*1	IS 1893: 1984	Criteria for earthquake resistant design of Structures
2	IS 1893(Part 1): 2002	Criteria for earthquake resistant design of structures: Part 1 General Provisions and buildings.
*3	IS 1893(Part 4) : 2005	Criteria for earthquake resistant design of Structures.: Part 4 Industrial structures including stack like structures.
*4	IS 436:1993	Code of practice for earthquake resistant design and construction of buildings
5	IS 4991:1968	Criteria for blast resistant design of structures for explosions above ground
6	IS 6922:1973	Criteria for safety and design of structures subject to underground blasts
7	IS 13827: 1993	Improving earthquake resistance of earthen building – Guidelines
8	IS 13828:1993	Improving earthquake resistance of low strength masonry building – Guidelines
9	IS 13920:1993	Ductile detailing of reinforced concrete structures subjected to seismic forces-code of practice.
10	IS 13935: 2009	Seismic evaluation repair and strengthening of masonry buildings – Guidelines

*** Under Revision**

ALISED DRAFTS UNDER PRINT

S.No.	DOC Number	Title
1	DOC.CED 39 (7231)	Criteria for Earthquake Resistant Design of Structures; Part Liquid Retaining Tanks
2	DOC.CED 39 (7620)	Seismic Evaluation and Strengthening of Exiting Reinforced Concrete Building - Guidelines.
3	DOC.CED 39 (7620)	Earthquake Resistant Design and Construction of Building – Code of Practice (Third revision of IS 4326)
4	DOC.CED 39 (7739)	Draft Indian Standards criteria for Earthquake Resistant Design of Structures: Part 3 Bridges and Retaining Walls.