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- **Additional Provisions in Development Control Regulations for Safety and**
- **Additional Provisions in Building Regulations/Byelaws for Structural Safety**  
—In Natural Hazard Zones of India

## **VOLUME - I (A)**

**FOR MUNICIPAL COUNCILS  
(BASED ON THE REPORT AS PER VOLUME -I)**

**ADDITIONAL PROVISIONS IN DEVELOPMENT CONTROL REGULATIONS FOR SAFETY  
&  
ADDITIONAL PROVISIONS IN BUILDING REGULATIONS/BYE-LAWS FOR STRUCTURAL  
SAFETY  
-IN NATURAL HAZARD ZONES OF INDIA**

**FOR MUNICIPAL COUNCILS  
( BASED ON THE REPORT AS PER VOLUME -I)**

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NATIONAL DISASTER MANAGEMENT DIVISION**

# **Additional provision in DCR for safety in Natural Hazard Prone Areas and provisions for structural safety in building regulations/bye-laws**

## **INTRODUCTION:**

The recommendations by the Committee of Experts constituted by the National Disaster Management Division, Ministry of Home Affairs, Govt. of India, for amendment in the DCR and Building Bye-laws for safety in Natural Hazard Prone Areas have been listed in Volume – I.

Mainly these recommendations, have been made for larger cities, where development and construction activities are enormous and even the higher level authorities with substantial technical manpower may be available, though these recommendations are optimal in nature, but for smaller and medium size towns where the lower order construction activities and their nature are different, there appears to a need to further simplify these regulations and building bye-laws with a view to facilitate implementation in such Towns.

## **Planning System as the Constitutional Obligation**

According to the Constitution (74<sup>th</sup> Amendment) Act 1992 (74<sup>th</sup> CAA), it is the obligation of the Government of different States to amend their relevant laws as per its provisions. Practically all the States have amended their Municipal Acts as per the 74<sup>th</sup> CAA. However, most of the States are yet to devolve powers and functions as per 74<sup>th</sup> CAA. It is particularly true in respect to urban planning including town planning function, and constitution of District Planning Committee (DPCs), and Metropolitan Planning Committee (MPCs). It is the constitutional obligation to provide legislative support to the following provisions of 74<sup>th</sup> CAA:

- Devolution of town planning function to urban local bodies (ULBs) ( Article 243-W and Twelfth Schedule ) as a mandatory provision;
- Provisions for preparation and implementation of urban development plan;
- Constitution of DPCs (Article 243-ZD) with one of the members to be appointed by the State Government being a full-time Urban and Regional Planner known as District Planning Member.
- Constitution of MPCs (Article 243-ZE) with one of the members to be appointed by the State Government being a full-time Urban and Regional Planner known as Metropolitan Planning Member.
- Repealing or amendments in Development Authorities Acts as their role will cease or change after devolution of town planning function to ULBs; and
- Contents of Districts Plan, Metropolitan Area Plans to include spatial planning as per Article 243-ZD (3) and 243-ZE(3).

## **District Planning Committees (DPCs)**

The opportunities, problems and issues of rural –urban inter-relationship need a rural-urban platform to address them at the district level and integrate the rural urban concerns to ensure the continuum. Article 243ZD provides for constitution of District Planning Committee (DPC) at the district level to consolidate the plans prepared by the Panchayats and Municipalities in the district and to prepare a draft development plan for the district as a whole.

The DPCs act as a platform for integrated planning for rural and urban areas and formulation of district development plan. Most States have passed enabling Acts to constitute District Planning Committee. So far 14 states have constituted DPCs\*.

### **Metropolitan Planning Committees (MPCs)**

Most of the metropolitan cities are urban agglomerations comprising several municipal jurisdictions. The metropolitan area encompasses not only the main city having a municipal corporation status but also a number of other urban and rural local bodies, surrounding the main city corporation. Among 35 metropolitan urban agglomerations, 18 are multi municipal agglomeration, 14 are one municipality plus other urban settlements, and 3 are principally single municipal corporations.

The 74<sup>th</sup> Constitution Amendment under Article 243ZE mandatorily prescribes the constitution of Metropolitan Planning Committee (MPC). The MPC is required to integrate urban and rural planning, facilitate the development or regional infrastructure and promote environment conservation. MPC has been conceived as an inter-governmental, inter-organizational collaborative platform for preparation of proper plan for the metropolitan area in association with the main city.

Although there are 15 States which have metropolitan areas, but so far only 8 States, (Karnataka, Kerala, Maharastra, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal) have passed enabling laws. West Bengal and Maharashtra, among them, are the only two States to have enacted separate Acts for the constitution of MPC. The MPC has actually been set up only for Kolkata in West Bengal in the year 2001 and is the first State to constitute MPC so far with Kolkata Metropolitan Development Authority (KMDA) serving as its secretariat.

The 74<sup>th</sup> Amendment has given importance to urban local bodies for city development but has also provided a valuable opportunity to the Development Authorities to be more purposeful and make more effective use of its technical resources by becoming the technical arm of the MPCs as in Kolkata MPC. This approach can make the Development Authorities more relevant and accountable by engaging them within the structure of urban governance, as envisaged in the Constitution Amendment.

### **PROPOSAL**

The enactment of 73<sup>rd</sup> and 74<sup>th</sup> Constitution Amendment Act is indeed a first step in the process of devolution of powers to the people at grass root level. In order to bring about uniformity in the constitution of Municipalities in the country three types of local bodies have been envisaged.

- (i) Nagar Panchayat for transitional area;
- (ii) Municipal Council for small urban areas;
- (iii) Municipal Corporations for large urban areas.

Besides, the Act envisages, to create MPCs and DPCs which have been empowered respectively to prepare Development Plans for Metropolitan Area and Development Plan for District as a whole. These Development Plans need to take care

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\* As per Ministry of Panchayati Raj, GOI as published in H.T dated 24<sup>th</sup> April, 07.

of the Natural Hazard Prone Areas and the land use zoning regulations as per recommendations given by MHA Committee as per volume – 1. However, the requisite amendments in the planning legislation in the State are to be done in order to give a legal support to MPCs and DPCs while preparing Development Plans. The development and construction activities are to be regulated and controlled by the respective ULBs in their areas.

### **Municipal Corporations:**

Large Cities within its planning area/influence area / urban agglomeration area/development area or controlled area whichever may be applicable as defined in the respective Town Planning Act of the State is to be controlled by the Municipal Corporations. Therefore, the provisions of the structural safety in building regulations/bye-laws are to be incorporated as per recommendations in Volume – I. Till such time, the MPCs and DPCs are constituted and powers are devolved to ULBs the Development Authorities or other Local Authorities, as the nomenclature may be different in different States, who at present are implementing Development Plans and controlling and regulating developmental and construction activities through the existing DCRs and Bye-Laws which are required to be amended as per recommendations, given by the Expert Committee constituted by MHA, as listed in Volume –I

### **Municipal Councils:**

Such town may fall in the category of class III to class I towns having population ranging between 20,000 to 1,00,000 as per Census of India. In such towns, though the development and construction activities are of lower order in their area of jurisdiction as stated in the above para, and also presently the lack of technical staff may be constraint but in a time scale these urban areas will have far greater attraction for real estate development. For such towns and cities the development plan may have been prepared under planning legislation or yet to be prepared by DPC after its constitution. In both the cases, even if the legislative amendments have not been done, but while sitting projects and preparing planning schemes, the provision of chapter 3 of Volume – I which pertains to the regulations for land use zoning for natural hazard prone areas must be followed. Therefore, as a reference and guideline to DPCs, this chapter 3 is enclosed as Annexure to the proposed simplified version of Volume-1, termed as Volume – I(A). The provisions of chapter 4 and chapter 5 and appendix –B, the prescribed Forms must form part of the recommendations to amend building bye-laws of the Municipal Councils. However, certain professionals like, Construction Management Agencies, Quality Auditor, Quality Audit Agencies, Geo-Technical Agency etc. may not be required, similarly certain Forms like Form No.8,9,10, 15,16 may not be required and only one Form No.7 to ascertain the progress at plinth level would be sufficient. Accordingly the recommendations have been grouped and the volume applicable to Municipal Council Area would be termed as Volume – 1(A).

### **Nagar Panchayats :**

Small towns with class –IV to class VI as per Census of India, may have some building bye-laws for approval of building plans in their areas of jurisdiction but the technical expertise may be a big constraint, also the construction activities are of much lower order.

The building bye-laws need to be simplified to a greater extent and the provision of Chapters 3, and 4 are not to be included, similarly, the technical professionals be limited with the requisite reduction in the Forms required to be certified. Thus, the simplified volume would be termed as volume 1(B) for such ULB's.

