

# Regulatory Provisions for Safety of Residential Buildings Shortcomings and Modifications for its Role in 21<sup>st</sup> Century

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**Abstract:** *The Rules and Regulations and its existence is the support system of the existences of Life on earth and part of natural instinct to control the happening of activities in the surrounding. Its need was felt to ensure and safeguard life, property and the very existence of all resources and ecosystem that supports life. Residence is another aspect which plays a very vital role in the Life Cycle of a living being and in particular a Human Being as he is considered to be most intelligent living being on Planet Earth. Humans evolved over a period of time from primitive stage to the modern world of 21<sup>st</sup> Century after undergoing a lot of change in their requirements, way of living and rules and regulations governing them. Rules and Regulations is a must to maintain discipline and safe performance of any act for a desired output. They changed over a period of time as the requirements changed and need felt. Those who framed and strictly observed the implementation of regulations were able to build a better and safe society and are called as Developed Countries. Development can happen and sustain on strict enforcement of set down rules by Rulers and proactive approach by Residents in implementation of rules. It helps to build a safe and better society. Building a safe society starts from building safe residences and in turn towns and cities which are governed by Development Control Regulations (DCR) for that region. DCR is guideline and can be amended to suite the changing requirements of region. In spite of the available rules and regulations and enforcing agencies it is observed that there is rampant practice of flouting the rules and regulations by developers, builders, and constructors. There is lack of responsibility towards the mankind and it's Safety. In present world Monetary Gains prevail over value of life of Human being, resulting in worst construction practices. The construction activity in India is governed by Development Control Regulations of States, local bodies and other documents accepted as regulatory provisions, such as National Building Code, IS Codes, Fire Safety Acts etc. Safety aspect has been studied extensively based on the accidents encountered and experience gained over a period of time. Technological advancement has given an edge to enhance the safety of people in much better way. In present situation there is huge gap in demand and supply of residence for low income group people. This gap has resulted in rampant unregulated construction of low cost residential buildings with the land owners developing and constructing the buildings on their own. The involvement of non technical personnel in construction is proving to be dangerous as quality of construction is not taken care to required standards, and this is happening as there are no strict laws governing the process of construction and accountability for sub standard construction done.*

**Keywords:** Development Control Regulations, Safe Building Construction, Safety of Human Life, Unified Law of Land & Strict Enforcement

## 1. Introduction

In 21st Century the erstwhile towns are growing to larger cities and cities to mega cities and metro cities. The fast growing urbanization has increased the need of shelter and subsequently the increased demand for residential buildings developed in a mass scale in form of town ships or individual building. The increased demand for Residential and Industrial land development led to

- Increased demand for change of land use from Agricultural / Forest / Salt Pan etc to Non Agricultural.
- Amendments to Development Control Regulations
- Changes in Development Control Plans.
- Amendments to existing rules and regulations after due deliberations in context to the prevalent situation.
- Formation of various departments and offices of authority to implement the improvised laws.
- The objective of forming DCR applicable for Municipal Corporations / Council and Town Planning Act for small and large cities was
- To ensure the land use is made for purpose assigned
- Proportionate and appropriate land allocation for Commercial, Residential, Institutional, Recreational, Community Welfare, Industrial purposes.

- Planning and providing services and infrastructure to cater to growing population.
- Avoid unregulated development.
- Create a safe and healthy environment for the residents / occupants.
- Preserve the natural habitat in overall process.

The focus and attention in this Project is given to the study of Rules and Regulations formulated by various statutory bodies and its current stature in context to Residential Buildings. Residential building forms the integral part of human development, care, upbringing, and most important the very existence of healthy and safe society.

Those circumstances which poses risk / threat to life of any kind is Unsafe. For human kind the place where he lives, works and the residence where a Family stays is more important. To build a safe society, mere existence of rules and regulations does not help, it is equally important for its residents to follow it in a responsible manner.

### 1.1 Problem Statement

The existing laws are falling short to cope up with the speed of development and also its implementation and monitoring.

Of the various facets of development that are happening one very important part which forms crucial for individuals and family members is his / her residence.

There are more challenges to be faced with changing environmental conditions and global warming as they are directly affecting the life and property. In order to face challenges and keep pace with the fast developing world, we as responsible citizens on earth should ensure that we follow the guidelines honestly and diligently. In spite of the available rules and regulations and enforcing agencies it is observed that there is rampant practice of flouting the rules and regulations by developers, builders, and constructors. There is lack of responsibility towards the mankind and its Safety. In present world Monetary Gains prevail over value of life of Human being, resulting in worst construction practices.

The common flaws / shortcomings in regulatory provisions of DCR for different cities are observed which results in absolute no control on

- Adherence to DCR and Town Planning acts by constructors.
- Strict monitoring and penalizing the defaulters
- Checking the technical qualification of persons involved in construction.
- Quality Control and management of construction activity to deliver safe residence.
- Periodic check on quality by regulatory authorities
- Provisions for third party check during all stages of construction.
- Population in the rural areas is more prone to safety hazards as there is absolute lack of knowledge and control on way construction work is carried out.
- Problem under study can be summarized as
- To identify flaws in existing regulatory provisions for Planning Design and Construction aspects of low Rise Residential Buildings in different cities of Maharashtra.
- To study Fire Safety Regulations and its shortcomings in context to current scenario of human population, its density, and rampant unsafe building construction happening.
- Compare existing regulatory provisions for similar structures in developed countries.

