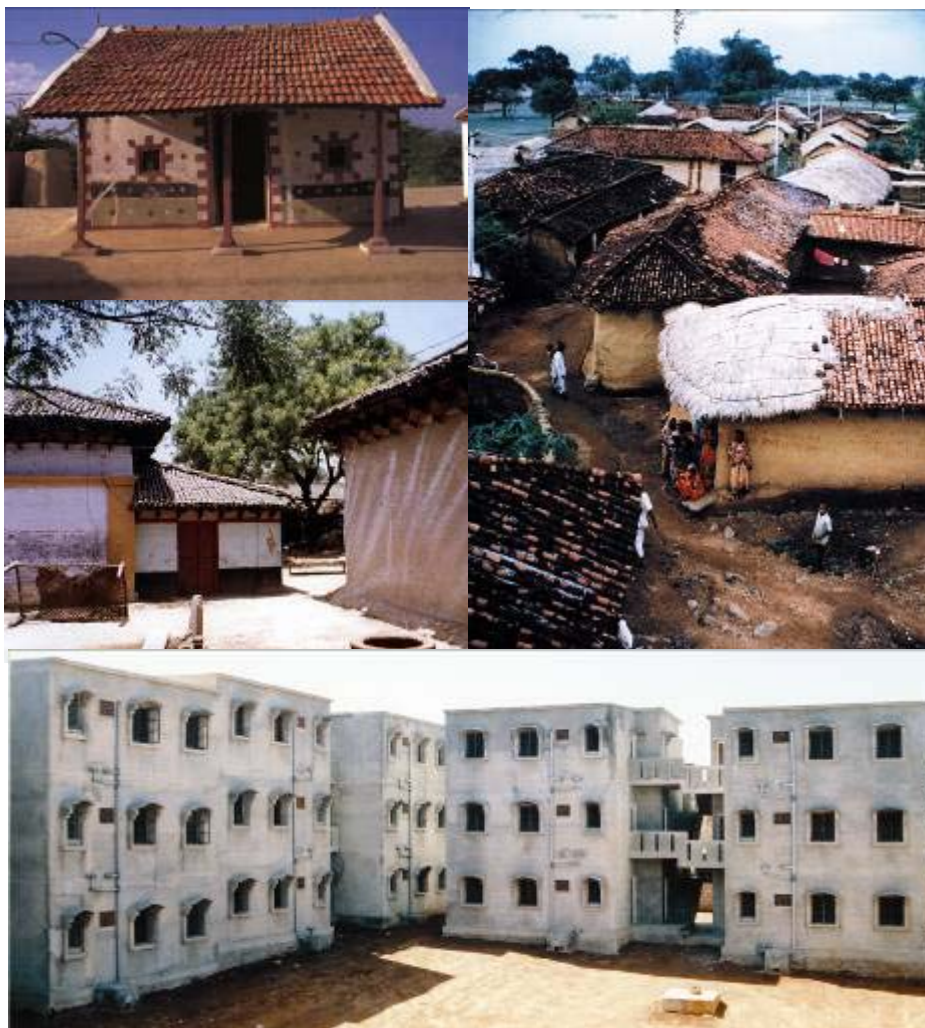


# Model Guidelines for Development & Building Construction including safety provisions for Natural Hazards in Rural Areas



सत्यमेव जयते



India

Prepared under  
**GoI – UNDP Disaster Risk Management Programme**  
Ministry of Home Affairs, Govt. of India  
New Delhi

## PREFACE

Ministry of Home Affairs had appointed an Expert Committee for formulating amendments in the Development Control Regulations and Building Bylaws with its secretariat at Building Materials & Technology Promotion Council (BMTPC) and Prof. A.S. Arya, National Seismic Advisor as its Chairman in the year 2004. This committee had submitted its recommendations to the Ministry of Home Affairs in May 2004 which covered four important aspects as follows:-

1. Amendments in the Town & Country Planning/Urban Development Acts.
2. Land Use Zoning regulations
3. Development Control Regulations
4. Building Bylaws

The emphasis in this report was on a holistic approach towards safety, transparency and accountability of various architects & engineers as well as builders involved in the process of construction of buildings. This report was termed as Volume 1. After due consideration and approval in the Ministry of Home Affairs, it was sent by Secretary (BM) to the Chief Secretaries of various States in September 2004 with the advice to constitute committees in the States to implement these amendments in the corresponding document in the States.

To further expedite this process the Ministry of Home Affairs contracted BMTPC to organize workshop in the various States to disseminate and advise the process of implementation in the States. However, inspite of number of workshops having been held in some States, the progress of implementing these recommendations in the State laws were extremely slow.

To have more consistent pursuance of the matter with the States, it was considered important to employ a consultant for doing this work on behalf of Ministry of Home Affairs. Through the Disaster Risk Management Programme (DRM) of GoI-UNDP, Sh. Ved Mittal, Retd. Chief Architect & Town Planner, U.P. Development Authorities, was appointed Consultant to work in full consultation with BMTPC and under the guidance of Prof. A.S. Arya, National Seismic Advisor. Not only assisting in holding workshops Sh. Mittal has studied the existing documents of the various States and advised in very clear terms how the various clauses in their Acts, DCR's & Building Bylaws need to be amended to fall in line with the recommendations of MHA Expert Committee as disseminated by Secretary (BM), MHA. Through these efforts 29 States/UT's have already been covered where such documents with amendments have been discussed with the State authorities and transmitted to them for further action for incorporating the same in the official amended Acts & Bylaws. In this effort BMTPC's facilities were utilized for carrying out this work and constant interaction took place between Prof. Arya, BMTPC & Sh. Ved Mittal. This compilation gives the full details of the tasks so completed.

Besides, implementing the provisions of Volume-I, it was also considered necessary that the provisions of Vol. I which was fully suited to the Municipal Corporations and large city governments, should be toned down when applied to Nagar Councils and Nagar panchayats as established by the 74<sup>th</sup> Constitutional Amendments. This issue was again taken to the Expert Committee appointed by MHA earlier and the same after approval of Expert Group has been submitted to MHA for approval and dissemination to the State governments. These have been termed as Vol. I (A) and I (B).

Further, it was observed that majority of the people, living in the rural areas, construct earthen (kutcha) houses, *semi-pucca* or *pucca* houses. Also constructions of large buildings of different size, volume, use and type are being done along the arterial roads, district/state roads and major National highways without consideration of structural safety aspect. Hence it was considered more appropriate to make provisions for safety against natural hazards in rural areas

Through a perusal of some Panchayati Raj Acts of States, it was noted that for development and building construction there are hardly any development control or building byelaws available for rural areas wherein safety provisions can be included. Therefore, detailed study of various Panchayat Raj Acts, the 73<sup>rd</sup> & 74<sup>th</sup> CAA, 1992, and provisions in NBC for rural housing etc. was taken up and the Guidelines for Development and Building Construction including safety provisions in rural areas were drafted. These efforts were further strengthened to include guidelines for construction with burned bricks, stone masonry, earthen walls which can be followed by masons, contractors and the owners for safe construction in the Rural Areas.

This draft was again placed before the Expert Committee appointed by MHA earlier after detailed deliberations the Guidelines were approved by the Expert Committee. This is being submitted to MHA for approval and disseminating to the States/UT's.

Now the entire compilation has been done in four Volumes for further reference by and State/UT.

**Volume I** :

- Recommendations of the Committee of Experts constituted by MHA, GoI for Model amendments in Town and Country Planning Acts, Zoning Regulations, Development Control and Building Regulations as contained in Vol. I (English and Hindi).

**Volume II** :

- Recommendations of the same Committee for simplified version of Vol. I to be applicable to Municipal Council/Nagar Panchayats as contained in Vol. I (A) & Vol. I (B) (English & Hindi)

**Volume III** :

- Model Guidelines for Development and Building construction including safety provisions for natural hazards in Rural Areas in (English and Hindi).

**Volume IV** :

- Suggestive amendments in Town and Country Planning Legislation, Land Use Zoning Regulations, Development Control and Building Regulations for various States/UT's. A list of States/UT's where one day Technical Workshop has been organized by BMTPC as assigned by MHA, GoI, is also enclosed.

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30<sup>th</sup> September, 2008

## Preface

India's rural population of nearly 750 million lives in about 177 million housing units in 5,86,706 villages. The type of construction varies from mud or stone or burned brick walls, with flat roofs consisting of wooden joists, earthen or lime concrete topping or various types of slabs and, others having pitched roofs consisting of thatch or tiled roof and bamboo construction etc. Various combination of all such local materials are also prevalent. In addition, the constructions with brick masonry, stone masonry and even RCC frame are also being done along the major roads where the extent, type, form and height of buildings vary. Experience has shown that all such constructions are highly vulnerable to destruction under one or the other natural hazards, viz; earthquakes, cyclones, floods and landslides.

The natural disasters do not spare any one and do not differentiate between urban and rural areas. Therefore, the safety provisions in construction and development in village abadi, in extended abadi areas and along the major-traffic corridors, are of as much necessity as in the major urban areas.

For urban areas, for safety provisions against natural hazards, the model amendments in Town Planning Legislations, Development Control Regulations and Building Bye-laws were framed by the Committee of Experts constituted by the Ministry of Home Affairs, Government of India, and MHA had sent to the Chief Secretaries of all the States/UT's for carrying out amendments in their respective Acts & Bye-laws.

The 73<sup>rd</sup> CAA, 1992 envisages three tiers of rural local bodies with viable, strong and responsive Panchayat at village level, Panchayat Samiti at block level and Zila Panchayat at the district level. Different States/UT's have enacted Panchayat Raj Act in their State/UT's. Therefore, the Government of State/UT's may devolve powers and responsibilities upon Panchayats, at appropriate level, so as to function as institutions of Local Self-Government.

It is observed that there are hardly any guidelines or building regulations for the rural areas. Therefore, constructions go on without a proper authority and/or technical expertise. Also there are no specific Development Control Regulations which will specify the planning norms in the villages.

To bridge this gap, an effort has been made here to prepare Model guidelines with a Preamble to list the legal provisions in 73<sup>rd</sup> & 74<sup>th</sup> CAA 1992 as well as Panchayat Raj Acts of some states along with suggestive recommendations. Following two components have been included:

Part-A Model Guidelines for Development & Building Construction including safety provisions for Natural Hazards in Rural Areas

Part-B Guidelines for construction with mud walls, stone masonry or brick masonry.

The Model guidelines presented herein, may be amended by States/UT's as per the local needs and used as the basis to control the development and safety in construction activities in rural areas. Accordingly certain recommendations have been given to devolve powers to the functionaries of the Panchayat, the Panchayat Samiti and the Zila Panchayat.

## **Acknowledgement**

Under my guidance, Shri Ved Mittal, former Chief Architect and Town Planner, UP Development Authorities, presently working as Consultant UNDP, under GoI-UNDP DRM Programme, worked tirelessly and studied the 73<sup>rd</sup> and 74<sup>th</sup> CAA, 1992; UP Panchayat Raj Act 1947; Haryana Panchayat Raj Act 1994; Kerala Panchayat Raj Act, 1994 and the directions issued by the State, the provisions in the State of Kerala; the provisions given in National Building Code for low income habitat planning in rural areas; village Panchayat regulations of Goa, and other provisions of low income housing etc where ever he could lay hand on. Mr. Mittal has thus, formulated the Model Guidelines for Development & Building Regulations. The assistance provided by Shri Ankush Agrawal, Technical Officer, UNDP in preparation of the Construction Guidelines based on earlier MHA Guidelines & BIS Codes is gratefully acknowledged. These guidelines can be followed by the masons, contractors and the owners for safer construction in rural areas. The qualified support extended by BMTPC, Ministry of Housing and Urban Poverty Alleviation, GoI is also thankfully acknowledged.

**30/09/08**

**Anand S. Arya  
National Seismic Advisor  
GoI-UNDP, DRM Programme**

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## **PREAMBLE:**

1. According to 2001 Census, India had a population of 1,027 million (27.8% in Urban and 72.2% in Rural areas) with 249.1 million housing units. (177.5 million in rural and 71.6 million in urban areas). There are about 5,86,706 villages and about 3969 towns and cities in India.

### **74<sup>th</sup> CAA, 1992**

#### **Part IX A**

#### **The Municipalities**

#### **(Article 243Q)**

As per 74<sup>th</sup> Constitution Amendment Act, 1992, there are three types of Urban Local Bodies for different size and class of towns and cities in various States of India, namely:-

- I. Nagar Panchayat for transitional area;
- II. Municipal council for small urban areas;
- III. Municipal Corporation for large urban areas.

Besides, the above referred Urban Local Bodies, there are several other Controlling Authorities and Development Authorities responsible for controlling, carrying out and guiding the development and construction activities in the private as well as public sector in these urban areas where the limit of their jurisdiction also extend beyond the municipal limits, meaning thereby, that many villages with their revenue boundaries are part of such regulated or development areas where these Authorities exercise control on the development and construction. Paradoxically, there are vast numbers of villages which are located beyond such regulated/development areas. Though the construction activities in such village *abadies* and extended *abadi* area are low but where some Regional routes, District roads, State or National Highways are passing through the revenue villages, in such cases, the construction activities and siting of projects along such roads are very large and varied in nature, form and bulk, but there is hardly any control on such constructions which are equally prone to Natural Hazards. Therefore, *there is a need to prepare Building Regulations in a simplified form for structural safety to ensure safety against natural hazards.*

## **2. Villages responsible for their Governance:**

In the year 1992, the Union Government amended the Constitution of India. The Constitution (73<sup>rd</sup> Amendment Act, 1992) envisages States to establish three tier local bodies with viable, strong and responsive Panchayat at village level, at intermediate level i.e. block level and at district level. Panchayats at the intermediate level may not be constituted in a State having a population not exceeding twenty lakhs. The Panchayat Raj system has a three tier structure, viz:

- i. Village/Gram Panchayat; (at Village Level)
- ii. Panchayat Samiti or Kshetra Panchayat or Taluk Panchayat; (at Intermediate Level)
- iii. Zila Parishad or District Board or Zila Panchayat; (at district Level)

In different States, the terminology is different, therefore, these may be substituted accordingly. These bodies, which are legally local government, have pyramidal structure. At the base is the gram sabha. The State Government shall, by notification in the official gazette, establish a Gram Sabha for a village or group of villages by such name as may be specified, provided that where the Gram Sabha is established for a group of villages, the name of the village having largest population shall be specified as the name of the Gram Sabha. The Gram Sabha means a body consisting of persons registered in the electoral rolls relating to the village/villages which elects the local government i.e. the panchayat. The Gram Panchayat which is a first level elected body takes the decisions but the Gram Sabha approves the major decisions taken by the Gram Panchayat.

The middle rung institutions are the Panchayat Samitis which function at the Block level and consists of many villages. Finally, there are Zila Panchayat that function at the District level. The purpose of these two institutions is mainly to co-ordinate the activities of the Panchayats and to provide them with such capacities that cannot be created solely at the local level.

### 3. 73<sup>rd</sup> CAA, 1992

**Article 243 G. Power, authority and responsibilities of Panchayats.-** Subject to the provisions of the Constitution, the Legislature of a State may, by law, endow the panchayats with such powers and authority as may be necessary to enable them to function as institutions of self-Government and such laws may contain provisions for devolution of powers and responsibilities upon Panchayats at the appropriate level, subject to such conditions as may be specified therein, with respect to-

- a) The preparation of plans for economic development and social justice;
- b) The implementation of schemes for economic development and social justice as may be entrusted to them including those in relation to the matters listed in the Eleventh Schedule.

#### **The Eleventh Schedule (Article 243-G)**

1. Agriculture, including agricultural extension.
2. Land improvement, implementation of land reforms, land consolidation and soil conservation.
3. Minor irrigation, water management and watershed development.
4. Animal husbandry, dairying and poultry.
5. Fisheries.
6. Social forestry and farm forestry.
7. Minor forest produce.
8. Small scale industries, including food processing industries.
9. Khadi, village and cottage industries.
10. *Rural housing.*



11. *Drinking water.*
12. *Fuel and fodder.*
13. *Roads, culverts, bridges, ferries, waterways and other means of communication.*
14. *Rural electrification, including distribution of electricity.*
15. *Non-conventional energy sources.*
16. *Poverty alleviation programme.*
17. *Education, including primary and secondary schools.*
18. *Technical training and vocational education.*
19. *Adult and non-formal education.*
20. *Library.*
21. *Cultural activities.*
22. *Markets and fairs.*
23. *Health and sanitation, including hospitals, primary health centres and dispensaries.*
24. *Family welfare.*
25. *Women and child development.*
26. *Social welfare, including welfare of the handicapped and mentally retarded.*
27. *Welfare of the weaker sections, and in particular, of the Scheduled Castes and the Scheduled Tribes.*
28. *Public distribution system.*
29. *Maintenance of community assets.*

#### **4. 74<sup>th</sup> CAA, 1992**

**Article 243 W. Power, authority and responsibilities of Municipalities etc.-** Subject to the provisions of this Constitution, the Legislature of a State may, by law, endow –

- (a) The Municipalities with such powers and authority as may be necessary to enable them to function as institutions of self-Government and such laws may contain provision for devolution of powers and responsibilities upon Municipalities subject to such conditions as may be specified therein, with respect to-
  - (i) the preparation of plans for economic development and social justice;
  - (ii) the performance of functions and the implementation of schemes as may be entrusted to them including those in relation to the matters listed in the Twelfth Schedule.
- (b) the committees with such powers and authority as may be necessary to enable them to carry out the responsibilities conferred upon them including those in relation to the matter listed in the Twelfth Schedule;

#### **The Twelfth Schedule (Article 243-W)**

1. *Urban Planning including town planning*
2. *Regulation of land-use and construction of buildings,*
3. *Planning for economic and social developments*
4. *Roads and bridges*
5. *Water supply for domestic, industrial and commercial purposes.*
6. *Public health, sanitation conservancy and solid waste management*
7. *Fire services*
8. *Urban forestry, protection of the environment and promotion of ecological aspects.*
9. *Safeguarding the interests of weaker sections of society, including the handicapped and mentally retarded.*
10. *Slum improvement and upgradation.*

11. Urban poverty alleviation.
12. Provision of urban amenities and facilities such as parks, gardens, playgrounds.
13. Promotion of cultural, educational and aesthetic aspects.
14. Burials and burial grounds; cremations, cremation grounds and electric crematoriums.
15. Cattle pounds; prevention of cruelty to animals.
16. Vital statistics including registration of births and deaths.
17. Public amenities including street lighting, parking lots, bus stops and public conveniences.
18. Regulation of slaughter houses and tanneries.

In the year 1992 the Union Government also amended the Constitution of India and 74<sup>th</sup> amendment was made wherein the constitution of District Planning Committee under article 243–ZD and Metropolitan Planning Committee under article 243-ZE were made mandatory as per following provisions.

**243 – ZD Committee for district planning.-(1)** There shall be constituted in every State at the district level a District Planning Committee to consolidate the plans prepared by the Panchayats and the Municipalities in the district and to prepare a draft development plan for the district as a whole.

- (2) The Legislature of a State may, by law, make provision with respect to-
  - (a) the composition of the District Planning Committees;
  - (b) the manner in which the seats in such Committees shall be filled:  
Provided that not less than four-fifths of the total number of members of such Committee shall be elected by, and from amongst, the elected members of the Panchayat at the district level and of the Municipalities in the district in proportion to the ratio between the population of the rural areas and the urban areas in the district;
  - (c) the functions relating to district planning which may be assigned to such Committees;
  - (d) the manner in which the Chairpersons of such Committees shall be chosen.
- (3) Every District Planning Committee shall, in preparing the draft development plan,-
  - (a) have regard to –
    - (i) matters of common interest between the Panchayats and the Municipalities including spatial planning, sharing of water and other physical and natural resources, the integrated development of infrastructure and environmental conservation;
    - (ii) the extent and type of available resources whether financial or otherwise;
  - (b) consult such institutions and organizations as the Governor may, by order, specify.
- (4) The Chairperson of every District Planning Committee shall forward the development plan, as recommended by such Committee to the Government of the State.

**243 – ZE Committee for metropolitan planning.-(1)** There shall be constituted in every metropolitan area Metropolitan Planning Committee to prepare a draft development plan for the Metropolitan area as a whole.

- (2) The Legislature of a State may, by law, make provision with respect to-
- (a) the composition of the Metropolitan Planning Committees;
  - (b) the manner in which the seats in such Committees shall be filled:  
Provided that not less than two-third of the members of such Committee shall be elected by, and from amongst, the elected members of the Municipalities and Chairperson's of the panchayat in the Metropolitan area. In proportion to the ratio between the population of the Municipalities and of the panchayats in the area;
  - (c) the representation in such Committees of the Government of India and the Government of the State and of such organization and institutions as may be deemed necessary for carrying out of functions assigned to such Committees;
  - (d) the functions relating to planning and coordination for the metropolitan area which may be assigned to such Committees;
  - (e) the manner in which the Chairpersons of such Committees shall be chosen.
- (3) Every Metropolitan Planning Committee shall, in preparing the draft development plan,-
- (a) have regard to –
    - (i) the plans prepared by the Municipalities and the panchayats in the Metropolitan area;
    - (ii) matters of common interest between the Municipalities and the Panchayats, including coordinated spatial planning of the area, sharing of water and other physical and natural resources, the integrated development of infrastructure and environmental conservation;
    - (iii) the overall objectives and priorities set by the Government of India and the Government of the State;
    - (iv) the extent the nature of investments likely to be made in Metropolitan area by agencies of the Government of India and of the Government of the State and other available resources whether financial or otherwise;
  - (b) consult such institutions and organizations as the Governor may, by order, specify.
- (4) The Chairperson of every Metropolitan Planning Committee shall forward the development plan, as recommended by such Committee to the Government of the State.

## 5. Panchayat Raj System

The main objective of 73<sup>rd</sup> and 74<sup>th</sup> CAA, 1992 is to empower rural and urban local bodies to enable them to function truly as institutions of self government, and in reality as a third tier of the government. The functions of DPC and MPC as narrated above require to strengthen Panchayat Raj System in the matter of planned and controlled development of Rural Areas, for which necessary provisions in the Panchayat Raj Act of States/UTs need to be effected. Therefore, as a case UP Panchayat Raj Act, 1947 (as amended), Haryana Panchayat Raj Act, 1994 and the Kerala Panchayat Raj Act, 1994 have been studied. The provisions are listed below.

### 5.1 UP Panchayat Raj Act, 1947 (Including amendments)

Most of the State/UT's had enacted their own Panchayat Raj Act, say U.P. enacted the Act in 1947 whereas Haryana enacted it in 1994. There are varied and numerous – terminologies in different Acts, for instance in U.P. Panchayat Raj Act 1947, there is a provision for Gram Sabha, Gram Panchayat, Nyaya Panchayat, Kshetra Panchayat and Zila Panchayat. U.P. also enacted U.P. Kshetra Panchayats and Zila Panchayats Adhiniyam 1961.

In Uttar Pradesh the Gram Panchayat is headed by a Pradhan, who is elected by the persons registered in the electoral rolls for territorial constituency of the Panchayat area from amongst themselves. Whereas Up- Pradhan is elected by members of the Panchayat. Gram Sachiv or Secretary is appointed by the State Government from amongst the employees who shall act as secretary for Gram Sabha, Gram Panchayat, and also for Nyaya Panchayat.

In case of Nyaya Panchayat, there are Panches who are appointed by the prescribed Authority out of the members of the Panchayat, whereas Sarpanch or Sahayak Sarpanch are elected by the Panches. Incase of Kshetra Panchayat at Block Level, it is headed by Block Pramukh whereas the State Government posts Block Development Officer, normally, a revenue officer. Similarly Zila Panchayat is headed by Adhyaksh.

The State Government may make rules u/s 110 of the UP Panchayat Act 1947, for carrying out the purpose of the Act and Zila Parishad (Panchayat) as well as Gram Panchayat may also make bye-laws u/s 111 and 112 ,respectively, of the Act as may be required by the State Government, for the purpose of promoting or maintaining the health, safety and convenience of persons residing within the jurisdiction of Gram Panchayat. However, there are no provisions for safety in development and construction against Natural Hazards.