However, incase of life line buildings or building beyond ground +2 storey or having covered area more than 500 sqm (may be changed as per local requirements) may be referred to the DPCs, wherever DPCs have not been constituted, in such cases it can be referred to the nearest Development Authority in the Commissioneries for Technical Advice or scrutiny from structural safety view point before approval by the Competent Authority of such ULBs.

#### **Directions :**

The State Government, MPCs or DPCs as may be applicable in a particular State may give necessary directions, as per legal provisions in the respective planning legislation, for scrutiny of the life line structures and other important buildings from the structural safety point of view by the technical staff available in higher order ULBs, before approval by the Competent Authority of the lower ULBs. For technical advice lower ULBs may be attached with the higher ULBs which may be the nearest higher ULBs in the respective Commissionerary.

#### **REFERENCE**

This document is based on the recommendations, of the Expert Committee constituted by the Govt. of India, Ministry of Home Affairs, as contained in Volume – I. Therefore, the requisite clauses viz-a-viz class of towns of local authorities, where amendments in their DCR and bye-laws are required, have been kept as the same number, so that reference is easy and without any ambiguity. It is therefore, clarified that the clauses are not continuous in numbering But refer to the main document Volume – I. The guidelines and structural safety provision for landslides and cyclone prone areas need not be included wherever not applicable.

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# ADDITIONAL PROVISIONS IN DEVELOPMENT CONTROL REGULATIONS FOR SAFETY IN NATURAL HAZARD PRONE AREAS

## 4.1 INTRODUCTION

Development Control Regulations and Building Bye-laws already exist. These additional provisions should be notified under the relevant provision of the applicable legislation in this behalf, where these do not exist, these provide guidelines.

In the **Scope** it may be added that this part deals with the development control rules and general building requirements to ensure health and safety of the public. The regulations for Land Use Zoning in Hazard Prone Areas are to be taken into consideration while formulating the Development Plan and Area Plan under the Town Planning and Urban Development Act.

A **Savings** clause may be added, such as, notwithstanding such modifications and revision, anything done or any action taken under the regulations in force prior to such modification shall be deemed to be valid and continue to be so valid, unless otherwise specified.

## 4.2 DEFINITIONS

### (i) Additions and/or Alterations

Means any change in existing authorized building or change from one use to another use, or a structural change such as additions to the area or height, or the removal of part of a building, or a change to the structure such as the construction or cutting into or removal of any structural wall or part of a structural wall, column, beam, joist, floor including a mezzanine floor or other support. The addition to any existing structure shall only be permitted if it complies with the provisions of these regulations.

## **(ii) Building**

Means all types of permanent building defined below, but structure of temporary nature like tents, hutment as well as shamianas erected for temporary purposes for ceremonial occasions, with the permission of the Competent Authority, shall not be considered to be "buildings".

Definition of building shall also include

"Unsafe Building" means a building which,

- is structurally unsafe,
- is insanitary,
- is not provided with adequate means of egress,
- constitutes a fire hazard,
- in relation to its existing use constitutes a hazard to safety or health or public welfare by reasons of inadequate maintenance, dilapidation or abandonment.

## **(iii) Natural Hazard**

The probability of occurrence, within a specific period of time in a given area, of a potentially damaging natural phenomenon.

## **(iv) Natural Hazard Prone Areas**

Areas likely to have moderate to high intensity of earthquake, or cyclonic storm, or significant flood flow or inundation, or land slides/mud flows/avalanches, or one or more of these hazards.

Note: Moderate to very high damage risk zones of earthquakes are as shown in Seismic Zones III, IV and V specified in IS:1893; moderate to very high damage risk zones of cyclones are those areas along the sea coast of India prone to having wind velocities of 39 m/s or more as specified in IS:875(Part 3); and flood prone areas in river plains (unprotected and protected) are indicated in the Flood Atlas of India prepared by the Central Water Commission, besides, other areas can be flooded under conditions of heavy intensity rains, inundation in depressions, back flow in drains, inadequate drainage, etc. as identified through local surveys in the development plan of the area and landslide prone areas as identified by State Government \ Land surveys.

**(v) Lifeline Building**

Those buildings which are of post earthquake importance such as hospital building, power house building, telephone exchange building and the like.

**(vi) Special Building**

Those buildings housing large gathering at a time such as cinemas, theatres, meeting halls, assembly halls, lecture halls, town halls and the like.

**(vii) Retrofitting**

Retrofitting mean upgrading the strength of an unsafe building by using suitable engineering techniques.

**(viii) Quality Control**

This is related to construction quality and to control of variation in the material properties and structural adequacy. In case of concrete, it is the control of accuracy of all operations which affect the consistency and strength of concrete, batching, mixing, transporting, placing, curing and testing.

**(x) Quality Assurance**

All planned and systematic actions necessary to ensure that the final product i.e. structure or structural elements will perform satisfactorily in service life.

**(xi) Compliance**

This is the verification of the properties of construction materials based on test data and verification of the strength and structural adequacy for various components of buildings and structures.

**(xii) Non-Structural Component**

Those components of buildings which do not contribute to the structural stability such as infill walls in r.c. frame buildings, glass panes, claddings, parapet walls, chimneys etc.

### **4.3 PROCEDURE FOR SECURING DEVELOPMENT PERMISSION**

#### **4.3.1 Forms of Application**

Every person who gives notice under relevant section of the Act shall furnish all information in forms and format prescribed herein and as may be amended from time to time by the Competent Authority. The following particulars and documents shall also be submitted along with the application.

Certificate of undertaking: Certificate in the prescribed **Form No.1** by the “Owner, Developer, Structural Engineer on Record and Architect on Record”; **Form No.2** by the “Architect on Record”/ “Engineer on Record”; and **Form No. 3** by the “Structural Engineer on Record; **Form No. 4** by the “Construction Engineer on Record” as prescribed in Appendix B.

#### **4.3.2 Documents to be Furnished with the Application**

1) The forms, plans, sections and descriptions to be furnished under these Development Control Regulations shall all be signed by each of the following persons:

- i) A person making application for development permission under relevant section of the Act.
- ii) A person who has prepared the plans and sections with descriptions who may be Architect on Record or Engineer on Record.
- iii) A person who is responsible for the structural design of the construction i.e. a Structural Engineer on Record.
- iv) A Construction Engineer on Record who is to look after the day-to-day supervision of the construction.
- v) A Developer, Promoter

2) A person who is engaged either to prepare plan or to prepare a structural design and structural report or to supervise the building shall give an undertaking in **Form No.1, Form No.2, Form No.3A and Form No.4** prescribed under these Development Control Regulations.

3) Approval of drawings and acceptance of any statement, documents, structural report, structural drawings, progress certificate, or building completion certificates shall not discharge the Engineer on Record, Architect on Record, Construction Engineer on Record, Structural Engineer on Record, Developer and Owner from their responsibilities imposed under the Act, the Development Control Regulations and the laws of tort and local acts.

4) The landowner shall be held responsible if any Unauthorized Construction, addition & alteration is done without prior permission of competent Authority

## **4.4 GENERAL REQUIREMENTS FOR DEVELOPMENTS**

### **4.4.1 Requirements of Site**

No land shall be used as a site for the construction of building-

- i) If the site is found to be liable to liquefaction by the Competent Authority under the earthquake intensity of the area, except where appropriate protection measures are taken.
- ii) If the Competent Authority finds that the proposed development falls in the area liable to storm surge during cyclone, except where protection measures are adopted to prevent storm surge damage.

### **4.4.2 Requirement of Site Plan**

- i) In hilly terrain, the site plan should include location of land slide prone areas, if any, on or near the site, detected during reconnaissance. The Authority in such case shall cause to ensure that the site is away from such land slide prone areas.
- ii) The site plan on a sloping site may also include proposals for diversion of the natural flow of water coming from uphill side of the building away from the foundation.

## **4.5 DECISION OF THE AUTHORITY**

### **4.5.1 Grant or Refusal of the Permission for Development**

On receipt of the application for Development Permission, the Competent Authority after making such inquiry and clearance from such an expert whenever considered necessary for the safety of building, as it thinks fit may communicate its decisions granting with or without condition including condition of submission of detailed working drawing/ structural drawing along with soil investigation report before the commencement of the work or refusing permission to the applicant as per the provisions of the Act.

On receipt of the application for Development Permission, the Competent Authority after making such inquiry as it thinks fit may communicate its decisions granting or refusing permission to the applicant as per the provisions of the Act. The permission may be granted with or without conditions or subject to any general or special orders made by the State Government in this behalf.

