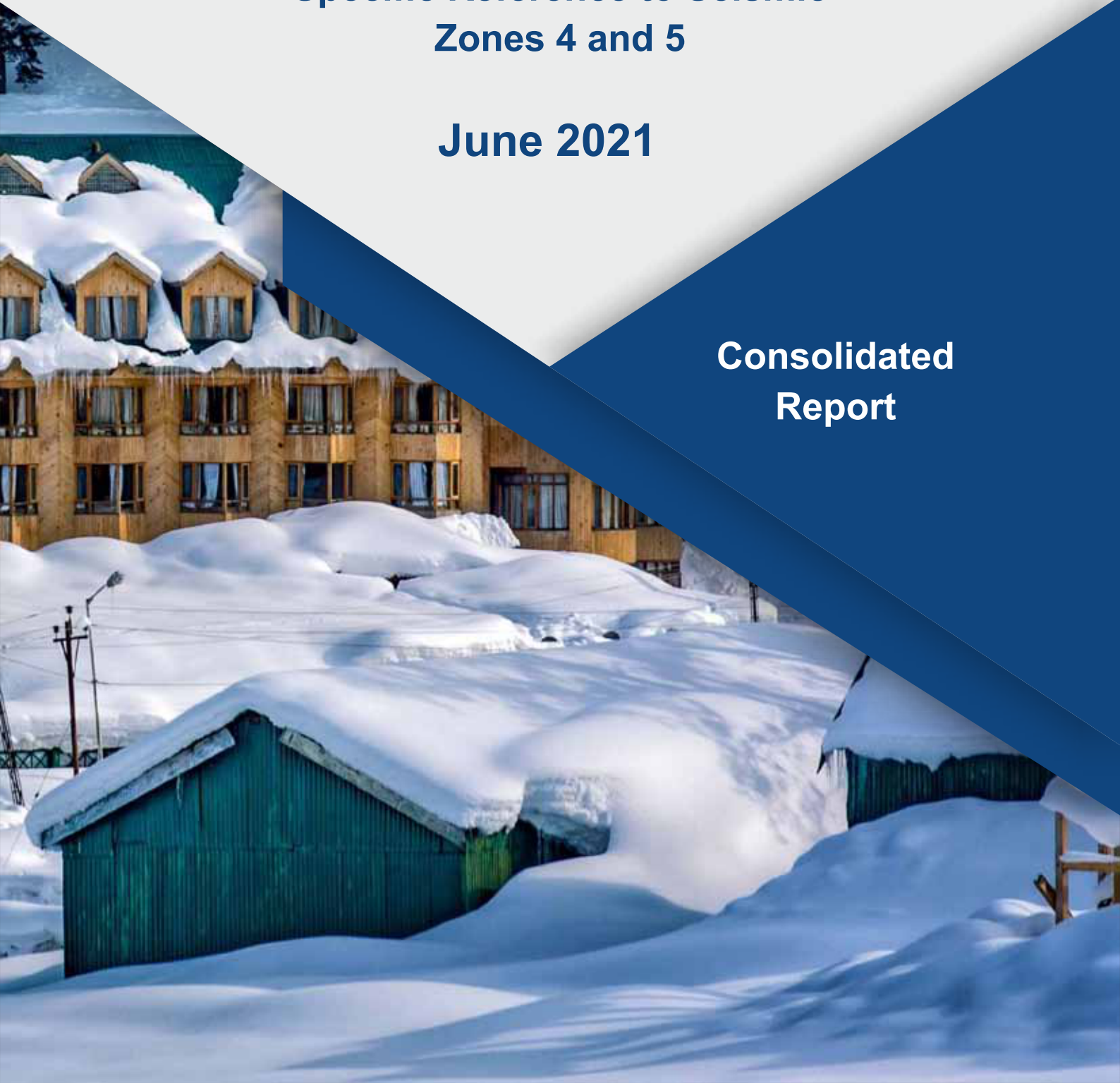




**Upgrading Design Guidelines  
and Building Codes Cum  
Material Specifications with  
Respect to Multiple Disasters in  
Jammu & Kashmir (J&K) with  
Specific Reference to Seismic  
Zones 4 and 5**

**June 2021**

**Consolidated  
Report**



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# Contents

## **A. Executive Summary**

Chapter 1	Background	3
Chapter 2	Current Building Regulatory System: An Overview	5
Chapter 3	Key Issues and Challenges	7
Chapter 4	Potential Way Forward	11
Chapter 5	Recommendations	13