## **5.2 Haryana Panchayat Raj Act, 1994**

Government of Haryana enacted Haryana Panchayat Raj Act 1994 and as per 73<sup>rd</sup> CAA made a provision of three tier rural local bodies i.e. Village Panchayat, Panchayat Samiti and Zila Parishad. The terminology used are different from the provisions in U.P. Panchayat Raj Act 1947, though on similar analogy, but in place of Pradhan, it is Sarpanch and Up- Pradhan is Up- Sarpanch and Secretary is Sachiv. There is no provision of Nyaya Panchayat in Haryana.

At the Block level, is the Panchayat Samiti where Chairman and Vice-Chairman are elected by and from amongst the elected members whereas Block Development Officer or Panchayat Officer appointed by the Government shall be ex-officio Executive officer of the Panchayat Samiti which will have general power of supervision over Gram Panchayat.

At the District level is the Zila Parishad where President and Vice-President are elected by and from amongst the members of Zila Parishad. The Addl. Deputy Commissioner or any other officer so designated by the Government shall be the

ex-officio Chief Executive Officer of Zila Parishad. The Government may also appoint a Dy CEO-cum-Secretary for the purpose of efficient administration of the Act.

#### **Haryana Panchayat Raj Act, 1994**

- (a) **Powers to make general orders**  
A Gram Panchayat u/s 25 may make following orders: -  
25 (g) regulate the construction of new buildings or extension or alteration of any existing building in the *abadi*.
- (b) **Preparation of Map of abadi deh**  
Gram Panchayat shall cause to be prepared a map of *abadi deh* in the Sabha area, showing the boundaries of buildings, public streets and other public open spaces.

Thus, Haryana Act provides for control and development of activities in Abadi area, but there is no mention of extended abadi area or any area along the major traffic arteries. Similarly provision for preparation of existing map of the area is there but specific provision for futuristic development of such areas is missing. Provisions for safety against Natural Hazards are also missing.

#### **5.2.1 Haryana Rural Development Authority**

The Haryana Panchayat Raj (Amendment) Act, 2007 has made a provision for Rural Development, by inserting a chapter XXII in the Haryana Panchayat Raj Act, 1994.

This amendment provides for Haryana Rural Development Authority on the analogy of Urban Development Authority Following provisions are significant and merit consideration by other States/UTs to adopt similar provisions in their Acts.

#### **Haryana Panchayat Raj (Amendment) Act 2007**

##### **U/s 230 - Duties and functions of the Authority**

- (a) Identification of rural areas for declaration of development zone;
- (b) Preparation of development plans for regulation of development zone;
- (c) Providing regulated growth in and around villages;

##### **U/s. 241 - Power to make Regulations**

- (d) the erection of buildings;

**U/s 249 - Development Plan** –(1) The District Planning Committee in consultation with the Authority shall prepare development plan for such villages, as considered necessary, for regulations of its zone.

(2) A plan may-

- (a) contain reservation of land for residential, commercial, industrial, open spaces, road network and other ancillary use;
- (b) contain provisions concerning matters necessary for proper development of the zone or any area thereof according to plan.

- (3) The District Planning Committee shall publish the plan for the purpose of inviting objections and suggestions from the public as may be prescribed.
- (4) After considering objections, suggestions, representations and recommendations, if any, the District Planning Committee may revise and forward the plan to the Authority for recommending it to the Government for approval.

**U/s 250- Development of land in development zone.-** (1) Subject to such conditions as may be specified by the Government, the Authority or Panchayat Raj Institution, as the case may be, shall undertake development of land within the development zone either itself or allow public or private parties to develop the land for residential, institutional or for any other purpose and on payment of such charges and conditions as may be specified by the Government from time to time, in accordance with the development plan.

- (2) No land within the development zone shall except with the permission granted under sub-section (1) be developed or fragmented for commercial purposes, but may be used for personal residential or agricultural purposes, as was being used on the date of publication of notification of development zone or the publication of development plan, as the case may be.
- (3) No construction within the development zone shall be carried out without getting the building plans approved and necessary permission from the authority as may be prescribed.

**U/s 251- Prohibition on fragmentation of land and other development activities in development zone.-** save as provided in section 250, no person in development zone shall –

- (i) without obtaining permission from the Authority, transfer or agree to transfer in any manner plots by fragmenting the land or make an advertisement or receive any amount in respect thereof;
- (ii) erect or re-erect any building in respect of which permission has not been granted;
- (iii) erect or re-erect any building or make or extend any excavation or layout any means or access to a road on a development zone save as in accordance with the plan and the restrictions and conditions referred to in section 249 with the previous permission of the Authority.

### **5.3 Kerala Panchayat Raj Act, 1994**

In Kerala Rural/Urban divide is difficult to identify, as the investment in development & construction along transportation linkages is enormous. The Govt. of Kerala has notified that the Municipalities Building Rules will also be applicable to the Gram Panchayat areas and also extended the Town Planning Act to the rural areas, where the Chief Town Planner has been given the responsibility to prepare development plans of the rural areas. In Municipalities Building rules also there are no provisions for safety against Natural Hazards.

The control of development and construction in rural areas under Kerala Panchayat Raj Act 1994 is by the Gram Panchayat and the Secretary of the Gram Panchayat is empowered to issue the building permit. However, there is a provision for special buildings, like life line buildings where if the plan is submitted with the Gram Panchayat, for such buildings having carpet area upto 500 sq m, the Secretary of the Gram Panchayat, refers such plans to the District Town Planners and only after getting technical clearance in view of Municipality Building Rules from the DTP, the Secretary of the Gram Panchayat issues the building permit. At the level of DTP, there is a help desk where any person Developer/Builder or owner or even JE/AE from L.S.G. Deptt. or Secretary of the Gram Panchayat, may seek guidance or clarifications about the building rules. At the level of Gram Panchayat, the JE and AE from L.S.G. Deptt. are posted as technical officers to assist Secretary of the Gram Panchayat.

Similarly any such building having more than 500 sq m carpet area, the Secretary of the Gram Panchayat refers it to the Chief Town Planner of the State and only after the Technical scrutiny under the Municipality rules and Town Planning Act, the layout permission is recommended or if there are any corrections/modifications are to be done, then Secretary of Gram Panchayat has to follow such orders, to get the proposal modified accordingly, before issuing a building permit.

## **6. Action Ahead:**

After studying Panchayat Act of three States, it is observed that the terminology and provisions like making general orders, bye-laws or existing map of abadi area, declaration of development zones, preparation of development plan, power to make regulations for erection of buildings and development of land etc differ from State to State. Therefore, Government of States/UTs should also have similar provisions.

Similarly, any specific provisions for control of development and construction in village abadi, extended abadi area or along the transportation routes, e.g. State or National Highways, may or may not be there in other States/UTs, of course except Haryana. It is only Road Side Land Control Act which is enforced by PWD or National Highway Act by NHAI, Govt. of India. These simply provide that *for any construction within 220 ft of State/National Highway, NOC from PWD or concerned Authority has to be obtained*. This is in no way related to the structural safety of the construction, land use or any development control regulations/building byelaws.

The Gram Panchayat sometimes, approves such plans but hardly there are any Guidelines or byelaws or specific provisions and delegation of powers to sanction any building or development. Therefore, as envisaged under Article 243-G of the Constitution Amendment Act, 1992, the State Government can devolve powers to the Panchayats and at the same time either frame byelaws or certain guidelines or adopt more simplified byelaws as applicable to the Nagar Panchayats, based on the byelaws as recommended by the Expert Committee

constituted by MHA, Gol for safety against Natural Hazard prone areas. *However, specific powers need to be devolved.*

## **7. Directions to be issued by the Government:**

The District Board or Zila Parishad or Zila Panchayat can play a crucial role while the draft development plan for the district is prepared. At the same time it can exercise an effective control on the Panchayat Samiti through the Block Development Officer and on the village panchayat through Pradhan. The Panchayats can be delegated powers for controlling and guiding the development and construction activities in rural areas, in extended abadi areas as well as along traffic arteries i.e. village roads, district roads, state highways and national highways. The District Planning Committee as envisaged in 74<sup>th</sup> CAA, 1992, is crucial for the development of the whole district as spatial planning is corollary to economic and social planning. **Therefore, the provision for the declaration of development zone and preparation of development plan/Local Plans (spatial plans) for every Gram Panchayat and erection of buildings, as envisaged u/s 230 and 241 of Haryana Panchayat Raj (Amendment) Act 2007, need to be adopted by every State/UT's. Alternatively, the provisions as envisaged in the State of Kerala may be considered/followed appropriately, but with provisions for safety against Natural Hazards.**

The UDPFI (Urban Development Plan Formulation & Implementation) guidelines prepared under the direction of the Ministry of Urban Affairs and Employment, Gol, which were forwarded to all the States/UT's to follow these guidelines as contained in vol. 1 and vol. 2A indicates the staffing pattern for various level of ULB's. On the similar lines, the staffing pattern upto village Panchayat has to be formed, so that Town Planners at Zila Panchayat and Panchayat Samiti level can prepare spatial plans and also assist in implementing these plans at all levels of rural bodies.

## **8. Recommendation:**

### **8.1 Construction in Gram Panchayat Area**

(i)The Sachiv of the Village Panchayat may be delegated powers to release the plans duly signed by him, but only after the approval of the BDO in respect of any building plan on a plot of upto 200 sq. m and a subdivision plan of upto 1000 sq. m area, after following development control and building regulations. The junior engineer from Rural Engineering Department of the State Government shall on technical matters assist Village Panchayats.

(ii)For a building of any use on a plot larger than 200 sq. m but less than 350 sq. m or subdivision plan of more than 1000 sq. m land but below 2000 sq. m, if submitted to the village panchayat for approval, then on the recommendations of the Architect/Town



Planner of Zila Panchayat, the Sachiv of the Gram Panchayat shall sanction and release the plans.

## **8.2 Construction on the Regional Routes in Gram Panchayat Area**

In an area of a revenue village within the ambit of development plan ,if any, some building project for any use, say residential, commercial, industrial, institutional etc. or any lay out or subdivision of land for development of a township, other than envisaged in 6.1 above is submitted to the village Panchayat, then after getting NOC from PWD or Highway Authority, if applicable, and after scrutiny based on Development Control and Building Byelaws by the Architect/Town Planner of Zila Panchayat or in the absence of any posting, the Architect/Town Planner of Municipal Corporation of the district, the CEO of Zila Panchayat shall sanction the layout/Building plan which will be released by the Sachiv of the Gram Panchayat.

Note: The above areas of plots are suggestive and may be changed as per the local conditions in the States/UTs.

With a view as above, certain Model Building Regulations for Health and Safety of the people including safety in construction against natural hazards as well as simplified form of Guidelines for construction with mud walls, stone masonry and brick masonry has been suggested which shall be followed by Panchayats, unless alternative safety provisions developed by the States/UTs, but necessary directions need to be issued by the respective States/ UTs.

# **Part-A**

## **Model Guidelines for Development & Building Construction including safety provisions for Natural Hazards in Rural Areas**

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## Part-A

# Model Guidelines for Development & Building Construction including safety provisions for Natural Hazards in Rural Areas

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**Model Guidelines for Development & Building Construction**  
**including safety provisions for Natural Hazards in**  
**Rural Areas**

**Notification**

In exercise of the powers conferred u/s\*----- of- Panchayat Raj Act\*\*---  
the Governor of  
----- hereby makes the following Regulations namely: -

**CHAPTER I**  
**Preliminary**

1. **Short title** – These Regulations may be called the **Rural Development and Building Construction Regulation of 200-----**under-----Panchayat Raj Act-----
2. **Definitions** – In these regulations unless the context otherwise, requires: -
  - (i) **Act:-** Means-----Panchayat Raj Act-----or Kshetra and Zila Panchayat Act-----
  - (ii) **“Agriculture”** includes horticulture, farming growing of crops, fruits, vegetables, flowers, grass, fodder and trees, any kind of cultivation of soil, breeding and keeping of live stock including cattle, horses, donkeys, mules and pigs, fish breeding, poultry farming and bee keeping, any use of land which is ancillary to the farming of land or to any purpose aforesaid, but shall not include the use of any land attached to a building for the purposes of gardens to be used along with such buildings; and “agricultural” shall be construed accordingly.
  - (iii) **“Architect”** having B.Arch degree from a recognized University and/or registered with the Council of Architecture (India) under Architect Act, 1972.
  - (iv) **“Building Line”** means the line which is parallel to the street alignment or boundary and to which the plinth of a building adjoining a street or an extension of a street or a future street may lawfully extend and includes the line prescribed if any, in any development plan or in these Regulations.

\* means relevant section of the concerned State/UT

\*\* means name of the State/UT

- (v) **“Block Development Officer and/or Panchayat Officer”** means an officer appointed as such by the Government;
- (vi) **“Building”** means any shop, house, hut, out-house, shed or stable, whether used for the purpose of human habitation or otherwise and whether of masonry, bricks, wood, mud, thatch, metal or any other material whatsoever and includes a wall and a well;
- (vii) **“Building operations,** include re-building operations, structural alterations of, or additions to, building and other operations normally undertaken in connection with the construction of buildings;
- (viii) **“Bye-laws”** means the bye-laws made by a Gram Panchayat, Panchayat Samiti or Zila Parishad under the Act;
- (ix) **“Development”** with its grammatical variations, means the carrying out of building, engineering, mining, quarrying or other operations in, or over or under land, the cutting of a hill or any portion thereof or the making of any material change in any building or land or in the use of any building or land including sub-division of any land;
- (x) **“Draughtsman Civil”** having qualifications equivalent to diploma in draftsmanship (Civil) from a recognized institute/polytechnic;
- (xi) **“Erection or Re-erection or Enlargement”** of any building includes-
  - (a) any material alteration or enlargement of any building;
  - (b) the conversion, by structural alternation, into a place of human habitation of any building not originally constructed for human habitation;
  - (c) the conversion of one or more places of human habitation into a lesser number of such places;
  - (d) the conversion of one or more places of human habitation into a greater number of such places;
  - (e) such alternation of a building as would affect a change in the drainage or sanitary arrangements or materially affect its security;
  - (f) the addition of any rooms, buildings out-houses or their structures to any building;
  - (g) the conversion by any structural alterations into a place of religious worship or into a building used for a

- sacred purpose or any place or building not originally meant or constituted for such purposes;
- (h) roofing or covering an open space between walls or buildings, in respect of the structure which is formed by roofing or covering such space;
  - (i) conversion into a stall, shop, warehouse or godown of any building not originally constructed for use as such or vice versa; and
  - (j) construction of a door in a wall adjoining any street or land not vested in the owner of the wall and opening on such street or land;
- (xii) **“Engineer”** Engineer, having qualifications equivalent to graduate in Civil Engineering/Architectural Engineering of recognized Indian or Foreign university, or the member of civil engineering division/architectural engineering division of the Institution of Engineers (India) or the statutory body governing such profession, as and when established or as prescribed by the public service commission of the concerned State to be eligible for selection to the post of Assistant Engineer;
  - (xiii) **“Gram Panchayat”** means the Panchayat constituted at village level under the Act;
  - (xiv) **“Gram Sabha”** means a body consisting of persons registered as voters in the electoral rolls of a village comprised within the area of the Panchayat at the village level;
  - (xv) **“Gram Sachiv”** means a Gram Sachiv of a Gram Panchayat or group of Gram Panchayats appointed by the Government;
  - (xvi) **“Junior Engineer”** means having qualification equivalent to Diploma in (Civil Engg.) from a recognized institute or as prescribed by the Public Service Commission of the concerned State to be eligible for selection to the post of Junior Engineer;
  - (xvii) **“Kuccha House”** as per definition given in census of India.
  - (xviii) **“Land”** includes benefits arising out of land and things attached to the earth or permanently fastened to anything attached to the earth;



- (xix) “**Licensing**” the qualified technical personnel shall be licensed by the Zila Panchayat.
- (xx) “**Mason**” shall preferably, have the following qualifications.
- a) Working knowledge of drawing and sketches.
  - b) Training under capacity building programme of the Government.
- (xxi) “**Owner**” means: -
- a) When used with reference to any premises, the person who receives the rent of the said premises, or who would be entitled to receive the rent thereof if the premises were let out and includes: -
    - i) an agent, or trustee, who receives such rent on account of the owner;
    - ii) an agent, or trustee, who receives the rent of any premises devoted to religious or charitable purposes;
    - iii) a receiver; Administrator or manager appointed by any Court of competent jurisdiction to have the charge of, or to exercise the rights of an owner, of any premises; and
    - iv) a mortgagee in possession; and When used with reference to any animal, vehicle or boat, includes the person for the time being in charge of the animal; vehicle or boat.
- (xxi) “**Panchayat area**” means the territorial area of a Gram Panchayat;
- (xxii) “**Panch**” means a member of a Gram Panchayat elected under the Act;
- (xxiii) “**Pradhan**” is a person elected by the electorate persons registered in the electoral rolls of the Gram Panchayat area from amongst themselves and is the Chairperson of the Gram Panchayat.
- (xxiv) “**Up Pradhan**” is a person elected out of and by the elected members of the Gram Panchayat.

- (xxv) “**Plot**” means a continuous portion of land held in one ownership;
- (xxvi) “**Private street**” means any street, road square, court valley passage or riding path which is not a public street, but does not include a path-way made by the owner of premises on his own land to secure the access to or the convenient use of such premises:
- (xxvii) “**public place**” means any place or building which is open to the use and enjoyment of the public whether it is actually used or enjoyed by the public or not and whether the entry is regulated by any charge or not;
- (xxviii) “**Panchayat Samiti**” means a Panchayat Samiti constituted for a block under the Act and having jurisdiction over the block area as notified in the official Gazette;
- (xxix) “**President or Adhyaksh**” means a President/Adhyaksh of a Zila Parishad elected under the Act;
- (xxx) “**Plumber**” shall be licensed by the Zila Panchayat having the following minimum qualifications:
- (i) A fair knowledge of official language of the State/UT.
  - (ii) Working knowledge of drawings and sketches.
  - (iii) Certificate of training from I.T.I. for the trade with minimum two years experience of execution of sanitary and plumbing works under any Govt. Deptt./Local bodies or licensed Architect/Engineer.
- OR
- A sound practical knowledge or experience of sanitary and plumbing works under any Govt. Deptt./local bodies or licensed Architect for period of five years.
- (xxxi) “**Pucca House**” as per definition given in the census of India.
- (xxxii) “**Residence**” includes the use for human habitation of any land or building or part thereof including gardens, garages, stable and out houses, if any appurtenant to such building and “residential” shall be constructed accordingly.
- (xxxiii) “**Structural Engineer**” The minimum qualification for a structural engineer shall be graduate in civil engineering of recognized Indian or foreign university, or Corporate Member of Civil Engineering Division of Institution of Engineers (India), and with minimum 3 years experience in

structural engineering practice with designing and field work.

- (xxxiv) **“Site Engineer”** means having qualification equivalent to Degree/Diploma in Engineering (Civil) from a recognized institute/university or as prescribed by the Public Service Commission of the concerned State to be eligible for selection to the post of Assistant/Junior Engineer;
- (xxxv) **“Town Planner”** Bachelor of planning or having Post Graduate degree or Diploma in Planning as prescribed by the Institute of Town Planner, India.
- (xxxvi) **“Village level Functionary”** means any person performing his official duties in the Gram sabha area and includes patwari, school teacher, secretary of a co-operative society, forest guard, village extension worker, agriculture development officer, multi-health purpose worker, anganwari workers and supervisors, auxiliary nurse, midwife, tubewell operator of Public Health Department, employees of civil and veterinary dispensaries, craft-teacher, gram sevika, lineman of Electricity Board etc;

**3. Applicability of Regulations** – These regulations shall apply to sub-division, development or re-development of land or construction, re-construction or alterations of buildings in Rural areas.

## CHAPTER II

### Requirement for Development and Building Permit

**4. Procedure for submission and scrutiny of application for development and construction**– (1) From the date of coming into force of these regulations, no change in the use of land or its development or sub-division of plot or layout of Private Street shall be made except with the written permission of the Panchayat for any land falling within the area of such Panchayat.

(2) On receipt of an application for permission under sub-regulations (1) above, the Panchayat shall (a) furnish to the applicant a written acknowledgement within a period of one week from its receipt;

(b) After enquiry as may be necessary, the Panchayat may grant permission for the construction of kacha house on a plot upto 100 sq. m in Village abadi/extended abadi area without the approval of Sanctioning Authority/Sachiv of Gram Panchayat subject to the following conditions,-

- (i) the construction should be kacha i.e. of mud and no stones should be used in the construction except for laying foundation erecting pillars and fixing windows and doors. No pucca masonry wall should be built towards construction;
- (ii) the area covered under the construction in accordance with the development plan/norms;
- (iii) village panchayat shall verify the ownership of the plot before granting the permission;
- (iv) village panchayat shall ensure that the existing traditional paths are not obstructed before granting permission and shall maintain proper set back for future development of roads;
- (v) the village panchayat may permit extension of the existing building provided the proper set backs are maintained;
- (vi) no occupancy certificate from the Panchayat shall be required for kacha construction if the guidelines, as per Part –B have been followed.
- (vii) the application for the building permission shall be accompanied along with a sketch map of the proposed construction in duplicate duly signed by the applicant.

(c) After enquiry as may be necessary, the Panchayat may grant permission for the condition of pucca house on a plot upto 250 sq. m in village abadi / extended abadi area with prior recommendations of the Architect/Town Planner/Engineer subject to the following conditions.-

- (i) the area covered under the construction in accordance with the development plan/norms;
- (ii) village panchayat shall verify the ownership of the plot before granting the permission;
- (iii) village panchayat shall ensure that the existing traditional paths are not obstructed before granting permission and shall maintain proper set back for future development of roads;
- (iv) the village panchayat may permit extension of the existing building provided the proper set backs are maintained;
- (v) no occupancy certificate from the technical office shall be required for pucca construction on upto 250 sq. metre plot, if the guidelines, as per part B have been followed;
- (vi) the application for the building permission shall be accompanied along with a sketch map of the proposed construction in duplicate duly signed by the applicant.

(d) The permission shall be issued in a standard form duly signed by the Sachiv. One copy of the permitted line map should be forwarded to the BDO (Block Development Officer) for information by the village Panchayat.

3) (a) The Architect/Town Planner shall, in cases as listed in 4(2)(c), advise the Panchayats, within a period of one month to sanction plans with or without modification or subject to such conditions as he considers expedient or to refuse to give sanction. In cases of Panchayats where Village land is abutting state road/highway etc., the Architect/Town Planner shall also advise panchayat in respect of building regulations for buildings on larger plots than listed in 4(2)(c).

(b) The Architect/Town Planner shall, whenever the applications are referred to him, communicate his decision to the Village Panchayat, within one month of receipt of such applications by him.

(c) In case of any disagreement between the Architect/Town Planner and the Village Panchayat, the matter shall be referred to the Architect/Town Planner at Zila Panchayat or if not posted in his absence Architect/Town Planner of the Municipal Council or Municipal Corporation at the district level whose decision shall be final and binding on all the parties.