The Development permission shall be in **Form No.5** and it should be issued by an officer authorized by the Competent Authority in this behalf. Every order granting permission subject to conditions or refusing permission shall state the grounds for imposing such conditions or for such refusal.

#### **4.5.2 Exception for Small Building**

The Competent Authority, however, may consider to grant exemption for submission of working drawing, structural drawing and soil investigation report in case the Competent Authority is satisfied that in the area where the proposed construction is to be taken, similar types of structure and soil investigation reports are already available on record and such request is from an individual owner/developer, having plot of not more than 500 sq mt. in size and for a maximum 3 storeyed residential building.

If the local site conditions do not require any soil testing or if a soil testing indicates that no special structural design is required, a small building having upto ground + 2 floors, having load bearing structure, may be constructed.

If the proposed small house is to be constructed with load bearing type masonry construction technique, where no structural design is involved, no certificate from a Structural Engineer on Record will be required (to be attached with **Form No.2**). However, a Structural Design Basis Report (**Form No. 6**), has to be submitted, duly filled in.

#### **4.5.3 Suspension of Permission**

Development permission granted under the relevant section of the Act shall deemed to be suspended in cases of resignation by any professional namely Architect on Record/ Engineer on Record, Structural Engineer on Record, and Construction Engineer on Record, till the new appointments are made. During this period construction shall not be carried out at the site. Any work at site during this time shall be treated as unauthorized development without any due permission.

#### **4.5.4 Structural Deviation During Course of Construction**

Notwithstanding anything stated in the above regulations it shall be incumbent on every person whose plans have been approved to submit revised (amended) plans for any structural deviations he proposes to make during the course of construction of his building work and the procedure laid down for plans or other documents here to before shall apply to all such Revised (amended) plans.

# ADDITIONAL PROVISIONS IN BUILDING REGULATIONS/ BYE-LAWS FOR STRUCTURAL SAFETY IN NATURAL HAZARD PRONE AREAS

## 5.1 STRUCTURAL DESIGN

For any building under the jurisdiction of these regulations structural design/ retrofitting shall only be carried out by a Structural Engineer on Record (SER) or Structural Design Agency on Record (SDAR).

Generally, the structural design of foundations, elements of masonry, timber, plain concrete, reinforced concrete, pre-stressed concrete and structural steel shall conform to the provisions of part VI Structural Design Section - 1 Loads, Section - 2 Foundation, Section - 3 Wood, Section - 4 Masonry, Section - 5 Concrete & Section - 6 Steel of National Building Code of India (NBC), taking into consideration the Indian Standards as given below:

### 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: 801-1975 "Code of Practice for Use of Cold Formed Light Gauge Steel Structural Members in General Building Construction
4. IS 875 ( Part 2):1987Design loads ( other than earthquake ) for buildings and structures Part2 Imposed Loads
5. IS 875 ( Part 3):1987Design loads ( other than earthquake ) for buildings and structures Part 3 Wind Loads
6. IS 875 ( Part 4):1987Design loads ( other than earthquake ) for buildings and structures Part 4 Snow Loads
7. IS 875 ( Part 5):1987Design loads ( other than earthquake ) for buildings and structures Part 5 special loads and load combination
8. IS: 883:1966 "Code of Practice for Design of Structural Timber in Building
9. IS: 1904:1987 "Code of Practice for Structural Safety of Buildings: Foundation"
10. IS1905:1987 "Code of Practice for Structural Safety of Buildings: Masonry Walls
11. IS 2911 (Part 1): Section 1: 1979 "Code of Practice for Design and Construction of Pile Foundation Section 1  
Part 1: Section 2 Based Cast-in-situ Piles  
Part 1: Section 3 Driven Precast Concrete Piles

Part 1:	Section 4 Based precast Concrete Piles
Part 2:	Timber Piles
Part 3	Under Reamed Piles
Part 4	Load Test on Piles

#### **For Cyclone/Wind Storm Protection**

12. IS 875 (3)-1987 "Code of Practice for Design Loads (other than Earthquake) for Buildings and Structures, Part 3, Wind Loads"
- 13 IS Guidelines for improving the Cyclonic Resistance of Low rise houses and other building

#### **For Earthquake Protection**

- 14 IS: 1893-2002 "Criteria for Earthquake Resistant Design of Structures (Fifth Revision)"
- 15 IS:13920-1993 "Ductile Detailing of Reinforced Concrete Structures subjected to Seismic Forces - Code of Practice"
- 16 IS:4326-1993 "Earthquake Resistant Design and Construction of Buildings - Code of Practice (Second Revision)"
- 17 IS:13828-1993 "Improving Earthquake Resistance of Low Strength Masonry Buildings - Guidelines"
- 18 IS:13827-1993 "Improving Earthquake Resistance of Earthen Buildings - Guidelines",
- 19 IS:13935-1993 "Repair and Seismic Strengthening of Buildings - Guidelines"

#### **For Protection of Landslide Hazard**

- 20 IS 14458 (Part 1): 1998 Guidelines for retaining wall for hill area: Part 1 Selection of type of wall.
- 21 IS 14458 (Part 2): 1997 Guidelines for retaining wall for hill area: Part 2 Design of retaining/breast walls
- 22 IS 14458 (Part 3): 1998 Guidelines for retaining wall for hill area: Part 3 Construction of dry stone walls
- 23 IS 14496 (Part 2): 1998 Guidelines for preparation of landslide – Hazard zonation maps in mountainous terrains: Part 2 Macro-zonation

**Note 1 :** Whenever an Indian Standard including those referred in the National Building Code or the National Building Code is referred, the latest revision of the same shall be followed except specific criteria, if any, mentioned above against that code.

**NOTE 2:** Codal Provisions/Guidelines Pertaining To Protection For Cyclone Or Landslide Hazard Can Be Omitted Whenever Not Applicable.

## 5.2 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 four parts (**Form No. 6**)

Part-1 - General Information/ Data

Part-2 - Load Bearing Masonry Buildings

Part-3 - Reinforced Concrete Buildings

Part-4 - Steel Buildings

(ii) Drawings and Documents to be submitted for approval of appropriate authorities shall include SDBR as detailed below:

Part - 1 Completed

Part - 2 (if applicable) - completed

Part -3 (if applicable) - undertaking that completed Part 3 will be submitted before commencement of construction.

Part- 4 (if applicable) - undertaking that completed Part 4 will be submitted before commencement of construction.

(iii) SDBR as detailed below shall be submitted to the appropriate authority as soon as design of foundation is completed, but not later than **one month** prior to commencement of construction.

Part-1 Completed

Part-2, Part-3 or Part-4 (if applicable) Completed

## 5.3 SEISMIC STRENGTHENING/RETROFITTING

Prior to seismic strengthening/ retrofitting of any existing structure, evaluation of the existing structure as regards structural vulnerability in the specified wind/ seismic hazard zone shall be carried out by a RSE/RSDA. If as per the evaluation of the RSE/RSDA the seismic resistance is assessed to be less than the specified minimum

seismic resistance as given in the note below, action will be initiated to carry out the upgrading of the seismic resistance of the building as per applicable standard guidelines.

Note: (a) for masonry buildings reference is to be made to IS: 4326 and IS: 13935 and (b) for concrete buildings and structures reference to be made to BIS code on evaluation and seismic strengthening for retrofitting of RCC buildings under preparation at present.

## **5.5 CERTIFICATION REGARDING STRUCTURAL SAFETY IN DESIGN**

Structural Engineer on Record (SER) or Structural Design Agency on Record (SDAR) shall give a certificate of structural safety of design as per proforma given in **Form-3** and **Form 14** at the time of completion.

## **5.6 CONSTRUCTIONAL SAFETY**

### **5.6.1 Supervision**

All construction except load bearing buildings upto 3 storeys shall be carried out under supervision of the Construction Engineer on Record (CER) for various seismic zones.

### **5.6.2 Certification of structural safety in construction**

CER shall give a certificate of structural safety of construction as per proforma given in **Form-13** at the time of completion.

## **5.7 QUALITY CONTROL AND INSPECTION**

**Inspection and Certification** of safety in quality construction.

**NOTE:** THIS WILL BE APPLICABLE FOR HIGH RISE AND SPECIAL BUILDING.

## **5.9 STRUCTURAL REQUIREMENTS OF LOW COST HOUSING**

Notwithstanding anything contained herein, for the structural safety and services for development of low cost housing, the relevant provisions of applicable IS Codes shall be enforced.

### **5.10 INSPECTION**

The general requirement for inspection of the development shall also include the following regulation.

#### **5.10.1 General Requirements**

The building unit intended to be developed shall be in conformity with Regulation on requirement of site. Generally all development work for which permission is required shall be subject to inspection by the Competent Authority as deemed fit.

