UTTAR PRADESH
STATE DISASTER MANAGEMENT AUTHORITY

Sri Yogi Adityanath
Chief Minister of Uttar Pradesh

SIMPLIFIED GUIDELINES FOR EARTHQUAKE SAFETY

2023

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FOREWORD

The Disaster Management Act-2005 and the National Policy lays down institutional mechanism at the National, State, District and Local levels for the conduct of all activities on Disaster Management (DM). Though, these institutions are at different levels, they work in close harmony & unison. The new institutional frameworks are expected to usher in a paradigm shift in DM from relief centric approach to a proactive regime that lays greater emphasis on preparedness, prevention and mitigation.

The State of Uttar Pradesh falls under Seismic Zones II, III and IV and out of 75 districts, 27 have geographical areas that come under zone III and IV, therefore, lie in moderate to severe intensity zones. Considering this, it's incumbent upon the authority to formulate and develop simplified guidelines for earthquake safety. These guidelines have been formulated keeping the above aspects in view.

The document is meant for the common population of the State and, therefore, finer nuances and technicalities of the subject have been avoided, wherever feasible. The main objective of these guidelines is to sensitize the people about the Earthquake Safety in all stages of Disaster Management. Detailed Roles and Responsibilities of departments have also been included so as to make the Earthquake Safety a multisectoral and all-encompassing initiative.

It's my firm conviction that the promulgated guidelines will witness reduction in loss of lives and property by strengthening and standardising the Earthquake Safety mechanism in our State.

Lucknow
January, 2023

Lt General Ravindra Pratap Sahi

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SIMPLIFIED GUIDELINES FOR EARTHQUAKE SAFETY

INTRODUCTION

1. The Disaster Management Act, 2005 (DM Act, 2005) lays down institutional and coordination mechanisms for effective Disaster Management (DM) at the National, State, and District levels. The Uttar Pradesh State Disaster Management Authority (UP SDMA) chaired by the Hon'ble Chief Minister and the District Disaster Management Authorities (DDMAs) chaired by the respective District Collectors and co-chaired by elected representatives of the local authorities of the respective districts have been set up to facilitate the paradigm shift from relief-centric approach to a more proactive, holistic and integrated approach of strengthening disaster preparedness, mitigation and emergency response. The Government of Uttar Pradesh has notified 10 different disasters which affects the State majorly. Earthquake is one of the major disasters affecting the nation as well as the State. This guideline is prepared to assist the State and district authorities in strengthening their preparedness for earthquake.

2. What is an Earthquake- The surface of earth is made of several plates; these plates move all the time. Due to this movement of plates, the energy stored is suddenly released when rocks get crushed under stress and spreads in the form of waves inside the ground creating earthquakes.

SEISMIC ZONES

3. Seismic Zonation map of the country (State wise) given by Bureau of Indian Standards (BIS) has categorized into several seismic zones (Zone II to Zone V) with variability of peak ground acceleration (PGA) (0.16g to > 0.36g) with of 10% of exceedance in PGA in 50-years. According to seismic zonation map, the State of Uttar-Pradesh lies in Zone IV, III and II. As per the seismic zoning map of the country, the total area is classified into four seismic zones. Zone V is seismically the most active region, while zone II is the

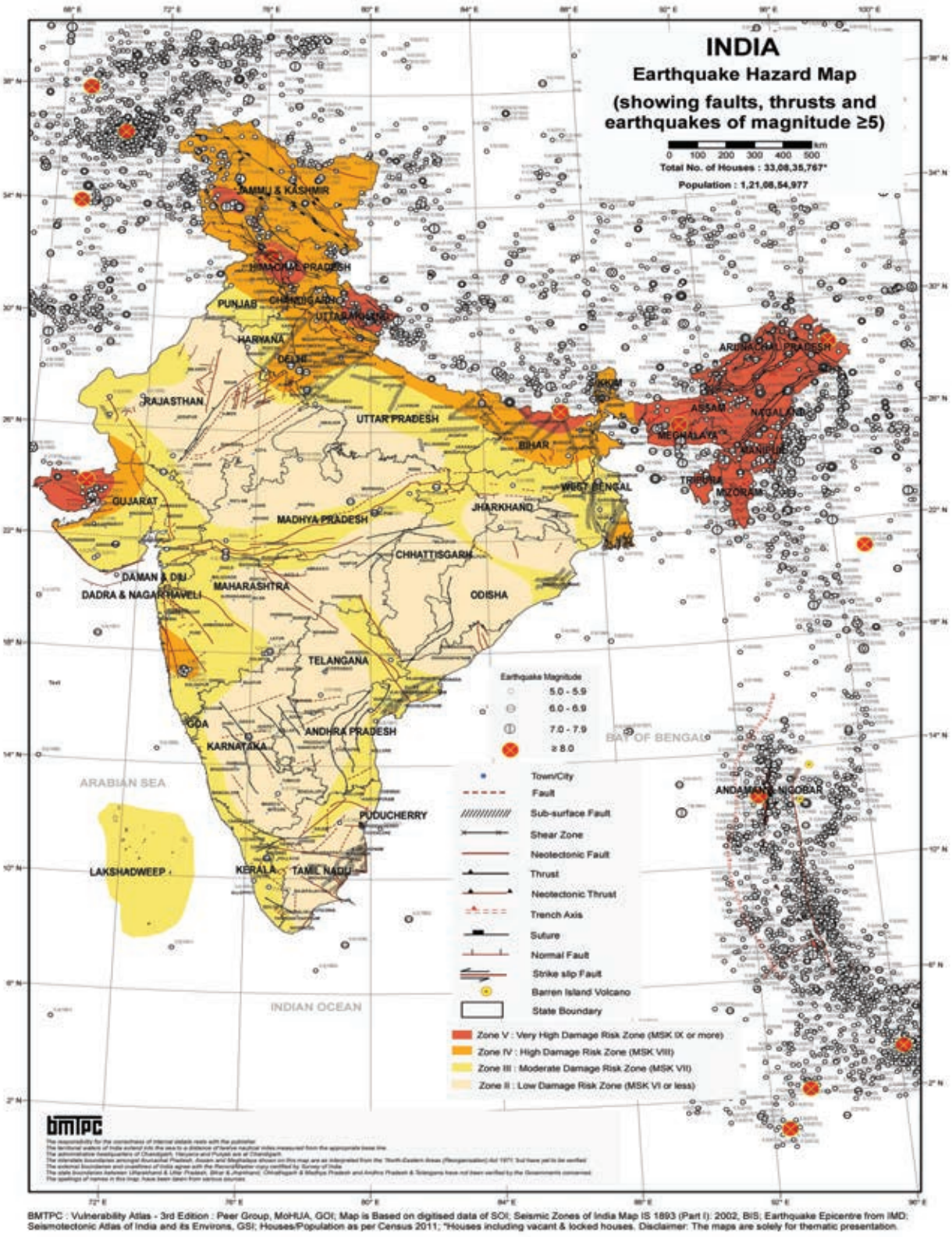
least. Approximately, 11% area of the country falls in zone V, 18% in zone IV, 30% in zone III and remaining in zone II.

- The following districts of UP are in the Earthquake High Damage Risk Zone-IV: Entire districts of Saharanpur, Muzaffarnagar, Baghpat, Bijnor, Meerut, Ghaziabad, Gautambuddh Nagar, Amroha, Rampur, Moradabad, Bulandshar, Shravasti, Balrampur, Siddharthnagar, Maharajganj, Kushinagar, and parts of Pilibhit, Shajahanpur, Kheri, Baharaich, Gonda, Mathura, Aligarh, Budaun, Bareilly, Basti, Sant Kabir Nagar, Deoria and Ballia.

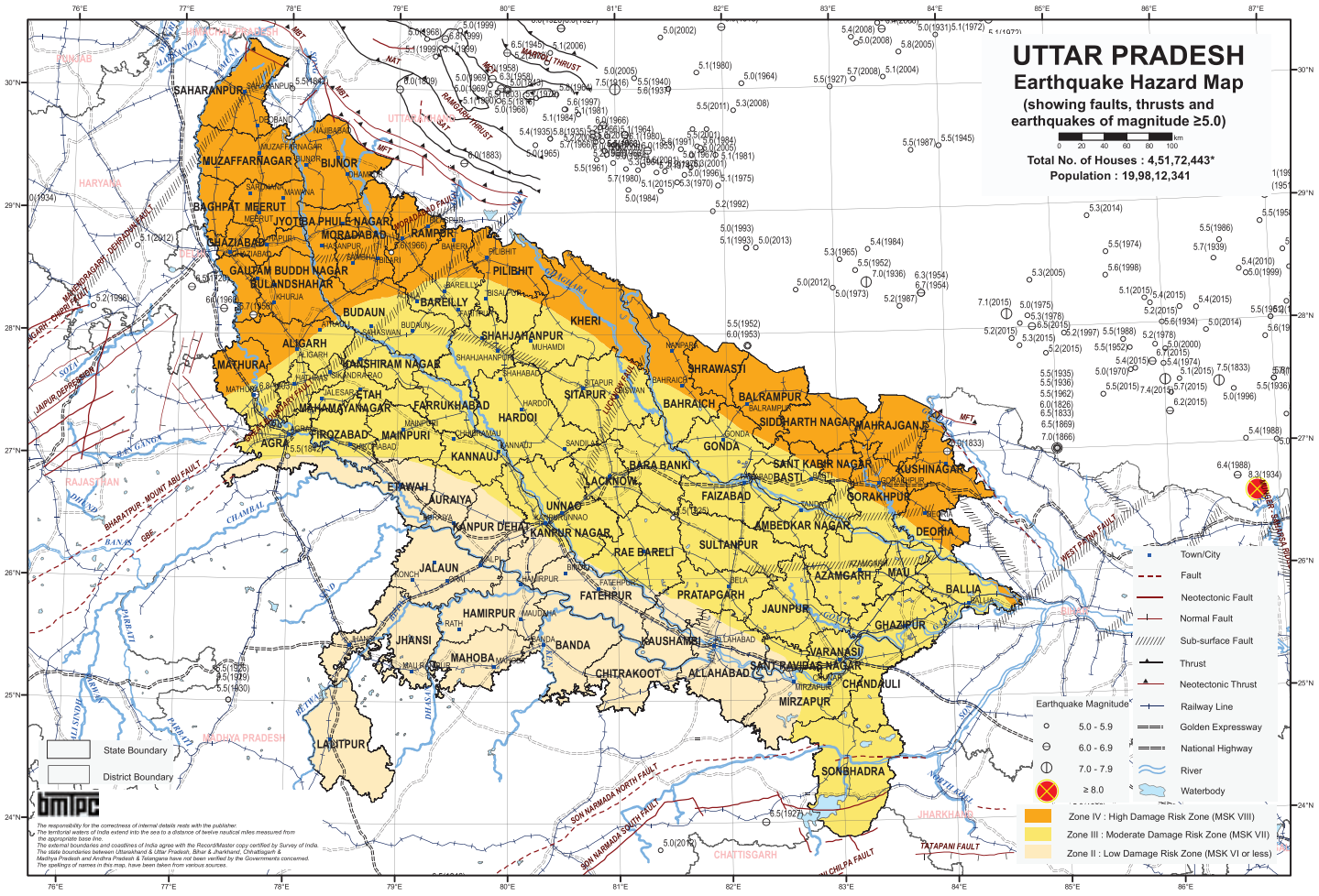
- The following districts of UP are in the Earthquake Moderate Damage Risk Zone III: Entire districts of Sonbhadra, Chandauli, Ghazipur, Varanasi, Jaunpur, Azamgarh, Gorakhpur, Sultanpur, Raebareli, Faizabad, Unnao, Lucknow, Barabanki, Sitapur, Hardoi, Kannauj, Mainpuri, Firozabad, Etah, Mahamayanagar, Farukkabad, and parts of Mirzapur, Pratapgarh, Kanpurnagar, Auraiya, Etawah, Agra, Mathura, Aligarh, Badaun, Bareilly, Pilibhit, Kheri, Baharaich, Gonda, Basti, Sant Kabir Nagar, Deoria and Ballia.