- (d) On receipt of the decision of the Architect/Town Planner under Sub regulations 4(2)(c) above, the Panchayats shall communicate the same to the applicant within a period of two weeks from the date of such decision.
- 5. Site Plans** – The site plan sent with the application for permission shall be drawn to a scale of 1:500 and shall show;
- a) the boundaries of the site;
  - b) the direction of the North point relative to the plan of the buildings;
  - c) all existing buildings or structures;
  - d) all surrounding buildings, in outline within a distance of 5 m. from the boundaries of the site;
  - e) the name of the street on which the building is proposed to be situated (if any) or location and name of the nearest street, public or religious building;
  - f) the position of access from the street to the building;
  - g) the width of the street in front and of the street at the side of the building if any;
  - h) The dimension of front, rear and side set backs, if any and also of the space to be left about the buildings to secure a free circulation of air, and admission of light;
  - i) the position of kitchens, staircases, privies, urinals, drains, cesspools, stables, cattle-sheds, garages, wells and other appurtenances of the building;
  - j) a clear statement of the area of the plot, plot coverage and the floor area ratio.
  - k) the highest flood level reached above the street in front of the building
- 6. Building Plans** – The Plans, sections and elevations of the building or buildings accompanying the notice shall be accurately drawn to a scale of 1:100.
- a) Plans of all floors, basements, terraces and accessory buildings indicating clearly (i) the north point, the percentage of covered area, the sizes and spacing of all supporting members, and dimensions of rooms; ii) exact location of essential services such as W.Cs., sinks and baths; iii) terrace plan indicating the drainage and the slope of the roof;

b) Sectional drawings showing clearly the materials used, sizes of footings, the thickness of basement walls, the plinth level (at least 150 mm above the HFL), roof, floor slabs and walls, the sizes and spacing of framing members, the ceiling, parapet heights and the provision of all earthquake resisting elements. The sections should indicate the drainage and slope of the roofs and at least one section should be taken through the staircase;

c) All street elevations;

d) Plans and sections of private water supply and sewage disposal system (if any).

Note: - (i) The drawing are to indicate where necessary, adequate arrangements for proper drainage.

(ii) Details of privy type, w.c. with hand flush and double pit, if any;

(iii) Dimensions of the portions projecting beyond the permissible building line.

7. **Signing the plans** – All the plans shall be duly signed by (i) the owner and (ii) Draftsman (civil), Junior Engineer (civil) or Architect or Town Planner or Engineer. As licensed by the Zila Panchayat.
8. **Duration of sanction** – The sanction once accorded shall remain valid up to five years, during which period a completion certificate for buildings as per 4(2)(c) from the registered Draftsman (civil) or Junior Engineer (civil) or Architect or Town Planner or Engineer as the case may be, shall be submitted and if this is not done, the sanction shall be got revalidated before the expiration of the said period. Revalidation shall be subject to the regulations then in force.
9. **Revocation of Permit** – The Panchayat concerned may revoke any permit issued under the provision of these regulations, wherever there has been any false statement or any misrepresentation of any material passed, approved or shown in the application on which the permit was based.
10. **Occupancy certificate** – As listed in regulation 4(2)(c) no building hereafter erected, re-erected or altered materially shall be occupied in whole or part until an occupancy certificate is issued by the Sachiv of the Panchayat after conducting the site inspection after affirming that such a building conforms in all respects to the requirements of these regulations and is fit for occupation.

## CHAPTER III Norms & Standards

### 11. Construction of buildings on plots in layout to conform to certain standards –

#### 11.1 Layout Plan

The distribution of land use for the preparation of layout plan shall be as follows:

##### 11.1(a) Land under each use

In the land to be developed, maximum of the plots may be of size less than 100 sq. m. and no plot may be more than 500 sq. m. The layout should generally conform to the following land use:

	<b>Land under each use</b>
(i) Residential	50 - 60 %
(ii) Work place, Schools, Institutions, Nursing Home, Dispensary, Community places/Facilities, Veterinary Hospitals etc.	15 - 20 %
(iii) Shops, Offices, Consumer Stores, Fertilizer Depot and other bazaar's	3 - 5%
(iv) Open spaces	10 - 15%
(v) Roads, Pedestrian Paths, Drains, Co-operative Bank, P.O. and other utilities	15 - 20%

*Note: In extended abadi areas or public land the preference for use of such land be given to locate educational, social, health, facilities and utility services, as the abadi area may be lacking in such facilities. The plot area and other norms may be taken as per provisions in Nagar Panchayat or Municipal Councils.*

##### 11.1(b) Residential Development

The Residential plotted development, till the development plans are prepared, the following norms shall be as follows:

(a) Plotted Development excluding other activities such as Cattle Shed, Storage etc.	60 and above plots/hectare
(b) Covered area per dwelling unit	25 sq. m. (minimum)
(c) Height of buildings	10 m maximum (3 storeys)

*Note: In exceptional cases, the height may be relaxed by Zila Parishad Panchayat.*

##### 11.1(c) Road hierarchy

(a) Road which connects villages to nearby areas	9 m (min.)
(b) Main Village Roads	6 m
(c) Internal Village Roads	4.5 m



## 11.1 (d) Social Facilities

Use	Standard/Population	Area
(a) Primary School	1 for 5000 population	0.4 to .6 hec
(b) High School with primary school	1 for 15000 population	1 hectare
(c) Dispensary/Health Centre	1 for 5000 population	.05 hectare
(d) Community Hall	1 for 5000 population	.05 hectare
(e) Anganwadi	1 for 5000 population	.05 hectare

## 11.2 Space requirement

The plot size ground coverage, FAR, height and set backs of various uses shall be as per following tables

Note: (1) The set backs proposed here under will be limited to table 1 to 5. The set backs along highways will be minimum as prescribed in section 12.

- (2) The norms are suggestive and may be modified as per local conditions in the States/UTs
- (3) The norms of nearby urban areas may also be referred.

## 1.0 Residential: Plotted Housing

**Table: Plot Size, Ground Coverage, FAR, dwelling units, Storeys, height and set backs**

S.No.	Plot Area in Sq m	Max in Ground Coverage %	FAR	No. of D/U	Max <sup>m</sup> height in M	SET BACKS M		
						Front	Side	Back
1	Below 30	90%	180	2	6	1.2	-	-
2	30 to 50	80%	160	2	6	1.2	-	-
3	51-100	80%	160	3	9	2.0	-	1.5
4	101-150	75%	150	3	9	2.0	-	2.0
5	151-250	66%	130	3	9	3.0	-	3.0
6	251-500	60%	120	3	9	4.5	1.5	3.0
7	Above 501	50%	100	3	9	4.5	3.0	3.0

\* Subject to the minimum of 25 sqm covered area.

## 2.0 Commercial Use

**Table: Ground Coverage, FAR, height and set backs**

S.No.	Use	Ground Coverage %	FAR	Max <sup>m</sup> Height in M	Set backs in M	
					Front	Back
1	Convenient Shops	75%	100	6	2	-
2	Local Shopping Centre	50%	100	6	3	-
3	Sectoral/Shopping	40%	120	9	4.5	-

Minimum size of plot for above will be 20 sq m

## 3.0 Industrial Use

(Resource based cottage industries, non-polluting and non-hazardous industries except those permitted by the State/UT)

**Table: Ground Coverage, FAR, height and set backs**

S.No.	Plot Size in Sq m	Ground Coverage %	FAR	Height	SET BACKS in M		
					Front	Side	Back
1	100-400	60 %	120	8	3	-	3
2	401-1000	55%	110	8	4.5	-	3
3	1001-4000	50 %	100	8	6	3	3
4	Above 4001	45 %	90	8	9	3	4.5

## 4.0 Institutional & Community Facilities

**Table: Plot Size, Ground Coverage, FAR, height and set backs**

S.No.	Plot Size in Sq m	Ground Coverage %	FAR	Height in M	SET BACKS in M		
					Front	Side	Back
1	500-1500	40%	120	9	4.5	3	3
2	1001-2000	33%	100	9	4.5	3	4.5
3	2001-4000	30%	90	9	6	3	4.5
4	Above 4001	25%	90	12	9	3	6

## 5.0 Education & Health

Table: Plot Size, Ground Coverage, FAR, height and set backs

S.No.	Use	Minimum Plot size in sq m	Ground Coverage %	FAR	Height in M	SET BACKS in M		
						Front	Side	Back
1	Nursery School/Anganwadi	500-1500	33.3%	100	10	4.5	3	3
2	Primary School	1500-3000	30%	90	10	6	3	6
3	Senior Secondary	4000-10000	25%	100	12.5	9	4.5	6
4	Nursing Home Dispensary & Diagnostic Centre	250	35%	70	6	3	-	3
		251-500	33.33%	100	9	4.5	3	3
		Above 501	30%	100	12	6	3	4.5

### 11.3 Parking Norms

The following equivalent car parking space (ECS) be provided as follows:

S.No.	Use	No. of Equivalent car space (ECS)
1	Residential Plotted Development	1 for 100-200 sqm Plot 2 for plots more than 201 sqm
2	Multi family residential	1 for 75-100 sqm built-up area 1.25 for more than 101 sqm built-up area
3	Commercial Multiplex/shopping Mall	2 for every 100 sqm built-up area 1 for 10 seats and 2 for 100 sqm built-up area
4	Motel	1 for every room
5	Wholesale Mandi Godown/Cold storage	2.5 for 100 sqm built-up area 1 for 550 cu.m storage
6	Offices/Conference hall/Banquet hall	2 for 100 sqm built-up area
5	Educational	1 for 100 sqm built-up area
7	Industrial	0.5 for 100sqm built-up area

**12. Control of building activities along highways** – 1) In order to regulate and control building activities along National Highways, State Highways, Major District roads and major urban roads as notified by – PWD, the persons responsible for carrying out excavation, earth work, construction, demolition or repairs to all sites within 100 m. from these roads shall apply to the Panchayat concerned for permission to carry out such work in accordance with the set back mentioned here below, subject to NOC from PWD/NHAI, where ever applicable.

Type of building activities	National Highway or State Highway	Major District Road	Village Roads
Theatres, Industrial Units etc. Major Commercial Establishments	8 m. front set back	5 m. front set back	3 m.
Residential	5 m. front set back	3 m. front set back	3 m.
Institutional	8 m. front set back	5 m. front set back	5 m.
Excavation for taking out earth	100 m. front set back	100 m. front set back	50 m.

**13. Minimum Ceiling Height of rooms** – Every habitable room in any building shall be in every part at least 2.7 metres in height from the floor to the underside of the roof slab or ceiling, provided that in the case of sloped roof the height shall not be less than 2.5 metres.

**14. Minimum size of habitable rooms** – No. habitable room shall have a floor area of less than 8.0 sq. m. The minimum width of a habitable room shall be 2.80 metres.

**15. Lighting and Ventilation of rooms** – Every habitable room shall have for the admission of light and air, one or more apertures such as windows, fanlights etc., opening directly to the external air into an open verandah and of an aggregate area, inclusive of frames, of not less than 10% of the floor area excluding doors, except in cases of hospital wards, dormitories and school where such apertures are to be not less than 16% of the floor area.

**16. Bathrooms and water closets** – 1) Every bathroom or water closet shall:-

- a) be so situated that of possible one of its walls shall open to external air.
- b) have (i) a floor area in case of bathrooms inclusive of water closet of not less than 2 sq. meter for which the smallest side shall not be less than 1.0 metre; and (ii) in case of a bathroom exclusive of a water closet, the floor area shall be not less than 1.2 sq. metre and the smallest side not less than 1 metre: and (iii) in case of separate water closet the floor area shall not be less than 0.9 sq. metre and the smallest side not less than 0.9 metre.
- c) bathrooms shall have a window or a ventilator open to external air of a superficial area of not less than 0.40 sq. metre and the water closet, if separate, shall have a window or a ventilator open to external air of a superficial area of not less than 0.25 sq. metre.
- d) height of not less than 2.10 metre.

2) Every bathroom or water closet shall: -

- a) not be directly over or under any other room other than another bathroom or water closet, washing place, terrace or bath, unless it has a water tight floor;
- b) have the platform or seat either plastered with cement, or be made of some water tight non-absorbent material;
- c) be enclosed by walls or particulars of brick or stone. The surface of every such wall or partition shall be finished with a smooth impervious surface such as cement plaster  $\frac{1}{2}$  " thick or any other suitable material to a height of one metre above the floor of such room;
- d) have an impermeable floor made of smooth hard material having a suitable fall to a soil pipe with an adequate trap connection and have a floor level of such a height so as to ensure suitable grade towards double pit.

3. No room containing a water closet shall be used for any purpose other than a lavatory and no such room shall open directly into any kitchen or cooking space. Every room containing a water closet shall have a door completely closing the entrance to such a room.

**17. Water Seal Latrine** – No building plan shall be approved or deemed to have been completed and fit for human occupation unless provision is

made for water seal latrine. No dry latrine shall be allowed. Water seal latrines can also be provided on the basis of community toilets or shared toilets. Where leaching pits are used, it should be constructed within the premises of the households. However, where, due to space constraint, construction of pits may be done in places like lanes, speeds and roads. The Water seal latrine should be properly maintained and kept in sanitary condition by the owner or the occupier. The contents of the septic tanks, soak pits, leach pits, etc, should be periodically emptied. The water hand pumps should be installed only at a distance of atleast 8 m and should be taken atleast deeper than 15 m.

**18. Kitchens** – 1) The size of cooking alcove shall not be less than 2.4 sq. m. with a minimum width of 1.2 metre. A kitchen shall have a floor area of not less than 3.3 sq. metres and shall not be less than 1.5 metres in width in case of plots having an area upto 200 sq. metres and shall not be less than 2 metres in width in case of plot having an area more than 200 sq. metres. Each kitchen not fully equipped with electric or gas cooking appliances shall be provided with a flue. Semi open spaces with low walls with or without roof, as per climatic comfort, may be permitted. Provision of smokeless CHULLHA may be made in the kitchen in view of fuel efficiency and health safety.

2) Every room to be used as a kitchen shall have:-

- a) a height of not less than 2.8 metres;
- b) a window of not less than that 0.5 sq. metre superficial area;
- c) an impermeable floor and an impermeable dado one metre high;
- d) The height of the plinth for the main building shall not be less than 0.45 m and that for cattle shed and the like not less than 0.2 metre above the general ground level.

**19. Dimension for staircase steps, corridor, passage and balcony** – i) In a residential building, no staircase shall be less than 0.9 metres in width incase of three and above storey, but may be 0.75 metre upto two storey and no step shall have a rise of more than 20 cm, and a tread of less than 25 cms.

ii) No corridor or passage in any residential building shall be less than 1.2 meters and the balcony will be maximum 1.0 meter wide.



## Roads

### 20. Means of Access –

- a) Every person who erects a building shall provide as means of access to such building a clear way not less than 3.0 metre in width from a street to the entrance door of such buildings, such pathways to be, so long as it is used as a means of access to the building, maintained free from any construction and shall not at any time cause or permit any portion of any building below a height of 4.5 m. to overhang or project over or into such a passage. However in case of traditional/conventional access exists, the same may be shown as access to the plot concerned, which will have to be duly certified by the Panchayat.
- b) A person who undertakes construction works on a building shall not reduce the access to any building previously existing below the minimum width of 5 m.
- c) No building shall be erected so as to deprive any other building of the means of access as provided in this clause.
- d) The means of access under these rules shall not be deemed to be suitable and sufficient until these have been approved by the Panchayat concerned which shall have power to prescribe the width of the clear way.

**21. Building abutting on two or more streets** – if a building abuts on two or more streets of different widths, the building shall be deemed for the purpose of this rule to face upon the street that has the greater width and the height of the building shall be related by the width of that street.

**22. Regular line of street** – No portion of any building shall project beyond the prescribed set back of any street or highway.

### Site Requirement

**23. Sites containing deposited refuse:-** No building shall be constructed on any site on any part of which there is deposited refuse, excreta or other offensive matter to which the health authority having jurisdiction objects, until such refuse has been prepared or left in manner suitable for building purpose to the satisfaction of the Panchayat concerned that where it is intended to construct a building on piles or on reinforced concrete pillars, the Panchayat concerned may approve the erection of such a building after the refuse has been appropriately treated by chemical or some other manner to the satisfaction of the Panchayat concerned and has been

covered by a layer of sand or other matters or by a layer of cement concrete not less than 15 cm thick.

**24. Damp Sites** – Wherever the dampness of a site or the nature of the soil renders such precautions necessary, the ground surface of the site between the walls of any building erected thereon shall be covered with a layer of sound cement concrete not less than 15 cm thick or with asphalt paving on a layer of closely packed broken stone hard cake not less than 15 cm thick or be otherwise rendered damp proof to the satisfaction of the Panchayat concerned.

#### **CHAPTER IV Services**

**25. Water Supply and Sanitary Installations** – The requirements regarding water supply and sanitary installations of the buildings shall conform to those specified in IS: 1172 -1993.

**26. Latrines with an opening on public roads** – It is prohibited to have latrines on to public roads and on lateral sides of neighboring houses.

**27. No Construction** – of horse stables, cattle yards and factories of washable corrosive products prejudicial to health, can take place in less than 100 metres of any existing drinking well.

**28. Construction of wells** – No drinking water well can be opened without prior consent of the Panchayat concerned.

#### **CHAPTER V Special Buildings**

##### **29. PETROL PUMPS**

The following regulations are recommended for locating the petrol pump or service stations.

- (i) Minimum distance from the road intersections.
  - (a) For minor roads having less than 30 m. R/W 50 m.
  - (b) For major roads having R/W 30 m. or more 100 m.
- (ii) The minimum distance of the property line of pump from the centre of the road should not be less than 15 metres on roads having less than 30 m. R/W. In case of roads having 30 m. or more R/W, the R/W of road should be protected.

- (iii) Plot Size
  - (a) Only filling stations 30 m. x 17 m. and small size 18 m. x 15 m. two and three wheelers)
  - (b) Filling-cum-service station minimum size 36 m. x 30 m. and maximum 45 m. x 33 m.
  - (c) Frontage of the plot should not be less than 30 m.
  - (d) Longer side of the plot should be the frontage.
- (iv) New Petrol Pump shall not be located on roads having less than 30 m. R/W.

*Other Controls*

- (a) Filling-cum-service station (size 36 m. x 30 m. and 45 m. x 33 m.)
  - (i) Ground coverage 20%
  - (ii) FAR 20
  - (iii) Max. Height 6 m.
  - (iv) Canopy Equivalent to permissible ground coverage within setback line.
- (v) Front Setback Min. 6 m.
  - (b) Filling Station (size 30 mt. x 17 mt. and 18 mt. x 15 mt.)
    - (i) Ground coverage 10%
    - (ii) FAR 10
    - (iii) Max. Height 6 m.
    - (iv) Canopy Equivalent to permissible ground coverage within setback line.
- (v) Front Setback Min. 3 m.

### 30. MOTELS

Motels are permitted in Rural Zone/ Green Belt on National Highways and Inter-State roads. Subject to a service lane.

The following norms and building standards are prescribed.

Minimum plot size	1.0 Ha
Minimum Setbacks	Front – 15 m. Rear and sides – 9 m.
Maximum	FAR 15
Maximum Ground Coverage	15%
Maximum Height	9 m.

## **CHAPTER VI**

### **Fire and Structural Safety**

#### **31. FIRE PROTECTION AND FIRE SAFETY REQUIREMENTS**

##### **Scope**

This part covers the requirements of the fire protection for the buildings such as multi-storeyed buildings (high rise buildings) and the buildings, which are of 10 m and above height and high occupancies of categories such as Assembly, Institutional, Educations (more than two storeyed and built-up area exceeds 1000 sq m), Business (where area exceeds 500 sq m.), Mercantile (where aggregate covered area exceeds 750 sq m), Hotel, Hospital, Nursing Homes, Underground Complexes, Industrial Storage, Ware house, CF godowns Meeting/Banquet Halls, Marriage Pandals and Tents Hazardous Occupancies.

##### **Procedure for Clearance from Fire Service**

- (a) The concerned Panchayat shall refer the building plans to the Chief Fire Officer of the District for obtaining clearance in respect of building listed above.
- (b) The owner shall furnish three sets of complete building plans indicating Fire protection arrangements and the means of excess/escapes with standard signs and symbols on the drawing duly certified by the licensed Fire Consultants.

#### **32. STRUCTURAL SAFETY**

##### **32.1 Structural Design**

The structural design of buildings listed in Section 31 herein, the foundation, masonry, timber, plain concrete, reinforced concrete, pre-stressed concrete and structural steel shall be carried out in accordance with Part-VI structural design, section-1 loads, section-2 foundation, section-3 wood, section-4 masonry, section-5 concrete and section-6 steel of latest National Building Code of India taking into consideration all relevant Indian Standards prescribed by Bureau of Indian Standards.

##### **For General Structural Safety**

1. IS: 456:2000 "Code of Practice for Plain and Reinforced Concrete

2. IS: 800-1984 “Code of Practice for General Construction in Steel
3. IS 875 ( Part 2):1987Design loads ( other than earthquake ) for buildings and structures Part2 Imposed Loads
4. IS: 1904:1987 “Code of Practice for Structural Safety of Buildings: Foundation”
5. IS1905:1987 “Code of Practice for Structural Safety of Buildings: Masonry Walls.

### **For Earthquake Protection**

6. IS: 1893-2002 “Criteria for Earthquake Resistant Design of Structures (Fifth Revision)”
7. IS:13920-1993 "Ductile Detailing of Reinforced Concrete Structures subjected to Seismic Forces - Code of Practice"
8. IS:4326-1993 "Earthquake Resistant Design and Construction of Buildings - Code of Practice (Second Revision)"
9. IS: 13828-1993 "Improving Earthquake Resistance of Low Strength Masonry Buildings - Guidelines"
10. IS:13827-1993 "Improving Earthquake Resistance of Low Strength Earthen Buildings - Guidelines"

### **STRUCTURAL DESIGN BASIS REPORT**

In compliance of the design with the above Indian Standard, the Structural Engineer on Record will submit a structural design basis report in the Proforma attached herewith covering the essential safety requirements specified in the Standard.

- (i) The “Structural Design Basis Report (SDBR)” consists of three parts  
**(Appendix A)**  
 Part-1 - General Information/ Data  
 Part-2 - Load Bearing Masonry Buildings  
 Part-3- RCC Buildings

***Note: - For Larger Buildings as referred in section 31 above. The structural design is to be done by the structural engineer licensed/registered by Municipal Councils or Nagar Nigams or Development Authorities in the district. The provisions of retrofitting, inspections completion reports, occupancy certificates etc. and for licensing of structural engineer, construction engineer, builders and contractors by the Zila Panchayat, the qualifications, duties and responsibilities of these can be taken as per DCR/Building Bye-laws prescribed by Nagar Nigams or Development Authorities. The structural design basis report and other forms have accordingly been amended.***

### **32.2 Conventional Buildings upto 10 m Height**

Structural safety for conventional buildings of one, two or three storeys will be governed by the provisions according to the relevant Indian Standards at s.no. 8,9,10 in Section 32.1 above. The construction of the buildings will be deemed to satisfy the Standards if these follows the Guidelines given as parts B1 to B5 as applicable to burnt bricks with cement mortar or strong lime mortar, low strength masonry construction and for earthen houses.

## **CHAPTER VII**

### **Supplemental & Miscellaneous**

- 33. Defective Work** – (a) The Panchayat concerned in consultation with the registered professionals with Zila Panchayat shall have the power to reject any work, workmanship or materials executed by any person under or by virtue of or pursuant to this part of these regulations which in its opinion is unsatisfactory or is likely to constitute danger to health.
- (b) Any work, workmanship or materials on rejection shall be remedied, amended or made good or shall be removed in whole or in part and replaced by new work, workmanship or materials as the Panchayat concerned may require until finally completed to its entire satisfaction.
- 34. Building under dangerous conditions** – Building considered to be in danger although they do not fall in line of imminent ruin, will be asked to be vacated by the Panchayat concerned and shall be declared habitable only when proper repairs are undertaken and considered to be in a good condition or security. The demolition of structures shall be obligatory when they are declared unhealthy and infectious by the Health authorities concerned and not in position to be repaired.
- 35. Compound wall:** - Any construction of compound wall along the district roads, state or national highways shall be permitted on temporary basis i.e. that part of the plot affected by the proposed R/W compound walls in such cases shall be of the approved design, with 1.00 metres height and construction material of a temporary nature. This compound wall erected along the above category of the roads, and other roads shall be demolished by the owners when the notice is served to them without any compensation for the same.
- 36. Authority to enter into land** – The Panchayat or its representative shall be authorized to enter into or upon any land for making inquiry for certain aspect relating to development if necessary,
- 37. Penal Action** – i) Any construction in contravention to the regulations shall be demolished by the owners on receipt of a notice from the concerned authorities within the stipulated time. In case the owner fails to demolish the construction illegally put up, the authorities shall demolish the same and the cost of demolition shall be collected from the defaulters.  
ii) Any persons who fails to comply with the notice issued by the Panchayat, under the provisions of these regulations, shall on conviction be punished with fine to be decided by Zila Panchayat.