## **B. Project of Review of Building Codes and Building Permit System**

Chapter 6	Background of Jammu and Kashmir State	27
Chapter 7	Building Regulatory System	35

## **C. Project Tasks 1& 2: Assessment of Local Building Code and the Implementation Systems**

Chapter 8	Objectives of Tasks 1 and 2	38
Chapter 9	Legislation Related to Build Environment	40
Chapter 10	Review of Applicable Building Standards, Building Byelaws, Building Codes and Master Plans	44
Chapter 11	Building Permit System – Enforcement Protocol	50
Chapter 12	Functioning of the Building Permit System – the Agencies Involved and Inherent Capacities and Inadequacies of the Enforcement Agencies to Perform Assigned Tasks	75
Chapter 13	Accreditation System	87
Chapter 14	Feedback of Building Permit users - Survey Analysis and Findings	88
Chapter 15	Recommendations on Improving Efficiency and Transparency of Permit Process	95
Chapter 16	Removing Bottlenecks and Improving the Overall Experience of Building Permit System	101
Chapter 17	Training Curriculum for Sensitization Programs and Short Courses for Stakeholders and Building Officials	103
Chapter 18	Concluding Remarks	124





#### **D. Project Task 3: Improving Effectiveness of Building Inspections**

Chapter 19	Objective of Task 3 – Improving the Effectiveness of On-Site Building Inspections	125
Chapter 20	Regulatory framework for building inspection with respect to fire and structural safety	128
Chapter 21	Current practices related to on site building inspection	131
Chapter 22	Suggestions for improvement in provisions of byelaws	139
Chapter 23	Comments on existing Capacity of ULBs & Training requirements of concerned staff and recommendations for capacity building of ULBs	145

#### **E. Task 4: Quality Control of Essential Facilities**

Chapter 24	Objective of Task 4 – Quality Control of Essential Facilities	155
Chapter 25	Background: Importance of essential facilities and their responsibilities	159
Chapter 26	Observations and comments on building Byelaws and current scenario in State for infrastructure of essential facilities	163
Chapter 27	Proposed road map for quality control for essential facilities with respect to structural and functional aspects	168

#### **F. Task 5: Public Awareness and Educational Campaign**

Chapter 28	Objective of Task 5 – Public Awareness and Educational Campaign	176
Chapter 29	Need of awareness campaign	177
Chapter 30	Various awareness programmes conducted in Jammu and Srinagar	181
Chapter 31	Support to designated authority for communications efforts related to proposed reforms	198
Chapter 32	Observations on Capacity Building Programs	199

#### **References**

Annexure I	Detailed Presentation of the Master Plan	204
Annexure II	Detailed Presentation for the Srinagar Municipal Corporation, SDA and Line Department	222
Annexure III	Detailed Presentation for the Jammu Municipal Corporation and Line Department	230
Annexure IV	Presentation on Natural Hazard Exposure of J&K and Sensitization to Earthquake Design Concepts by Ms. Alpa Sheth at Institute of Engineers	234
Annexure V	Presentation on Seismic Setting, Construction and Design in the State of J&K by Prof. Rupen Goswami at Institute of Engineers	241
Annexure VI	Presentation on Design and Detailing Issues of IS 1893(1) & IS 13920:2016 by Prof. Rupen Goswami at NIT, Srinagar	271



# Executive Summary



# CHAPTER 1

## Background

In 2015, the erstwhile Government of Jammu & Kashmir (GoJ&K) launched the Jhelum-Tawi Flood Recovery Project (JTFRP) with World Bank support. While prioritizing restoration and strengthening of critical infrastructure impacted by the J&K flood of 2014, the JTFRP has another key objective. It envisages capacity enhancement of disaster risk management systems in recognition of J&K's vulnerabilities to multiple natural hazards.

With building regulatory systems having a proven role in shaping robust disaster risk management systems, the JTFRP engaged the TARU-VMS LLP JV (hereinafter, the Consultants) to review J&K's existing building regulatory framework and chart the way forward based on review findings.

The Scope of Work, organized into five core tasks, envisaged reviews of the current building permit process, including on-site inspection procedures and implementation capacities among concerned institutions, and the regulatory and implementation systems for essential facilities. Recommendations were expected with respect to address gaps identified from the review.