- The following districts of UP are in the Earthquake Low Damage Risk Zone II: Entire districts of Lalitpur, Jbansi, Mahoba, Jalaun, Banda, Kausambi, Allahabad and parts of Agra, Etawah, Auraiya, Kanpur Nagar, Fatehpur, Pratapgarh, and Mirzapur.

4. Vulnerability map of India and Uttar Pradesh



Earthquake Hazard Map- India, Source



BMTPC : Vulnerability Atlas - 3rd Edition : Peer Group, MoHUA, GOI; Map is Based on digitised data of SOI; Seismic Zones of India Map IS: 1893 (Part I): 2002, BIS; Earthquake Epicentre from IMD; Seismotectonic Atlas of India and its Environs, GSI; Houses/Population as per Census 2011; *Houses including vacant & locked houses. Disclaimer: The maps are solely for thematic presentation.

BMTPC

Earthquake Hazard Map- Uttar Pradesh, Source- BMTPC

HISTORY OF MAJOR EARTHQUAKES IN UTTAR PRADESH

5. The history of earthquakes in UP having epicenter at different locations, including bordering State and neighboring Nepal, is provided in Table.

History of earthquakes in UP

Year	Epicenter	Magnitude	Districts Affected	Damage/ People effected
6 Nov 1925	Raebareli,Sultanpur District Border	6.0	Raebareli and Sultanpur	NA
15 Jan 1934	India-Nepal Border Region	8.0	Eastern UP, Allahabad and Lucknow	10,500
8 Nov 1952	Nepal	6.0	Bahraich-Gonda	NA
10 Oct 1956	Jahangirpur	6.2	Bulandshahr	NA
27 Aug 1960	Ghagot, Haryana	6.0	Gurgaon,Faridabad, Noida	50 deaths
24 Dec 1961	Salkot, Nepal	6.0	Pilibhit and Lakhimpur Kheri	NA
1 Jun 1965	Sant Kabir Nagar	5.7	Gorakhpur and Basti	NA
15 Sep 1966	Raunda Mustahkam	5.8	Moradabad	NA
21 Oct 1991	Uttarkashi	6.8	Uttarkashi and UP	Reported number of deaths: 768 Number of people affected: 0.4 million
18 Oct 2007	Gautam Buddha Nagar	3.8	Gautam Buddha Nagar	Nil
26Apr 2015	Barpak, Nepal	7.3	Entire UP	Nil

Source- Draft SDMP Uttar Pradesh

6. Earthquake Vulnerability Assessment of Uttar Pradesh- According to the latest seismic zone map of India, based on the seismic vulnerability, the entire country is divided in to seismic zones (Zone II, III, IV, V). Most of the State of Uttar Pradesh lies in the Gangetic Plain and geologically this region is a fore-deep, a down warp of the Himalayan foreland, of variable depth, converted into flat plains by long-vigorous sedimentation. This Indo-Gangetic Geosyncline has shown considerable amounts of flexure and dislocation at the northern end and is bounded in the North by the Himalayan Frontal Thrust. Beneath Uttar Pradesh, runs the Delhi-Haridwar Ridge (DHR), trending NNE-SSW along New Delhi to the Garhwal region. The Delhi-Muzaffarnagar Ridge (DMR), which trends East to West, running from New Delhi to Kathgodam. The last ridge is the Faizabad Ridge (FR), which runs in a curved manner, first East to West from Allahabad to Kanpur and then starts to bend towards the North-East towards Lucknow and carries on in this direction towards the Himalayas in Nepal. The depression that forms between the Delhi-Muzaffarnagar Ridge (DMR) and the Faizabad Ridge (FR), forms the West Uttar Pradesh in the West and the Sharda Depression in the East. The region to the South of the Faizabad Ridge, forms the East Uttar Pradesh. There are several faults in the region, mainly the Moradabad Fault which trends NE-SW. Apart from these, there are East-West running tear faults in the region that control the courses of the main rivers. Earthquakes have occurred in, mostly, all parts of Uttar Pradesh. Major earthquakes in the neighboring New Delhi, Uttarakhand, Bihar and from across the Indo-Nepal border have also shaken many parts of Uttar Pradesh. However, the proximity to faults does not necessarily translate into a higher hazard as compared to areas located further away, as damage from earthquakes depends on numerous factors such as subsurface geology as well as adherence to the building codes. Since the earthquake database in India is still incomplete, especially with regards to earthquakes prior to the historical period (before 1800 A.D.), these zones offer a rough guide of the earthquake hazard in any particular region and need to be regularly updated. One of the most powerful earthquakes in Uttar Pradesh struck the districts of western Uttar Pradesh at

21:01 IST on October 10th, 1956. The massive shock was centered near Jehangirpur, in Bulandshahr District. No fatalities were reported. The shock was also strongly felt at Delhi, where there was some minor damage.

7. The State of Uttar Pradesh lies near two high risk zones with a history of many earthquakes, namely Nepal and Uttarakhand. The State has total 75 districts, out of which 27 districts have geographical areas that come under zone 4 and zone 3 combined. The Himalayan foothill region of the State has been facing the ill effects of earthquakes for past several years. The recent Bihar – Nepal earthquake is one of the examples. Scientific publications have warned that very severe earthquakes are likely to occur anytime in the Himalayan Region, which could adversely affect the lives of several million people.

Table 1: List of districts of Uttar Pradesh Falling in Earthquake Damage Risk Zones (On the basis of Vulnerability Atlas of India by BMTPC)

Districts completely Falling in Earthquake Damage Risk Zones IV		**Districts partly Falling in Earthquake Damage Risk Zones IV & III**		**Districts Completely Falling in Earthquake Damage Risk Zones III**		**Districts partly Falling in Earthquake Damage Risk Zones III & II**		**Districts Completely Falling in Earthquake Damage Risk Zones II**	
SI No.	Districts Name	SI No.	Districts Name	SI No.	Districts Name	SI No.	Districts Name	SI No.	Districts Name
1.	Baghpat	1.	Aligarh	1.	Ambedkar Nagar	1.	Agra	1.	Banda
2.	Bijnor	2.	Bahraich	2.	Azamgarh	2.	Prayagraj	2.	Chitrakoot
3.	G. B.Nagar	3.	Ballia	3.	Barabanki	3.	Auraiya	3.	Hamirpur
4.	Ghaziabad	4.	Balrampur	4.	Chandauli	4.	Etawah	4.	Jalaun
5.	Amroha	5.	Bareilly	5.	Etah	5.	Firozabad	5.	Jhansi
6.	Kushinagar	6.	Basti	6.	Ayodhya	6.	Fatehpur	6.	Kaushambi
7.	Maharajganj	7.	Budaun	7.	Farrukhabad	7.	Kanpur Dehat	7.	Lalitpur
8.	Meerut	8.	Bulandshahr	8.	Kasganj	8.	Kanpur Nagar	8.	Mahoba
9.	Muzaffarnagar	9.	Deoria	9.	Hardoi	9.	Mainpuri		
10.	Rampur	10.	Gonda	10.	Lucknow	10.	Mirzapur		
11.	Saharanpur	11.	Gorakhpur	11.	Ghazipur	11.	Pratapgarh		
12.	Siddharthnagar	12.	Pilibhit	12.	Jaunpur	12.	Raebareli		
		13.	Lakhimpur Kheri	13.	Kannauj	13.	Bhadohi		
		14.	Mathura	14.	Hathras	14.	Unnao		
		15.	Moradabad	15.	Mau				
		16.	Shahjahanpur	16.	Sonbhadra				
		17.	Shravasti	17.	Sultanpur				
		18.	Sitapur	18.	Varanasi				
		19	Sant Kabir Nagar						

EARTHQUAKE SAFETY ACTION PLAN

8. It has been observed in disasters in India in the past two decades that a large majority of structures being built in the country, especially the non- engineered ones and at times even the engineered ones, do not take into consideration the potentially destructive local hazards. As a result, they lack hazard resisting features which make them vulnerable to the impact of natural hazards. The other shortcomings observed in our structures is lack of good quality and violation of most basic rules. This adversely affects the longevity of the structure and also makes the structure weak. This earthquake safety action plan envisages the institutionalization of stakeholder initiatives, by involving communities and other key stakeholders covering pre-disaster components of mitigation and preparedness based on scientific and technical principles, as well as on indigenous technical knowledge and building techniques. These Guidelines emphasize the need for carrying out the structural safety audit of existing lifeline structures and other critical structures in earthquake-prone areas, and carrying out selective seismic strengthening and retrofitting. The six pillars of earthquake management are: -

- Ensure the incorporation of earthquake resistant design features for the construction of new structures.
- Facilitate selective strengthening and seismic retrofitting of existing high priority and lifeline structures in earthquake-prone areas.
- Improve the compliance regime through appropriate regulation and enforcement.
- Improve the awareness and preparedness of all stakeholders.
- Introduce appropriate capacity development interventions for effective earthquake management (including education, training, R&D, and documentation).
- Strengthen the emergency response capability in earthquake-prone areas.

9. Framework of Earthquake Management- District Disaster Management Authorities are required to prepare DM plans to improve earthquake preparedness, mitigation and emergency response in accordance with this guideline. A typical DM plan will, inter alia,

include aspects of earthquake management, like identification of all tasks to be undertaken before, during and after an earthquake; outline the response mechanism with clearly defined roles and responsibilities for various stakeholders; and identify the available resources to ensure their effective utilization in the event of an earthquake. The plans will spell out the strategies for addressing the various tasks relating to earthquake preparedness and awareness creation, capacity development, monitoring and enforcement of earthquake-resistant codes and building bye-laws. They will also include emergency response, earthquake-resistant design and construction of new structures, and selective seismic strengthening and retrofitting of priority and lifeline structures in earthquake-prone areas. The India Disaster Resource Network (IDRN) database of resource inventories in the districts will be strengthened through regular updating. Districts will also integrate this database with their DM plans.

10. Earthquake-Resistant Design- In most earthquakes, the collapse of structures like houses, schools, hospitals and public buildings results in the widespread loss of lives and damage. Earthquakes also destroy public infrastructure like roads, dams and bridges, as well as public utilities like power and water supply installations. Past earthquakes show that over 95 per cent of the lives lost were due to the collapse of buildings that were not earthquake-resistant. Though, there are building codes and other regulations which make it mandatory that all structures in earthquake-prone areas in the country must be built in accordance with earthquake-resistant construction techniques, new constructions often overlook strict compliance to such regulations and building codes. It is necessary to empower communities to ensure the seismic safety of the built environment by encouraging the use of simple, easy and affordable technical solutions and institutional arrangements. These make use of indigenous technical knowledge and locally available materials in the construction of earthquake-resistant buildings in suburban and rural areas. Vulnerability atlas of the State, as shown below, amply highlights the necessity of safety, more importantly the weaker structural designs.