**Office of the Village Panchayat**

**FORM No. 1**

**Permission No.**

(See regulation 4)

Shri/Smt./Kum.....from.....ward.....is hereby granted permission for the construction of.....(as applicable) as per the plans in triplicate/duplicate attached to his/her application. One copy of the plans concerned, with the approval carrying the seal of this Panchayat and duly signed is returned to the interested party, who shall comply with the following conditions:

1. To limit himself/herself to the Plan approved and statements therein.
2. The construction shall be as per plan approved by the village Panchayat and condition imposed on it.

**Conditions for pucca buildings (applicable to serial 3 to 5)**

3. To inform the Panchayat when the construction has been completed upto Plinth level.
4. To inform the Panchayat as soon as the construction is completed.
5. Not to inhabit the building without the prior permission of the Panchayat.
6. To abide by the other relevant provisions of law for the time being in force.
7. That the building or construction is carried out as per the alignment given and the Plinth level fixed by the Panchayat.
8. The construction permission shall be revoked.
  - a) If the construction work is not executed as per the plans approved and statements therein;
  - b) Wherever there is any false statement of any misrepresentation of any material passed, approved or shown in the application on which the permit was based.

9. ....
10. ....
11. ....
12. ....

The permission shall be valid for a period of five years from.....to.....He has paid the respective tax/fees to the tune of Rs.....by Receipt No.....dated.....

This carries the seal or of the Village Panchayat of .....19.....



**FORM NO. 2**

**CERTIFICATE OF UNDERTAKING**

(As per the competency of the Licensed Personnel)

To

Ref : Proposal work of \_\_\_\_\_

(Title of the project)

F.P.No. \_\_\_\_\_ ward No. \_\_\_\_\_ at

Village \_\_\_\_\_ Taluka \_\_\_\_\_

Scheme No. \_\_\_\_\_ of \_\_\_\_\_

(Village)

For \_\_\_\_\_

(Name of Owner / Developer/ Builder)

Address: \_\_\_\_\_

Tel.No.: \_\_\_\_\_

I am registered with the Council of Architecture or I am licensed by Zila Panchayat as Draughtsman/Junior Engineer/Engineer/Town Planner.

I hereby certify that I am appointed as the ----- to prepare the plans, sections and details as required under the provisions of the Act / Development control Regulations for the above mentioned project and that I have prepared and signed the same and that the execution of the project shall be carried out under my direction, and supervision of a Site Engineer as per the approved drawings. I am fully conversant with the provisions of the Regulations, which are in force, and about my duties and responsibilities under the same and I undertake to fulfill them in all respects, except under the circumstances of natural calamities.

I also undertake to provide my guidance for the adequate measure to be taken by the owners for installation of plumbing, drainage, sanitation and water supply. The appointment of a Site Engineer, building contractor, plumbing contractor and electrical contractor shall be made at the appropriate stage by the owner before the relevant work commences.

Signature : \_\_\_\_\_

Architect or (Licensed Personnel)

Reg. No. \_\_\_\_\_ Date :

Name : \_\_\_\_\_  
Address : \_\_\_\_\_  
\_\_\_\_\_

Tel. No. : \_\_\_\_\_

**FORM NO. 2-A**

**CERTIFICATE OF UNDERTAKING**

(See regulation 32.1)

To

Ref : Proposal work of \_\_\_\_\_  
(Title of the project)

F.P.No. \_\_\_\_\_ ward No. \_\_\_\_\_ at

Village \_\_\_\_\_ Taluka \_\_\_\_\_

Scheme No. \_\_\_\_\_ of \_\_\_\_\_  
(Village)

For \_\_\_\_\_  
(Name of Owner / Developer / Builder)

Address: \_\_\_\_\_

Tel.No.: \_\_\_\_\_

I am Registered Structural Engineer (RSE). This is to certify that I have been appointed as the Structural Engineer on record to prepare the Structural Design basis report, detailed Structural Design and detailed Structural Drawings for the above mentioned project. I am fully conversant of my duties and responsibilities under the Regulation and assure that I shall fulfill them in all respects. The construction will be done as per my directions but under the supervision of the site engineer.

I have prepared and signed a structural design basis report (SDBR).

I undertake to supply the owner and the supervisor the detailed structural drawings. If my services are terminated, I undertake to intimate the Authority in writing.

Signature : \_\_\_\_\_  
Registered Structural Engineer  
Reg. No. \_\_\_\_\_ Date :

Name : \_\_\_\_\_  
Address : \_\_\_\_\_  
Tel. No. : \_\_\_\_\_

**FORM NO. 2-B**

**CERTIFICATE OF UNDERTAKING**

(See regulation -32.2)

To  
Ref : Proposal work of \_\_\_\_\_  
(Title of the project)  
F.P.No. \_\_\_\_\_ ward No. \_\_\_\_\_ at  
Village \_\_\_\_\_ Taluka \_\_\_\_\_  
Scheme No. \_\_\_\_\_ of \_\_\_\_\_  
(Village)  
For \_\_\_\_\_  
(Name of Owner / Developer / Builder)  
Address: \_\_\_\_\_  
Tel.No.: \_\_\_\_\_

I am registered with the Council of Architecture or I am licensed by Zila Parishad as Draughtsman/Junior Engineer/Engineer/Town Planner.

I hereby certify that I am appointed as the ----- for the execution of the project and shall be carried out under my direction, and supervision as a Site Engineer as per the Guidelines under regulation 32.2. I am fully conversant with the provisions of the Regulations, which are in force, and about my duties and responsibilities under the same and I undertake to fulfill them in all respects, except under the circumstances of natural calamities.

I also undertake to provide my guidance for the adequate measure to be taken by the owners for installation of plumbing, drainage, sanitation and water supply. The appointment of a Site Engineer, building contractor, plumbing contractor and electrical contractor shall be made at the appropriate stage by the owner before the relevant work commences.

Signature : \_\_\_\_\_  
Architect or (Licensed Personnel)  
Reg. No. \_\_\_\_\_ Date :

Name : \_\_\_\_\_  
Address : \_\_\_\_\_  
\_\_\_\_\_   
Tel. No. : \_\_\_\_\_

**FORM NO. 3**

**BUILDING COMPLETION CERTIFICATE BY LICENSED PROFESSIONALS**

Reference No.

Owner's Name :  
Submitted on:

Location :  
Received on :

The Chief Executive Officer/Sachiv Village Panchayat  
Zila Panchayat

Sir,

1. The building/s has/have been constructed according to the sanctioned plan/ as per Guidelines under regulation 32.2.
2. The building/s has /have been constructed as per approved plan and design as per detailed architectural drawings and specifications prepared by -----.
3. Construction has been done under my supervision / guidance and adheres to the drawings submitted.

Signature of the Owner  
Date

Signature of -----  
Designation  
Date

Name in block letter:

Name in block letters:

Address : \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Address: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



**FORM NO. 4**

**BUILDING COMPLETION CERTIFICATE BY SITE ENGINEER**

See regulation 32.1

Reference No.

Owner's Name:

Location :

Submitted on:

Received on :

The Chief Executive Officer/Sachiv Village Panchayat  
Zila Panchayat

Sir,

1. The building/s has/have been constructed according to the sanctioned plan.
2. The building/s has / have been constructed as per
  - the detailed structural drawings and structural specifications prepared by the Structural Engineer.....
  - the detailed Architectural drawings and Architectural specifications prepared by the Architect or -----
  - detailed drawings and specifications of all services
3. All materials used in the construction have been tested as provided in specifications and a record of test reports has been kept.

Signature of the Owner

Signature of Site Engineer

Date

Date

Name in block letter:

Name in block letters:

Address: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



# **Part-B**

## **Guidelines for construction with Burned Brick work, stone masonry and Earthen walls**

### **Contents:**

#### **Simplified Guideline for All New Buildings**

**B-1** Earthquake Safe Construction of Masonry Buildings-Zone V

**B-2** Earthquake Safe Construction of Masonry Buildings-Zone IV

**B-3** Earthquake Safe Construction of Masonry Buildings-Zone III

**B-4** Earthquake Safe Construction of Stone Buildings-Zone-III, IV & V

**B-5** Earthquake Safe construction of Earthen Houses-Zone III, IV & V

**Appendix A Structural Design Basis Report**



# EARTHQUAKE SAFE CONSTRUCTION OF MASONRY BUILDINGS

## Simplified Guideline for *All New Buildings* in the *Seismic Zone V* of India

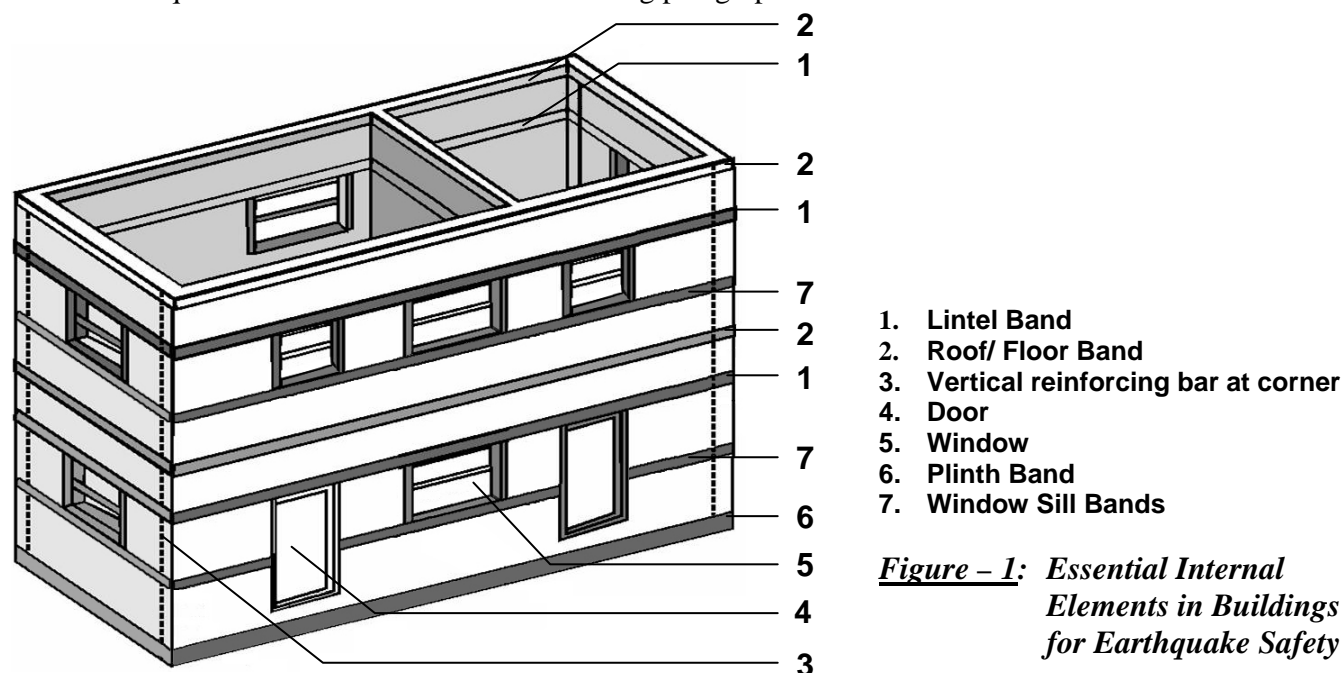
**Zone V**

### ***Introduction:***

The Ministry of Home Affairs, Government of India and the National Disaster Management Authority are keen that **All New Buildings** should be made earthquake resistant in the first instance so that we do not add to the stock of existing unsafe buildings. Since most of the buildings are constructed using brickwork or, solid hollow concrete blocks with flat roofs, very simple illustrated guidance is provided in the attached brochure for incorporating the earthquake resistant features suitable for seismic Zone V.

### ***Essential Elements for Earthquake Safety<sup>1</sup>:***

The essential elements required to make a building earthquake safe are as given in **Figure 1**. Some additional requirements are detailed in the following paragraphs.



1. Lintel Band
2. Roof/ Floor Band
3. Vertical reinforcing bar at corner
4. Door
5. Window
6. Plinth Band
7. Window Sill Bands

***Figure – 1: Essential Internal Elements in Buildings for Earthquake Safety***

### **1. GOOD CEMENT MORTAR:**

The cement mortar should be used in the ratio of 1 part of cement with 4 parts of sand (1 sack of cement mixed with 4 equal sacks of sand).

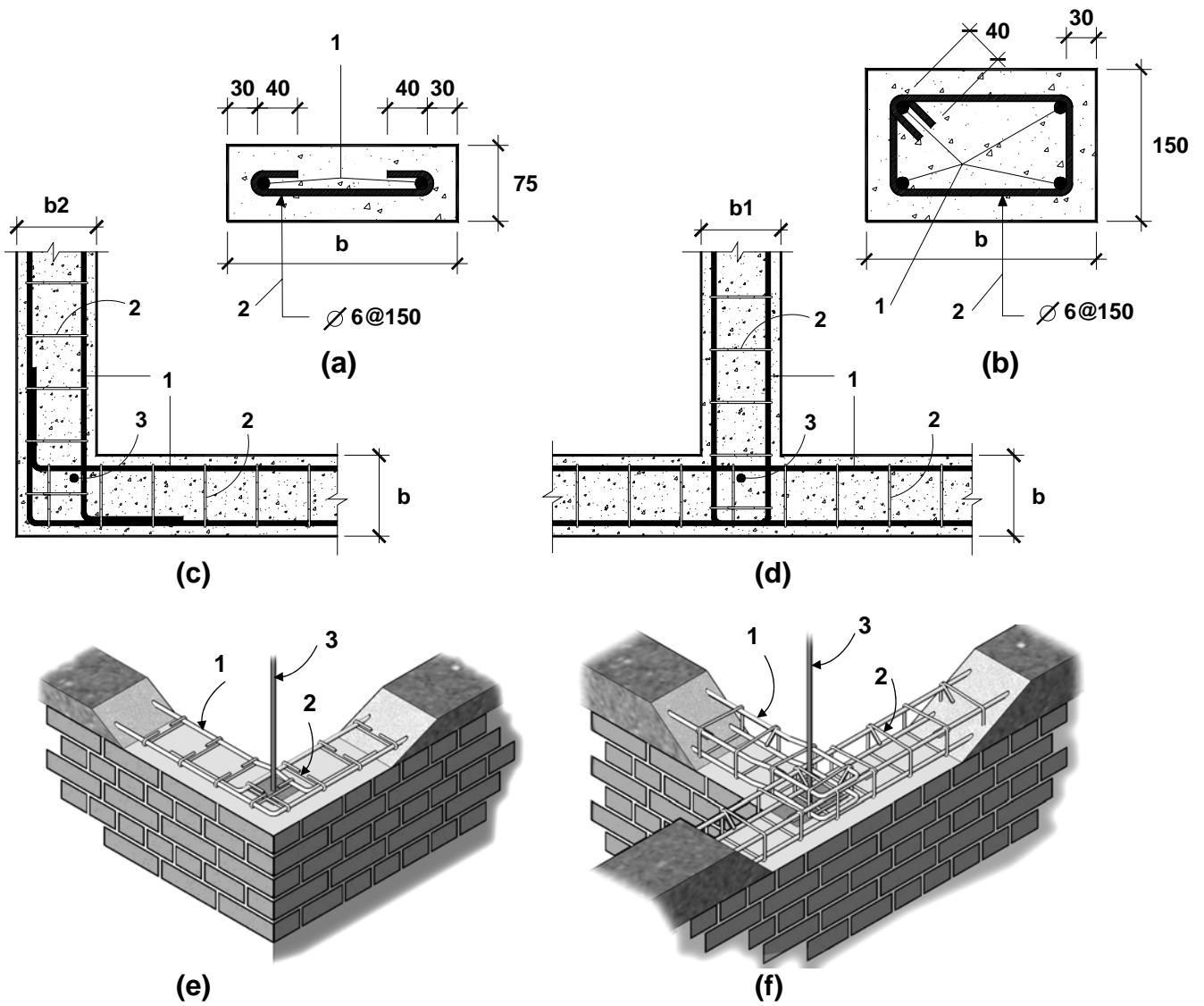
### **2. HORIZONTAL SEISMIC BANDS:**

A seismic band consists of reinforced concrete flat runner through **all external and internal masonry walls** at the following levels in the building.

- a. at the plinth level of the building
- b. at the levels of lintels of doors and windows
- c. at the ceiling level of roofs consisting of wooden joists or, prefabricated reinforced concrete beams or, planks. (*Such band will not be necessary if the roof consists of Reinforced Concrete or, Reinforced Brick slabs cast on the walls covering a minimum of 2/3 of the thickness of the wall.*)

The dimensions of the band and the reinforcement inside depend upon the length of the walls between the perpendicular cross walls. The table below (**Table-1**) shows the dimensions to be adopted for the seismic bands and the internal reinforcement details to be provided. The reinforcement and bending details of seismic bands are given in the **Figure-2**. Reinforcing bars will be of Fe 415 type [TOR or, High Yield Strength Deformed, i.e. HYSD bars]

<sup>1</sup> The details given here are extracted from **IS: 4326-1993 Code of Practice** as applicable to buildings with Brick/ Concrete block walls and R.C. flat slab roofs. Details not given here may be seen in the Code.



- (a) Section of the Band with 2 longitudinal steel bars
- (b) Section of the Band with 4 longitudinal steel bars
- (c) Structural Plan at L - type wall junction
- (d) Structural Plan at T - type wall junction
- (e) 3 Dimensional view of the L - type wall junction
- (f) 3 Dimensional view of the T - type wall junction

- 1. Longitudinal reinforcements
- 2. Lateral Ties
- 3. Vertical reinforcement at corners
- b, b1, b2 Wall thickness

**Figure-2: Reinforcement and Bending Details of Seismic Bands**

**Table-1: Recommended size and longitudinal steel in Seismic Bands (Zone V)**

Internal length of wall	Buildings of all types i.e., Residential buildings & Public Buildings (Schools, Hospitals, Meeting Halls, Anganwadis, etc.)		
	Size of the band	No. of Bars	Dia (mm)
5 m or, less	10 cm x wall width	2	10
6 m	10 cm x wall width	2	12
7 m	15 cm x wall width	4	10
8 m	15 cm x wall width	4	12

### 3. VERTICAL REINFORCEMENT IN THE BRICK WALLS:

For earthquake safety in seismic zone V reinforcing bars have to be embedded in brick masonry at the corners of all the rooms and the side of the door openings. Window openings larger than 60 cm in width will also need such reinforcing bars (**Figure - 4**). The diameter of the bar depends upon the number of storeys in the building. The recommendations are given in **Table-2**.

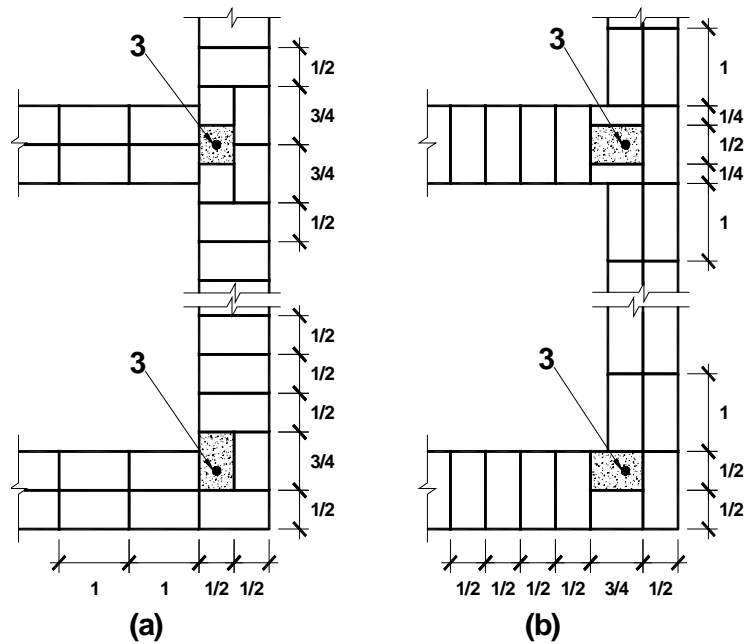
Providing the vertical bars in the brickwork and concrete blocks requires special techniques which could be easily learnt by the supervising engineers and masons will need to be trained.

These vertical bars have to be started from the foundation concrete, will pass through all seismic bands where they will be tied to the band reinforcements using binding wire and embedded to the ceiling band/roof slab as the case may be using a 300 mm 90° bend. Sometimes the vertical bars will not be made in one full length. In that case the extension of the vertical reinforcement bars are required, an overlap of minimum of **50 times the bar diameter** should be provided. The two overlapped reinforcement bars should be tied together by using the binding wires.

**Table-2: Recommended size of vertical steel in Seismic Bands (Zone V)**

Buildings of all types i.e., Residential buildings & Public Buildings * (Schools, Hospitals, Meeting Halls, Anganwadis, etc.)		
No. of storeys	Floor	Dia of Single HYSD(TOR) Bar at corners of room (mm)
One	-	12
Two	Top	12
	Bottom	16
Three	Top	12
	Middle	16
	Bottom	16

\* Building of four storey not permitted in Zone V.



- (a) & (b)** : Alternate courses in one brick wall  
**1** : One brick length  
**1/2** : Half brick length  
**1/4** : Quarter of a brick length  
**3/4** : Three quarters of a brick length  
**3** : Vertical reinforcement bars with Concrete/ mortar filling in pocket of M20 grade (1:1½:3 nominal mix)

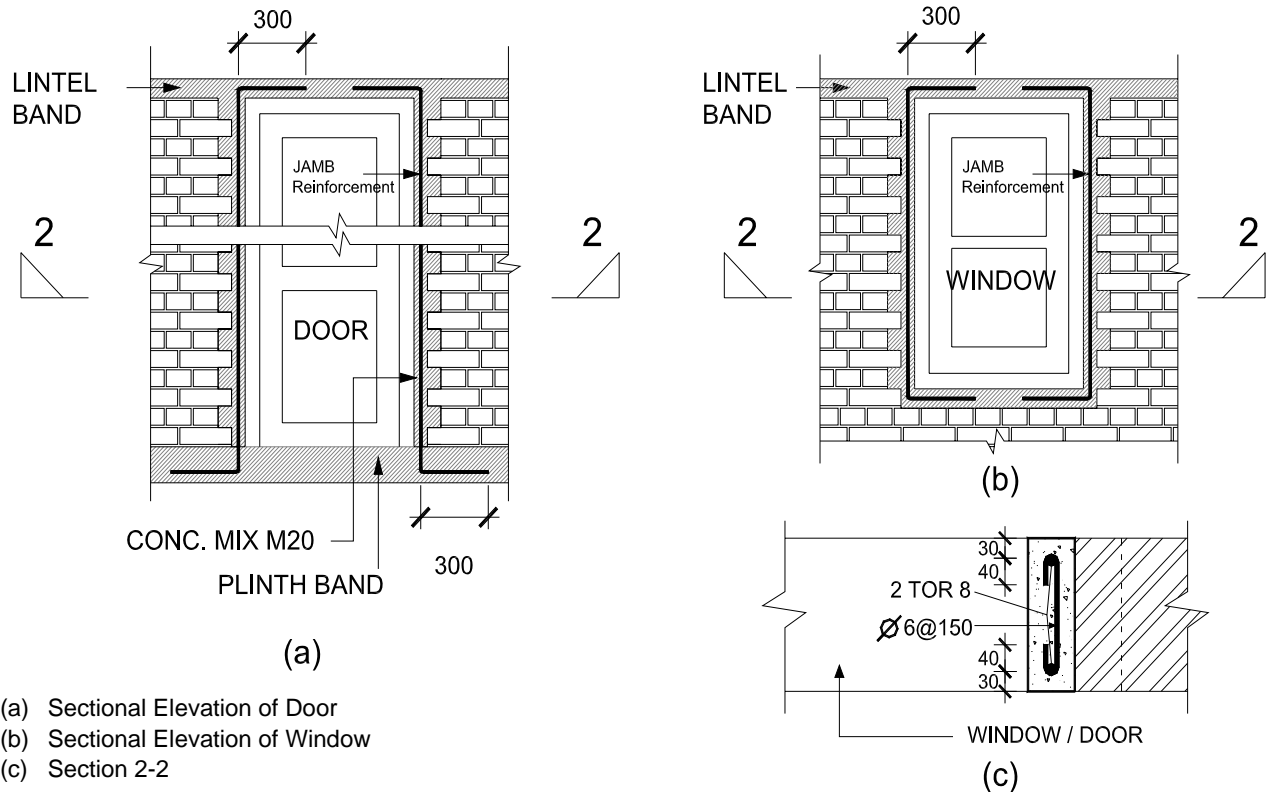
**Figure-3: Typical Details of Providing Vertical Steel Bars in Brick Masonry**

**Table-3: Recommended joint details with the vertical reinforcement at corner for masonry walls using different kind of materials**

Type of Joint	Corner reinforcement in case of Brick Masonry	Corner reinforcement in case of Solid Concrete Block Masonry	Corner reinforcement in case of Hollow Concrete Block Masonry (see the hole and slit made)
L- Joint			
T- Joint			

#### 4. VERTICAL REINFORCEMENT AT JAMBS OF OPENINGS:

All door and window openings wider than 600 mm will have vertical reinforcement in jambs as shown in *Figure-4*.