### 1.2 Objectives

The aim of study was realized through the following objectives:

- Study the concept of Regulatory provisions for safety in Residential Buildings.
- Investigate the current regulatory provisions for construction of Low Rise Residential Buildings
- Prepare and develop a framework comparing current regulations which had flaws and shortcomings against the regulatory provisions in developed countries.
- Based on study and investigation of the literature, draft the recommendations and suggestions for making necessary changes and further implementation in existing regulatory provisions.

### 1.3 Significance of Study

The study is significant in several ways as it highlights and emphasizes on,

- Shortcomings in existing regulatory provisions for planning, designing and monitoring construction of low rise residential buildings, with respect to high rise buildings.
- Need of fixing responsibility and accountability on builders, developers, and contractors.
- Strict punishment for non adherence of rules and regulations.
- Need of mandatory provisions for insurance and maintenance of buildings.

## 2. Literature Survey

The study relates to regulatory provisions and its shortcomings in regard to its role in 21st Century. The literature under study comprises of the Regulatory documents which act as guideline for the developmental activities in the India, International study papers on safety aspects of buildings, safe practices in construction adopted internationally. The documents referred under study are as below

### Indian Regulatory Documents

- National Building Code 2005
- Maharashtra Regional Town Planning Act 1966
- Development Control Rules Navi Mumbai Municipal Corporation
- CIDCO Development Control Regulation – 1984
- Model Guidelines For Development & Building Construction Including Safety Provisions for Natural Hazards in Rural Areas

### International Regulatory Documents

- Hong Kong Code Of Practice for Fire Safety
- The Statues of The Republic Of Singapore – Building Control Act Chapter 29

### Research Papers

- Staircase Width Study by - Jake L. Pauls, John J. Fruin, and Jeffrey M. Zupan
- Stair Safety: Causes and Prevention of Residential Stair Services – Published by National Safety Council – Department of Design and Environmental Analysis, Cornell University.

Study of Indian Regulatory Documents specified above was undertaken to get first hand information on whether safety aspects for lesser height residential buildings are covered considering the current situation and speed of development works happening. In the current scenario fast urbanization resulted in a haphazard development in suburban areas. The safety aspects during construction process and of design were violated leading to disasters of building collapse. Low quality construction resulted in reduction of building life to 1/3 of its estimated life. Current construction quality specifically of low height residential buildings is very poor due to the involvement of non technical people and lack of supervision and moral responsibility of developers. Absence

of strict regulations and its enforcements has lead to such a disastrous situation.

### 2.1 National Building Code – 2005 (NBC)

Construction, both public and private, accounts for about fifty percent of the total outlay in any Five Year Plan. Half of the total money spent on construction activities is spent on buildings for residential, industrial, commercial, administrative, education, medical, municipal and entertainment uses. It is estimated that about half of the total outlay on buildings would be on housing.

National Building Code came into existence to unify the building regulations throughout the country for use by Government departments, Municipal bodies and other construction agencies. The then Indian Standards Institution (now Bureau of Indian Standards) was entrusted by the Planning Commission with the preparation of the National Building Code. The Guiding committee with help of expert panels of various fields drafted the first National Building Code in 1970. NBC comprises of different sections based on provisions for various facets of building construction and is as below.

- Administration
- Development Control Rules
- Fire and Life Safety
- Building Material
- Structural Design
- Construction practices and Safety
- Building Services

### 2.2 Maharashtra Regional Town Planning Act 1966

The above regulation is part of Regional Control on Developmental activities and acts as guideline for setting up regulatory provisions for Municipal corporations, Municipal Councils and Regional development Authorities.

### 2.3 DCR Navi Mumbai Municipal Corporation and CIDCO Fire Protection Regulation 1984

Navi Mumbai is a well planned city with various nodes which are further divided into sectors. Initially the development in city was governed by CIDCO and currently by DCR for Navi Mumbai Municipal Corporation.

### 2.4 Development Controls for Rural Areas

These provide guidelines for development activities in rural areas. It details out the construction process to be followed for load bearing structures by providing bands at different levels to ensure the stability of structure. It defines various safety aspects to be followed while constructing residences out of local available materials.

### 2.5 International Regulatory Documents

These documents were studied to understand the Fire safety norms being practiced in those countries. It also specifies the strict monitoring of the entire construction process from inception to the completion. The regulations strictly set

down the mandatory requirements of qualified, technically strong and experienced people in the construction process.

Comparing the Indian and International regulatory documents it is observed that the Indian documents lag far behind in the monitoring and enforcement aspects during the construction process. It lacks the check methods at various stages by regulatory authorities which is one of the basic reasons for low quality construction and specifically for the low cost and low rise residential buildings.