Distribution of Houses by Predominant Materials of Roof and Wall and Level of Damage Risk

UTTAR PRADESH

Wall / Roof		Census Houses		Level of Risk under								
				EQ Zone				Wind Velocity m/s				Flood Prone Area in %
		No. of Houses	%	V	IV	III	II	55 & 50	47	44 & 39	33	
				Area in %				Area in %				
STATE - UTTAR PRADESH					29.0	48.3	22.7	43.2	53.4	3.4		26.0
WALL												
A1 - Mud & Unburnt Brick Wall	Rural	7,671,487	18.0									
	Urban	557,829	1.3									
	Total	***8,229,316***	***19.3***		*H*	*M*	*L*	*VH*	*H*	*M*		*VH*
A2 - Stone Wall not packed with mortar	Rural	328,497	0.8									
	Urban	181,046	0.4									
	Total	***509,543***	***1.2***		*H*	*M*	*L*	*H*	*M*	*L*		*VH*
Total - Category - A		***8,738,859***	***20.5***									
B - Burnt Bricks Wall & Stone wall packed with mortar	Rural	21,620,426	50.7									
	Urban	8,140,057	19.1									
	Total	***29,760,483***	***69.8***		*M*	*L*	*VL*	*H*	*M*	*L*		*H/M*
Total - Category - B		***29,760,483***	***69.9***									
C1 - Concrete Wall	Rural	147,358	0.3									
	Urban	114,495	0.3									
	Total	***261,853***	***0.6***		*L*	*VL*	*VL*	*L*	*VL*	*VL*		*L/VL*
C2 - Wood wall	Rural	62,424	0.1									
	Urban	20,630	-									
	Total	***83,054***	***0.1***		*L*	*VL*	*VL*	*VH*	*H*	*M*		*H*
Total - Category - C		***344,907***	***0.8***									
X - Other Materials	Rural	3,365,434	7.9									
	Urban	392,676	0.9									
	Total	***3,758,110***	***8.8***		*VL*	*VL*	*VL*	*VH*	*H*	*M*		*VH*
Total - Category - X		***3,758,110***	***8.8***									
TOTAL HOUSES*		42,602,359										

ROOF												
R1 - Light Weight Sloping Roof	Rural	11,074,872	26.0									
	Urban	1,223,806	2.9									
	Total	***12,298,678***	***28.9***		*M*	*L*	*VL*	*VH*	*VH*	*H*		*VH*
R2 - Heavy Weight Sloping Roof	Rural	7,767,796	18.2									
	Urban	1,759,998	4.1									
	Total	***9,527,794***	***22.3***		*M*	*L*	*VL*	*H*	*M*	*L*		*H*
R3 - Flat Roof	Rural	14,352,958	33.7									
	Urban	6,422,929	15.1									
	Total	***20,775,887***	***48.8***	*Damage Risk as per that for the Wall supporting it*								
TOTAL HOUSES*		42,602,359										

Housing Category : Wall Types

Category - A : Buildings in field-stone, rural structures, unburnt brick houses, clay houses

Category - B : Ordinary brick building; buildings of the large block & prefabricated type, half-timbered structures, building in natural hewn stone

Category - C : Reinforced building, well built wooden structures

Category - X : Other materials not covered in A,B,C. These are generally light.

Notes : *1. Flood prone area includes that protected area which may have more severe damage under failure of protection works. In some other areas the local damage may be severe under heavy rains and chocked drainage.*

2. Damage Risk for wall types is indicated assuming heavy flat roof in categories A, B and C (Reinforced Concrete) building

3. Source of Housing Data : Census of Housing, GOI, 2011

Housing Category : Roof Type

Category - R1 - Light Weight (Grass, Thatch, Bamboo, Wood, Mud, Plastic, Polythene, GI Metal, Asbestos Sheets, Other Materials)

Category - R2 - Heavy Weight (Tiles, Stone/Slate)

Category - R3 - Flat Roof (Brick, Concrete)

EQ Zone V : Very High Damage Risk Zone (MSK > IX)

EQ Zone IV : High Damage Risk Zone (MSK VIII)

EQ Zone III : Moderate Damage Risk Zone (MSK VII)

EQ Zone II : Low Damage Risk Zone (MSK < VI)

Level of Risk : VH = Very High; H = High; M = Moderate; L = Low; VL = Very Low

* Total No.of Houses excluding Vacant/Locked Houses

bmtpc **Building Materials & Technology Promotion Council** **Peer Group, MoHUA, GOI**

Distribution of Houses in Uttar Pradesh Source: BMTPC

10.1 Building Codes

While building any structure, it should be made sure that it is designed for safety. The structure should be designed and built as per the norms laid by the **Bureau of Indian Standards (BIS codes)** which has published the following seismic codes: -

a) **IS: 1893 (Part I), 2002,** Indian Standard Criteria for Earthquake Resistant Design of Structures (5th Revision).

b) **IS: 4326, 1993**, Indian Standard Code of Practice for Earthquake Resistant Design and Construction of Buildings (2nd Revision).

c) **IS: 13827, 1993,** Indian Standard Guidelines for Improving Earthquake Resistance of Earthen Buildings.

d) **IS: 13828, 1993,** Indian Standard Guidelines for Improving Earthquake Resistance of Low Strength Masonry Buildings.

e) **IS: 13920, 1993,** Indian Standard Code of Practice for Ductile Detailing of Reinforced Concrete Structures Subjected to Seismic Forces.

f) **IS: 13935, 1993,** Indian Standard Guidelines for Repair and Seismic Strengthening of Buildings.

ROLES AND RESPONSIBILITIES OF MAJOR DEPARTMENTS OF UTTAR PRADESH GOVERNMENT

11. Each Department and Govt. Agency involved in Disaster Management and mitigation will-

"Nominate a single point contact on matters related to Disaster Management, the designated official will be not below the rank of Director along with his details i.e. Mobile number, Email id, office landline number and also detail of alternate arrangement in his absence to look after the work."

- Ensure establishment of two-way communication with the State and District Disaster Management Authority. The List of Roles and Responsibilities at State Level Departments/ agencies related to earthquake is mentioned below-

11.1 Uttar Pradesh State Disaster Management Authority

- Development of awareness campaign strategy and its implementation in the State.
- Development of Earthquake Safety Guidelines and its strict compliance.
- Capacity building programmes through training and developing various modules for training.
- Laying down policies and plans for disaster management in the State.
- Approve the disaster management plans prepared by the departments of the Government of the State.
- Lay down guidelines to be followed by the departments of the Government of the State for the purposes of integration of measures for prevention of disasters and mitigation in their development plans and projects and provide necessary technical assistance therefor;
- Review the development plans of the different departments of the State and ensure that prevention and mitigation measures are integrated therein;

- Review the measures being taken for mitigation, capacity building and preparedness by the departments of the Government of the State and issue such guidelines as may be necessary.
- Ensuring the conduct of mock drills regularly.
- Earthquake vulnerability assessment of State.
- Ensure strict compliance of NBC- 2016 through line departments which are engaged in construction and Urban Development.
- ACEO, UPSDMA will act as Liaison Officer at State Level during any emergency. (As per the State Government Notification by UP Government dated 16th August 2019)
- Every stakeholder must submit their documentation of best practices opted during any emergency to minimize the losses and, thereafter, SDMA will review and bridge the gaps in all the stages of DM.
- Develop application for end-to-end early warning system based on shake alert for UP.
- Promote use of insurance/ risk transfer.

11.2 Uttar Pradesh Fire Services

Mitigation/Preparedness Activities: -

- Modernization of fire-fighting equipment's and strengthening infrastructure.
- Procurement of search and rescue equipment's viz. gas cutters, drillers and human sensors etc.
- Identify and procure latest technological equipments for firefighting.
- Protection of property and the environment from fire damages.
- Development /enforcement of relevant legislations and regulations to enhance adoption of fire safety measures.
- Identification of pockets of industrial, commercial or residential area which are highly susceptible to fire accidents in the event of building collapse due to earthquake.

- Educate people to adopt fire safety measures in the immediate aftermath of earthquakes.
- Conduct training and drills for use of various fire protection and preventive systems in order to ensure higher level preparedness in the community.
- Training the communities to handle fire emergencies more effectively.

Response & Recovery Activities: -

- Rescue of persons trapped in burning, collapsed or damaged buildings, damaged vehicles, including motor vehicles, trains and industries, boilers, trenches and tunnels.
- Control fires and minimize the resultant damages.
- Protection of property and the environment from fire damage.
- Support to other agencies in the response to emergencies.
- Investigation into the causes of fire and assist in damage assessment.
- Strengthening of infrastructure and human resources.
- Review and documentation.
- Share experiences and lessons learnt with SDMA.

11.3 Uttar Pradesh Police Department

Mitigation/Preparedness Activities: -

- Keep the force in general and the PAC in particular fighting fit for search, rescue, evacuation and other emergency operations at all times through regular trainings and mock drills.
- Procurement and deployment of modern emergency equipment while modernizing existing infrastructure and equipment for disaster response along with regular training and drills for effective handling of these equipment.
- Ensure that all communication equipment including wireless are regularly functioning and deployment of extra wireless units in vulnerable pockets.
- Keeping close contact with the District Administration & District Control Room.

- Organize training programmes on search, rescue and evacuation for the members of the Ward and Village Disaster Management Committees and NGOs of the areas falling in the Earthquake Damage Risk Zone IV & III.

Response & Recovery Activities: -

- To take up search, rescue and evacuation operations in coordination with the administration, locals, NGOs and volunteers.
- Make security arrangements for relief materials in transit and in camp etc.
- Security arrangements for relief materials in transit and in camps etc.
- Emergency traffic management particularly the arrangement for the safe passage to the ambulances carrying the injured persons.
- Maintenance of law and order in the affected areas.
- Strengthening of infrastructure and human resources.
- Review and documentation.
- Share experiences and lessons learnt with SDMA.

11.4 Department of Medical Health & Family Welfare Department

Mitigation/Preparedness Activities

- Assess preparedness levels at State, District, Block and village level.
- Formation of functional DM plan of hospitals.
- Ensure Hospital building is earthquake resistant and constructed as per building by laws i.e. NBC 2016.
- Maintain the detail analysis of surge capacity of hospital. (Ability of a health service to expand beyond normal capacity to meet increased demand for clinical care).
- Formation of adequate number of mobile units with trained personnel, testing facilities, communication systems and emergency treatment facilities.
- Identification of locations in probable disaster sites for emergency operation camps.
- Strengthening of Primary Health Centers with network of para-professionals to improve the capacity of surveillance and control of epidemics post disaster
- Identification of areas prone to endemic and epidemics due to disaster and disruption of routine session.

- Awareness generation about do's and don'ts regarding first aid to earthquake victims in the immediate aftermath of an earthquake.
- Training of members of Village Disaster Management Committees (VDMCs) and NGOs of the villages (falling in Earthquake Damage Risk Zone IV & III) on first aid of earthquake victims.
- Training of field personnel, Traditional Birth Attendants, community leaders, volunteers, NGOs and CBOs in first aid, measures to be taken to control outbreak of epidemics during and after a disaster, etc.
- Arrangement of standby generators for every hospital.
- Listing of vehicles, repair of departmental vehicles that will be requisitioned during emergencies for transport of injured.
- Listing and networking with private health facilities

Response & Recovery activities: -

- Ensure adequate availability of personnel at disaster site.
- Ensure special arrangements for the management of critical medical attention requirements (as prescribed in the Minimum Standards for Relief by NDMA)
- Planning for making prior arrangement for early transfer of patients who need specialized care/treatment.
- Opening up of site operation camps in the affected areas
- Early transfer of patients who need specialized care/treatment
- Establishment of public information centers with appropriate and modern means of communication, to assist the patients, their families, other people living in epidemic affected areas regarding vaccination, Do's and Don'ts and treatment facilities, etc.
- Monitoring of water and food quality and disposal of waste in transit and relief camps, feeding centers and affected areas.
- Stockpiling of life-saving drugs, de-toxicants, anesthesia, halogen tablets in vulnerable areas.
- Situational assessment and reviewing the status of response mechanisms in known vulnerable pockets.