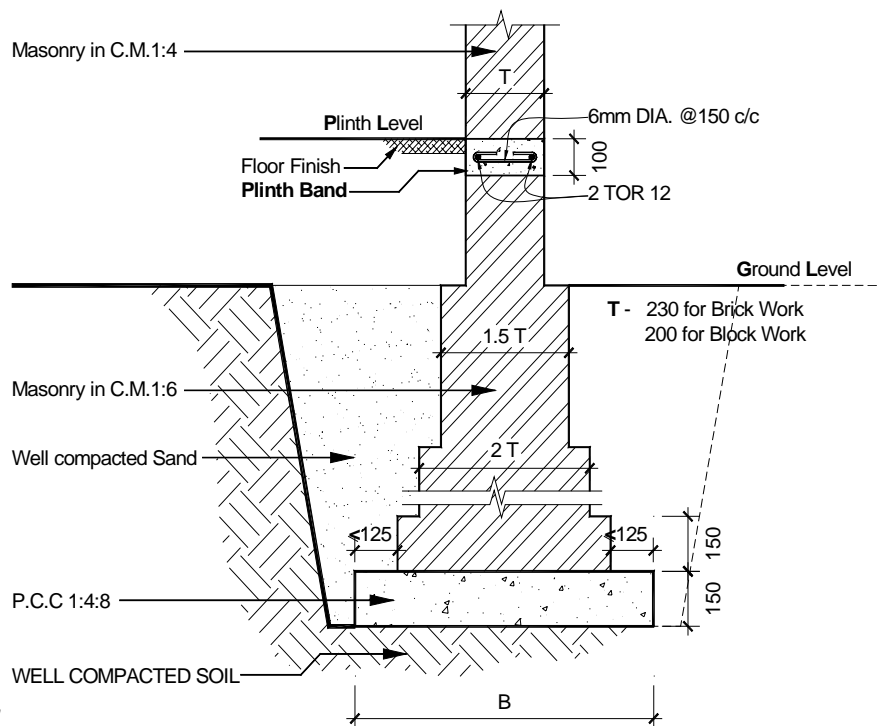
**Figure-4:** Typical Details of Providing Vertical Steel Bars around doors/windows

#### 5. FOUNDATION

Foundation width 'B' should be decided by the load coming on the foundation and the bearing capacity. Masonry width may be reduced by  $\frac{1}{2}$  times T in every step of 150 mm height.

##### NOTE:

In sandy soils with high water table within 8 m depth below ground level, which may get liquefied during earthquake of MSK intensity VIII to IX, pile foundation need to be used in consultation with the Structural/ Geotechnical Engineer.



**Figure-5:** Foundation Detail with Plinth Band in Brick or, Concrete Block Masonry

Prepared by:

**Professor Anand S. Arya assisted by Jananjan Panda**

**GoI - UNDP, Disaster Risk Management Programme**

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# EARTHQUAKE SAFE CONSTRUCTION OF MASONRY BUILDINGS

## Simplified Guideline for *All New Buildings* in the *Seismic Zone IV* of India

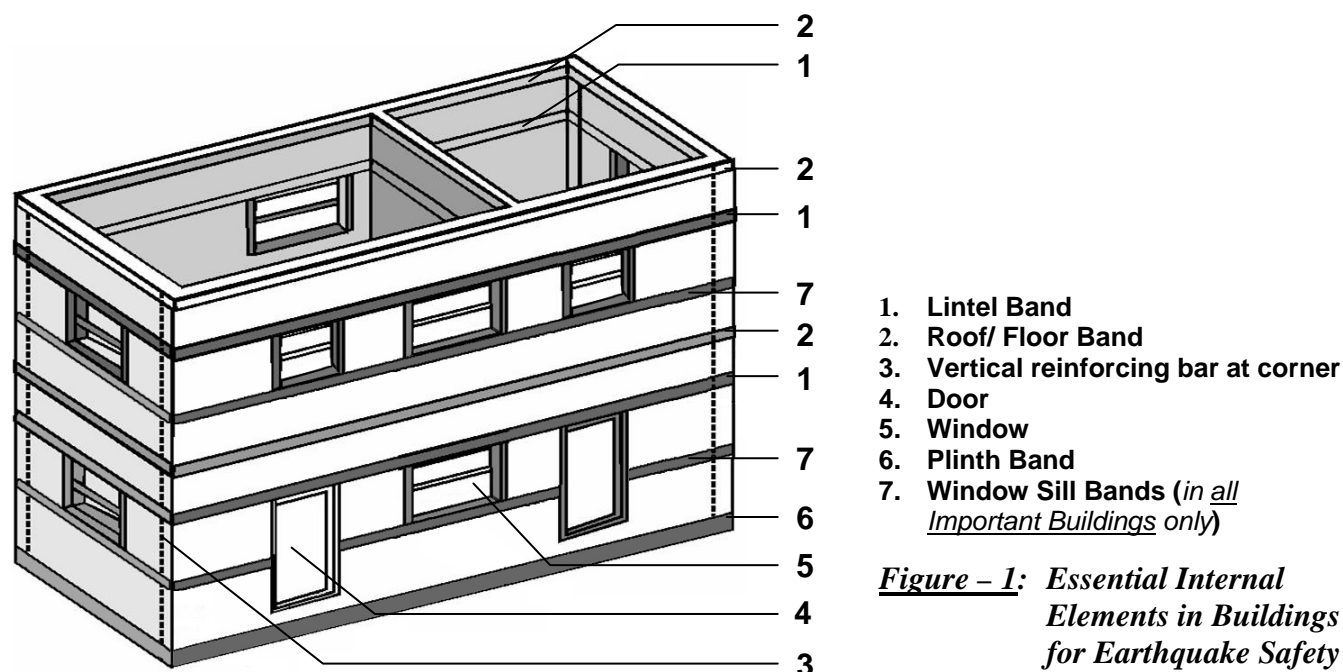
# Zone IV

### **Introduction:**

The Ministry of Home Affairs, Government of India and the National Disaster Management Authority are keen that **All New Buildings** should be made earthquake resistant in the first instance so that we do not add to the stock of existing unsafe buildings. Since most of the buildings are constructed using brickwork or, solid hollow concrete blocks with flat roofs, very simple illustrated guidance is provided in the attached brochure for incorporating the earthquake resistant features suitable for seismic Zone IV.

### **Essential Elements for Earthquake Safety<sup>1</sup>:**

The essential elements required to make a building earthquake safe are as given in **Figure 1**. Some additional requirements are detailed in the following paragraphs.



1. Lintel Band
2. Roof/ Floor Band
3. Vertical reinforcing bar at corner
4. Door
5. Window
6. Plinth Band
7. Window Sill Bands (*in all Important Buildings only*)

**Figure – 1:** *Essential Internal Elements in Buildings for Earthquake Safety*

### **1. GOOD CEMENT MORTAR:**

The cement mortar should be used in the ratio of 1 part of cement with 6 parts of sand (1 sack of cement mixed with 6 equal sacks of sand).

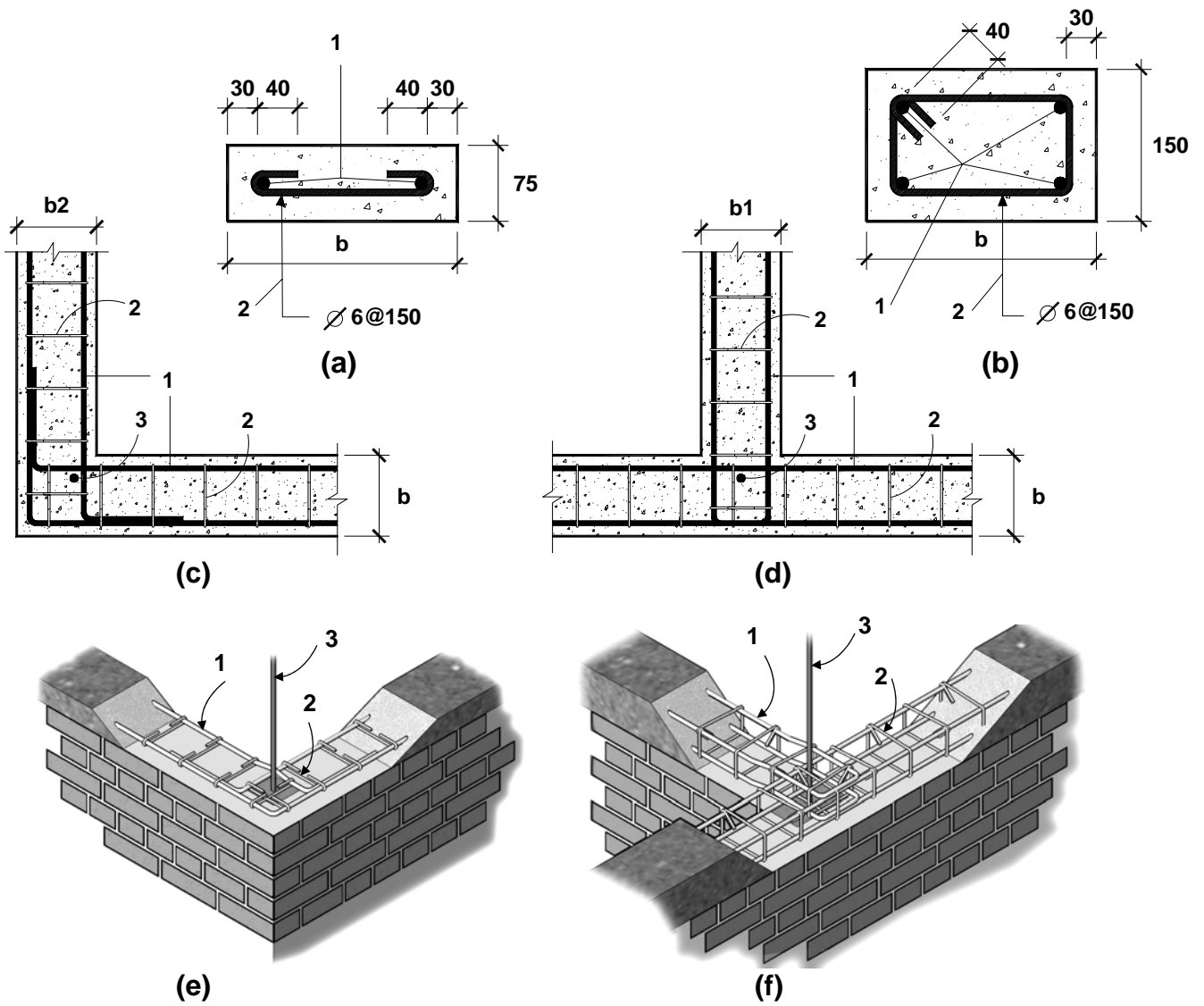
### **2. HORIZONTAL SEISMIC BANDS:**

A seismic band consists of reinforced concrete flat runner through **all external and internal masonry walls** at the following levels in the building.

- a. at the plinth level of the building
- b. at the levels of lintels of doors and windows
- c. at the ceiling level of roofs consisting of wooden joists or, prefabricated reinforced concrete beams or, planks. (*Such band will not be necessary if the roof consists of Reinforced Concrete or, Reinforced Brick slabs cast on the walls covering a minimum of 2/3 of the thickness of the wall.*)

The dimensions of the band and the reinforcement inside depend upon the length of the walls between the perpendicular cross walls. The table below (**Table-1**) shows the dimensions to be adopted for the seismic bands and the internal reinforcement details to be provided. The reinforcement and bending details of seismic bands are given in the **Figure-2**. Reinforcing bars will be of Fe 415 type [TOR or, High Yield Strength Deformed, i.e. HYSD bars]

<sup>1</sup> The details given here are extracted from **IS: 4326-1993 Code of Practice** as applicable to buildings with Brick/ Concrete block walls and R.C. flat slab roofs. Details not given here may be seen in the Code.



- (a) Section of the Band with 2 longitudinal steel bars
- (b) Section of the Band with 4 longitudinal steel bars
- (c) Structural Plan at L - type wall junction
- (d) Structural Plan at T - type wall junction
- (e) 3 Dimensional view of the L - type wall junction
- (f) 3 Dimensional view of the T - type wall junction

- 1. Longitudinal reinforcements
- 2. Lateral Ties
- 3. Vertical reinforcement at corners
- b, b1, b2 Wall thickness

**Figure-2: Reinforcement and Bending Details of Seismic Bands**

**Table-1: Recommended size and longitudinal steel in Seismic Bands (Zone IV)**

Internal length of wall	Residential buildings			Important Public Buildings (Schools, Hospitals, Meeting Halls, Anganwadis, etc.)		
	Size of the band	No. of Bars	Dia (mm)	Size of the band	No. of Bars	Dia (mm)
5 m or, less	10 cm x wall width	2	8	10 cm x wall width	2	10
6 m	10 cm x wall width	2	10	10 cm x wall width	2	12
7 m	15 cm x wall width	4	8	15 cm x wall width	4	10
8 m	15 cm x wall width	4	10	15 cm x wall width	4	12

### 3. VERTICAL REINFORCEMENT IN THE BRICK WALLS:

For earthquake safety in seismic zone IV reinforcing bars have to be embedded in brick masonry at the corners of all the rooms and the side of the door openings. Window openings larger than 60 cm in width will also need such reinforcing bars (**Figure – 4**). The diameter of the bar depends upon the number of storeys in the building. The recommendations are given in **Table-2**.

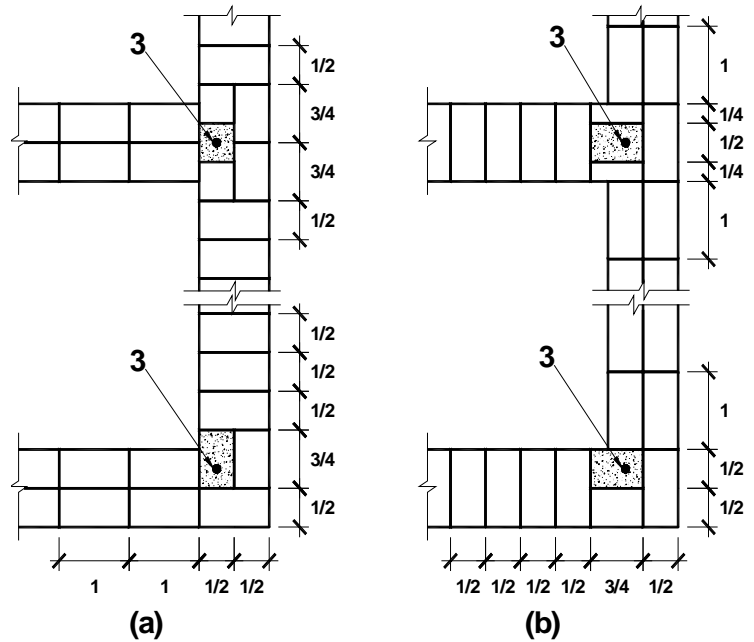
Providing the vertical bars in the brickwork and concrete blocks requires special techniques which could be easily learnt by the supervising engineers and masons will need to be trained.

These vertical bars have to be started from the foundation concrete, will pass through all seismic bands where they will be tied to the band reinforcements using binding wire and embedded to the ceiling band/roof slab as the case may be using a 300 mm 90° bend. Sometimes the vertical bars will not be made in one full length. In that case the extension of the vertical reinforcement bars are required, an overlap of minimum of **50 times the bar diameter** should be provided. The two overlapped reinforcement bars should be tied together by using the binding wires.

**Table-2: Recommended size of vertical steel in Seismic Bands (Zone IV)**

No. of storeys	Floor	Residential buildings *	Important Public Buildings * (Schools, Hospitals, Meeting Halls, Anganwadis, etc.)
		Dia of Single HYSD (TOR) Bar at corners of room (mm)	Dia of Single HYSD(TOR) Bar at corners of room (mm)
<b>One</b>	-	10	12
<b>Two</b>	Top	10	12
	Bottom	12	16
<b>Three</b>	Top	10	12
	Middle	12	16
	Bottom	12	16

\* **Building of four storey though permitted in Zone IV, but not desirable.**



- a & b : Alternate courses in one brick wall
- 1 : One brick length
- 1/2 : Half brick length
- 1/4 : Quarter of a brick length
- 3/4 : Three quarters of a brick length
- 3 : Vertical reinforcement bars with Concrete/ mortar filling in pocket of M20 grade (1:1½:3 nominal mix)

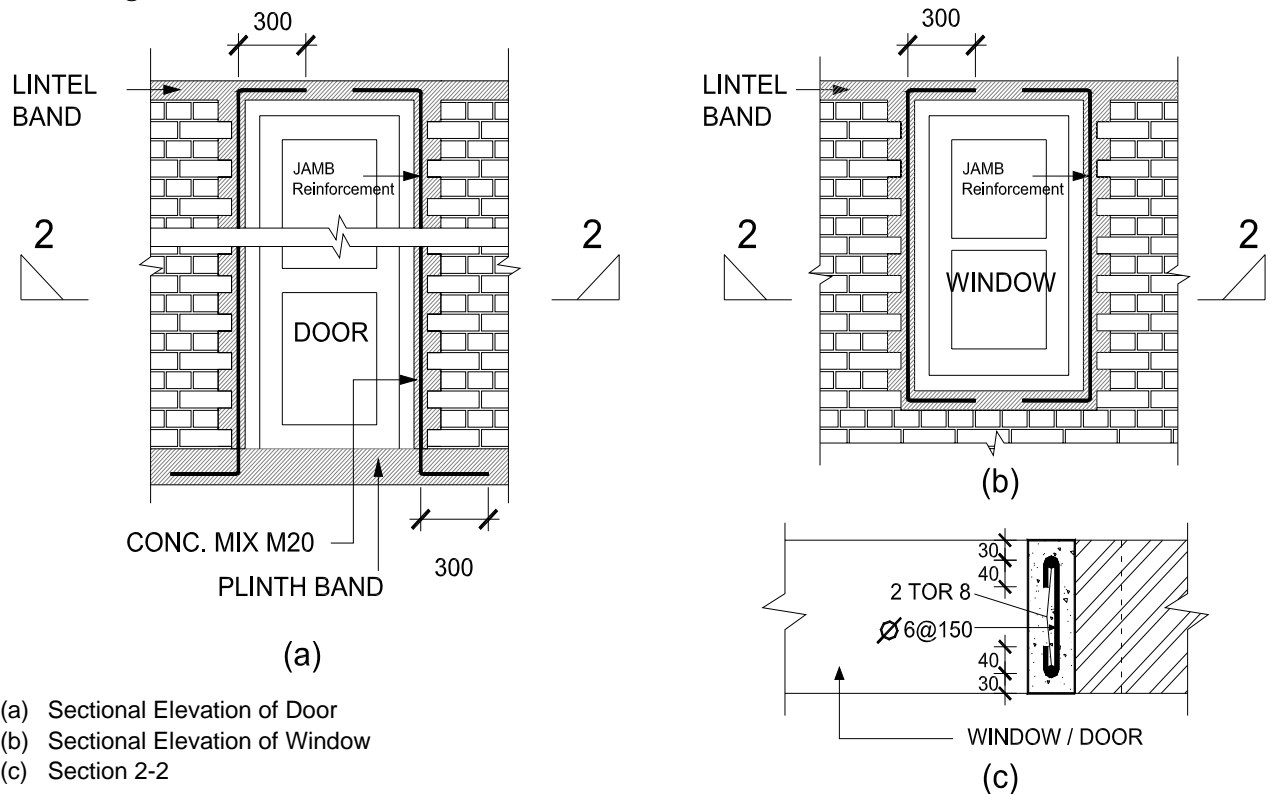
**Figure-3: Typical Details of Providing Vertical Steel Bars in Brick Masonry**

**Table-3: Recommended joint details with the vertical reinforcement at corner for masonry walls using different kind of materials**

Type of Joint	Corner reinforcement in case of Brick Masonry	Corner reinforcement in case of Solid Concrete Block Masonry	Corner reinforcement in case of Hollow Concrete Block Masonry (see the hole and slit made)
L- Joint			
T- Joint			

#### 4. VERTICAL REINFORCEMENT AT JAMBS OF OPENINGS:

All door and window openings wider than 600 mm will have vertical reinforcement in jambs as shown in *Figure-4*.



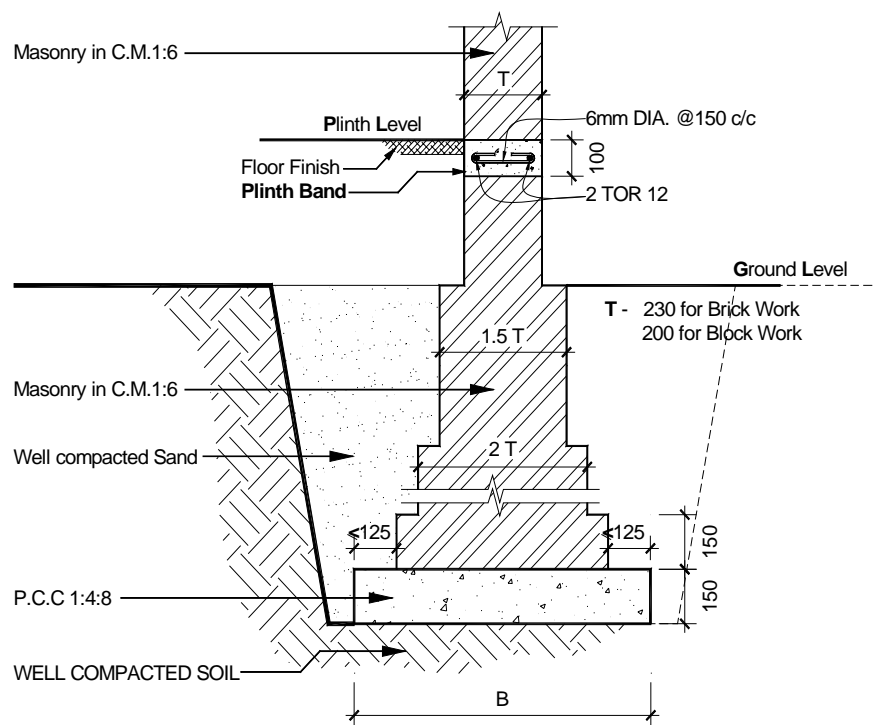
**Figure-4:** Typical Details of Providing Vertical Steel Bars around doors/windows

#### 5. FOUNDATION

Foundation width 'B' should be decided by the load coming on the foundation and the bearing capacity. Masonry width may be reduced by  $\frac{1}{2}$  times T in every step of 150 mm height.

**NOTE:**

In sandy soils with high water table within 8 m depth below ground level, which may get liquefied during earthquake of MSK intensity VIII, pile foundation need to be used in consultation with the Structural/ Geotechnical Engineer.