The Consultants commenced work on the Assignment in January 2019 and have undertaken envisaged tasks and submitted agreed task-specific reports since. The latter have been approved by the Review Committee of experts constituted by the JTFRP.

This document summarizes the contents of the task-specific reports submitted, with an intent to draw decision-makers' attention to key issues and options for addressing them and add to the larger discussion on resilient built environments. Readers interested in specifics are encouraged to refer relevant task-specific reports.

### JAMMU & KASHMIR: KEY REGIONS AND URBAN CENTERS

**The erstwhile state of J&K comprised of three regions: Kashmir, Jammu, and Ladakh.** J&K reported a population of about 12.5 million in 2011. This population was distributed across three regions: Kashmir, with a population of about 6.9 million (about 55 percent of the total) spread over 10 districts; Jammu, with a population of about 5.3 million (about 43 percent of the total) spread over another 10 districts; and, Ladakh, with a population of about 290,000 (about two percent of the total) spread over two districts.

**Urbanization is low, and about half the urban population is concentrated in just two cities, Srinagar and Jammu.** The urban population of about 3.4 million (about 27 percent of the total) was distributed across 82 urban local bodies (ULBs). Srinagar and Jammu, both designated Municipal Corporations (MCs), together accounted for about half the state urban population, with Srinagar alone accounting for about 35 percent of the state urban population.







## JAMMU & KASHMIR: NATURAL HAZARD EXPOSURE

**J&K has high exposure to multiple natural hazards,** These include earthquake, flood, landslide, and fire. Exposure to cyclones and snow blizzards is moderate.

The entire region of J&K is seismically active, falling in Seismic Zones IV and V, severe and very severe intensity earthquake zones, respectively. Kashmir region is in Seismic Zone V; Jammu and Ladakh regions are in Seismic Zone IV.

Flood risk is particularly high in Kashmir. This arises from the region's natural topography and is compounded by construction activity on flood plains, encroachment on water bodies and diversion of nullahs. Ladakh experiences sudden cloudbursts and is inundation-prone on account of poor drainage. Both earthquakes and floods trigger landslides, affecting, inter alia, movement on the critical Srinagar-Jammu National Highway.

With wood being the traditional material for construction, a large volume of inflammable woven material including carpets and blankets found in homes, and the practice of winter fires being lit indoors common, fires are common in the Kashmir region and have resulted in much economic and heritage loss over time. The narrow, winding streets in these cities are also known to hobble fire relief and rescue efforts. Forest fires have worsened matters in recent years.

**Srinagar and Jammu face added challenges,** From the seismological perspective, the sizeable built habitat along the River Jhelum in Srinagar and the River Tawi in Jammu is of special concern. Such areas have deep soft soil deposits and could see

amplification of earthquake effects or be prone to liquefaction in the event of an earthquake.

At another level, the existing building stock in these cities, both older, poorly maintained and therefore crumbling structures in core areas and newer developments many of which may not be appropriately sited and/or designed, could prove vulnerable to seismic activity.

Jammu is prone to high flooding due to the combined effect of torrential rain and topographical changes induced due to weakly-regulated urbanization,

## LADAKH

Ladakh, on account of being scarcely populated, except for the town of Kargil and Leh, tends to be ignored in terms of planning and development priorities. This is despite Ladakh being a very important national and international tourism destination on account of its breathtaking landscapes and monasteries.

Leh and Kargil have their own Ladakh Autonomous Hill Development Councils. However, there has not been an effective integrated town planning approach. The draft master plan of 2018 for Kargil is not notified as of date (2021). Similarly the preparation of master plan of Leh has not been initiated.

Previous attempts have been made for structuring a plan for the preservation of the fast changing old townscape and revitalization of traditional social structures<sup>1</sup> but they have not been developed into an action plan. On account of lack of a cohesive master plan and severe space constraints in the town of Leh, the town has seen a spurt of numerous multi-storey hotels and tourist lodges coming up on narrow streets.