- Regular reporting to control rooms.
- Review and update precautionary measures and procedures, and apprise the personnel who will be implementing those.
- Disinfection of water bodies and drinking water sources.
- Immunization against infectious diseases.
- Ensure continuous flow of information.
- Strengthening of infrastructure and human resources.
- Review and documentation.
- Share experiences and lessons learnt with SDMA.

11.5 Animal Husbandry Department

Mitigation/Preparedness Activities

- Listing of animal population with category.
- Stockpiling of emergency medicines and medical equipment.
- Listing and identification of vehicles to be requisitioned for transport of injured animals.
- Vaccination of the animals and identification of campsites in the probable sites.
- Promotion of animal insurance.
- Tagging of animals
- Arrangement of standby generators for veterinary hospitals.
- Provision in each hospital for receiving large number of livestock at a time.
- Training of community members in carcasses disposal.
- Stockpiling of water, fodder and animal feed.
- Stockpiling of surgical packets
- Construction of mounds for safe shelter of animals.
- Identification of various water sources to be used by animals.
- Establishment of animal disease surveillance system.

Response & Recovery Activities: -

- Ensure adequate availability of personnel and mobile teams.

- Eradication and control of animal diseases, treatment of injured animals.
- Eradication and control of animal diseases, treatment of injured animals
- Protection of abandoned and lost cattle.
- Supply of medicines and fodder to affected areas.
- Disposal of carcasses ensuring proper sanitation to avoid outbreak of epidemics
- Establishment of Public Information Centre with a means of communication, to assist in providing an organized and continuous source of information.
- Mobilizing community participation for carcass disposal recovery activities.
- Assess losses of animals assets and needs of persons and communities.
- Strengthening of infrastructure and human resources.
- Review and documentation.
- Share experiences and lessons learnt with SDMA.
- the documentation of best practice and lessons learnt.

11.6 Revenue Department & Relief Commissioner Office

Mitigation/Preparedness Activities: -

- Systematic data management on disaster damage and loss assessments.
- Review, stock and repositioning plan of relief items for earthquake response.
- Identification and documentation for temporary shelter camps for an earthquake scenario.
- Carry out mass media awareness campaigns.
- Rescue preparation.

Response & Recovery Activities-

- Information dissemination with concerned departments regarding preparedness.
- Relief distribution to the disaster effected areas and also financial support as per the guidelines of State Government.
- Review and documentation.
- Share experiences and lessons learnt with SDMA.

11.7 Jal Shakti, Jal Nigam, Nagar Panchayat/Nagar Nigam /Nagar Palika

Mitigation/Preparedness Activities: -

- Provision of safe water to all habitats
- Prior arrangement of water tankers and other means of distribution and storage of water.
- Carrying out emergency repairs of damaged or partially damaged water supply systems.
- Adequate prior arrangements to provide water and halogen tablets at identified sites as relief camps or in areas with high probability to be affected by earthquake.
- Raising of tube-well platforms, improvement in sanitation structures and other infrastructural measures to ensure least damages during future disasters.
- Clearance of drains and sewerage systems, particularly in the urban areas.

Response & Recovery Activities: -

- Disinfections and continuous monitoring of water bodies
- Ensuring provision of water to hospitals and other vital installations
- Provision to acquire tankers and establish other temporary means of distributing water on an emergency basis
- Arrangement and distribution of emergency tool kits for equipments required to dismantle and assemble tube wells, etc.
- Carrying out emergency repairs of damaged water supply systems.
- Strengthening of infrastructure and human resources.
- Review and documentation.
- Share experiences and lessons learnt with SDMA.

11.8 Food & Civil Supplies Department

Mitigation/Preparedness Activities

- Construction and maintenance of storage godowns/warehouses at strategic locations.
- Stockpiling of food reserves and essential commodities in anticipation of disaster.

- Details of each of the warehouse connected to the base warehouse and its distance from the base warehouse, capacity in number of bags. Similarly detailed database of all the public distribution shops connected to each of the warehouse including distance of each of the public distribution shop from the warehouse and capacity in number of bags. As this information can be utilized for safe stockpiling the food gains received from various sources in the immediate aftermath of earthquake.
- Take appropriate preservative measures to ensure that food and other relief stocks are not damaged during storage, especial precautions against moisture, rodents and fungus infestation.

Response & Recovery Activities

- Ensure that food items supplied must comply by the **Guidelines on Minimum Standards of Relief by NDMA**, which clearly prescribe provisions of 2400 cal/day/person for men and women and 1700 cal/day/person for infant and children.
- Management of procurement.
- Management of material movement in close coordination with Transport Department and Railways for transportation of relief supplies.
- Inventory management
- Strengthening of infrastructure and human resources.
- Review and documentation.
- Share experiences and lessons learnt with SDMA.

11.9 Uttar Pradesh Home Guards

Mitigation/Preparedness Activities

- Organize training programmes on first aid, search, rescue and evacuation for its personnel to improve their skills.
- Preparation and demonstration of first aid, search and rescue service plans for earthquakes.
- Remain fit and prepared through regular drills and exercises at all times.

- Organize training programmes on search, rescue and evacuation for the members of the Ward and Village Disaster Management Committees and NGOs of the areas falling in the Earthquake Damage Risk Zone IV & III.

Response & Recovery Activities

- Act as support agency for provision of first aid, search and rescue services to other emergency service agencies and the public.
- Act as support agency for movement of relief items.
- Provide first aid for injured.
- Work in coordination with medical assistance team.
- Help the Police for traffic management and law and order.
- Strengthening of infrastructure and human resources.
- Review and documentation.
- Share experiences and lessons learnt with SDMA.

11.10 Public Works Department

Mitigation/Preparedness Activities

- Develop safe building practices.
- Implementation of strengthening and seismic retrofitting as per recommendations of safety audits in all govt. departments, public utilities, schools, colleges etc.
- Ensure implementation, monitoring, enforcement and proper compliance of bye-laws within the State by public, private and individuals.
- Keep a list of earth moving and clearing vehicles/equipments (available with Govt. Departments including the nearby project site of National Highway Authority, PSUs, and private contractors, etc.) and formulate a plan to mobilize those at the earliest.
- Inspection and emergency repair of roads/ bridges, public utilities and buildings
- To prepare inventory of equipments available with the class 1 contractors of PWD so that these can be timely identified acquired and mobilized to the disaster site for search and rescue work in the immediate aftermath of an earthquake.

- Acquisition of hi-tech equipments such as gas cutters etc. from class 1 contractors (PWD) for using such equipments in search and rescue of the people stranded under the fallen roofs and walls of houses due to earthquake.

Response & Recovery Activities

- Clearing of roads and establish connectivity. Restore roads, bridges and where necessary make alternate arrangements to open the roads to traffic at the earliest.
- Mobilization of community assistance for clearing blocked roads
- Facilitate movement of heavy vehicles carrying equipments and materials.
- Identification and notification/signage of alternative routes to strategic locations.
- Filling of ditches, disposal of debris, and cutting of uprooted trees along the road.
- Arrangement of emergency tool kit for every section at the divisional levels for activities like clearance (power saws), debris clearance (fork lifter) and other tools for repair and maintenance of all disaster response equipments.
- Development of checklists and contingency plans.
- Strengthening of infrastructure and human resources.
- Review and documentation.
- Share experiences and lessons learnt with SDMA.

11.11 Department of Additional Sources of Energy

Mitigation/Preparedness Activities

- Identification of materials/tool kits required for emergency response.
- Ensure the minimum safety standards to be adopted for electrical installation and equipments and organize training of electricians.
- Develop and administer regulations to ensure safety of electrical accessories and electrical installations.
- Preparation of a contingency plan to ensure early electricity supply to essential services during emergencies and restoration of electric supply at an earliest.
- Develop and administer code of practice for power line clearance to avoid electrocution due to broken / fallen wires.

- Strengthen high-tension cable towers, modernize electric installation, strengthen electric distribution system to ensure minimum damages during an earthquake.
- Conduct public/industry awareness campaigns to prevent electrical accidents during normal times and during and after a natural disaster.

Response & Recovery Activities: -

- Disconnect electricity after receipt of warning.
- Attend sites of electrical accidents and assist in undertaking damage assessment
- Standby arrangements to ensure temporary electricity supply
- Inspection and repair of high-tension lines /substations/transformers/poles etc.
- Ensure the public and other agencies are safeguarded from any hazards, which may have occurred because of damage to electricity distribution systems.
- Restore electricity to the affected area as quickly as possible.
- Replacement/restoration of damaged poles/salvaging of conductors and insulators.
- Strengthening of infrastructure and human resources.
- Review and documentation.
- Share experiences and lessons learnt with SDMA.

11.12 Irrigation and Water Resources Department

Mitigation/Preparedness Activities

- Identify flood prone rivers and segments of embankments along them which can witness cracks or seepage in the event of an earthquake.
- Strengthening of such segments of embankments and formulation of emergency plans for such areas.
- Identification and maintenance of materials/tool kits required for emergency response cracking or breaching of embankments in the event of an earthquake.
- Stockpiling of sand bags and other necessary items for breach closure.
- Development of checklists and contingency plans

Response & Recovery Activities: -

- Inspection of bunds of dams, irrigation channels, bridges, culverts, control gates and overflow channels in the immediate aftermath of an earthquake.
- Monitoring and protection of irrigation infrastructures.
- Monitoring flood situation in the immediate aftermath of an earthquake and dissemination of flood warning.
- Inspection and repair of pumps, generators, motor equipments and station buildings.
- Strengthening of infrastructure and human resources.
- Review and documentation.
- Share experiences and lessons learnt with SDMA.

11.13 Transport Department

Mitigation/Preparedness Activities: -

- Listing of vehicles which can be used for emergency operation especially for carrying the rescue teams and relief supplies.
- Safety accreditation, enforcement and compliance.
- Ensuring vehicles follow safety standards.
- Build awareness on road safety and traffic rules through awareness campaign, use of different IEC strategies and training to school children.
- Ensure proper enforcement of safety regulations.

Response & Recovery Activities: -

- Requisition of vehicles, trucks especially for carrying the rescue teams and relief supplies.
- Coordination with railway authorities for carrying the rescue teams and relief supplies.
- Strengthening of infrastructure and human resources.
- Review and documentation.
- Share experiences and lessons learnt with SDMA.