#### **5.10.2 Record of Construction Progress**

**(a)** Stages for recording progress certificate and checking:-

i) Plinth, in case of basement before the casting of basement slab. (Form No.7)

**(d) Completion Report**

i) It shall be incumbent on every applicant whose plans have been approved, to submit a completion report in Form No.11.

ii) It shall also be incumbent on every person / agency who is engaged under this Development Control Regulations to supervise the erection or re-erection of the building, to submit the completion report in Form No.12 and 13 prescribed under these Development Control Regulations.

iii) No completion report shall be accepted unless completion plan is approved by the Competent Authority.

### **5.10.3 Issue of Occupancy Certificate**

The Authority issuing occupancy certificate before doing so shall ensure that following are complied from consideration of safety against natural hazard.

- (i) Certificate of lift Inspector has been procured & submitted by the owner, regarding satisfactory erection of Lift.
- (ii) The Certificate of Competent Authority and or fire department for completion and or fire requirements as provided in regulations has been procured and submitted by the owner.
- (iii) If any project consists of more than one detached or semi detached building / buildings in a building unit and any building / buildings there of is completed as per provisions of D.C.R.. (Such as Parking, Common Plots, Internal Roads, Height of the Building, Infrastructure facilities, lift and fire safety measures), the competent authority may issue completion certificate for such one detached or semi detached building / buildings in a building unit.

The occupancy certificate shall not be issued unless the information is supplied by the Owner and the Architect on Record/ Engineer on Record concerned in the schedule as prescribed by the Competent Authority from time to time.

## REGULATIONS FOR LAND USE ZONING FOR NATURAL HAZARD PRONE AREAS

### 3.1 INTRODUCTION

The regulations for Land Use Zoning for Natural Hazard Prone Areas are to be notified under section

- 1) u/s 73(f) of Model Town & Country Planning Act, 1960; OR
- 2) u/s 143(f) of Model Regional and Town Planning and Development Law; OR
- 3) u/s 181(f) of Model Urban & Regional Planning and Development Law (Revised) of UDPI Guidelines

as may be applicable in the respective States under the existing provisions of Town & Country Planning Legislation as and when Master Plan/ Development Plan of different cities/ town/ areas are formulated. However, these zoning regulations are to be implemented through the provisions of Development Control Regulations/ Building Bye-Laws, wherever the Master Plan are not in existence or not formulated.

Classification of urban land uses is based upon the requirements of the various plans. For example, a perspective plan, which is a policy document, need not show many details of a specific land use and may only show the main use which could be, say, residential or commercial. In the case of a development plan, which is a comprehensive plan indicating use of each parcel of land, there is a need to show more details of a specific land use. It has to indicate for the land designated as, say, commercial, the further details as to which land is for retail commercial, or for wholesale trade or for godowns. In the case of layouts of projects of a shopping centre further details shall be necessary, indicating which block of retail commercial is for, say, cloth or electronics or vegetables. There could be three levels in land use classification shown under:

Level I	For Perspective Plans
Level II	For Development Plans
Level III	For Layouts of Projects/Schemes

### **3.2 LAND USE ZONING**

The main purpose of the land use zoning is to provide regulations for development of a particular area to serve the desired purpose efficiently and to preserve its character. It also provides for the kind of buildings to be constructed. Zoning regulations are legal tools for guiding the use of land and protection of public health, welfare and safety. Such regulations also include provisions for the use of premises/property and limitations upon shape, size and type of buildings that are constructed or occupy the land. Further, these provide both horizontal as well as vertical use of land. These regulations also improve the quality of life in urban centres. For instance in flood zones, the land use may be parks, playground and gardens while restricting any building activity in such vulnerable areas. Similarly, along the drains green belts can be planned which may facilitate improvements of these drains in future. Life line structures should also be protected likewise while either proposing land uses or otherwise.

### **3.3 USE ZONES**

In order to promote a healthy and balanced development, it is necessary to apply reasonable limitations on use of lands and buildings. For desirable development, the city is divided into a number of 'use zones' such as residential, commercial, industrial recreational, etc. For each zone, specific regulations are provided for. A single set of regulations cannot be applied for the whole city.

### **3.4 NON-CONFORMING USE**

Zoning protects residential areas from harmful invasions of other uses like industrial use and commercial use. However, it does not prohibit use of lands and buildings that are lawfully established prior to coming into effect of such zoning regulations. If such uses are contrary to regulations in a particular 'use zone' and are not to be allowed, such uses are designated as 'non-conforming uses'. These are to be gradually eliminated without inflicting unreasonable hardship on the property owners/users.

For implementation and enforcement of proposals under each land use category, contained in a development plan, there is a need to list out various uses and activities that are permitted, permissible on an application to the Competent Authority and prohibited. Land use zoning regulations precisely provide this list for various use zones. The suggested list of uses/activities for various use zones should be comprehensive, keeping in mind the local and special characteristics of various sizes of settlements (large, medium and small). Depending upon the specific situation this list could be further enhanced or reduced, as the case may be.

### **3.5 DEFINITIONS**

#### **(i) Natural Hazard**

The probability of occurrence, within a specific period of time in a given area, of a potentially damaging natural phenomenon.

#### **(ii) Natural Hazard Prone Areas**

Areas likely to have (i) moderate to very high damage risk zone of earthquakes, OR (ii) moderate to very high damage risk of cyclones OR (iii) significant flood flow or inundation, OR (iv) landslide proneness or potential, OR (v) one or more of these hazards.

Note: Moderate to very high damage risk zones of earthquakes are as shown in Seismic Zones III, IV and V specified in IS:1893; moderate to very high damage risk zones of cyclones are those areas along the sea coast of India prone to having wind velocities of 39 m/s or more as specified in IS:875(Part 3) and flood prone areas in river plains (unprotected and protected) are indicated in the Flood Atlas of India prepared by the Central Water Commission, besides, other areas can be flooded under conditions of heavy intensity rains, inundation in depressions, back flow in drains, inadequate drainage, etc. as identified through local surveys in the Development Plan of the area and landslide prone areas as identified by State Government/Local surveys.

#### **(iii) Natural Disaster**

A serious disruption of the functioning of a society, causing widespread human, material or environmental losses caused due to earthquake, cyclone, flood or landslide which exceeds the ability of the affected society to cope using only its own resources.

#### **(iv) Mitigation**

Measures taken in advance of a disaster aimed at decreasing or eliminating its impact on society and on environment including preparedness and prevention.

### **3.6 OBJECTIVES**

3.6.1 The objective of land use zoning is to regulate land use in hazard prone areas to minimise the damage caused to the habitat, as a result of natural hazards viz.

earthquakes, cyclonic storms and floods which recur from time to time. Land Use Zoning, therefore, also aims at determining the locations and the extent of areas likely to be adversely affected by the hazards of different intensities and frequencies, and to develop such areas in a manner that the loss to the development is reduced to the minimum.

- 3.6.2 Land Use Zoning envisages certain restrictions on the indiscriminate development of the "unprotected" hazard prone areas and to specify conditions for safer development by protecting the area from severe losses. In the former case, boundaries of different zones are to be established to prevent unrestricted growth there.
- 3.6.3 Another objective of Land Use Zoning in the hill areas will be to ensure the forest cover and to preserve the green areas for environment protection.
- 3.6.4 Costal Regulation Zone: Another objective of the land use zoning in the costal areas is to protect inland stretches that are influenced by tidal action.

### **3.7 APPLICABILITY**

- 3.7.1 Areas planned under State Perspective Plan/Regional Plan/ Master Plan/ Development Plan

#### **State Perspective Plan/Regional Plan Development Plan (Master Plan/Zonal Development Plan)**

While formulating Perspective Plan/Regional Plan, Development Plan (Master Plan/Zonal Development Plan) for any notified area, the proposals should indicate:

- i) Natural hazard prone areas with the type and extent of likely hazards,

- 3.7.2 Areas not covered under Master Plan

In such areas where there are no Master Plans or Development Plans, general guidelines and recommendations on natural disaster mitigation should be issued to the various local bodies, Municipalities and Town Area Committees and Panchayats to enable them to take these into consideration while sitting various projects and deciding on construction of buildings etc. Technical help may be required by some of the local bodies in implementation of the recommendations and for interpretation of the guidelines.