<sup>1</sup> EStructuring a Plan for the Preservation of an Endangered Townscape and Revitalization of Traditional Social Structures by Andre Alexander, Berlin 2007  
[http://www.tibetheritagefund.org/media/download/leh\\_conservation\\_aa.pdf](http://www.tibetheritagefund.org/media/download/leh_conservation_aa.pdf)





## CHAPTER 2

# Current Building Regulatory System: An Overview

**The legislative framework for the building regulatory system is grounded in a set of eight laws.** Municipal Corporation of Srinagar follows the Municipal Corporation Act of 2000 for issuance of building permission. Cities other than Srinagar follow J&K Control of Building Operations Act 1988 (Rules and Regulations of 1998) for the planning and development of the built habitat. This Act brings all building construction activity in the state under the purview of ULBs and select other authorities, envisages a building permit system, and empowers ULBs and concerned authorities to act against unauthorized construction. Other laws envisage local and regional master planning, specify the powers and responsibilities of ULBs, promote heritage protection and conservation, and aim at regulating organized real estate activity.

The Jammu Master Plan 2032 was notified in March 2017 and the Srinagar Master Plan 2035 was notified in May 2019. New developments in the local areas of Jammu and Srinagar are required to be conform to these master plans. Further, the Unified Building Byelaws have been drafted and are awaiting final notification which is expected within 2021. Subsequent to the notification of the UBB, all municipal corporations, urban local bodies and urban development authorities are expected to mirror and adopt the UBB as appropriate. This is still work in progress at time of writing the report.

**Building byelaws and development regulations provide building standards and detail the building permit system and the enforcement arrangements for it.**

**The building byelaws specify the following:**

- Building parameters such as zoning norms, setbacks, ground coverage, and floor-area ratio (FAR);
- Provisions and requirements for various services such as fire protection, light and ventilation, elevators, sewage, waste disposal, drainage, water supply, and, parking;
- Steps in the building permit system, including preliminary review of applications for issue of construction permits, on-site inspections during construction, and issue of completion certificates post-construction;
- Site inspection requirements before and during construction and specify material testing requirements during the construction phase;
- Requirements for engaging technically competent persons for daily supervision and quality assurance of construction work;
- Requirements for stability certification from structural engineers and construction certification from site supervisor before completion certificates can be issued and,





- Disallow permanent water and power connections to buildings without completion certificates.

Notably, in what can perhaps be construed as a recognition of ground realities, there exist contentious provisions, mainly for ‘deemed’ approval of buildings and conditions for post-construction building approval.

**There are added requirements for certain types of buildings, viz., multi-storey buildings, commercial buildings, and essential facilities<sup>2</sup>.**

Structural designs and construction standards for multi-storey buildings are expected to be supervised at three stages, i.e., basement/plinth stage, halfway of superstructure stage, and completion stage. Multi-storey buildings of more than 15 m in height have to abide by the more rigorous fire safety requirements specified in the National Building Code (NBC) 2016.<sup>3</sup>

As per the Jammu Municipal Corporation Building Bye-Laws Under The “J&K Municipal Corporation Act 2000”, commercial buildings more than 200 sq m in area or over G+1 require no-objection certificates (NOCs) from fire authorities and structural clearances from structural engineers for building completion certificates to be issued.

Building byelaws provide for general requirements of minimum plot area, FAR, ground coverage, building height, minimum set back, circulation area, etc., for select essential facilities such as hospitals, police stations, and fire stations. For structural safety of such facilities, adherence to the National Building Code (NBC) is mentioned as a requirement, but not often followed.<sup>4</sup>

**Several agencies are involved in the building permit process. They follow the same broad steps, though with some variation in how construction permit applications are processed.**

While it is ULBs, including the SMC and the JMC, that are the key agencies anchoring the building permit system, there are others involved too. These include the Srinagar (SDA) and Jammu Development Authorities (JDA) (for parts of these cities that lie beyond municipal limits), tourism development authorities (in select locations of tourist importance such as Sonmarg and Kargil), and the Lakes & Waterways Development Authority in identified areas around lakes and waterways.

### **General Process of Build Permit System**

Typically, construction permit applications, after preliminary scrutiny, are sent for NOCs to a range of agencies, among them revenue and town planning authorities, environment protection agencies, fire services, and water and power utilities. On receipt of NOCs from these agencies, an initial site inspection is made. Construction permits are issued - paving the way for construction activity to commence - if the (pre-construction) site inspection results are satisfactory and upon payment of specified fees by the applicant

In terms of processing construction permit applications, differences among agencies are mainly in relation to the nature and volume of documentation required, the adoption of online processes, and the range and number of agencies from which NOCs are sought.

Enforcement protocols such as those for site inspections during construction or material testing and special rules pertaining to multi-storey and commercial buildings are more or less consistent across various agencies.