11.14 Department of Panchayati Raj

Mitigation/Preparedness Activities: - Develop strategies for risk reduction at community level by following measures-

- Training of elected representatives on various aspects of disaster management.
- Ensure integration of GPDP with DRR (Disaster Risk Reduction).
- Public awareness on various aspects of disaster management through training programs to be organized at the Gram Panchayat level on pre, during and post-earthquake do's and don'ts.
- Organize mock drills to respond to the earthquake disaster in the areas of Earthquake Damage Risk Zone IV & III.
- Facilitate the Village Disaster Management Committees of the areas falling in the (Earthquake Damage Risk Zone IV & III) in preparing their community disaster management plan.
- Support strengthening response mechanisms at the Gram Panchayat level (e.g. better communication, local storage, search & rescue equipments, etc.)
- Ensure alternative routes/means of communication for movement of relief materials and personnel to marooned areas or areas likely to be marooned.
- Time to time cleaning of blocked drains.
- Assist all the government departments to plan and prioritize prevention and preparedness activities while ensuring active community participation.
- The Panchayat Samity and Gram Panchayat members to be trained to act as an effective interface between the community, NGOs, and other developmental organizations.
- Provide training so that the elected representatives can act as key functionaries for reconstruction and recovery activities.

Response & Recovery Activities: -

- Encourage Gram Panchayat Members and facilitate timely and appropriate delivery of warning to the community.
- Clearance of blocked drains and roads, including tree removal in the villages.

- Construct alternative temporary roads to restore communication to the villages.
- Identify the school building, community centers and operationalize them into emergency relief centers and emergency shelters.
- Make necessary arrangements for sanitation, drinking water and medical aid.
- Participate in post impact assessment of emergency situation.
- Support in search, rescue and first aid activities.
- Provision of personal support services e.g. counseling
- Repair/restoration of infrastructure e.g. roads, bridges, public amenities.
- Supporting the Gram Panchayats in development of storage houses for food stocks.
- Coordination for distribution of relief and rehabilitation materials.
- Strengthening of infrastructure and human resources.
- Review and documentation.
- Share experiences and lessons learnt with SDMA.

11.15 Information & Public Relations Department

Mitigation/Preparedness Activities: -

- Creation of public awareness regarding various types of disasters (including earthquakes) through media propagation.
- Dissemination of information to public and others concerned regarding do's and don'ts of various disasters including earthquakes.
- Develop various technology to disseminate the information related to earthquake safety.

Response & Recovery Activities: -

- Setting up of a control room to provide authentic information to public regarding impending emergencies.
- Keep the public informed about the updates on emergency situation (area affected, lives lost etc.)
- Information, Education and Communication (IEC) activities for major awareness.
- Keep the public informed about various post disaster assistances and recovery programmes.

- Strengthening of infrastructure and human resources.
- Review and documentation.
- Share experiences and lessons learnt with SDMA.

11.16 Environment Forest and Climate Change Department

Mitigation/Preparedness Activities

- Promotion of shelter belt plantation and green cover.
- Provision of seedling to the community and encourage plantation activities, promoting nurseries for providing seedlings in case of destruction of trees during natural disasters.
- Climate Change Adoption policies and its implementation.
- Monitoring and Coordination of Sustainable Development Goals.
- Information, Education and Communication (IEC) activities for greater awareness regarding the role of trees and forests for protection during emergencies and eco-friendly utilization of trees for rehabilitation activities in the aftermath of an earthquake.
- Increasing involvement of the community, NGOs and CBOs in plantation, protection and other forest protection, rejuvenation and restoration activities.

Response & Recovery Activities

- Assist in road clearance
- Provide of tree cutting equipments
- Provide of building materials such as bamboos etc. for construction of shelters.
- Strengthening of infrastructure and human resources.
- Review and documentation.
- Share experiences and lessons learnt with SDMA.

11.17 Basic, Secondary and Higher Education Departments

- Improve curriculum periodically to include earthquake awareness and do's and don'ts of earthquake in school and college.

- Promote IEC materials through social media, hoardings and other medium to youth.
- Engage children of Primary Education in various activities so that they will be aware of earthquake safety as well as other disasters.
- Organize mock- drills at regular interval.
- Prepare School Safety Plan which clearly mentions the evacuation plan of the school premises.
- Share the content of curriculum to UPSDMA for review and expert inputs.
- Include State specific disasters in syllabus of Secondary Education which are notified by Govt. of UP.
- In higher education focus to develop a scientific temper towards best technological shifts in Disaster Management.

11.18 Civil Societies, Volunteer organization and AAPDA Mitra's

- Contribute to policy analysis, policy making and strategy formulation, including aggregating and advocating the preferences and interests of affected populations to strengthen linkages between policies and local practices.
- Share the details of civil societies which are working in domain of Disaster Management in general and Earthquake safety in particular.
- Developing innovative approaches, good practices, participatory methodologies and new types of multi-stakeholder partnerships.
- Enhancing the inclusion and meaningful participation of vulnerable, marginalized people who are disproportionately impacted by disasters to ensure DRR interventions reflect the needs and priorities of all members of society.
- Recognize the role of civil society and community practitioners in broadening the participation of citizens in the formulation and implementation of community-driven disaster risk management
- Facilitating data and information exchange.
- Dissemination of information & awareness generation by IEC material, campaigns at public places and at doorsteps to reach the last mile via AAPDA Mitra's.
- Conduct an awareness drive to educate rural communities through AAPDA Mitra's.

- Utilize the trained volunteers of civil societies and AAPDA Mitra's in rescue and relief after earthquake.

11.19 All concerned departments of UP Govt. must prepare Departmental Disaster Management Plan duly integrated with DRR aspects in their departmental development projects under ***DM Act 2005*** as mentioned below –

"Section 18(2) d in the Disaster Management Act, 2005 lays down guidelines to be followed by the departments of the Government of the State for the purposes of integration of measures for prevention of disasters and mitigation in their development plans and projects and provide necessary technical assistance therefor;"

12 Techno- Legal Regime- The State Govt./SDMA will adopt the model techno-legal framework for ensuring compliance of earthquake- resistant design and construction practices in all new constructions. State Governments will update the Urban Regulations by amending them to incorporate multi- hazard safety requirements. State Government will review, revise and update the town and Country Planning Acts, land use and zoning regulations, building bye-laws and this process will be repeated at least once every five years.

Reference- NDMA: Management of Earthquakes Chapter- 5 Regulation and Enforcement, 5.2.1 Techno Legal Regime.

"The departments which are involved in construction like all development authorities of Municipalities, Nagar Palika, PWD, Dept of Technical Education, Housing and Urban Planning, Infrastructure and Industrial Development, Panchayati Raj, Planning, must ensure to implement National Building by Laws which make all future construction earthquake resilient. Also establish a Dashboard for State inventory and database of lifeline buildings which are constructed as per NBC- 2016."

13 Incident Response System (IRS)- The roles and responsibilities of officials at State and District level are clearly defined by Government of UP Notification number 161/1-11-2019 and 183/1-11-2019 dated 16th of August 2019, which is given below-

उत्तर प्रदेश शासन
राजस्व अनुभाग–11
संख्या– 183 /1–11–2019
लखनऊ : दिनांक : 11 जुलाई, 2019

अधिसूचना

उत्तर प्रदेश सरकार द्वारा प्रदेश में घटित होने वाली आपदाओं के शमन व प्रत्युत्तर हेतु तत्काल प्रभाव से "इन्सीडेन्ट रेस्पांस सिस्टम" को आदर्श सिस्टम के रूप में प्रदेश में लागू किया जाता है। "इन्सीडेन्ट रेस्पांस सिस्टम" को कियान्वित करने हेतु "जिला स्तरीय इन्सीडेन्ट रेस्पांस टीम" को निम्नवत् गठित किये जाने की अधिसूचना की जाती है:–

District Level Incident Response Team		
1.	Responsible Officer	District Magistrate
2.	Incident Commander	ADM, F/R
3.	Deputy Incident Commander	City Magistrate
4.	Safety Officer	Superintendent of Police
5.	Liaison Officer	City Magistrate
6.	Information Officer	District Information Officer
7.	Operation Section Chief	Superintendent of Police
	a. Staging Area Manager	R.T.O
	b. Rescue & Response Branch	
	i. Natural Disasters	District Fire Off.
	ii. Epidemic & Health Hazard	C.M.O
	iii. Manmade Disasters	Additional S.P.
	c. Transport Branch (road, Rail, Water & Air Unit)	R.T.O.
8.	Planning Section Chief	ADM, F/R
	a. Situation Unit	Emergency Operation Center, In charge
	b. Resource Unit	Disaster Expert/DDMA In charge
	c. Documentation Unit	District Information Officer
	d. Demobilization Unit	ADM, F/R
9.	Logistic Section Chief	Chief Development Officer
	a. Service Branch	District Development Off.
	i. Communication Unit	District Information Off.
	ii. Medical Unit	Chief Medical Off.
	iii. Food Unit	District Supply Off.
	b. Support Branch	SDM, Sadar
	i. Resource Provisioning Unit	Ex. Engineer Irrigation & PWD
	ii. Facilities Unit	Chief Veterinary Off.
	iii. Ground Support	Ex. Officer, Nagar Nigam/Jal Nigam
	c. Finance Branch	Treasury Officer
	i. Time Unit	Nazir
	ii. Compensation/Claim Unit	Relief Clerk
	iii. Procurement Unit	Treasury Officer
	iv. Cost Unit	Treasury Officer

किसी आपात स्थिति/आपदा के घटित होने पर "रेस्पान्सिबल ऑफीसर" द्वारा "जिला स्तरीय इन्सीडेन्ट रेस्पांस टीम" को कियाशील किया जायेगा।

(अनूप चन्द्र पाण्डेय)
मुख्य सचिव,
उ0प्र0 शासन।

संख्या व दिनांक तदैव
प्रतिलिपि निम्नलिखित को सूचनार्थ एवं आवश्यक कार्यवाही हेतु प्रेषित–

1. समस्त अपर मुख्य सचिव/प्रमुख सचिव, उ0प्र0 शासन।
2. समस्त विभागाध्यक्ष, उत्तर प्रदेश।
3. समस्त मण्डलायुक्त एवं समस्त जिलाधिकारी, उत्तर प्रदेश।
4. सम्बन्धित पत्रावली ।

(रेणुका कुमार)
अपर मुख्य सचिव,
राजस्व विभाग,
उ0प्र0 शासन।

उत्तर प्रदेश शासन
राजस्व अनुभाग–11
संख्या– 16) /1–11–2019
लखनऊ : दिनांक : 16 जुलाई, 2019
अगस्त

अधिसूचना

उत्तर प्रदेश सरकार द्वारा प्रदेश में घटित होने वाली आपदाओं के शमन व प्रत्युत्तर हेतु तत्काल प्रभाव से "इन्सीडेन्ट रेस्पांस सिस्टम" को आदर्श सिस्टम के रूप में प्रदेश में लागू किया जाता है। प्रदेश में "इन्सीडेन्ट रेस्पांस सिस्टम" को क्रियान्वित करने हेतु "राज्य स्तरीय इन्सीडेन्ट रेस्पांस टीम" को निम्नवत् गठित किये जाने की अधिसूचना की जाती है:–