## **3.8 IDENTIFICATION OF NATURAL HAZARD PRONE AREAS**

### **3.8.1 Earthquake Prone Areas**

- a. Intensities of VII or more on Modified Mercalli or MSK intensity scale are considered moderate to high. Areas under seismic zones III, IV and V as specified in IS 1893. Therefore, all areas in these three zones will be considered prone to earthquake hazards.
- b. In these zones the areas which have soil conditions and the level of water table favourable for liquefaction or settlements under earthquake vibrations will have greater risk to buildings and structures which will be of special consideration under Land Use Zoning.
- c. Under these zones, those hilly areas which are identified to have poor slope stability conditions and where landslides could be triggered by earthquake or where due to prior saturated conditions, mud flow could be initiated by earthquakes and where avalanches could be triggered by earthquake will be specially risk prone.
- d. Whereas, earthquake hazard prone areas defined in 'a' above are identified on the map given in IS 1893 to small scale and more easily identified in the larger scale state wise maps given in the Vulnerability Atlas of India, the special risky areas as defined in 'b' and 'c' above, have to be determined specifically for the planning area under consideration through special studies to be carried out by geologists and geo-technical engineers.
- e. If an active fault trace is identified by GSI (Geological Survey of India), a structure for human occupancy should not be placed over the fault trace and must be set back by a minimum of 15 m on either side of fault trace..

### **3.8.2 Cyclone Prone Areas**

- a. Areas prone to cyclonic storms are along the sea coast of India where the cyclonic wind velocities of 39 meter per second or more are specified in the Wind Velocity Map given in IS 875 (part 3) to a small scale and easily identified in the Vulnerability Atlas of India where the Maps are drawn state wise on a larger scale.

- b. In these cyclone prone areas, those areas which are likely to be subjected to heavy rain induced floods or to flooding by sea-water under the conditions of storm surge, are specially risky due to damage by flood flow and inundation under water.
- c. Whereas, areas under 'a' are easily identified, those with special risk as under 'b' have to be identified by special contour survey of the planning area under consideration and study of the past flooding and storm surge history of the area. These studies may have to be carried out through the Survey of India or locally appointed survey teams, and by reference to the Central Water Commission, Government of India and the department of the State or U.T dealing with the floods.

### **3.8.3 Flood Prone Areas**

- a. The flood prone areas in river plains (unprotected and protected by bunds) are indicated in the Flood Atlas of India prepared by the Central Water Commission and reproduced on larger scale in the statewise maps in the Vulnerability Atlas of India.
- b. Besides the above areas, other areas can be flooded under conditions of heavy intensity rains, inundation in depressions, backflow in drains, inadequate drainage, failure of protection works, etc.
- c. Whereas, the flood prone areas under 'a' are identified on the available maps as indicated, the areas under 'b' have to be identified through local contour survey and study of the flood history of the planning area. Such studies may be carried out through Survey of India or local survey teams, and by reference to the Central Water Commission and the departments of the state or U.T dealing with the floods.

### **3.8.4 Land Slide Prone Areas**

- (a) While it is known that most hilly areas are prone to landslides/landslips, the susceptibility of the various areas to landslide varies from very low to very high. Landslide zoning naturally requires mapping on large scale. Normally medium scale of 1:25000 is at least chosen.

In preparation of the landslide zone map, two types of factors are considered important as listed here below:

1. *Geological/Topographic Factors/Parameters*
    - Lithology
    - Geological Structures/Lineaments
    - Slope-dip (bedding, joint) relation
    - Geomorphology
    - Drainage
    - Slope angle, slope aspect and slope morphology
    - Land use
    - Soil texture and depth
    - Rock weathering
  
  2. *Triggering Factors*
    - Rainfall
    - Earthquake
    - Anthropogeny
- (b) Whereas the factors listed under geological/topographic parameters have been considered as basic inputs for the landslide potential model, the three triggering factors namely, rainfall, earthquake and anthropogeny were considered external factors which trigger the occurrence of a landslide.
- (c) Whereas, the landslide prone areas under 'a' are available for some parts of the country on the maps given in Landslide Hazard Zonation Mapping in the Himalayas of Uttranchal and Himachal Pradesh States using Remote Sensing and GIS Techniques, pub. By National Remote Sensing Agency, Department of Space, Government of India, Hyderabad and Landslide Hazard Zonation Atlas of India - Landslide Hazard Maps and Cases Studies prepared by Building Materials & Technology Promotion Council, Ministry of Urban Development & Poverty Alleviation, Govt. of India, the risky areas in other parts of the country have to be determined specially for the planning areas under consideration through special studies to be carried out by the State/UT governments and the concerned Competent Authorities.

### **3.9 APPROACH FOR LAND USE ZONING**

Having identified the hazard prone areas the following alternatives can be adopted for dealing with the disaster risk problems.

- a) *Leaving the area unprotected.* In this case it will be necessary to specify Land Use Zoning for various development purposes as recommended under herein from 3.10 to 3.13.
- b) Using protection methods for the areas as a whole or in the construction of buildings, structures and infrastructure facilities to cater for the hazard intensities likely in the planning area.
- c) It will be appropriate to prioritise buildings, structures and infrastructures in terms of their importance from the point of view of impact of damage on the socio-economic structure of the society.

### **3.10 PRIORITISATION**

In regard to Land Use Zoning, different types of buildings and utility services are grouped under three priorities as indicated below.

Priority 1. Defence installation, industries, public utilities, life line structures like hospitals, electricity installations, water supply, telephone exchange, aerodromes and railway stations; commercial centres, libraries, other buildings or installations with contents of high economic value.

Priority 2. Public and Semi Public institutions, Government offices, and residential areas.

Priority 3. Parks, play grounds, wood lands, gardens, green belts, and recreational areas.

### **3.11 LAND USE ZONING FOR FLOOD SAFETY**

#### **3.11.1 Recommendations for Land Use Zoning of Flood Prone Areas:**

##### **(a) Preparation of Flood Contour Maps**

The following actions should be taken to prepare the flood contour maps by taking up special studies/surveys as found necessary in the Development Area:

- i. Prepare detailed contour plan of the area liable to flood on a scale of 1 in 15000 or larger scale showing contours at interval of 0.3 to 0.5 metre;
- ii. Fix reference river gauges or maximum flood levels due to heavy rains with respect to which the areas are likely to be inundated;

- iii. Demarcate areas liable to flooding by *floods in rivers* of return periods of 5, 25, 50 and 100 years or by *excessive rainfall* of return period of 5, 10, 25, and 50 years;
- iv. Mark on the maps the submersion contours for these flood stages.

(b) **Regulation for Land Use Zoning**

- i. Installations and Buildings of Priority 1 should be located in such a fashion that the area is above the levels corresponding to a 100 year flood or the maximum observed flood levels whichever higher. Similarly they should also be above the levels corresponding to a 50 year rainfall flooding and the likely submersion due to drainage congestion;
- ii. Buildings of Priority 2 should be located outside the 25 year flood or a 10 year rainfall contour, provided that the buildings if constructed between the 10 and 25 year contours should have either high plinth level above 25 year flood mark or constructed on columns or stilts, with ground area left for the unimportant uses;
- iii. Activities of Priority 3 viz. play grounds, gardens and parks etc. can be located in areas vulnerable to frequent floods.

Note 1 In natural hazard prone areas identified under the land use zoning regulations, structures buildings and installations which cannot be avoided, protective measures for such construction/ development should be properly safeguarded based on the suggestion given in Appendix A. (Refer Volume -I)

Note 2 These zoning regulations should be read in conjunction with the Master Plan Objectives and other regulations.

### **3.12 PLANNING IN HILL AREAS**

In order to ensure environmentally sound development of hill towns, the following restrictions and conditions may be proposed for future activities.

- 3.12.1 An integrated development plan should be prepared taking into consideration environmental and other relevant factors including ecologically sensitive areas, hazard prone areas, drainage channels, steep slopes and fertile land.
- 3.12.2 Water bodies including underground water bodies in water scarce areas should be protected.
- 3.12.3 Where cutting of hill slope in an area causes ecological damage and slope instability in adjacent areas, such cuttings shall not be undertaken unless appropriate measures are taken to avoid or prevent such damages.
- 3.12.4 No construction should be ordinarily undertaken in areas having slope above 30° or areas which fall in landslide hazard zones or areas falling on the spring lines and first order streams identified by the State Government on the basis of available scientific evidence.
- 3.12.5 Construction may be permitted in areas with slope between 10° to 30° or spring recharge areas or old landslide zones with such restrictions as the competent authority may decide.

### **3.13 IDENTIFICATION OF OPEN SPACES**

Out of the open spaces earmarked as district parks, neighbourhood parks and local parks in the development plan, zonal plans and local plans, suitable and approachable parks/open spaces should be identified for the use during the emergency to provide shelter and relief caused by a natural hazard. Such pockets should be clearly marked on the city maps.