**Figure-5:** Foundation Detail with Plinth Band in Brick or, Concrete Block Masonry

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# EARTHQUAKE SAFE CONSTRUCTION OF MASONRY BUILDINGS

## Simplified Guideline for *All New Buildings* in the *Seismic Zone III* of India

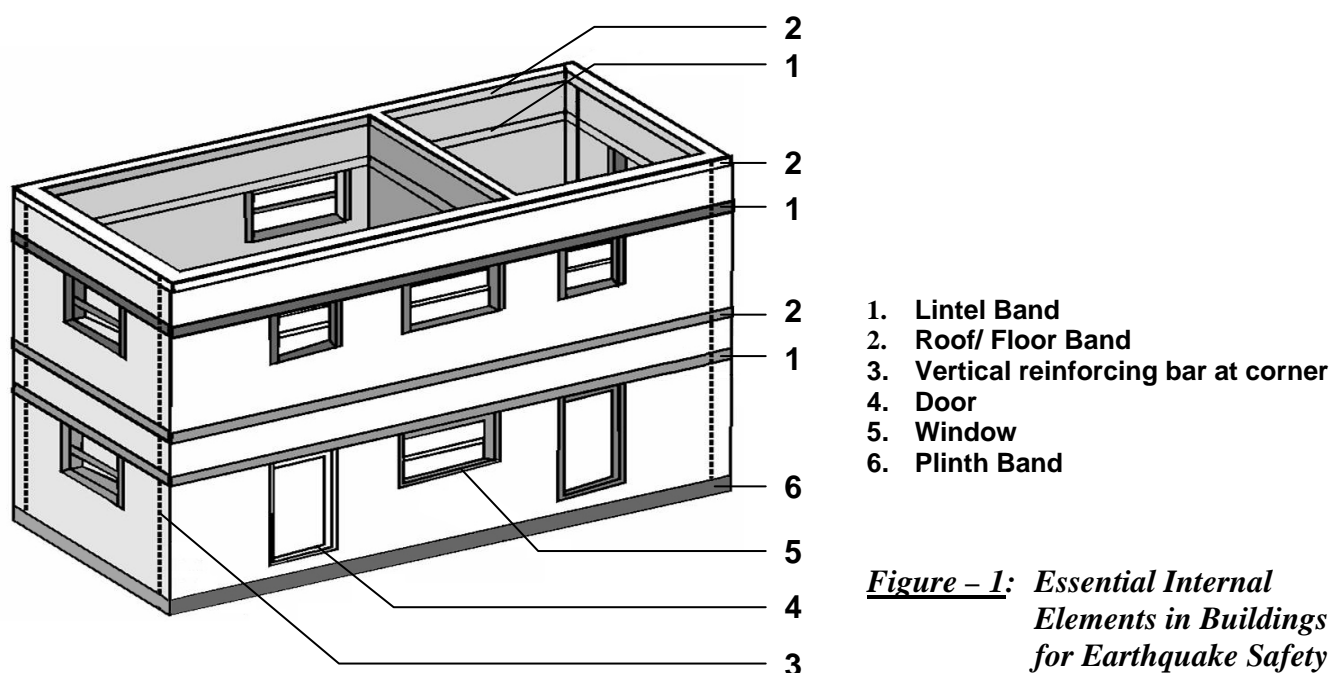
**Zone III**

### ***Introduction:***

The Ministry of Home Affairs, Government of India and the National Disaster Management Authority are keen that **All New Buildings** should be made earthquake resistant in the first instance so that we do not add to the stock of existing unsafe buildings. Since most of the buildings are constructed using brickwork or, solid hollow concrete blocks with flat roofs, very simple illustrated guidance is provided in the attached brochure for incorporating the earthquake resistant features suitable for seismic Zone III.

### ***Essential Elements for Earthquake Safety<sup>1</sup>:***

The essential elements required to make a building earthquake safe are as given in **Figure 1**. Some additional requirements are detailed in the following paragraphs.



1. Lintel Band
2. Roof/ Floor Band
3. Vertical reinforcing bar at corner
4. Door
5. Window
6. Plinth Band

***Figure – 1: Essential Internal Elements in Buildings for Earthquake Safety***

### **1. GOOD CEMENT MORTAR:**

The cement mortar should be used in the ratio of 1 part of cement with 6 parts of sand (1 sack of cement mixed with 6 equal sacks of sand).

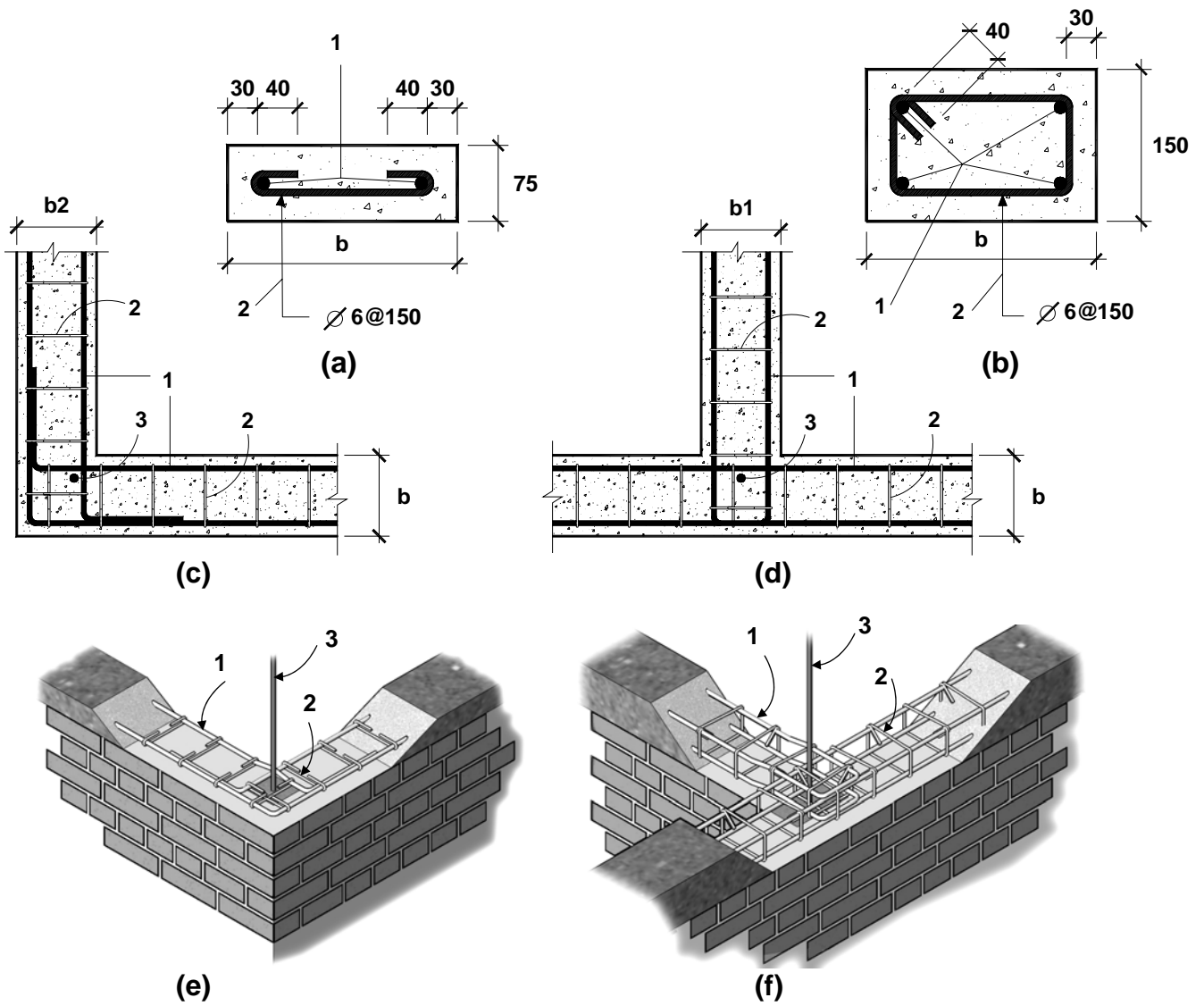
### **2. HORIZONTAL SEISMIC BANDS:**

A seismic band consists of reinforced concrete flat runner through **all external and internal masonry walls** at the following levels in the building.

- a. at the plinth level of the building
- b. at the levels of lintels of doors and windows
- c. at the ceiling level of roofs consisting of wooden joists or, prefabricated reinforced concrete beams or, planks. (*Such band will not be necessary if the roof consists of Reinforced Concrete or, Reinforced Brick slabs cast on the walls covering a minimum of 2/3 of the thickness of the wall.*)

The dimensions of the band and the reinforcement inside depend upon the length of the walls between the perpendicular cross walls. The table below (**Table-1**) shows the dimensions to be adopted for the seismic bands and the internal reinforcement details to be provided. The reinforcement and bending details of seismic bands are given in the **Figure-2**. Reinforcing bars will be of Fe 415 type [TOR or, High Yield Strength Deformed, i.e. HYSD bars]

<sup>1</sup> The details given here are extracted from **IS: 4326-1993 Code of Practice** as applicable to buildings with Brick/ Concrete block walls and R.C. flat slab roofs. Details not given here may be seen in the Code.



- (a) Section of the Band with 2 longitudinal steel bars
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- 1. Longitudinal reinforcements
- 2. Lateral Ties
- 3. Vertical reinforcement at corners
- b, b1, b2 Wall thickness

**Figure-2: Reinforcement and Bending Details of Seismic Bands**

**Table-1: Recommended size and longitudinal steel in Seismic Bands (Zone III)**

Internal length of wall	Residential buildings			Important Public Buildings (Schools, Hospitals, Meeting Halls, Anganwadis, etc.)		
	Size of the band	No. of Bars	Dia (mm)	Size of the band	No. of Bars	Dia (mm)
5 m or, less	10 cm x wall width	2	8	10 cm x wall width	2	8
6 m	10 cm x wall width	2	8	10 cm x wall width	2	10
7 m	15 cm x wall width	2	10	15 cm x wall width	2	12
8 m	15 cm x wall width	2	12	15 cm x wall width	4	10

### 3. VERTICAL REINFORCEMENT IN THE BRICK WALLS:

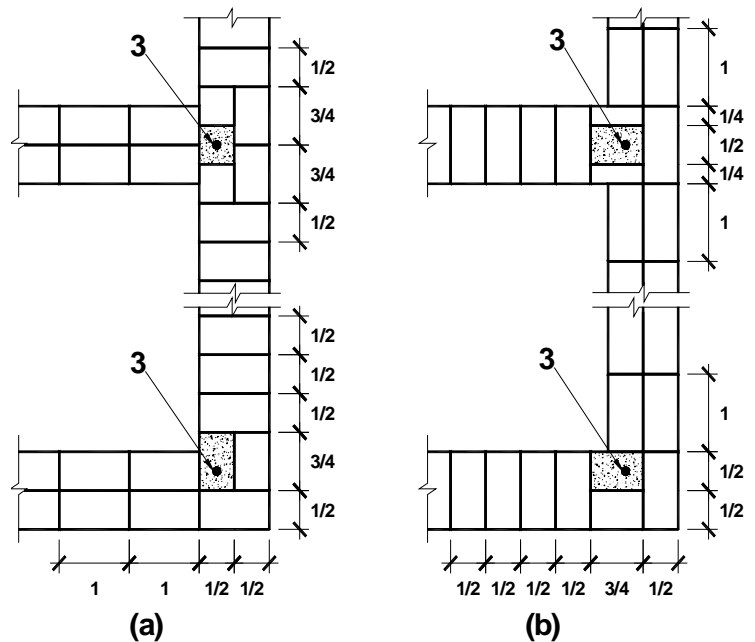
For earthquake safety in seismic zone III reinforcing bars have to be embedded in brick masonry at the corners of all the rooms and the side of the door openings. Window openings larger than 60 cm in width will also need such reinforcing bars (**Figure – 4**). The diameter of the bar depends upon the number of storeys in the building. The recommendations are given in **Table-2**.

Providing the vertical bars in the brickwork and concrete blocks requires special techniques which could be easily learnt by the supervising engineers and masons will need to be trained.

These vertical bars have to be started from the foundation concrete, will pass through all seismic bands where they will be tied to the band reinforcements using binding wire and embedded to the ceiling band/roof slab as the case may be using a 300 mm 90° bend. Sometimes the vertical bars will not be made in one full length. In that case the extension of the vertical reinforcement bars are required, an overlap of minimum of **50 times the bar diameter** should be provided. The two overlapped reinforcement bars should be tied together by using the binding wires.

**Table-2: Recommended size of vertical steel in Seismic Bands (Zone III)**

No. of storeys	Floor	Residential buildings *	Important Public Buildings * (Schools, Hospitals, Meeting Halls, Anganwadis, etc.)
		Dia of Single HYSD (TOR) Bar at corners of room (mm)	Dia of Single HYSD (TOR) Bar at corners of room (mm)
<b>One</b>	-	-	10
<b>Two</b>	Top	-	10
	Bottom	-	12
<b>Three</b>	Top	10	10
	Middle	12	12
	Bottom	12	12
<b>Four</b>	Top	10	10
	Third	10	12
	Second	12	16
	Bottom	12	20



- (a) & (b)** : Alternate courses in one brick wall  
**1** : One brick length  
**1/2** : Half brick length  
**1/4** : Quarter of a brick length  
**3/4** : Three quarters of a brick length  
**3** : Vertical reinforcement bars with Concrete/ mortar filling in pocket of M20 grade (1:1½:3 nominal mix)

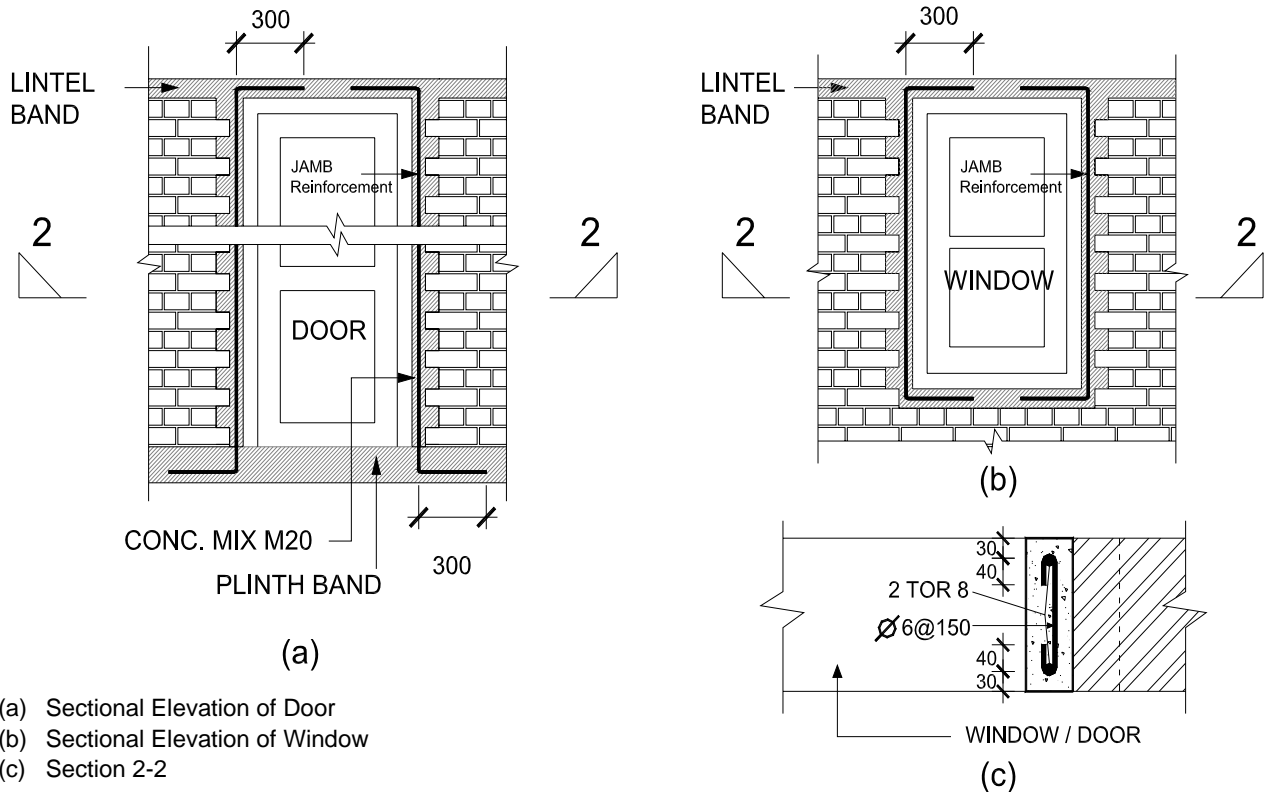
**Figure-3: Typical Details of Providing Vertical Steel Bars in Brick Masonry**

**Table-3: Recommended joint details with the vertical reinforcement at corner for masonry walls using different kind of materials**

Type of Joint	Corner reinforcement in case of Brick Masonry	Corner reinforcement in case of Solid Concrete Block Masonry	Corner reinforcement in case of Hollow Concrete Block Masonry (see the hole and slit made)
L- Joint			
T- Joint			

#### 4. VERTICAL REINFORCEMENT AT JAMBS OF OPENINGS:

All door and window openings wider than 600 mm will have vertical reinforcement in jambs as shown in **Figure-4** where required as per Table-2.



**Figure-4:** Typical Details of Providing Vertical Steel Bars around doors/windows

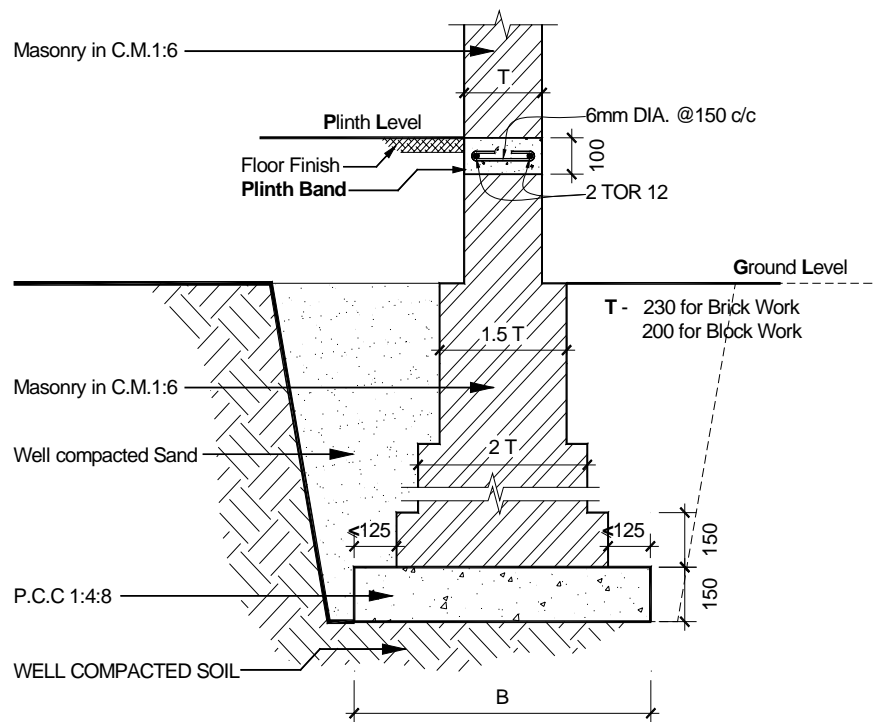
#### 5. FOUNDATION

Foundation width 'B' should be decided by the load coming on the foundation and the bearing capacity. Masonry width may be reduced by  $\frac{1}{2}$  times T in every step of 150 mm height.

**NOTE:**

In sandy soils with high water table within 5 m depth below ground level, which may get liquefied during earthquake of MSK intensity VII, pile foundation need to be used in consultation with the Structural/ Geotechnical Engineer.

**Figure-5:** Foundation Detail with Plinth Band in Brick or, Concrete Block Masonry



Prepared By:

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**NATIONAL DISASTER MANAGEMENT DIVISION**

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# EARTHQUAKE SAFE CONSTRUCTION OF STONE BUILDINGS<sup>1</sup>

## Simplified Guideline for *All New Buildings* in the *Seismic Zone III, IV & V of India*

### 1. INTRODUCTION

This guide cover those houses which are situated in the earthquake prone zones and whose bearing walls are built using coursed stone masonry with rooms not exceeding 7.0 meters in length and the number of storeys are no more than two or three as specified. The roof can be flat or sloping. The earthquake resistant provisions are indicated for seismic Zones III, IV and V as appropriate. Construction of Rubble stone walls using mud mortar as well as cement mortars are both dealt in this Guide.

### 2. FOUNDATIONS:

#### 2.1 Rocky Ground

Weathered, jointed and fissured rock may be leveled by chiseling, in steps of about 150 mm and stepped strip footing built on it, with the foundation width of 600 mm for two storeyed houses. Boulder site may be leveled by removing small boulders but leaving large boulders in place. In all cases, the base concrete of sufficient thickness (with a minimum of 100 mm) should be used for leveling before starting the masonry.

#### 2.2 Soil Site

Use stepped-strip foundation with minimum depth of 750 mm below ground level and width of 700 mm (upto 2 storeyed houses). For each additional storey, increase width by 300 mm.

#### 2.3 Treatment at Plinth Level

This will depend on site-soil condition as follows:

##### a. Rocky Ground

The seismic band is not required. Use damp-proof course (D.P.C.) as usual on the strip foundation. It may be cement-sand mortar of 1:3 mix 25mm thick or 1:2:3 micro concrete 38mm thick, with damp proofing compound mixed in each case.

##### b. Boulder or Soil Site

Use RC seismic band of 75 to 100mm thickness.

### 3. STONE MASONRY WALLS IN MUD MORTAR

Stone masonry walls built using mud mortar and other details as given in the following paras, could be used for *housing only*, for reasons of affordability or non- availability of cement supply. Stone masonry in mud should not be used for community buildings such as schools, hospitals, mosques, etc.

#### 3.1 Construction Control

- (i) The mortar should be clay mud of good quality.
- (ii) The wall thickness 't' should preferably be kept 450mm, but not to be larger than 500mm. In any case, the stones of the inner and outer wythes should be interlocked with each other as far as possible.
- (iii) The masonry should preferably be brought to courses at not more than 600 mm lift so as to achieve 'coursed rubble masonry'.

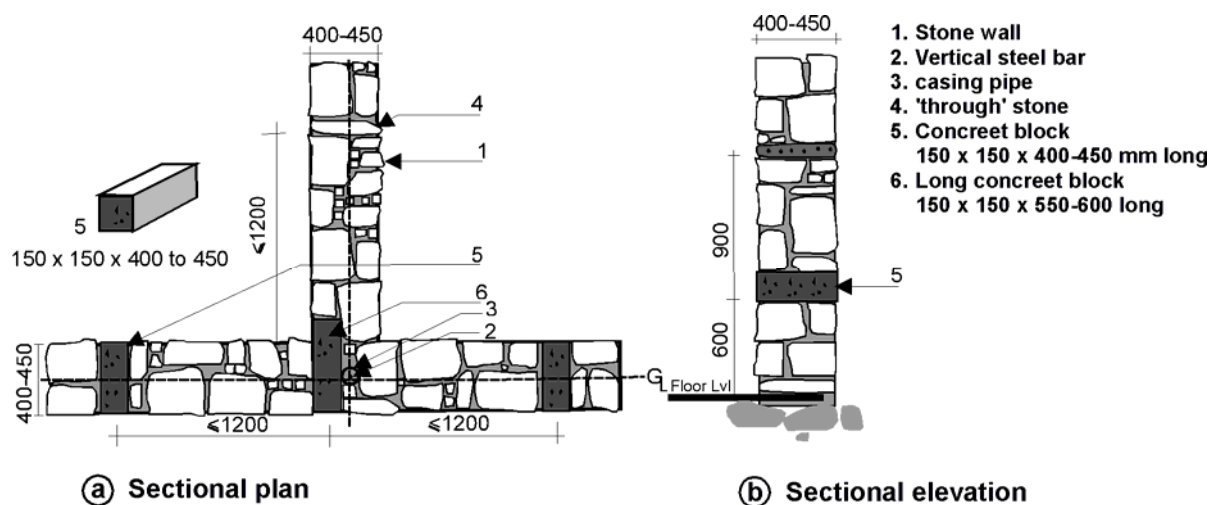


Fig. 1 'Through' stone or bond elements in stone wall built in mud mortar

<sup>1</sup> The details given here are extracted from IS:13828-1993 "Improving Earthquake Resistance of Low Strength Masonry Buildings – Guidelines". Details not given here may be seen in the Code.