<sup>2</sup> Essential facilities refers to manmade structures/ improvements that because of their function, size, service area, or uniqueness, have the potential to cause serious bodily harm, extensive property damage, or disruption of vital socio-economic activities if they are destroyed, damaged, or are functionally impaired. Hospitals, colleges, schools, and fire stations have been focused on in this Study.

<sup>3</sup> The Jammu & Kashmir Unified Building Byelaws 2021 (awaiting final notification at time of this report) has addressed most of these concerns but could benefit from strengthening of the seismic safety requirements.

<sup>4</sup> The Unified Building Bye-Laws 2021 has addressed the conformance requirements of NBC 2016 more extensively.





## CHAPTER 3

# Key Issues and Challenges

**The current situation is marked by frequent breach of planning and building standards and insufficient attention to hazard resistance in building design and construction.** These cumulatively point to urban development that is unplanned and at-risk and can be traced mainly to citizen's limited engagement with the building permit system and gaps in building regulatory standards and their enforcement. A fundamental challenge in enforcement is the weakly-manned enforcement apparatus.

**Citizen's engagement with the building permit system is limited.**

Data collected during an extensive survey of building permit users in the course of the project suggests that a very small percentage of all building owners and developers follow the building permit system. A negligible number of the few building permit users apply for building completion certificate. This is particularly concerning – and important to address - because even the best-designed systems will struggle to achieve envisaged results if citizens remain reluctant to engage with them.

Ladakh, especially needs active participation from the local residents to ensure that there is a balanced development of the region. The pressures from the tourism industry and a development strategies which are not aligned with the special character and heritage of Ladakh could be quite damaging.

**Three factors impact citizen's engagement with the building permit system:**

- The need for disaster mitigation is under-appreciated. While past disasters J&K has seen have underscored the importance of preparedness and immediate rescue and relief among citizens, this does not extend to disaster mitigation. Many citizens remain resigned to the prospect of damage in the event of disaster. This is not unique to J&K but is possibly exacerbated by fatalistic attitudes the erstwhile state's upheavals and traumas have spawned.

A similar under-appreciation is evident among institutional stakeholders. Their general awareness of risks and vulnerabilities has yet to trigger systematic assessments of potential losses in disaster scenarios and yield a concerted push for mitigation efforts. Such efforts are commonly viewed as speed breakers in the path of growth and development.

- The building permit system is unsuitable – too complex - for self-use homes. Such homes make a majority of the buildings in J&K. The building permit system is more tuned to developer-built construction and, hence, incorporates a measure of complexity. On the other hand, self-use homes, which account for the bulk of building construction activity in J&K,





need simple building permit systems. The International Residential Code and the Small Building Code of Trinidad and Tobago have set precedence for this.

- Gaps in permit rules, enforcement protocol, and concerns over high informal costs act as further deterrents. Prospects of delay in issue of construction permits and completion certificates, together with the high informal costs these may involve encourage owners/ promoters to circumvent the permit system. Data analysis of the surveys of over 300 building permit users conducted during the project in Jammu and Srinagar suggests informal costs to be significantly higher than officially prescribed costs and involvement of ‘liaising agents’.

A key reason for the delays in the building permit system is the requirement of NOCs from the Revenue Department. Applicants often do not have the necessary documentation for land ownership in the desired format. Aggressive, unrealistic timelines envisaged for various sub-processes have also played a role in fomenting perceptions of a slow-moving building permit process. These timelines raise applicants’ expectations – and end up disappointing them.

The awareness that existing provisions for post-construction approval can be utilized if needed in time and that enforcement of existing penalties is weak, further act as perverse incentives.

**The system is not geared towards addressing issues of safety against natural hazards and issues of structural safety under ordinary loads. This is primarily due to gaps in building**

### **byelaws, permit procedures, and enforcement protocols**

- There is neither any explicit requirement to design buildings for J&K’s multi-hazard exposure, nor any hazard vulnerability map that the building permit system can be dovetailed to before construction permits are issued.<sup>5</sup>
- The building permit system does not envisage submissions of structural drawings, soil investigations, or stability certificates at any stage.<sup>6</sup>

Structural stability issues have special significance for multi-storey buildings. However, not all such buildings are designed and certified by structural engineers and the requirement for structural clearances for them before they can receive completion certificates is not completely adhered to. The qualifications of structural engineers to be engaged for quality assurance on structural issues and providing structural clearances is not specified.