### **3.14 SAVINGS**

- 3.14.1 Notwithstanding anything contained in any other regulation for the time being in force, the Regulations for Land Use Zoning for Natural Hazard Prone Areas shall have an overriding effect for planning and development purposes.
- 3.14.2 In any specific circumstances, if any part of the Regulations has to be relaxed then it will be incumbent on the part of the user to adopt safe guard and protective measures to the satisfaction of the Competent Authority.

## REGISTRATION, QUALIFICATIONS AND DUTIES OF PROFESSIONALS

### B1. REGISTRATION OF PROFESSIONALS

B1.1 The competent Authority shall register Town Planners (RTP), Architects (RA), Structural Engineers (RSE), Geo-technical Engineers (RGE), Construction Engineers (RCE), Developers (RD), Owner wherever applicable, till such time there is no legislative frame for the professionals like engineers and others, similar to Architects Act 1972.

Application for registration shall be submitted by these professionals to the competent authority.

Registration shall be valid for a period of three years and shall be renewable.

### B1.2 REGISTERED STRUCTURAL ENGINEER (RSE)

On the basis of their academic qualifications and experience, Structural Engineers shall be “Registered” The eligibility criteria for registration and the “Scope of Work” which can be entrusted to the Structural Engineer are given below.

This registration shall be renewed every three years.

The registration may be cancelled permanently or for a specified period for unprofessional conduct.

**Scope of work:** To prepare structural design and structural drawings of High rise buildings, Educational Institutes, Hospitals, Public buildings, Special structures, Lifeline Buildings and the likes.

**Eligibility:**

- (i) B. E. Civil or equivalent with minimum 10 years experience (after attaining the degree) in structural design work at a responsible position as a structural designer OR
- (ii) M. E. Structures/ Earthquake Engineering or Ph.D. in Structural Engineering with minimum 5 years of experience (after attaining the degree) in structural design work at a responsible position a structural designer
- (iii) The experience as stated above shall be under a Structural Engineer on Record. (This requirement shall be waived for the first ten years of the promulgation of these Regulations)

**B1.4 REGISTERED CONSTRUCTION ENGINEER (RCE)**

- (A) The requirements for registration shall be:
  - (i) B.E. Civil or equivalent with five years experience in construction or
  - (ii) Diploma in Civil Engineering with seven years experience in construction
  - (iii) B.Arch or its equivalent with a degree or diploma in Construction Management and five years of experience in construction.
  - (iv) The experience as stated above shall be under one or more Construction Engineer on Record or under one or more reputed construction companies. Such company or companies established within or outside the area of jurisdiction of the competent authority shall be of minimum ten years of standing.
- (B) The registration shall be renewed every three years.
- (C) The registration may be cancelled for unprofessional conduct permanently or for a specified period.

**B.1.9 REGISTERED ARCHITECT (RA)****Qualification and Experience:-**

The person/ firm/company acting as Architect shall be registered with Council of Architecture and shall be bound by the terms & conditions as prescribed under the professional rules by the Council of Architecture to render professional services.

### **B.1.10 TOWN PLANNER ON RECORD (TPR)**

The qualifications, responsibility and the professional charges shall be applicable as prescribed by the Institute of Town Planners, India for rendering professional services.

### **B3 GENERAL DUTIES AND RESPONSIBILITIES APPLICABLE TO ALL PROFESSIONALS**

- a) Each Professional shall clearly indicate on every plan, document & submission, prepared by him the details of his / her designation with registration number and date, full name and his/her address below the signature for identification.
- b) The Structural Engineer on Record and Architect on Record shall be responsible for adhering to the provisions of the relevant and prevailing 'Indian Standard Specifications'. They will not be held responsible for the severe damage or collapse that may occur under the natural forces going beyond the design forces provided in the above 'Indian Standard Specifications'

### **B3.1 STRUCTURAL ENGINEER ON RECORD (SER)**

#### **Duties and Responsibilities**

- (A) At the time of seeking permission from Competent Authority for starting construction, the Owner shall submit an undertaking from SER or SDAR that
  - (i) the SER / SDAR is agreeable to accept the assignment to prepare designs, drawings and specifications.
  - (ii) the designs shall be carried out according to relevant national codes and specifications and good engineering practice.
  - (iii) A structural design report giving salient features of the structure, loads and soil characteristics and capacity, etc. shall be submitted in the prescribed format
- (B) In the case of high-rise buildings and Special Structures, SER/ SDAR shall
  - (i) prepare Preliminary Design of the structure in addition to the Report indicated in A (iii) above.

- (ii) get required soil (geo-technical) investigation done from an approved laboratory and submit the report concerning the same in prescribed format to the Competent Authority.
  - (iii) get the Preliminary Design checked through third party verification by a member of Structural Design Review Panel and submit a certificate concerning the same to the Competent Authority. Provided that in case of high-rise buildings having seven or more structural floors and special structures detailed design verification of major structural components will be required.
- (C) All Reports and other submissions to the Competent Authority by and on behalf of the SDAR shall only be signed by Registered Structural Engineer (SER) as a proprietor, partner or as a designated officer of the company.
- (D)
- a) To prepare a report of the structural design.
  - b) To prepare detailed structural design and to prescribe the method and technique of its execution strictly on the basis of National Building Code or relevant Indian Standard Specifications.
  - c) To prepare detailed structural drawings and specifications for execution indicating thereon, design live loads, safe soil bearing capacity, specifications of material, assumptions made in design, special precautions to be taken by contractor to suit the design assumptions etc whatever applicable.
  - d) To supply two copies of structural drawings to the supervisor.
  - e) To advise the Owner/Architect/Engineer for arranging for tests and their reports for soil, building material etc. for his evaluation and design consideration.
  - f) To prepare the revised calculations & drawings in case of any revision with reference to the earlier submission of drawings & design in a particular case.
  - g) To inform in writing the Competent Authority within 7 days, if for any reason, he/she is relieved of his appointment/responsibilities as the registered Structural designer for the development.

### **B3.2 CONSTRUCTION ENGINEER ON RECORD (CER)**

All construction work shall be carried out under the supervision of a Construction Engineer on Record.

### **Duties and Responsibilities:**

- a) To adhere strictly to the structural drawings, specifications and written instructions of the Structural Engineer on Record and Architect on Record / Engineer on Record
- b) To follow the provisions of N.B.C. or I.S. specifications as regards materials, components, quality control and the process of construction.
- c) To provide for safety of workers and others during excavation, construction and erection.
- d) TO provide safe and adequate temporary structure required for construction and erection.
- e) To bring to the notice of the structural designer and Architect/Engineer any situation of circumstances which in his opinion are liable to endanger the safety of the structure.
- f) To deposit with the Competent Authority one set of working drawings of the works executed along with the progress certificates before proceeding with the next stage of the work.
- g) He/she shall be in overall charge of the site and responsible for overall supervision of the work.
- h) He/she shall ensure that all the work under his charge is carried out in conformity with the approved drawings and as per the details and specifications supplied by the registered Architect/Engineer.
- i) He/she shall take adequate measures to ensure that no damage is caused to the work under construction and adjoining properties.
- j) He/she shall also ensure that no undue inconvenience is caused in the course of his/her work to the people in the neighborhood.
- k) He shall also ensure that no nuisance is caused to traffic & neighboring people by way of noise, dust, smell, vibration etc. in the course of his/her work.

### **B3.3 CONSTRUCTION MANAGEMENT AGENCY ON RECORD (CMAR)**

Construction work for a high-rise building or Special Structures shall be carried out by a Construction Management Agency on Record.

#### **Duties and Responsibilities :**

- (A) At the time of seeking permission from Competent Authority for starting construction of a high-rise building or special structures, the Owner shall submit an undertaking from CMAR that

- i. the CMAR is agreeable to accept the assignment to execute the project as per designs, drawings and specifications
- ii. the CMAR shall install a Quality Assurance programme by retaining an independent Quality Audit Agency on Record (QAAR) and submit a certificate concerning the same to the Owner/Developer as well as to the Competent Authority. The appointed QAAR shall be acceptable to the Owner/Developer.

(The text is put in italics as it does not specifically apply/relate for registration.)

- (B) Upon completion of the construction work of the high-rise building and Special Structures the CMAR shall intimate to the Owner/Developer that the work has been carried out according to the design drawings and specifications and written instructions of SDAR and as per guidance of the QAAR.
- (C) The CMAR shall submit a report and certificate in the prescribed format from the QAAR that the quality assurance programme has been satisfactorily carried out on the construction work. This report and certificate shall be submitted to the Owner/Developer for final submission to the Competent Authority.
- (D) All Reports and other submissions to the Competent Authority by and on behalf of the CMAR shall only be signed by Construction Engineer ON Record (CER) as a proprietor, partner or by as a designated officer of the company.