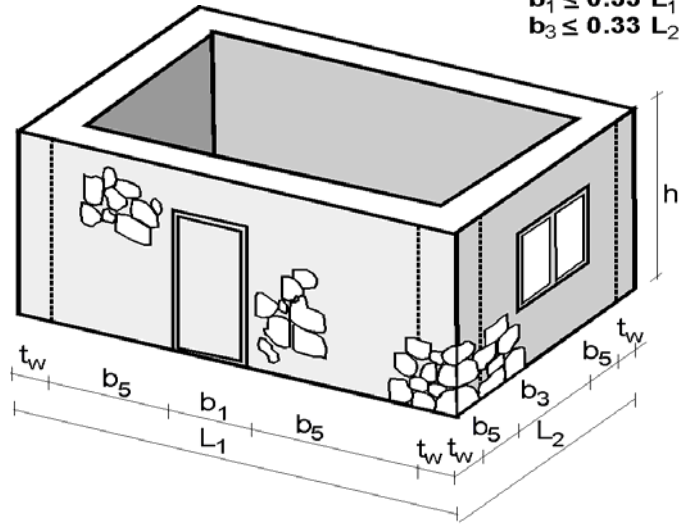
- (iv) 'Through' stones of full length equal to wall thickness should be used in every 600 mm lift at not more than 1.2m apart horizontally (Fig.1).
- (v) In place of 'through' stones, 'bonding elements' of concrete bars of 50mm x 50mm section with an 8mm dia rod placed centrally or solid concrete blocks of 150 x 150 x 'wall thickness size' may be used. (Fig. 1). Alternatively, seasoned wooden battens of 50 mm x 50 mm size may be used as bonding element.
- (vi) Long stones of 600 mm length or solid concrete blocks of 150 x 150 x 600 mm size should be used at wall corners and T-junctions every 600 mm height to connect the perpendicular walls effectively (Fig.1). Alternatively, seasoned wooden batten of 60 mm x 60 mm x 600 mm size may be used.

$$L_1 \leq 5.0 \text{ m}$$

$$h \leq 2.7 \text{ m}$$

$$b_1 \leq 0.33 L_1$$

$$b_3 \leq 0.33 L_2$$



**Fig. 2 Control on length, height and openings in stone walls built in mud mortar.**

### 3.2 Control on Wall Length and Building Height

Height of the coursed rubble masonry walls in mud mortar should be restricted, with storey height to be kept 2.7m maximum, and span of walls between cross walls to be limited to 5.0 m as follows:

*In Zones III and IV:* preferably upto two storeys, but not more than three storeys in any case.

*In Zone V :* preferably One storey but not more than two storeys in any case.

### 3.3 Control of Openings in Bearing Walls

For coursed rubble stone masonry built in mud mortar, the door and window opening may be located in the walls as follows (Fig.2)

Total length of openings in a wall = 0.33 of wall length in Zone IV & V and 0.42 in Zone III.

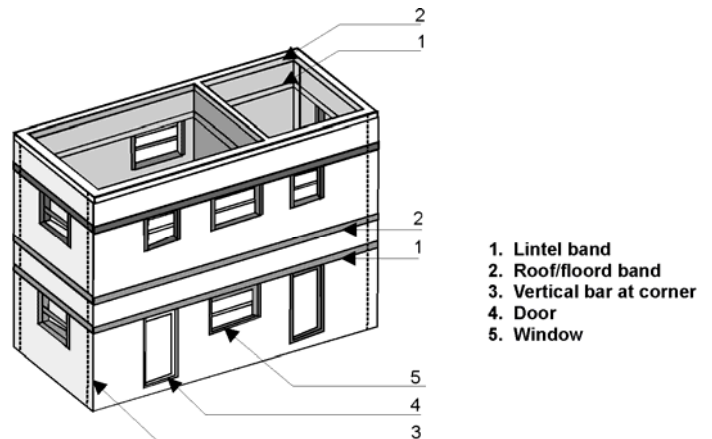
Distance of opening from inside corner:  $b_5 \geq 600$  mm in Zone IV & V and 450 mm in Zone III.

Pier width between consecutive openings  $\geq 600$ mm

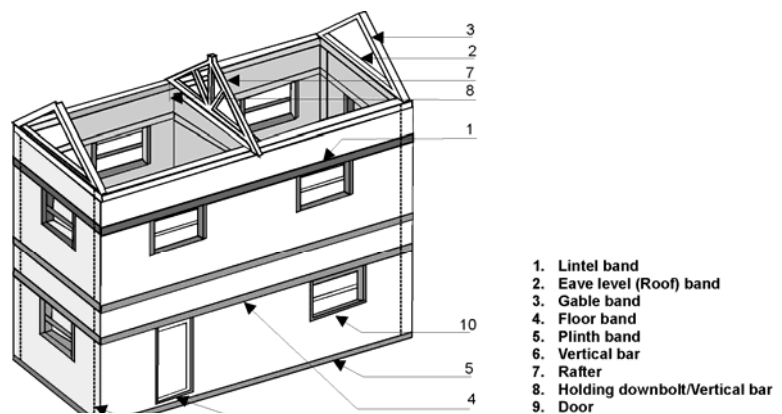
### 3.4 Seismic Bands

The overall arrangement of seismic reinforcing of masonry buildings is shown in Fig. 3 for buildings with flat roof and in Fig. 4 for building with sloping roof consisting of horizontal seismic bands and vertical bars. The seismic bands at various critical sections shall be as follows:

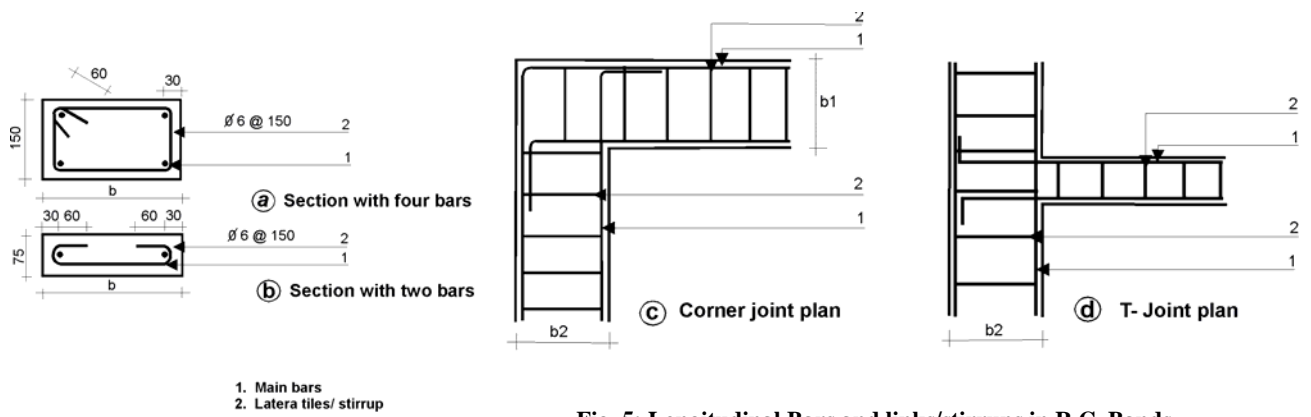
- (i) Seismic bands at plinth, lintel, and ceiling levels in buildings with flat roof will be provided in all internal and external walls continuously without break in all storeys. Requirement of reinforcing bars in RC bands are given in Table 1 and the details of bands are shown in Fig. 5.
- (ii) In case of sloping roofs, triangular gable walls must be enclosed within eave level band and a band at the top of the gable wall. These bands must be made monolithic and continuous as shown in Fig. 6.



**Fig. 3 Overall arrangement of earthquake resisting elements in double storeyed houses having flat roof (Roof not shown)**



**Fig. 4 Overall arrangement of reinforcing in masonry double storey building having pitched roof (Roof not shown)**



**Fig. 5: Longitudinal Bars and links/stirrups in R.C. Bands**

(iii) For achieving good bond with masonry, the bands should be cast directly on the masonry and its top surface should be made rough. In the case of plinth and lintel band, stones may be cast in the concrete to project out of the concrete by 50 to 75mm.

**Table 1 : Longitudinal Bars\* in RC Bands (Stone Masonry in Mud or Cement Mortar)**

Length of wall in room (m)	Reinforcing Bars in Seismic Zones					
	Zone III		Zone IV		Zone V	
	No	Dia (mm)	No	Dia (mm)	No	Dia (mm)
≤ 5	2	8	2	8	2	10
6	2	8	2	10	2	12
7	2	10	2	12	4	10

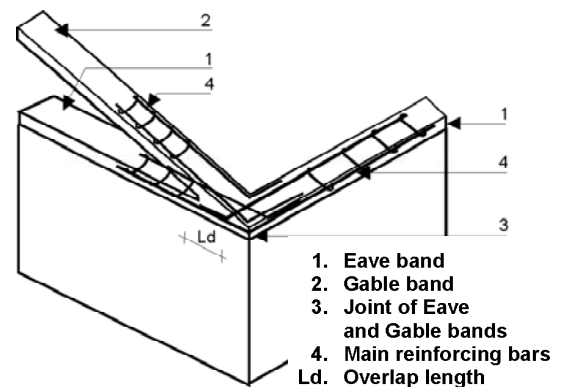
\*High Strength Deformed (Tor) bars

### 3.5 Vertical Reinforcing Bars in Walls

The vertical reinforcing of walls consists of a single high strength deformed (HSD) or 'TOR' bar (Table 2 for required diameters) located at each junction of walls.

**Table -2: Vertical Bars at Corners of Room (Stone Masonry in Mud or Cement Mortar)**

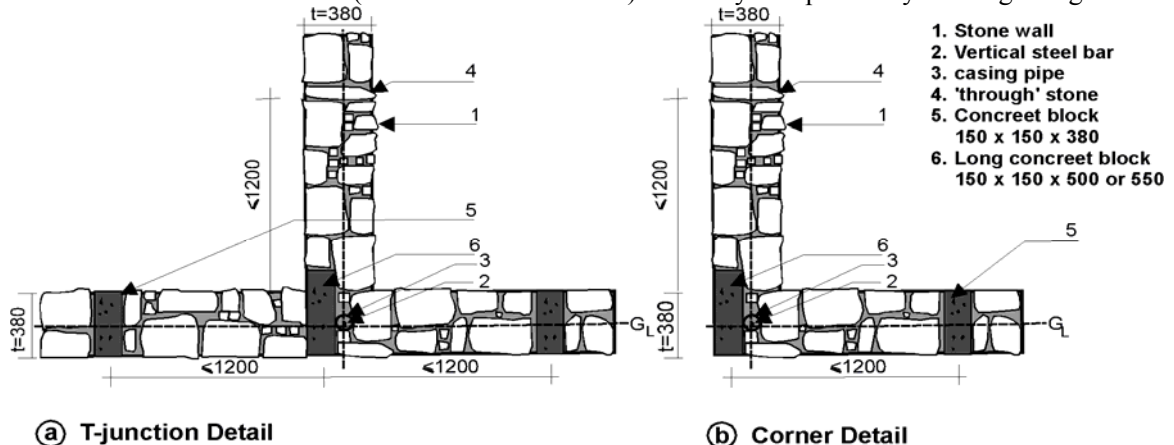
No. of Storeys	Storey	Diameter Of Single HSD (TOR) Bar at Corners of Room		
		Zone III	Zone IV	Zone V
		One	---	10
Two	Top	10	10	12
	Bottom	10	12	16
Three	Top	10	Three storeyed building, nor permitted in mud mortar	
	Middle	10		
	Bottom	12		



**Fig. 6 Continuity of reinforcement in eave and gable bands.**

#### 3.5.1 Installation of Vertical Bars

For installations of vertical bars in stone masonry, use of PVC casing pipe of 100mm external dia, 600-750 mm long is recommended around which masonry be built to height 450-600mm (see Fig. 7) and the pipe made loose by gently rotating. As the masonry hardens, the pipe is raised and the cavity filled with M20 concrete (nominal mix of 1:1.5:3) and fully compacted by rodding using 12mm dia



**(a) T-junction Detail**

**(b) Corner Detail**

t = 380 for cement mortar, 450 for mud mortar

**Fig. 7: Installing vertical steel bars in stone masonry walls**

bar. The vertical bar should start from foundation and terminate in roof slab (Incase of RCC roof)/terminate at eaves band (for sloping roof).

#### 3.5.2 Keeping the Bar Vertical

Before casting the foundation, the vertical bars must be kept in correct in position horizontally and vertically. For this purpose tripods may be erected using bamboos or spare reinforcing bars.

### 3.6 Water Proofing

*For protection of external walls against damage by water*

- (i) Take out roof projection beyond the walls by about 300mm, and
- (ii) Use cement-sand mortar pointing on external face of walls;

## 4. STONE MASONRY USING CEMENT MORTAR

Stone masonry using cement mortar and other details as set out in the following paras may be used for all building categories in the area.

### 4.1 Construction Control

- *Mortar.* The mortar in superstructure masonry should be cement-sand (1:6 in Zones III & IV and 1:4 Zone V). In the foundation masonry upto plinth, the mix 1:6 may be kept in all cases.
- *Composite Mortar.* In place of cement-sand 1:6 and 1:4 mortars, cement-lime-sand mortar may be used as 1:2:9 and 1:1:6 respectively.
- *Wall Thickness.* The wall thickness should not be larger than 380 mm (not more than 450 mm in any case) and the stones on the inner and outer wythes should be interlocked with each other.
- *Coursed.* The masonry should preferably be brought to courses at not more than 600 mm lift.
- *'Through' Stone'* 'Through' stones of full length equal to wall thickness should be used in every 600 mm lift at not more than 1.2 m apart horizontally. In place of 'through' stones, 'bonding elements' of concrete bars of 50mm x 50mm section with an 8 mm dia rod placed centrally or solid concrete blocks of 150 x 150 x walls thickness, can also be used. Detail similar to fig.1.
- *Corner Stones.* Long stones of 500-600mm length should be used at wall corners and T-junctions of walls. Alternatively use of 150x150x(500 to 600) solid concrete blocks to connect the perpendicular walls effectively (Detail similar to fig.1).

### 4.2 Control on Wall Length and Building Height

The height of the coursed-rubble masonry walls in cement mortar should be restricted as follows:

- (i) *For Zones III & IV:* Three storeys with flat roof or two storey plus attic.
- (ii) *For Zone V:* Two storeys with flat roof or one storeys plus attic for pitched roof.

The storey height to be kept 3.2m maximum, and span of walls between cross walls to be limited to 7.0m. If rooms longer than 7m are needed, buttresses may be used at intermediate points not farther apart than 5.0m. The size of the buttress be kept of uniform thickness with top width equal to the thickness of main wall and the base width equal to one sixth of wall height.

### 4.3 Control of Openings in Bearing Walls

For stone masonry built in cement mortar and brought to courses, the door and window openings should be controlled as follows:

Ratio of total length of openings in a wall to length of the wall in a room should not exceed 0.5 in single storeyed, 0.42 in 2-storeyed and 0.33 in 3 storeyed buildings.

Distance of opening from inside corner  $\geq$  450mm

Pier width between consecutive openings  $\geq$  600mm

### 4.4 Seismic Bands

The seismic bands at various critical sections should be as provided in sub-para 3.4 (Figs. 5, 6).

### 4.5 Vertical Reinforcement

The vertical bars to be provided at corners of rooms and the jambs of large openings should be as specified in 3.5 (See Fig. 7).

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Prepared By :

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# Earthquake Safe Construction of Earthen Houses <sup>1</sup>

## Simplified Guideline for All New Buildings in the Seismic Zone III, IV & V of India

### 1. INTRODUCTION

The earthen houses suffer a great deal when impacted by earthquakes due to inherent weakness of the material in tension and shear. Earthquake experience shows that earthen buildings may be cracked in seismic zone II (MSK Intensity VI), wide cracks and even partial collapse may occur in zone III (MSK Intensity VII) and collapses are widespread under zone IV (MSK Intensity VIII). Damage is always much more severe in two storeyed buildings than in one storeyed ones.

The main object of this brochure is to indicate such simple and affordable improvements in construction and addition of earthquake resisting elements which will make the earthen buildings safe against total collapse in seismic zones III & IV. Use of earthen houses in seismic zone V may not be permitted.

### 2. GENERAL CONSIDERATIONS

- 2.1 Any of the three forms of earthen construction i.e. hand-formed or sun dried mud blocks (called Adobe) or rammed earth may be used for construction of houses but the safety elements suggested need to be incorporated in all.
- 2.2 Experience in Intensity areas of MSK VIII in Zone IV has shown the high vulnerability of two-storeyed houses, hence only one storey construction should *preferably* be adopted in seismic Zones III & IV. Important building as for community gathering, school, primary health centre etc. should not be constructed with earthen walls
- 2.3 Sites with sandy loose soils, poorly compacted clays, and fill materials should generally be discarded due to their excessive settlements during seismic vibrations. Also, sites with very high water table and those in flood prone areas should be avoided to be free from liquefaction and saturation effects on mud walls.
- 2.4 Site should be above high flood level or the ground shall be raised to this effect.

### 3. SUITABILITY OF SOIL

The following qualitative tests may be used for determining the suitability of a soil for earthen construction.

#### 3.1 Strength Test of clay block (Adobe):-

The strength of adobe may be qualitatively ascertained as follows:

After 4 weeks of sun drying, it should be strong enough to support in bending the weight of a person 60 – 70 kg (see Fig. 1). If it breaks, more clay and fibrous material is required to be added.

Quantitatively, the compressive strength may be determined by testing 100 mm cubes of clay after completely drying them. A minimum value of 1.2 N/mm<sup>2</sup> (12 kg/cm<sup>2</sup>) will be desirable.

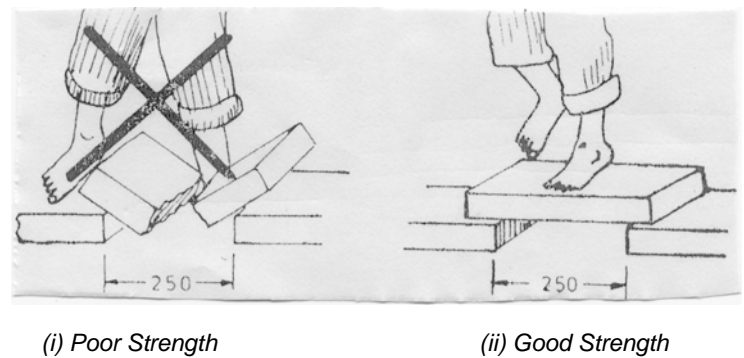


Fig.1 Field Testing of Adobe Strength

### 4. ADEQUATE CONFIGURATION OF EARTHEN BUILDINGS

Taking the various planning measures into account, a configuration of earthen buildings, which will be suitable in seismic zones, is shown in Fig. 2. Here a sloping roof is sketched, but could be replaced with a flat, using a wall plate under the wood logs or joists. The following is mainly recommended:-

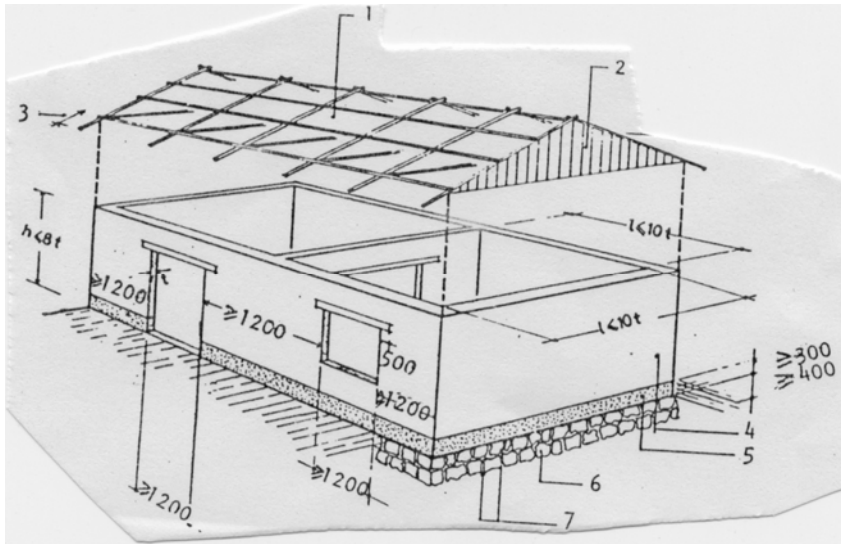
- One floor construction
- Roughly square room
- Symmetric distribution of walls
- Small openings <1200 mm width

### 5. HOUSE SITE IN SEISMIC ZONES

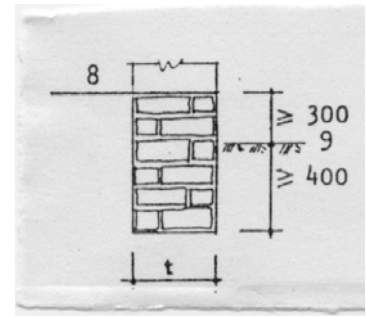
#### (i) Foundation

- (a) Width of strip footings of the walls may be kept as follows:

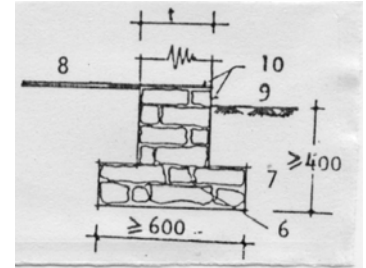
<sup>1</sup> The details given here are extracted from IS:13827-1993 "Improving Earthquake Resistance of Earthen Buildings - Guidelines", Details not given here may be seen in the Code.



- 1 – Light roof, 2 – Light gable wall (matting or boarding),
- 3 – Rain protection overhang about 500 mm, 4 – Stable plaster,
- 5 – Plinth height for flood protection, 6 – Stable foundation,
- 7 – Good mortar preferably non-clay, 8 – Floor level,
- 9 – Ground level, 10 – Water proof layer,  $t$  = wall thickness



a) Firm Soil



b) Soft Soil

**Fig. 2:- Adequate Configuration of Earthen Buildings**

- One storey on firm soil -  $1.5 t$  where  $t$  = thickness of wall
- One storey on soft soil -  $2.0 t$

(b) The depth of foundation below existing ground level should at least be 500 mm.

(c) The footing should preferably be built by using stone, fired brick, or concrete block, using cement or lime mortar. Alternatively, it may be made in lean cement concrete with plums (cement : sand : gravel : stones as 1:4:6:10) or without plums as 1:5:10. Lime could be used in place of cement in the ratio lime:sand:gravel as 1:4:8.

(ii) **Plinth Masonry:-** The wall above foundation up to plinth level should preferably be constructed using stone or burnt bricks laid in cement or lime mortar. *Clay mud mortar may be used only as a last resort.* The height of plinth should be above the flood water line or a minimum of 300 mm above ground level.