## 3. Methods / Approach

The research work involves defining safety aspects of building to be studied and systematic approach adopting suitable methodology for desired output. The methodology involves,

- Extensive literature review to study the regulatory provisions in context to safety of residential buildings.
- Comparison of regulatory provisions with respect to those adopted in developed countries
- Data collection on implementation of safety aspects for structures constructed and under construction
- Flaws in the existing regulations with context to current situation of fast urbanization supported by unregulated construction activity
- Suggest amendments and new concepts for controlled quality construction activity

The literature review is undertaken to identify the various safety aspects to be considered in building construction process briefed as below.

Safety aspects of a building are based on

- Location and its ground stability
- Structural Stability
- Occupational Safety
- Fire Safety Provisions
- Safe Evacuation Provisions
- Safe access and exit

Safety aspects are checked at various stages as below,

- Planning and Designing
- During Construction
- Pre Occupancy
- Post Occupancy

The safety provisions covered in planning are

- Access to and from building from adjacent road
- Movement areas such as corridors, staircase, lifts
- Fire Safety installations

The Design stages involves

- Seismic zone and soil data report of proposed location
- Structural design as per applicable codes.
- Specifying materials considered in design stage for use in building construction.
- During construction, safety of building can be ensured by monitoring, supervising the works as per laid down procedure by
- Supervision by qualified Engineers & Supervisors
- Use of Quality materials

- Adopting correct sequence of operations
- Quality check of materials and works completed at various stages
- Third party testing of material and works
- Compliance of non conforming activities • Third Party check of the completed works by conducting NDT procedures
- Making change in the process if required for getting the desired results.

### **3.1 In order to study and record the flaws in current construction, below process shall be adopted**

- Study the reports and findings of structural consultants for deteriorated and damaged structure
- Testing of major material of buildings under construction i.e Reinforcement Steel
- Concrete cast at site - By having core cuts of the concrete and testing it for its porosity, strength of concrete.

The above is to be adopted randomly for residential buildings spread over areas.

The results obtained shall reveal the exact nature of completed construction in terms of quality, sustainability and durability.

3.2 The second part of methodology is to present the findings of above tests and investigations to the regulatory authorities in order to highlight the defective and unsafe construction being done. Highlight flaws in the construction process and monitoring activities by the developers and constructors. Flaws in regulatory provisions which do not have provision for

- Monitoring the overall construction process.
- Control on quality aspect of material to be used.
- Accountability and responsibility undertakings from the developers, builders, planners and designers for quality and safety of building in terms of safety and life of building.
- Issuance of Occupancy Certificate for specific period and renewal on checking the health of building once again.

3.3 The third part of methodology shall cover the coordination and communication with the statutory bodies which are responsible for framing the rules and regulations for effecting necessary changes.

## **4. Results**

The results shall be evolved in two steps

- Findings of investigation done and identifying causes for construction of unsafe buildings.
- Amendments to the existing regulatory provisions making those involved more accountable for the construction done in terms of its safety for desired life span of building.

## **5. Conclusion**

Safe building is a need and basic requirement for safety of occupants and protecting national wealth. Safe building can be constructed by developing a proactive approach of moral

responsibility of protecting fellow residents. With more job opportunities in urban areas, cities are growing at a tremendous speed. It has resulted in unregulated construction activity with no quality control measures. First time developers are only interested in exploiting the situation. The supply demand gap of affordable housing has resulted in residents opting out for cheaper and non quality construction endangering their investments and also life. To ensure safe building construction and its upkeep for longer life the developer and constructor must follow rules and regulations and process defined in NBC and different IS codes. The existing fire safety regulation cater for only high rise building over and above 16m height which needs amendments as below

### **a) Staircase**

Minimum Clear width of 1.0 mt for any type of building  
Treads 300 mm wide and Risers 150mm high  
Railing on both side of stairway  
Non slippery flooring for staircase  
Mid landing and landing width 1.0 mt  
RCC shear wall construction for staircase core  
Segregating fire staircase from lift core and residents exit points

### **b) Fire Safety installation**

Min provision of fire water tank, fire pump, fire hydrant and a hose reel for any type of building.  
Fire extinguishers a must for all residents  
Fire doors for fire staircase  
Periodic check of fire safety installations for its functioning  
Provision of fire rated doors for main exit of individual residence  
Sprinklers and fire detection, a must for commercial buildings of any height

In addition to above making the planners, designers, developers and constructors responsible for construction shall be the top priority of regulatory authorities.

- Existing formats of undertakings and completion certificates issued by designers shall be revised suitably.
- Additional undertakings shall be evolved to make the developers more accountable towards overall quality of construction, and sustainable development.
- The amendments shall be issued as notifications for implementation and enforcement during execution of the projects.

All above requires a political will of policy makers to amend the laws and make it stricter to ensure building a safe and sustainable society.

Eco friendly and sustainable development is need of hour in the fast changing atmospheric conditions due to global warming. By building safe and long lasting structures we are contributing to the saving of national wealth and natural wealth of country.

Generation of wealth also means preserving the existing wealth and investment by middle class in the residential sector is the hard earned money and need to be taken care by

providing them safe buildings which can last longer worth the value paid for it.

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