#### **B3.4 QUALITY AUDITOR ON RECORD (QAR)**

- (A) The construction work of a high-rise building executed by CMAR shall be under an independent quality inspection programme prepared and implemented under the supervision of an independent QAR.

#### **B 4 DEVELOPER**

##### **Duties and Responsibilities**

The responsibilities of developers shall be:

1. To obtain and submit to the Competent Authority, along with application for development permission, each progress report and application for occupation certificate.

2. To appoint an Architect on Record/ Engineer on Record and Structural Engineer on Record.
3. To obtain at relevant stages certificates from them, for submission to the Competent Authority, that in designing the real estate development and providing detailed drawings and specifications for it, they have complied with requirements as laid out in the Regulations.
4. To appoint a registered CER as site supervisor.
5. To obtain and adhere to the quality assurance procedure prepared by the registered site supervisor.
6. To adequately enable the site supervisor to carry out his responsibilities.
7. To certify along with the site supervisor that construction of the real estate development has been carried out as per the design, detailed drawings and specifications provided by the Architect on Record/ Engineer on Record and Structural Engineer on Record.
8. To obtain development permission from the Competent Authority prior to commencement of construction of the real estate development
9. To regularly submit progress reports and certificates as required by the Competent Authority.
10. To inform in writing the Competent Authority within 7 days, if for any reason he ceases to be the developer or is relieved of his responsibilities as the developer of the real estate development
11. To inform in writing the Competent Authority within 7 days, if for any reason any of the registered professionals appointed by him have been relieved of their responsibilities or have resigned.
12. The appointment of the registered Architect/ Engineer on Record shall mean that he (the Developer) has authorized the Architect on Record / Engineer on Record to do all things necessary and to take all adequate measures for preparing the design, drawings and specifications for the project and to appoint on his behalf appropriate persons to act as registered, clerk of works site supervisor, required for the proper execution of the project and to retain on behalf of the owner any other specialist or expert required on the work of the project.
13. He shall not cause or allow any deviations from the approved drawings in the course of the execution of the project against the instruction of Architect on Record /Engineer on Record /Site Supervisor on Record /Clerk of Works on Record / Structural Engineer on Record and shall bear all responsibility for any irregularity committed in the use and function of the building or

- its parts for which the approval has been obtained.
14. When no registered construction contractor or site supervisor is required to be appointed and not appointed he shall be responsible for their duties and responsibilities under the Regulations.
  15. He shall not commence the use of building or shall not give the possession to occupy the building to any one before obtaining the occupancy certificate from the Competent Authority.
  16. He shall provide adequate safety measures for structural stability and protection against fire hazards likely from installation of services like electrical installation, plumbing, drainage, sanitation, water supply etc. wherever required under the regulations.
  17. He shall exhibit the names of registered persons only, on site and no additional names will be exhibited/displayed.
  18. He shall explain the construction design and its intended use as per approved plan only, to the prospective purchaser of the premises under construction.
  19. He shall make available copies of titles for the land, approved plans and all certificates issued to the Competent Authority under these Regulations.

## **B 5 OWNER**

“Owner”, in relation to any property, includes any person who is for the time being, receiving or entitled to receive, whether on his own account or on account of or on behalf of, or for the benefit of, any other person or as an agent, trustee, guardian, manager or receiver for any other person or for any religious or charitable institution, the rents or profits of the property; and also includes a mortgaging possession thereof.

## **B. 6 Builder/Contractor**

The minimum qualification and competence for the builder/contractor for various categories of building and infrastructural development shall be as decided by the Authority to ensure compliance of quality, safety and construction practices as required under the NBC.

### **Duties and Responsibilities:**

1. To appoint a Site Supervisor (Diploma) and Site Engineer (Civil) for site supervision.
2. To obtain and adhere to the quality assurance procedure including testing of materials for quality prepared by the registered Construction Engineer and to get the materials e.g. cement, steel, bricks, water, cement mortar and cement concrete of every batch, tested from an approved lab and properly maintain the records.
3. To certify along with the RCE/Site Supervisor/Site Engineer that construction of the real estate development has been carried out as per the design, detailed working drawings and specifications provided by the Architect on Record/Engineer on Record and Structural Engineer on Record.
4. To regularly submit progress report and certificates as required by the Competent Authority.
5. To inform in writing to the Competent Authority within 7 days, if for any reason he ceases to be the Builder/Contractor or is relieved of his responsibilities of the real estate development.
6. To inform in writing to the Competent Authority within 7 days, if for any reason any of the professionals appointed by him have been relieved of their responsibilities or have resigned.
7. The appointment of the Site Engineer shall mean that he has authorized the him to do all things necessary and to take all adequate measures for construction as per architectural/Structural design, working drawings, quality of materials and workmanship for the project and to appoint appropriate persons to act as clerk of work/site supervisor, required for the proper execution of the project and to retain on behalf of him any other specialist or expert required on the work of the project.
8. He shall not cause any deviations from the approved drawings in the course of the execution of the project against the instruction of Architect on Record Construction Engineer on Record/Site Supervisor Clerk of Works Structural Engineer on Record unless a written permission is obtained by him and he shall bear all responsibility for any irregularity committed in this behalf.
9. He shall provide adequate safety measures for all labourers/technical , staff, material, timbering, scaffolding, shuttering and other stability and protection against fire hazards like from installation of services like electrical installation etc.,
10. He shall submit the certificate for execution of work as per structural safety requirements and give written notice to the Authority regarding completion of work described in the permit.
11. Any other condition as per local laws of the authority

**FORM NO 1**  
(Para 4.3.1 and 4.3.2)

**CERTIFICATE OF UNDERTAKING**  
**FOR HAZARD SAFETY REQUIREMENT**

TO,

REF : Proposed work of \_\_\_\_\_  
(Title of project)

C.S.No./R.S.No. \_\_\_\_\_ Inward No. \_\_\_\_\_ at  
Village \_\_\_\_\_ Taluka (F.P. \_\_\_\_\_ Scheme No. \_\_\_\_\_  
of \_\_\_\_\_ Village/Town/City

1. Certified that the building plans submitted for approval will satisfy the safety requirements as stipulated under Building Regulation No. ...and the information given therein is factually correct to the best of our knowledge and understanding.
2. It is also certified that the structural design including safety from hazards based on soil conditions shall be duly incorporated in the design of the building and these provisions shall be adhered to during the construction.

Signature of Owner with date \_\_\_\_\_  
Name in Block Letters \_\_\_\_\_ Structural Engineer on Record with date  
Address \_\_\_\_\_ Name in Block Letters \_\_\_\_\_  
\_\_\_\_\_ Address \_\_\_\_\_  
\_\_\_\_\_

Signature of Developer with date \_\_\_\_\_ Signature of the Architect on Record/  
Engineer on Record  
with date \_\_\_\_\_

Name in Block Letters \_\_\_\_\_ Name in Block Letters \_\_\_\_\_  
Address \_\_\_\_\_ Address \_\_\_\_\_  
\_\_\_\_\_

**Note : The certificate of Undertaking shall be signed by person concerned as per the provisions of Paras 4.3.1 and 4.3.2.**

**FORM NO. 2**

(Para 4.3.1 and 4.3.2)

**CERTIFICATE OF UNDERTAKING OF ARCHITECT ON RECORD/  
ENGINEER ON RECORD**

To

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

C.S.No.R.S.No./F.P.No. \_\_\_\_\_ Inward No. \_\_\_\_\_ at  
Village \_\_\_\_\_ Taluka \_\_\_\_\_

Scheme No. \_\_\_\_\_ of \_\_\_\_\_  
(Village/Town/City)

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

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

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

I am a member of Council of Architects/Institution of Engineers (India) and I am possessing current registration to act as registered Architect/Engineer.

I hereby certify that I am appointed as the Architect on Record / Engineer on Record 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 Construction Engineer on Record, 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 Construction Engineer on Record, building contractor, plumbing contractor and electrical contractor shall be made at the appropriate stage by the owner before the relevant work commences.

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

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

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

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

\_\_\_\_\_

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

**FORM NO. 3**  
(Para 4.3.1 and 4.3.2)

**CERTIFICATE OF UNDERTAKING OF STRUCTURAL ENGINEER ON RECORD**  
**(SER)**

To

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

C.S.No./R.S.No./F.P.No. \_\_\_\_\_ Inward No. \_\_\_\_\_  
at Village \_\_\_\_\_ Taluka \_\_\_\_\_  
Scheme No. \_\_\_\_\_ of \_\_\_\_\_  
(Village/Town/City)

Owner: \_\_\_\_\_  
Address: \_\_\_\_\_  
Tel. No.: \_\_\_\_\_

I am a 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 above mentioned project. I am fully conversant of my duties and responsibilities under the Regulations and assure that I shall fulfill them in all respects.