State Level Incident Response Team		
1.	Responsible Officer	Chief Secretary to the Govt. of Uttar Pradesh
2.	Incident Commander	Additional Chief Secretary/Principal Secretary, Revenue Dept.
3.	Nodal Officer (Air Operation)	Additional Chief Secretary/Principal Secretary, Aviation Dept.
4.	Deputy Incident Commander	Secretary & Relief Commissioner
5.	Safety Officer	Director General of Police, U.P.
6.	Liaison Officer	Additional C.E.O., U.P.S.D.M.A.
7.	Information & Media Officer	Director Information & Public Relation Department
8.	Operation Section Chief	ACS/ Principal Secretary, Home
	a. Staging Area Manager	Secretary, PWD (Road)
	b. Rescue & Response Branch	
	i. Natural Disasters	ADG, SDRF/PAC/FIRE
	ii. Epidemic & Health Hazard	DG, Health
	iii. Manmade Disasters	ADG, Law & Order
	c. Transport Branch (road, Rail, Water & Air Unit)	Commissioner, Transport
9.	Planning Section Chief	Additional C.E.O., U.P.S.D.M.A.
	a. Situation Unit	Project Director (Emergency Operation), UPSDMA
	b. Resource Unit	Project Manager, Relief Commissioner Organization
	c. Documentation Unit	Project Coordinator (Training), UPSDMA.
	d. Demobilization Unit	Project Director (Flood/ Earthquake/ Epidemics/ Fire/ Drought), UPSDMA.
10.	Logistic Section Chief	ACS/ Principal Secretary, Food & Civil Supply, Department
	a. Service Branch	Secretary, Health & FW
	i. Communication Unit	DIG, Radio & Wireless Communication

	ii. Medical Unit	Director, Health
	iii. Food Unit	Commissioner, Food & Civil Supply
	b. Support Branch	Special Secretary PWD-Building
	i. Resource Provisioning Unit	Chief Eng., PWD-Road
	ii. Facilities Unit	Chief Eng., PWD-Building
	iii. Ground Support	Chief Eng., Jal Nigam
	c. Finance Branch	Secretary, Finance (E-5) Dept
	i. Time Unit	Dy. Secy., Finance
	ii. Compensation/Claim Unit	Dy. Secy., Finance
	iii. Procurement Unit	Director, Finance
	iv. Cost Unit	Director, Finance

किसी बड़ी आपात स्थिति/आपदा के घटित होने पर "रेस्पान्सिबल ऑफीसर" द्वारा "राज्य स्तरीय इन्सीडेन्ट रेस्पांस टीम" को क्रियाशील किया जायेगा।

(अनूप चन्द्र पाण्डेय)
मुख्य सचिव,
उ0प्र0 शासन।

संख्या व दिनांक तदैव
प्रतिलिपि निम्नलिखित को सूचनार्थ एवं आवश्यक कार्यवाही हेतु प्रेषित–

1. समस्त अपर मुख्य सचिव/प्रमुख सचिव, उ0प्र0 शासन।
2. समस्त विभागाध्यक्ष, उत्तर प्रदेश।
3. समस्त मण्डलायुक्त एवं समस्त जिलाधिकारी, उत्तर प्रदेश।
4. सम्बन्धित पत्रावली ।

(रेणुका कुमार)
अपर मुख्य सचिव,
राजस्व विभाग,
उ0प्र0 शासन।

14. National Building Code 2016 for Urban Development by various Government Stakeholders

There are various guidelines by apex bodies regarding safety of any building construction or development work done by departments. The primary intent of the earthquake resistant design provisions of NBC 2016 is to prevent collapse of structures, and thereby protect human and animal lives. Under severe intensity of ground shaking, damage is likely to occur in the structural members of normal houses. Severity of earthquake ground shaking underneath the house varies depending on the intensity of the earthquake and the distance of the house from the epicenter of the earthquake. As per the philosophy of earthquake resistant design:

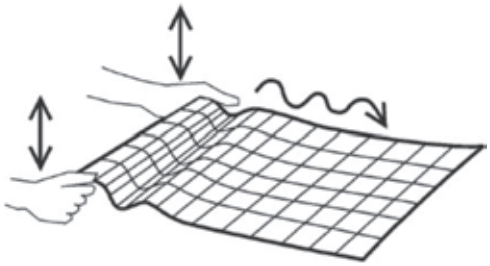
- Under minor (but frequent) shaking, structural members should not be damaged.
- Under moderate (but occasional) shaking, structural members may sustain repairable damage; and
- Under strong (but rare) shaking, structural members may sustain severe (even irreparable) damage, but the house should not collapse. Different types of structural damage can occur in houses during earthquakes.

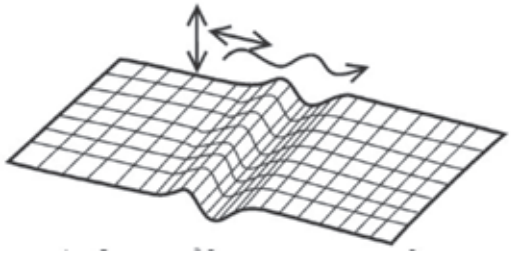
Therefore, the main focus in the design of houses is ensuring that the said structural damage is of acceptable type and at acceptable locations. For example, in a reinforced concrete frame building with unreinforced masonry infill walls in the bays between beams and columns, the vertical separation cracks are acceptable between columns and masonry walls, but the diagonal cracks cutting across the columns are not acceptable.

In UP various government departments, which are involved in construction of building work must refer to below mentioned guidelines.

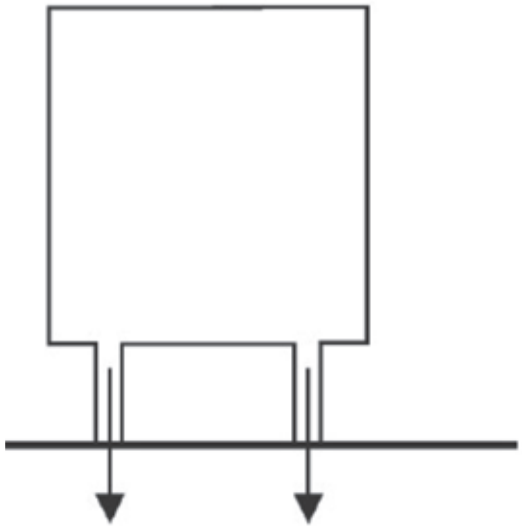
Web link of guideline NBC-2016: ***https://cpwd.gov.in/Publication/Booklet-Guide-for-Using-NBC-2016.pdf***

15. <u>Structural & Non- Structural Elements which causes Damage-</u> Sudden movements of the plates or faults cause ground shaking. The soil type affects the shaking, for example the shaking increases in soft soil. This can be understood like a sheet of cloth. By shaking it at one end, a wave is formed. This is what happens in an earthquake. Because of the wave, horizontal force acts on the building. For this sideways movement, the building has to be specifically designed.

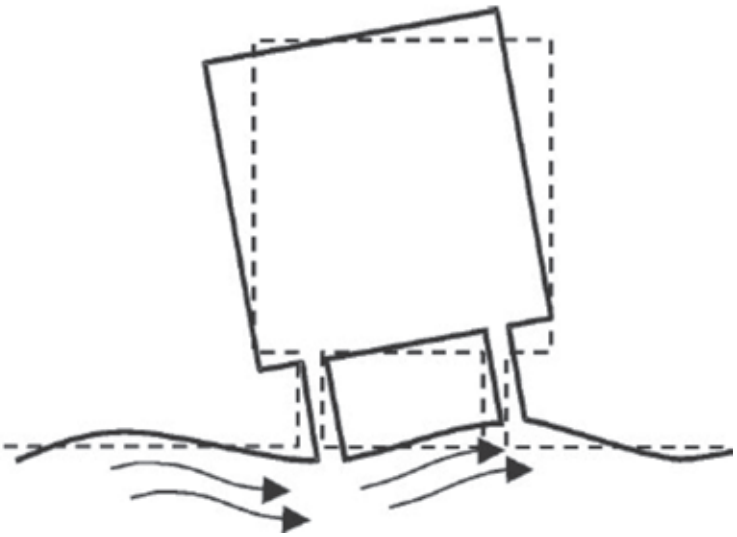




Normally, the weight of the building travels vertically down to the ground. All buildings are designed for this weight. Crack, and in some cases failures, occur if the shape, material and details of the construction are not adequate to withstand sideways shaking.



Normal position of building



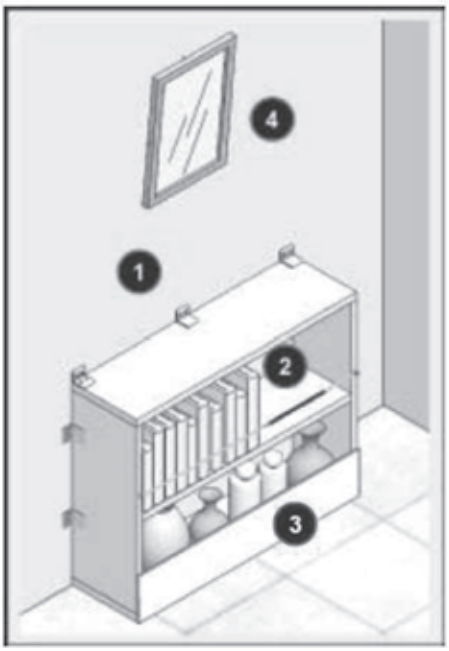
Building during earthquake

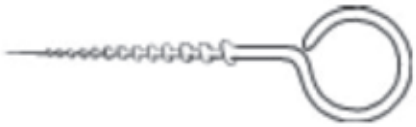
15.1 Structural elements- In a multistoried building the **first step** that one need to take is to sensitize your fellow residents and the neighborhood about the damages and losses they may face in an earthquake. The next step would be to get your building reviewed for earthquake safety by a competent and experienced structural engineer. Sequence in which structural elements are to be checked are mentioned below-

- Corner columns and beams.
- Peripheral columns and beams.
- Cantilever beams (for balcony covered framed buildings).
- Stair walls and columns and lift walls.
- Columns at upper levels.
- Water tanks.
- Infill and partition Walls.
- As a precautionary measure the beams and columns as well as their junctions at all levels must be checked.

15.2 Non-Structural Elements- This covers the ways to reduce damage to and injury from the contents of your home.

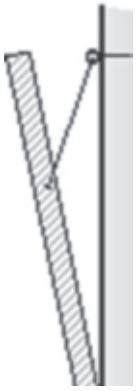
- Provide brackets at top or, sides secure the shelves from toppling off.
- Metal or, wire guardrails will also help to keep objects from falling off open shelves.
- Metal plastic or, wood ledge barriers prevent objects from sliding off the shelves.
- Picture frames, bulletin boards and mirrors will fall during an earthquake, if they are not securely fastened to the wall. Use *closed screw-eye* to hang up picture frame/ bulletin boards/ mirrors.





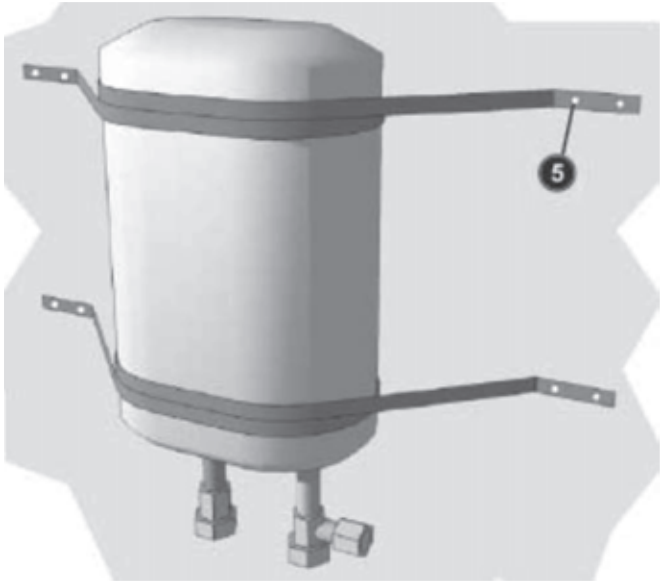
Closed screw-eye

Picture frame hanging from wall using closed screw-eye.