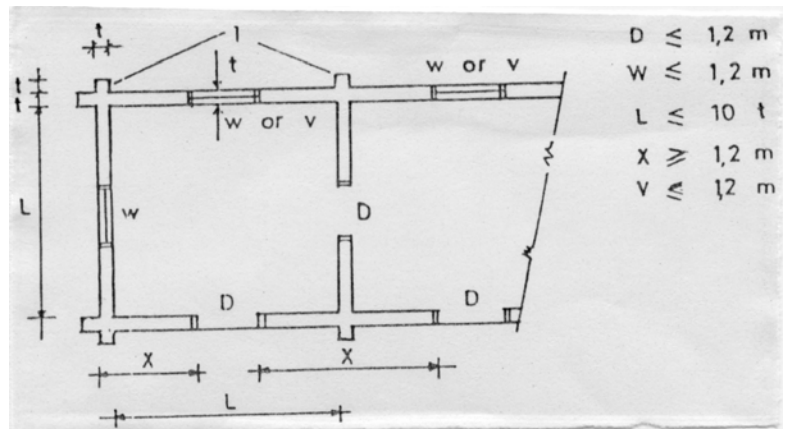
(iii) **Damp Proof Course:-** It will be preferable to use a water-proofing layer in the form of waterproof mud or heavy black polythene or polyethylene sheet at the plinth level before starting the construction of superstructure wall. If Adobe itself is used for plinth construction, the outside face of plinth should be protected against water-damage by suitable burnt-brick facia or lime plaster.

(iv) **Drainage:-** A water drain should be made 900 to 1200 mm away from the wall to save it from seepage.

(v) **Length of Wall:-** The length of a wall, between two consecutive walls at right angles to it, should not be greater than 10 times the wall thickness  $t$ , nor greater than  $8t$  in height of wall.

(vi) **Thickness of Wall:-** Hand-formed walls could preferably be made tapering upwards, keeping the minimum thickness 300 mm at top and increasing it with a batter at bottom to 500 mm.

(vii) **Openings in Walls:-** The width of an opening should not be greater than 1.20 m (see Fig. 3). The distance between an outside corner and the opening should be not less than 1.20 m.



1. - Pillaster,  $D$ = Door,  $W$ = Window,  $V$ = Ventilator

2 **Fig. 3 Wall Dimensions, Pilaster at Wall Junctions**

The sum of the widths of openings in a wall should not exceed  $\frac{1}{3}$  of the total wall length in seismic zone III &  $\frac{2}{5}$  in zone IV.

(viii) Providing outside pillasters at all corners and junctions of wall are recommended as these increase the seismic stability of the buildings a great deal (see Fig.3).

(ix) **Lintels:-**The bearing length (embedding) of lintels on each side of an opening should not be less than 300 mm.

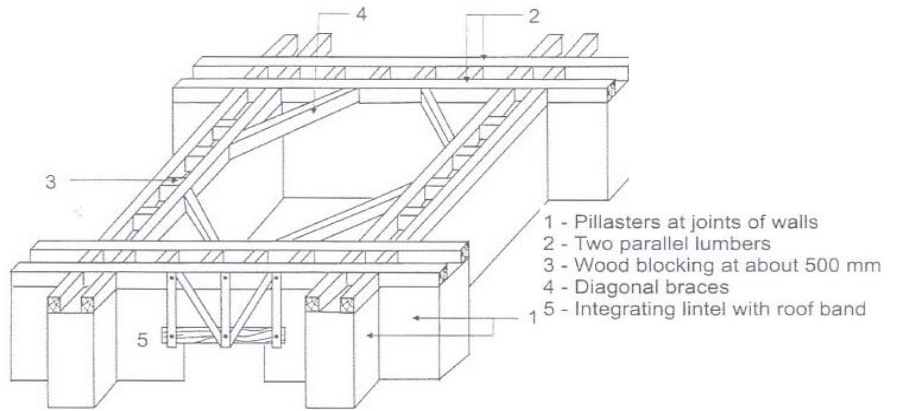


Fig.5:-Seismic band using timber on pillastered walls

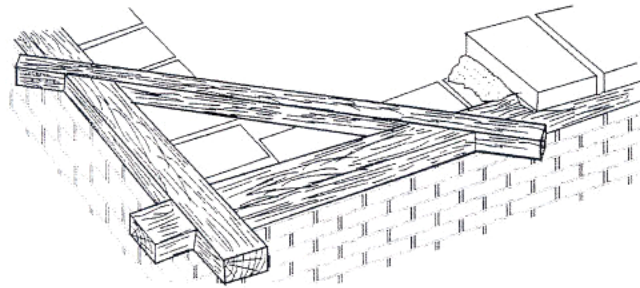
## 6. SEISMIC STRENGTHENING OF BEARING WALL BUILDINGS

### 6.1 Collar Beam or Horizontal Seismic Band

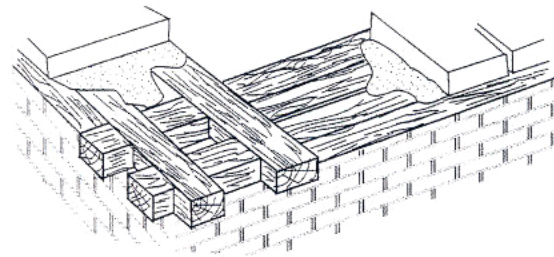
Three horizontal continuous reinforcing and binding beams or *seismic bands* should be used in seismic zones III & IV as follows:

(i) **Lintel Band:-** This wooden band will be provided coinciding with lintels of door and window openings. Separate window lintels will not be necessary.

(ii) **Ceiling Band:-** This band will be provided just below the roof or floor. This will also serve as wall plate for supporting the floor/roof wood logs or joists, or rafters/trusses in case of pitched roofs which should be nailed/spiked to this band for ensuring their stability during earthquakes.



a) Rough cut lumber in single piece with corner diagonal



b) Rough cut lumbers in parallel

Note.

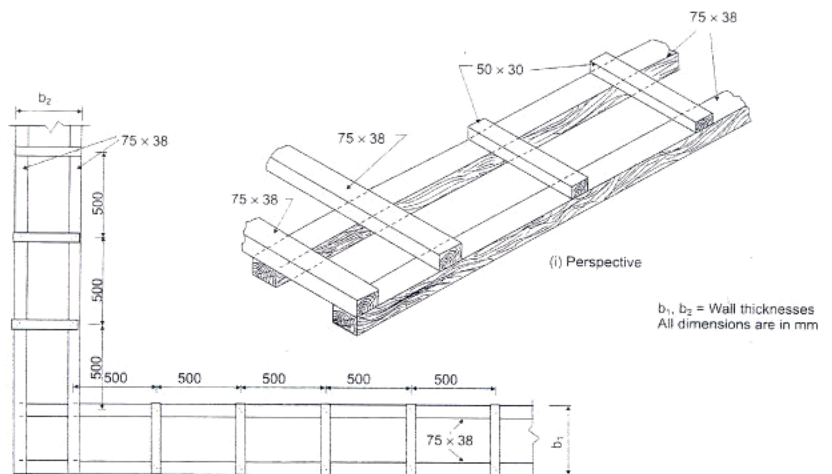
1. Where the height of wall is not more than 2.5 m, the lintel band can be avoided, but the lintels should be connected to the roof band (see fig.5).

2. Only one such band below the roof and floor each may be used in Zone II.

### 6.2 Details of Bands

The bands in earthen walls and walls made of stone or burned bricks laid in mud mortar could be in the following forms:

(i) Unfinished rough cut or sawn (50 x 125 mm in section) lumber in single pieces provided with diagonal members for bracing at corners (see Fig.4a).



c) Details of timber seismic bands

Fig.4:- Wood bands at Lintel and Ceiling Levels

- (ii) Unfinished circular sawn into halves (from 90-100 mm dia log) or fully sawn (75 x 38 mm in section) lumber in two pieces placed in parallel with halved joints at corners and junctions of walls (see Fig. 4b and 4c). The longitudinal pieces will be braced by cross pieces 50x30, (or circular halves, 60 mm dia) with nailed joints.

*Alternatively*, bamboos in ladder form may be used as seismic bands.

In each case, the lengthening joint in the elements shall be made using framed joints with overlapping strips or iron-straps with sufficient nails/screws to ensure the strength of the original lumber or bamboo at the joint.

### 6.3 Pillasters and Buttresses

Where pillasters or buttresses are used, as recommended earlier at corners and T-junctions, the collar beam or band should cover the buttresses as well, as shown in Fig. 5. Use of diagonal struts at corners will further stiffen the collar beam.

### 6.4 Dowels/Band at Window Sill Level

In the severe seismic zone IV, a seismic band should be provided at window sill level going through all the walls except at door locations. Alternatively, dowels may be provided at all corners and T-junctions of walls as shown in Fig. 6.

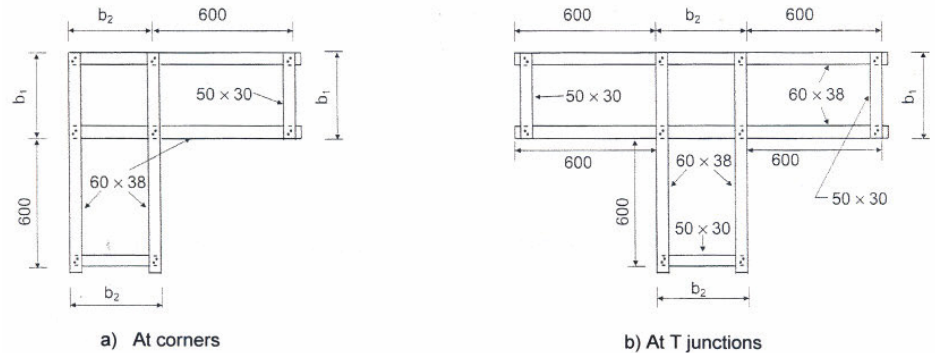
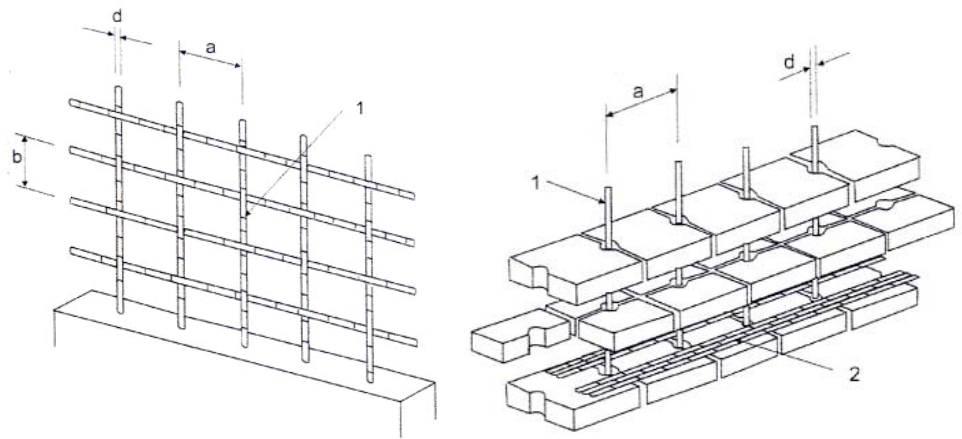


Fig.6:- Wood bands at lintel and ceiling levels

### 6.5 Vertical Reinforcement in Walls

In the highest seismic zone V, mesh form of reinforcing embedded in the walls is recommended. Here the whole walls are reinforced by a mesh of canes or bamboos as shown in Fig. 7 along with the collar beams or seismic band which may in this case be made from canes or bamboos themselves. The vertical canes must be tied to the horizontal bamboos as well as the collar beams at lintel and the ceiling levels.



(a) Pattern of mesh in hand made or rammed earthen walls

(b) Pattern in Adobe walls (note preformed notches in adobe for receiving cane)

1 – Cane or bamboo, 2 – Crushed cane or split bamboo every four layers of adobe.  
a – Spacing of canes, 400 mm maximum, d – Diameter of cane or bamboo about 20

Fig.7:- Best earthquake reinforcing arrangement for earthen walls

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## Annexure-A

### STRUCTURAL DESIGN BASIS REPORT

1. This report to accompany the application for Building Development Permission.
2. In case information on items 3, 10, 17, 18 and 19 can not be given at this time, it should be submitted at least one week before commencement of construction.

Part 1 General Data			
S.No.	Description	Information	Notes
1	<b>Address of the building</b> <ul style="list-style-type: none"><li>• Name of the building</li><li>• Plot number</li><li>• Subplot number</li><li>• TPS scheme<ul style="list-style-type: none"><li>a. Name</li><li>b. Number</li></ul></li><li>• Locality/Township</li><li>• District</li></ul>		
2	Name of owner		
3	Name of Builder on record		
4	Name of Architect/Engineer on record		
5	Name of Structural engineer on record		
6	Use of the building		
7	Number of storeys above ground level (including storeys to be added later, if any)		
8	Number of basements below ground level		
9	<b>Type of structure</b> <ul style="list-style-type: none"><li>• Load bearing walls</li><li>• R.C.C frame</li><li>• R.C.C frame and Shear walls</li><li>• Steel frame</li></ul>		
10	<b>Soil data</b> <ul style="list-style-type: none"><li>• Type of soil</li><li>• Design safe bearing capacity</li></ul>		IS: 1893 Cl. 6.3.5.2 IS: 1904
11	<b>Dead loads (unit weight adopted)</b> <ul style="list-style-type: none"><li>• Earth</li><li>• Water</li><li>• Brick masonry</li><li>• Plain cement concrete</li><li>• Reinforced cement concrete</li><li>• Floor finish</li><li>• Other fill materials</li></ul>		IS: 875 Part 1

	<ul style="list-style-type: none"> <li>• Piazza floor fill and landscape</li> </ul>		
12	<b>Imposed (live) loads</b> <ul style="list-style-type: none"> <li>• Piazza floor accessible to Fire Tender</li> <li>• Piazza Floor not accessible to Fire Tender</li> <li>♥ • Floor loads</li> <li>♦ • Roof loads</li> </ul>		IS: 875 Part 2
13	Cyclone / Wind <ul style="list-style-type: none"> <li>• Speed</li> <li>• Design pressure intensity</li> </ul>		IS: 875 Part 3
14	Seismic zone		IS:1893 2002)
15	Importance factor		IS:1893 (2002) Table 6
16	Seismic zone factor(Z)		IS:1893 Table 2
17	Response reduction factor		IS: 1893 Table-7
18	Fundamental natural period - approximate		IS: 1893 Cl. 7.6
19	Design horizontal acceleration spectrum value ( $A_h$ )		IS: 1893 Cl. 6.4.2
20	♠ Expansion / Separation Joints		

- ♥ Enclose small scale plans of each floor on A<sub>4</sub> sheets
- ♦ Incase terrace garden is provided, indicate additional fill load and live load
- ♠ Indicate on a small scale plan on A<sub>4</sub> sheet

Signature

(Structural Enginner)

(Continued)

Part 2		Load bearing masonry buildings																		
S.No.	Description	Information			Notes															
1	Building category				IS:4326 Cl. 7 read with IS: 1893 <table border="1" data-bbox="1084 415 1442 583"> <tr> <td>Bldg zone</td> <td>II</td> <td>III</td> <td>IV</td> <td>V</td> </tr> <tr> <td>Ordinary</td> <td>B</td> <td>C</td> <td>D</td> <td>E</td> </tr> <tr> <td>Important</td> <td>C</td> <td>D</td> <td>E</td> <td>E</td> </tr> </table>	Bldg zone	II	III	IV	V	Ordinary	B	C	D	E	Important	C	D	E	E
Bldg zone	II	III	IV	V																
Ordinary	B	C	D	E																
Important	C	D	E	E																
2	Basement Provided																			
3	Number of floors including Ground Floor (all floors including stepped floors in hill slopes)																			
4	Type of wall masonry																			
5	Type and mix of Mortar				IS:4326 Cl. 8.1.2															
6	<b>Re: size and position of openings (See note No.1)</b> <ul style="list-style-type: none"> <li>• Minimum distance (b<sub>5</sub>)</li> <li>• Ratio <math>(b_1+b_2+b_3)/l_1</math> or <math>(b_6+b_7)/l_2</math></li> <li>• Minimum pier width between consequent opening (b<sub>4</sub>)</li> <li>• Vertical distance (h<sub>3</sub>)</li> <li>• Ratio of wall height to thickness<sup>4</sup></li> <li>• Ratio of wall length between cross wall to thickness</li> </ul>				IS:4326 Table 4, Fig.7															
7	<b>Horizontal seismic band</b> <ul style="list-style-type: none"> <li>• at plinth level</li> <li>• at window sill level</li> <li>• at lintel level</li> <li>• at ceiling level</li> <li>• at eave level of sloping roof</li> <li>• at top of gable walls</li> <li>• at top of ridge walls</li> </ul>	<b>P</b> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<b>IP</b> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<b>NA</b> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	(see note no.2)  IS:4326 Cl. 8.4.6 IS:4326 Cl. 8.3 IS:4326 Cl. 8.4.2 IS:4326 Cl. 8.4.3 IS:4326 Cl. 8.4.3  IS:4326 Cl. 8.4.4															
8	<b>Vertical reinforcing bar</b> <ul style="list-style-type: none"> <li>• at corners and T junction of walls</li> <li>• at jambs of doors and window openings</li> </ul>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	IS:4326 Cl. 8.4.8  IS:4326 Cl. 8.4.9															

9	Integration of prefab roofing/flooring elements through reinforced concrete screed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	IS:4326 Cl. 9.1.4
10	<b>Horizontal bracings in pitched truss</b> <ul style="list-style-type: none"> <li>• in horizontal plane at the level of ties</li> <li>• in the slopes of pitched roofs</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

**Notes**

1. Information in item 6 should be given on separate A4 sized sheets for all walls with large number of openings.
2. P indicated **"Information Provided"**  
TP indicates **"Information to be Provided"**  
NA indicates **"Not Applicable"**  
Tick mark one box

Signature

(Structural Engineer)



(Continued)

<b>Part 3 Reinforced concrete framed buildings</b>			
Sl no	Description	Information	Notes
1	<b>Type of Building</b> <ul style="list-style-type: none"><li>• Regular frames</li><li>• Regular frames with Shear walls</li><li>• Irregular frames</li><li>• Irregular frames with shear walls</li><li>• Soft storey</li></ul>		IS: 1893 Cl. 7.1
2	Number of basements		
3	Number of floors including ground floor		
4	<b>Horizontal floor system</b> <ul style="list-style-type: none"><li>• Beams and slabs</li><li>• Waffles</li><li>• Ribbed Floor</li><li>• Flat slab with drops</li><li>• Flat plate without drops</li></ul>		
5	<b>Soil data</b> <ul style="list-style-type: none"><li>• Type of soil</li><li>• Recommended type of foundation<ul style="list-style-type: none"><li>- Independent footings</li><li>- Raft</li><li>- Piles</li></ul></li><li>• Recommended bearing capacity of soil</li><li>• Recommended, type, length, diameter and load capacity of piles</li><li>• Depth of water table</li><li>• Chemical analysis of ground water</li><li>• Chemical analysis of soil</li></ul>		IS: 1498
6	<b>Foundations</b> <ul style="list-style-type: none"><li>• Depth below ground level</li><li>• Type<ul style="list-style-type: none"><li>Independent</li><li>Interconnected</li><li>Raft</li><li>Piles</li></ul></li></ul>		
7	<b>System of interconnecting foundations</b> <ul style="list-style-type: none"><li>• Plinth beams</li><li>• Foundation beams</li></ul>		IS: 1893 Cl. 7.12.1
8	Grades of concrete used in different parts of building		
9	Method of analysis used		
10	Computer software used		
11	Torsion included		IS: 1893 Cl. 7.9
12	<b>Base shear</b> <ul style="list-style-type: none"><li>a. Based on approximate fundamental period</li><li>b. Based on dynamic analysis</li><li>c. Ratio of a/b</li></ul>		IS: 1893 Cl. 7.5.3
13	Distribution of seismic forces along the height of		IS:1893 Cl. 7.7

- the building (provide sketch)
- 14 The column of soft ground storey specially designed IS:1893 Cl. 7.10
- 15 **Clear minimum cover provided in** IS: 456 Cl. 26.4
- Footing
  - Column
  - Beams
  - Slabs
  - Walls
- 16 **Ductile detailing of RC frame**
- Type of reinforcement used IS: 456 Cl. 5.6
  - Minimum dimension of beams IS:13920 Cl. 6.1
  - Minimum dimension of columns IS:13920Cl. 7.1.2
  - Minimum percentage of reinforcement of beams at any cross section IS: 456 Cl. 26.5.1.1(a)
  - Maximum percentage of reinforcement at any section of beam IS:13920 Cl. 6.2.1 IS: 456 Cl. 26.5.1.1(b)
  - Spacing of transverse reinforcement in 2-d length of beams near the ends IS:13920 Cl. 6.2.2
  - Ratio of capacity of beams in shear to capacity of beams in flexure IS: 13920 Cl. 6.3.5
  - Maximum percentage of reinforcement in column
  - Confining stirrups near ends of columns and in beam-column joints
    - a. Diameter IS: 456 Cl. 26.5.3.1
    - b. Spacing
  - Ratio of shear capacity of columns to maximum seismic shear in the storey IS: 13920 Cl. 7.4

#### General Notes

1. A certificate to the effect that this report will be completed and submitted at least **one month** before commencement of Construction shall be submitted with the application for Building Development Permission.
2. In addition to the completed report following additional information shall be submitted, at the latest, **one month** before commencement of Construction.
  - 2.1 Foundations
    - 2.1.1 In case raft foundation has been adopted indicate K value used for analysis of the raft
    - 2.1.2 In case pile foundations have been used give full particulars of the piles, type, dia, length, capacity
    - 2.1.3 In case of high water table indicate system of countering water pressure, and indicate the existing water table, and that assumed to design foundations.
  - 2.2 Idealization for Earthquake analysis
    - 2.2.1 In case of a composite system of shear walls and rigid frames, give distribution of base shear in the two systems on the basis of analysis, and that used for design of each system.
    - 2.2.2 Indicate the idealization of frames and shear walls adopted in the analysis with the help of sketches.
  - 2.3 Submit framing plans of each floor
  - 2.4 In case of basements, indicate the system used to contain earth pressures

BMT/CBM/MHA/08  
October 8<sup>th</sup> 2008

**Subject: Committee of Experts, constituted by MHA, Gol for preparing model amendments in Town Planning Legislation, Zoning Regulations, DCR and Building Bye-Laws for safety against Natural Hazards-Extended meeting to consider DCR and Building Regulations including safety provisions in rural areas.**

Dear All

This is in reference to the 2<sup>nd</sup> meeting held on the above subject. The perusal of the draft document page wise and the suggestions, as per decisions, have been incorporated in the model guidelines which will serve as the basis for adoption by the States/UTs in the larger interest of safety in construction and development against natural hazards. However, the modifications can be done as per local needs.

The revised copy is being sent as discussed, if there is any edition it may be intimated latest by 14<sup>th</sup> October, 2008 in order to finalize it expeditiously.

Thanking you,

Yours faithfully



J.K. Prasad  
Convenor

हम हिन्दी में किये गये पत्राचार का स्वागत करते हैं।

# ATTENDANCE SHEET

## EXPERT COMMITTEE MEETING

for

Finalizing Model Development Control & Building Regulations including Safety Provisions in Rural Areas.

08.09.2008 : 1500 hrs.

Dr. A. S. Arya, Chairman

Dr. D. K. Paul D. K. Paul

T. N. Gupta

D. S. MESHARAM D. S. Meshram

Mahendra Raj

Prof SUBIR SAHA Subir

J. K. PRASAD J. K. Prasad

Other participant

Ved Mishra

Consultant Ved Mishra

Ved Mishra

## ATTENDANCE SHEET

### EXPERT COMMITTEE MEETING

For

Finalizing Model Guidelines for Development & Building Construction  
including Safety Provisions in Rural Areas.

29.9.2008

1100 hrs.

Dr. A. S. Arya	—	<u>Manya</u>
Shri Mahendra Raj	—	<u>Swabandya</u>
Shri T. N. Gupta	—	<u>T. N. Gupta</u>
Shri S. C. Gupta	—	<u>S. C. Gupta</u>
Shri Meshram	—	<u>M. Meshram</u>
Prof. Subir Saha	—	<u>S. Saha</u>
<del>Dr. M. B. Singh</del>	—	<u>M. B. Singh</u>
Shri Ved Mittal	—	<u>V. Mittal</u>