- There are no byelaws for fixing plinth levels and construction over flood channels. Fire safety requirements, accessibility norms, and regulations for validating the safety of existing buildings and ensuring necessary maintenance and retrofitting are inconsistent with the NBC 2016.
- While site inspection is carried out at the building permit approval stage, subsequent site inspections are rarely undertaken. Even in the case of multi-storey buildings where three rounds of site inspection are explicitly envisaged, only the inspection at the basement/plinth stage occurs.

<sup>5</sup> A multi hazard vulnerability Map is under preparation at time of writing this report

<sup>6</sup> The Unified Building Bye-Laws 2021 has addressed some of these concerns and could benefit from further strengthening of structural safety requirements. We recommend an exclusive chapter on structural safety be inserted into the draft Code.





- Fire inspections do occur at two stages – for issuing NOCs for construction permits initially and completion certificates later – but are confined to commercial and institutional buildings (not residences) and focus on the building structure itself, not its siting implications for access during rescue.
- There is no established protocol for testing building material used.
- Owners/ promoters engage technical persons for daily supervision only in case of commercial and public buildings. Engagement of quality assurance personnel such as structural engineers is rare.
- There is no established protocol for enquiry into building failures and pinning responsibility for the same.
- Traditional self-use homes in Kashmir, particularly those built in the Dhajji-Dhawari and Taq styles, have excellent intrinsic seismic resistance features and great heritage value. There are few efforts in evidence for restoring and promoting such homes and heritage precincts.<sup>7</sup>

The high-level Heritage Conservation Authority (HCA) envisaged under the J&K Heritage Conservation and Protection Act 2010 to steer heritage conservation and protection efforts in J&K was constituted late, has met rarely, and needs greater representation of building professionals such as architects, town planners, and structural engineers to steer such efforts. The HCA also has a potential role in ensuring that short-term tourism growth considerations do

not overtake heritage considerations in pilgrimage and tourism centers.

**The same building permit system is applicable for essential facilities, however the essential facilities did not follow the building permit requirements.** Joint visual inspections undertaken by the JTFRP and the Consultants in select hospitals, fire stations, and colleges suggests inadequate attention to seismic and flood design requirements (especially in structural design and detailing and inappropriate siting), construction quality, and use of inflammable material.

These can be traced to the following:

- There is no specific requirement in building byelaws to address risk and vulnerability of essential facilities during and after disaster. Building byelaws are also silent on benchmarks for assessing the disaster mitigation potential and performance-based design of essential facilities. The latter, notably, is a gap even in the NBC 2016.
- While general adherence to the National Building Code is implicit in the current building byelaws, there is no mention of specific clauses therein. This presents challenges as the NBC 2016 is wide and far-reaching in scope, contributing to a situation where it is inadequately referenced and followed more in breach than adherence.<sup>8</sup>
- Buffer zones envisaged in Master Plans are not rigorously implemented in areas having moderate to high vulnerability to flash floods and landslides.<sup>9</sup>

<sup>7</sup> The Unified Building Bye-Laws 2021 has addressed some of these concerns. It is a huge improvement from the existing document and could be further strengthened with input from a structural engineering expert.

<sup>8</sup> The Unified Building Bye-Laws 2021 makes extensive references to NBC 2016

<sup>9</sup> The Unified Building Byelaws 2021 have introduced a two-stage building permit process and it is hoped that this will improve the compliance to building byelaws and to the National Building Code for essential facilities and high-rise buildings. Conformance to documents relating to Hospital safety and safety of essential facilities published by the National Disaster Management Authority, if mandated, will greatly improve the safety of essential facilities.





**In what is potentially the single biggest issue inhibiting the building regulatory system, building permit departments in ULBs and other concerned agencies face serious shortage of technically qualified staff.**

Many senior technical positions are occupied by persons not suitably qualified for the position. Many instances of this situation have been enumerated in the Task reports.

Smaller ULBs have few technical staff - many don't have even a single technical individual - and even larger ULBs and agencies are short of engineers, planners, architects, building inspectors, and enforcement staff. In instances when some of these positions are occupied, individuals may not have the necessary technical qualifications owing to dilution of qualification criteria over time. Fire authorities have trained fire personnel but capacities for checking building designs and drawings are strained.