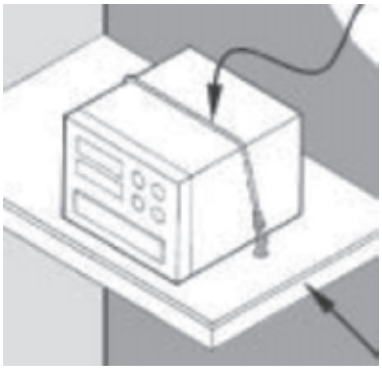
- A typical water heater weighs between 30 to 60 kilograms when full. A sudden jolt and/or the rolling motion that accompanies most earthquakes can cause them to topple over. Wrap heavy-gauge metal bands or nylon strapping 1½ times around the tank. Secure this band or strapping to the wall with several 6 mm by 75 mm or longer lag screws/ expansion bolts with washers.

Water heater wrapped by metal band and screwed by 75 mm screw.

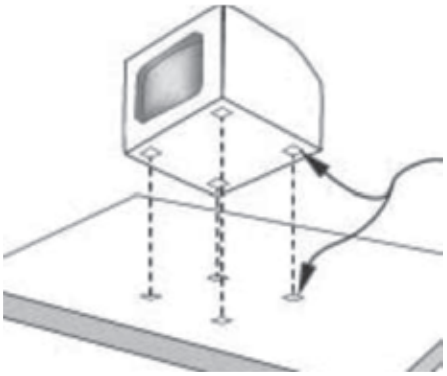


- Secure your equipment/ computer in the work place**.** Heavy objects such as televisions, computers and stereos are usually placed on top of cabinets, bookcases and tables. Fasten these items so they will not slide off during an

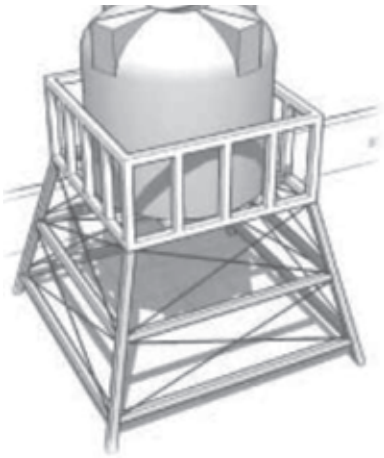
earthquake. Such simple structural measures are vital to maintain safety during an earthquake.

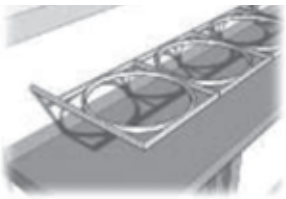


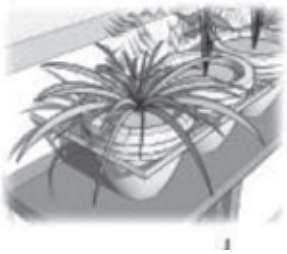
Use of chain to anchor objects.

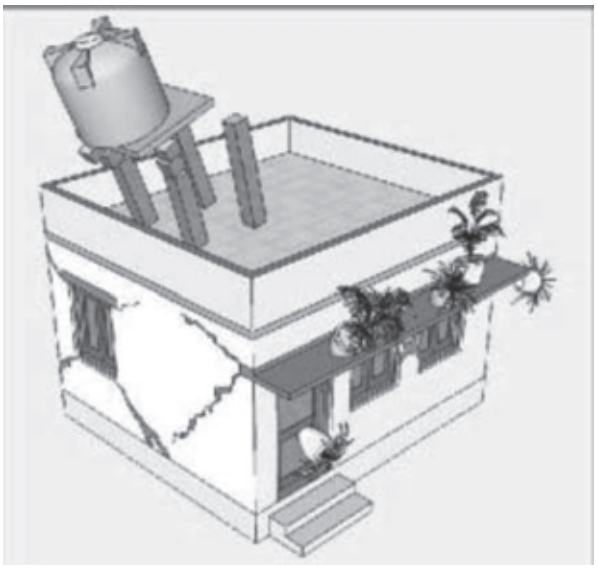


Hook & Loop Material



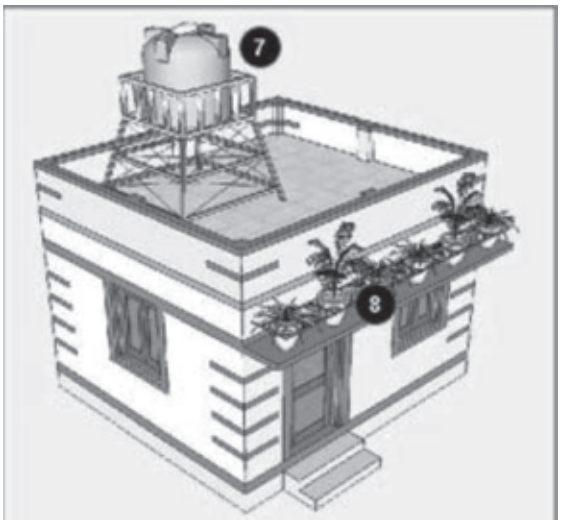




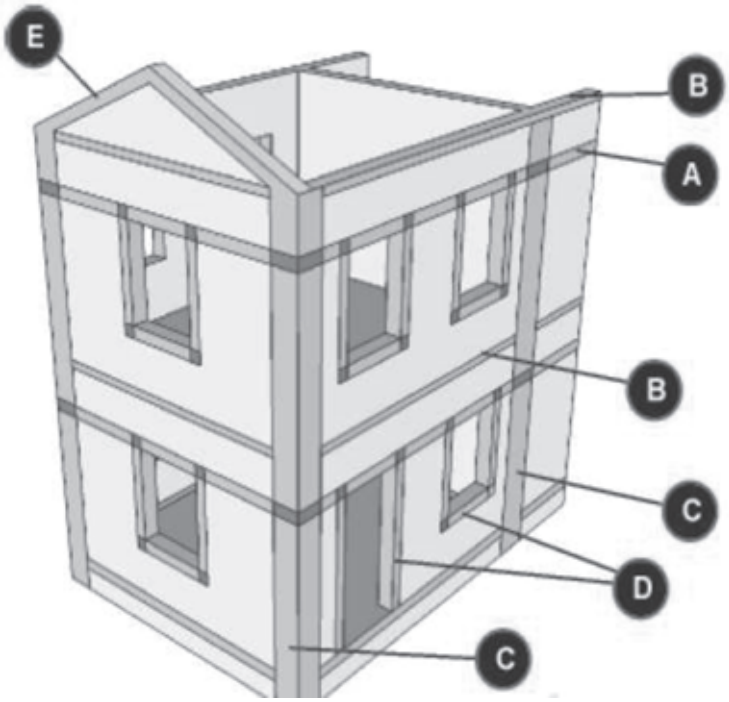


Elements likely to cause damage

Elements secured to avoid damage



16. Retrofitting of building



Nails and galvanized welded steel wire mesh

A. Horizontal Seismic Belts just above the lintels of Door and Window opening.

B. Horizontal belts just below the roof.

C. Vertical Seismic Belts at wall junctions (L & T junctions).

D. Seismic belt around doors and windows containing galvanized welded steel wire mesh as reinforcement.

E. Seismic belts around the gable wall.

16.1 Steps to lay the seismic belts in house

- Remove plaster in the height of the belt.
- Rake out mortar joints to 12 – 15 mm depth.
- Clean the surface and wet it with water.
- Apply neat cement slurry and thereafter apply the first coat of 12 mm thickness cement mortar. Roughen the surface of the plaster before initial hardening.
- Fix the mesh with 150 mm long nails at about 300 mm apart while the first coat of plaster is in its initial hardening stage.
- Apply second coat of plaster of 16 mm thickness.

A COMMONER GUIDELINES FOR ACTIONS BEFORE, DURING AND AFTER EARTHQUAKE

Before an Earthquake

17. "Earthquakes don't kill people, unsafe buildings do." It should be made sure that the proper structural design and engineering practices are followed while constructing a house. For existing buildings, evaluate the structural soundness of buildings and strengthen/ retrofit if necessary.

17.1 Points to Remember

- Repair deep plaster cracks in ceilings and foundations. Get expert advice, if there are signs of structural defects.
- Anchor overhead lighting fixtures to the ceiling.
- Follow BIS codes relevant to your area for building standards
- Fasten shelves securely to walls.
- Place large or heavy objects on lower shelves.

- Store breakable items such as bottled foods, glasses, closed cabinets with latches.
- Hang heavy items such as pictures and mirrors away from beds, settees, and anywhere that people sit.
- Brace overhead light and fan fixtures.
- Repair defective electrical wiring and leaky gas connections. These are potential fire risks.
- Secure water heaters, LPG cylinders etc., by strapping them to the walls or bolting to the floor.
- Store weed killers, pesticides, and flammable products securely in closed cabinets with latches and on bottom shelves.

- Identify safe places indoors and outdoors.
  - Under strong dining table, bed
  - Against an inside wall
  - Away from places where glass could shatter such as around windows, mirrors, pictures, or where heavy bookcases or other heavy furniture could fall over
  - In the open, away from buildings, trees, telephone and electrical lines, flyovers and bridges
- Know emergency telephone numbers (such as those of doctors, hospitals, the police, etc)
- Educate yourself and family members.

- Have a disaster emergency kit ready as suggested below: -
  - Battery operated torch with extra batteries
  - Battery operated radio
  - First aid kit and manual
  - Emergency food (dry items) and water (packed and sealed)
  - Candles and matches in a waterproof container
  - Knife

- Chlorine tablets or powdered water purifiers
- Can opener.
- Essential medicines
- Cash and credit cards
- Thick ropes and cords
- Sturdy shoes

17.2 Develop an emergency communication plan

- In case family members are separated from one another during an earthquake (a real possibility during the day when adults are at work and children are at school), develop a plan for reuniting after the disaster.
- Ask an out-of-state relative or friend to serve as the 'family contact' after the disaster; it is often easier to call long distance. Make sure everyone in the family knows the name, address, and phone number of the contact person.

17.3 Help your community get ready (by State/ District administration

- Publish a special section in your local newspaper with emergency information on earthquakes. Localize the information by printing the phone numbers of local emergency services offices and hospitals.
- Conduct week-long series on locating hazards in the home.
- Work with local emergency services and officials to prepare special reports for people with mobility impairment on what to do during an earthquake.
- Provide tips on conducting earthquake drills in the home.
- Instruct representatives of the gas, electric, and water companies about shutting off utilities.
- Work together in your community to apply your knowledge to building codes, retrofitting programmes, hazard hunts, and neighborhood and family emergency plans.