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

I undertake to carry out a detailed structural design and prepare detailed structural drawings of the proposed building as per the latest Indian Standard Specifications, and as indicated in the Structural design basis report.

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 : \_\_\_\_\_

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

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

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

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

**FORM NO.4**  
(Para 4.3.1 and 4.3.2)

**CERTIFICATE OF UNDERTAKING OF THE  
CONSTRUCTION ENGINEER ON RECORD**

To.....

.....

Ref : Proposed work of .....

(Title of the work )

C.S.NO. /R.S.NO. /F.P.NO.....in word..... at

village..... Taluka.....

Scheme NO.....at.....

Owner :

Address :

Tele. No.....

I possess a current Registration to act as Registered Construction Engineer.

I hereby certify that I am appointed as a Construction Engineer on Record on the above mentioned project and that all the works under my charge shall be executed in accordance with the drawings and specifications prepared for this project.

I am fully conversant with the provisions of the Regulations which are in force and about the Duties and Responsibilities under the same and I undertake to fulfill them in all respect.

\* I undertake not to supervise more than ten works at a given time as provided in Development Control Regulations.

\* I undertake not to supervise work simultaneously at one point of time on any other sites during my supervision of the execution of this work.

Signature:

Registration No.....Date.....

Name.....

Address.....

Tele.No.....

**FORM NO. 6**  
(PARA 5.2)

**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               <ol style="list-style-type: none"> <li>a. Name</li> <li>b. Number</li> </ol> </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> </ul>		IS: 875 Part 1

	<ul style="list-style-type: none"> <li>• Other fill materials</li> <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
- ♦ In case 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 Engineer)

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" style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;">Bldg zone</td> <td style="text-align: center;">II</td> <td style="text-align: center;">III</td> <td style="text-align: center;">IV</td> <td style="text-align: center;">V</td> </tr> <tr> <td style="text-align: center;">Ordinary</td> <td style="text-align: center;">B</td> <td style="text-align: center;">C</td> <td style="text-align: center;">D</td> <td style="text-align: center;">E</td> </tr> <tr> <td style="text-align: center;">Important</td> <td style="text-align: center;">C</td> <td style="text-align: center;">D</td> <td style="text-align: center;">E</td> <td style="text-align: center;">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 (b<sub>1</sub>+b<sub>2</sub>+b<sub>3</sub>)/l<sub>1</sub> or (b<sub>6</sub>+b<sub>7</sub>)/l<sub>2</sub></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"/> <input type="checkbox"/>	<b>NA</b> <input type="checkbox"/> <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"/>	IS:4326 Cl. 8.4.8
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	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**

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

Signature

(Structural Engineer)

Part 3		Reinforced concrete framed buildings	
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</li> </ul> Independent Interconnected Raft Piles		
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>		
	a. Based on approximate fundamental period		IS: 1893 Cl. 7.5.3
	b. Based on dynamic analysis		

- c. Ratio of a/b
- 13 Distribution of seismic forces along the height of the building IS:1893 Cl. 7.7  
(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

Part 4 Buildings in Structural Steel			
1	Adopted method of Design	<input type="radio"/> Simple <input type="radio"/> Semi-rigid <input type="radio"/> Rigid	IS: 800; Cl. 3.4.4 IS: 800; Cl. 3.4.5 IS: 800; Cl. 3.4.6
2	Design based on	<input type="radio"/> Elastic analysis <input type="radio"/> Plastic analysis	IS: 800; Section-9 SP: 6 (6)
3	Floor Construction	<input type="radio"/> Composite <input type="radio"/> Non-composite <input type="radio"/> Boarded	
4	Roof Construction	<input type="radio"/> Composite <input type="radio"/> Non-composite <input type="radio"/> Metal <input type="radio"/> Any other	
5	Horizontal force resisting system adopted	<input type="radio"/> Frames <input type="radio"/> Braced frames <input type="radio"/> Frames & shear walls	<i>Note: Seismic force As per IS: 1893 Would depend on system</i>
6	Slenderness ratios maintained	Members defined in Table 3.1, IS: 800	IS: 800; Cl. 3.7
7	Member deflection limited to	Beams, Rafters Crane Girders Purlins Top of Columns	IS: 800; Cl. 3.13
8	Structural members	<input type="radio"/> Encased in Concrete <input type="radio"/> Not encased	IS: 800; Section-10
9	Proposed material	<input type="radio"/> General weld-able <input type="radio"/> High strength <input type="radio"/> Cold formed <input type="radio"/> Tubular	IS: 2062 IS: 8500 IS: 801, 811 IS: 806
10	Minimum metal thickness Specified for corrosion protection	<input type="radio"/> Hot rolled sections <input type="radio"/> Cold formed sections <input type="radio"/> Tubes	IS: 800, Cl. 3.8 Cl. 3.8.1 to Cl. 3.8.4 Cl. 3.8.5 Cl. 3.8.5
11	Structural connections	<input type="radio"/> Rivets <input type="radio"/> C T Bolts <input type="radio"/> S H F G Bolts	IS: 800; Section-8 IS: 1929,2155,1149

12	Minimum Fire rating Proposed, with method	<input type="radio"/> Black Bolts <input type="radio"/> Welding- Field Shop (Specify welding type proposed) <input type="radio"/> Composite  <input type="radio"/> Rating ----- hours <input type="radio"/> Method proposed- - In tumescent Painting - Spraying - Quilting - Fire retardant boarding	IS: 6639, 1367 IS: 3757, 4000 IS: 1363, 1367 IS: 816, 814, 1395, 7280, 3613, 6419 6560, 813, 9595  IS: 1641, 1642, 1643
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**FORM NO. 11**  
(Para 5.10.2 d)

**COMPLETION REPORT**

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Reference No.

Owner's Name:

Submitted on:

The

Chief Executive Authority / Municipal Commissioner,  
Urban Development Authority / Municipal Corporation

Location:

Received on:

Sir,

The work of erection/re-erection of building as per approved plan is completed under the Supervision of Architect/Construction Engineer who have given the completion certificate which is enclosed herewith.

We declare that the work is executed as per the provisions of the Act and Development Control Regulations/Byelaws and to our satisfaction. We declare that the construction is to be used for \_\_\_\_\_ the purpose as per approved plan and it shall not be changed without obtaining written permission.

We hereby declare that the plan as per the building erected has been submitted and approved.

We have transferred the area of parking space provided as per approved plan to an individual/association before for occupancy certificate.

**Any subsequent change from the completion drawings will be our responsibility.**

**Yours faithfully,**

**(Developer's / Builder's Signature)**

**(Owner's Signature)**

**Name of Developer / Builder**

**Name of Owner**

**Date:**

**Address:**

**Encl: Completion Certificate**

**FORM NO. 12**  
(Para 5.10.2d)

**BUILDING COMPLETION CERTIFICATE BY ARCHITECT ON RECORD**

Reference No.

Owner's Name :

Location :

Submitted on:

Received on :

The Chief Executive Authority  
Urban / Area Development Authority

Sir,

1. The building/s has/have been constructed according to the sanctioned plan.
2. The building/s has /have been constructed as per approved plan and design as per detailed architectural drawings and specifications prepared by Architect on Record.
3. Construction has been done under our supervision / guidance and adhres to the drawings submitted.

Signature of the Owner

Signature of Architect on Record

Date

Date

Name in block letter:

Name in block letters:

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

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

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**FORM NO. 13**  
(Para 5.10.2.d)

**BUILDING COMPLETION CERTIFICATE BY CONSTRUCTION ENGINEER ON RECORD**

Reference No.

Owner's Name :  
Submitted on:

Location :  
Received on :

The Chief Executive Authority  
Urban / Area Development Authority

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 on Record
  - the detailed Architectural drawings and Architectural specifications prepared by the Architect on Record.
  - 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 Construction  
Engineer on Record  
Date

Date

Name in block letter:

Name in block letters:

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

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

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**FORM NO. 14**  
(Para 5.10.2d)

**BUILDING COMPLETION CERTIFICATE BY STRUCTURAL ENGINEER ON  
RECORD**

Reference No.

Owner's Name :

Location :

Submitted on :

Received on :

The Chief Executive Authority  
Urban / Area Development Authority

Sir,

This is to certify that detailed structural drawings of the buildings/s has / have been prepared on the basis of a detailed analysis and a detailed design carried out according to relevant provisions of the latest Indian Standard Codes, National Building Code and as indicated in the structural design basis report.

Signature of the Owner

Signature of Structural Engineer  
on Record

Date

Date

Name in block letters:

Name in block letters:

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

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

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_