17.4 Simplified Guidelines for Earthquake Safety Buildings

The following is a summary of the main points presented in this guide, which need the attention of a home owner towards ensuring earthquake safety:

S.No.	Do's
1	Ensure that the house is construct as per the building code, either on hill slopes or in plains
2	Ensure that the building is: (a) neither too long nor too tall, (b) simple without any bend in plan, and (c) uniformly wide along the height, if not, wider at the base.
3	Ensure that masonry houses have walls with: (a) regularly shaped masonry units, (b) bands, (c) proper masonry courses, (d) relatively small door and window openings, which are away from wall corners, and (e) buttresses supporting long walls.
4	Ensure that RC Frame buildings have: (a) structural walls along the full building height, (b) 135° hook ends in transverse ties, and (c) additional horizontal RC elements to break slender masonry infill walls into smaller panels
5	Ensure that good quality materials are used in construction of the house. In houses built of stone masonry, only dressed stones should be used.
6	Ensure that masonry and RC works are cured for the prescribed duration using potable water.
7	Secure properly the following to RC members and never to masonry walls:(a) heavy objects (like water tanks), and (b) utilities (like electric, gas and water lines).
8	Ensure regular maintenance of buildings, and repair of: (a) Minor structural and non-structural damages, (b) Plumbing items and water leakages from joints, (c) Electrical items, (d) Aesthetics and painting, and (e) General cleaning of roofs, balconies and ledges.
9	Seek services of competent Professionals for design and construction of the house, and skilled Artisans for construction.

S.No.	Don'ts
1.	Do not start construction until the plot of land is marked by the surveyor from the Municipal Office, and approvals are provided for construction by the Municipal Office.
2.	Do not use false ceilings excessively in the house.
3.	Do not use excessive appendages (like façade, stone cladding) or large sized glass windows/walls in the house.
4.	Do not buy a house that is not certified to be earthquake-resistant by a competent structural engineer

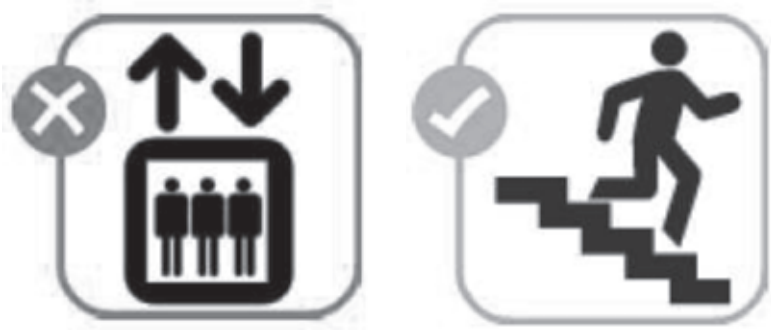
Source - Simplified guidelines on earthquake safety by NDMA and BIS

During an Earthquake

18. During earthquakes, drop to the floor, take cover under a sturdy desk or table, and hold on to it so that it doesn't move away from you. Wait there until the shaking stops.

- If you are in a structurally sound building, stay there. If you are inside an old weak structure, take the fastest and safest way out.

- Do not use elevators. After the shaking stops, take the staircase to reach open space.



- If you are **near an exit**, leave the building as soon as possible. ***Do not rush*** to the exit point. Get out calmly in an orderly manner. If you are **not near an exit** or, you are situated in **high-rise building/ upstairs** stay inside. **Do not *panic;*** stay calm and take necessary action.

- Stay away from buildings with glass panels and move away from power lines, posts, walls, false ceiling, parapet, falling flower pots and other elements that may fall or, collapse.


- When driving a vehicle pull to the side of the road and stop. If you are on a steep hillside, move away in case of landslides and falling rocks.
- Do not attempt to cross bridges/flyovers, which may have been damage.



After an Earthquake

19. Do's

- Check for fire and, if any, have it controlled.
- Check your water and electrical lines for defects.
- Clean up household chemical spills, toxic and flammable materials to avoid any chain of unwanted events.
- Gather information and necessary instructions from battery operated radio.
- Leave a message stating where you are going if you must evacuate your residence and take a survival kit with you.

Dont's

- Don’t enter partially damaged buildings. Strong aftershocks can cause further damage to the buildings and weak structures may collapse.

- Don’t use your two-wheeler/car to drive around the areas of damage. Rescue and relief operations need the road for mobility.

19.1. Important Facts

- Prediction of earthquakes is not possible. Do not listen to or, spread rumors.
- Expect aftershocks. Aftershocks are normally less intense and gradually die out.
- Long-term strengthening or, retrofitting must be done to avoid future failures, based on the technology and expertise mentioned in the codes of practice for this.
- The extra cost of earthquake resistant features in severe earthquake zone for masonry buildings shall be 4-6 % and for R.C. buildings (4-8 storey's) would be 5-6 %.
- Retrofitting of buildings not initially designed for earthquake will cost 2 to 3 times as much as the extra cost of the earthquake resistant features in the new buildings.

COMMUNITY BASED CAPACITY BUILDING FOR EARTHQUAKE SAFETY

20. Public awareness campaigns should be initiated at the, State and district levels in high-risk areas for widely disseminating information on earthquake risk reduction through seismic retrofitting among all stakeholders and to develop professional human resources for seismic retrofitting. Case studies documenting the process of vulnerability assessment needs to be prepared and disseminated for creating greater public awareness among professionals and critical stakeholders.

21. Seismic risk reduction can be achieved by applying currently available national and international knowledge on seismic strengthening and retrofitting; imbibing available national and international knowledge and customizing the same; and finally, generating new applied knowledge to address the problems specific to India. Significant and maximum gains can be achieved by initiating rigorous research and development activities to develop new knowledge and techniques and to adapt the available knowledge

to the Indian context. DDMAs and professional bodies should organize knowledge sharing workshops to disseminate the methodology and important experiences of seismic strengthening and retrofitting of lifeline structures to the professional community.

22. Earthquake Education & Capacity Development- Earthquake education addresses the multifaceted aspects of earthquake management, especially preparedness, mitigation and response efforts. In this regard, case histories of actual earthquakes are used as valuable inputs for earthquake education. The development of high-quality education materials, textbooks, field training and the improvement of the quality of teaching at all levels should be given due emphasis. Education and training programs should be designed, with greater attention on developing the capacity and skills of trainers and trained teachers. The mainstreaming of earthquake management in development planning should be supplemented with the development of the requisite infrastructure in technical and professional institutions, improved laboratories and libraries in knowledge institutions and R&D institutions. These measures will enable them to undertake research, execute pilot projects, and develop resource materials and technical documents for education, sensitization and training programs. The DM plans should be prepared by DDMAs, departments and should address these requirements in detail.

The target groups for capacity development should include elected representatives and government officials, professionals in visual and print media, urban planners, infrastructure development experts, engineers, architects and builders, NGOs, Community Based Organizations (CBOs), social activists, social scientists, schoolteachers, and schoolchildren. Specially designed public awareness programs should be developed for addressing the needs of women and the elderly.

23. Need for Technical Audits and Monitoring- All modifications to existing buildings, including seismic strengthening and retrofitting projects should be regulated and monitored by the Urban Local Bodies. The structural design calculations and drawings of public buildings should be scrutinized for regulation compliance as per the specifications

of the model techno-legal regime. In the case of major projects, these aspects should be subjected to detailed technical audit before granting the building permissions. It should also be ensured that only building materials, of the quality conforming to the seismic safety codes and standards, should be used in the construction of buildings and structures.

WAY FORWARD

24. Need of Coordinated Response- Following actions to remedy the existing gaps on earthquake safety in the State of UP needs to be addressed-

- Lack of coordinated response with line departments.
- Lack of awareness of seismic knowledge and implications among the communities.
- Inadequate data on disaster damage and loss.
- Lack of studies on vulnerabilities and capacities covering social, physical, economic, ecological, gender, social inclusion and equity aspects.
- Inadequate capacities for implementing robust mechanisms for monitoring construction of earthquake-resilient houses.
- Lower level of compliance to relevant building codes in high-rise buildings.
- Moderate level of compliance to adoption of building bye-laws for rural and urban areas.
- Lack of adequate number of trainings and orientation sessions of the State Government Staff, and other direct stakeholders such as civil society, media persons, elected representatives and professionals on earthquake preparedness and response measures
- Lack of knowledge related to earthquakes and seismicity among common people.

25. Important measures to be taken for making UP, "An Earthquake Resilient State"-

- Role of various stakeholders must be integrated with guidelines of UPSDMA.

- Create awareness of seismic knowledge and implications among the communities.
- Strict compliance to relevant building codes in high-rise buildings.
- Grassroot monitoring regarding adoption of building bye-laws for rural and urban areas.
- Adequate number of trainings and orientation sessions to be conducted to the State Government Staff, and other direct stakeholders such as civil society, media persons, elected representatives and professionals on earthquake preparedness and response measures
- Importance of micro zonation (In city which has population of more than 5 Lakh)
- Creating inventory of Life Line Buildings
- Strengthening the Earthquake Safety Education through community based DRR.
- Research and Development in association with various reputed Institutions.
- Implementation of insurance mechanism for buildings.
- Training of masons on basic safety construction practices.
- Creation of dashboard for inventory of earthquake resistant buildings in high seismic zones.
- Use of labour cess for training of masons and rajmistries for earthquake safety and capacity building.
- RVS and safety audit of heritage buildings, as per the guidelines of NDMA for Heritage Safety.

CONCLUSION

26. The management and control of the adverse consequences of future earthquakes will require coordinated, prompt and effective response systems at the Central and State Government levels, especially at the district and the community levels. For earthquakes, depending on their magnitude, the scale of response and the corresponding role players will be identified and mobilized at the district, State or National levels. Systems should be institutionalized by the DMAs, at various levels, for coordination between the various agencies like Government ministries and departments, district administration, ULBs, and other stakeholders for effective post-earthquake response.

27. The community in the affected neighborhood is always the first responder after any disaster. Experience has shown that over 80 per cent of search and rescue from collapsed buildings is carried out by the local community before the intervention of the State machinery and specialized search and rescue teams. Thus, trained and equipped teams consisting of local people should be set up in earthquake-prone areas to respond effectively in the event of an earthquake. Trained community level teams will assist in planning and setting up emergency shelters, distributing relief among the affected people, identifying missing people, and addressing the needs of education, health care, water supply and sanitation, food etc., of the affected community. All response activities should be undertaken at the local level through a suitably devised IRS (Incident Responses system) coordinated by the local administration through the EOC.

28. A number of organizations like NGOs, self help groups, CBOs, youth organizations, Aapda Mitra's, women's groups, volunteer agencies, Civil Defense, Home Guards, etc. normally volunteer their services in the aftermath of any disaster. DDMAs should coordinate the allocation of these human resources for performing various response activities and work with these agencies to understand and plan their roles in the command chain of the IRS, and incorporate them in the DM plans.

29. Specialized heavy earthmoving equipment and search and rescue equipment are required immediately following an earthquake to clear debris and to carry out search and rescue of trapped people from collapsed structures. DDMAs should compile a list of such equipment and identify suppliers of such specialized equipment and enter into long-term agreements for their mobilization and deployment in the event of an earthquake. The IDRN, which is a web-based resource inventory of information on emergency equipment and response personnel available in every district, should be revised and updated frequently.

30. The setting up of relief camps for the people whose houses have been damaged by an earthquake and the provision of basic amenities in such camps involve complex logistics of mobilizing relief supplies, tents, water supply and sanitation systems, transport and communication systems, and medical supplies. The DM plans district levels should address this issue in detail.

31. The guidelines formulated are comprehensive enough but not exhaustive and would need constant review and updation with evolving technology. The best practices globally, as applicable to the State and districts, need to be dovetailed in the guideline to make the State "Earthquake Resilient in all its Dimensions".

Rescue operation by NDRF after Nepal Earthquake

Earthquake Safety Mock Drill by NDRF in School

Uttar Pradesh State Disaster Management Authority
Picup Bhawan, Vibhuti Khand,
Gomti Nagar, Lucknow, Uttar Pradesh 226010