Many of the bottlenecks evident in the system can be ascribed to staff shortages. That said, a filling-up of vacant positions, while important, may not be sufficient to address the range of issues in evidence.

**Accreditation and licensing systems and systematic capacity building are other aspects of human resource development needing attention.<sup>10</sup>**

There is a case for exploring substantive role for various types of building professionals outside building regulatory institutions. This could include their involvement in hazard-resistant building design and quality assurance and certification on a range of subjects including soil testing, material quality, structural design, and construction supervision. Accreditation and licensing systems for such professionals will inspire the necessary credibility and enable targeting of capacity building (CB) efforts for preparedness for envisaged roles.

Further, neither hiring nor accreditation and licensing systems preclude the need for CB on various aspects of hazard-resistant design and construction, experiences and recent developments therein, and applicable standards, byelaws, and role requirements, via a mix of trainings, sensitization exercises, exposure visits, reference manuals, etc.,. Such effort would also be important for tradespersons, including masons, plumbers, electricians, and plumbers, involved in building construction activity.

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<sup>5</sup> A detailed accreditation system has been incorporated in the Unified Building Byelaws 2021 (awaiting final notification at time of writing this report) which, if implemented, will can alleviate the situation significantly.



## CHAPTER 4

# Potential Way Forward

### Key Intervention Areas

The discussion on key issues and challenges suggests three key intervention areas:

- **Encouraging citizen engagement with the formal building permit system**, a situation currently constrained by a system overly complex for self-use homes, delays in building permit processes arising on account of difficulty in obtaining Revenue Department No Objection Certificates, concerns over perceived delays and informal payments, and limited appreciation of the importance of disaster mitigation measures among the citizenry;
- **Revisiting building byelaws and their implementation arrangements**, building on the NBC 2016 and best practices in more developed regions of India and with special attention to essential facilities, and aimed at robust design, rigorous site inspection and material testing, systematic quality assurance, improved accountability for building failure, and conserving heritage; and,
- **Improving institutional and implementation capacities**, addressing the shortage of technically qualified personnel in public institutions,

the need for engaging building professionals and tradespersons outside public institutions, and ensuring preparedness for envisaged roles among all involved in implementation.

**Cumulatively, these are expected to yield a systematized building regulatory system for the entire J&K.** This refreshed system will be marked by:

- building standards that respond to all aspects of safety;
- a rationalized building permit system that improves citizen engagement with such standards;
- implementation arrangements that ensure adherence to such standards, including clear protocols for on-site inspection and testing;
- improved capacity and accountability of public institutions, with local institutions positioned to implement and enforce envisaged standards and systems;
- engagement of a wide pool of licensed professionals and registered tradespersons in ensuring hazard-resistant building design and quality assurance and certification; and,
- sustained investment in CB.





The recommendations in relation to the three key intervention areas are presented below. Most recommendations can be taken forward through Government Resolutions (GRs), orders, directives, work plans, and other such non-legislative instruments for, and the need for these has not been repeated against each applicable recommendation for brevity sake. Recommendations which need legislative framework changes (complementing non-legislative ones) have been identified though.

**It would be desirable for the regional administrations in both regions of Jammu and Kashmir to separately consolidate the recommendations into a comprehensive building regulation document.**





## CHAPTER 5

# Recommendations

### Improved Engagement with Building Permit System

**#1 A separate, simplified building permit system should be introduced for self-use homes.** This simplified system, intended for self-use homes of up to 2,000 sq ft and not exceeding two storeys, should apply only to load bearing structures. (Reinforced concrete frame structures require in-depth engineering knowledge, more so in J&K's highly seismic context.)<sup>11</sup>

Under this system, a licensed architect, civil engineer, or planner would certify a building's compliance with building byelaws and design and detailing norms freshly developed for such homes. Upon this certification, there will no requirement on the part of building permit authorities to check the adequacy of the building site, plan, and design. A change in the legislative framework would ensure better seeding of this recommendation.

**# 2. Added means for establishing ownership claims over building sites should be identified.** If an applicant has sufficient evidence to indicate that she is the owner of the building site but is unable to furnish ownership papers for the same in the desired format, options such as inviting objections in local newspapers (at the cost of the applicant) and/ or sworn affidavits can be exercised.

In addition, indemnification can be sought from the applicant for any damage arising on account of misrepresentation and rights to demolish the building may be retained by building permit authorities in case of fraudulently obtained building permits. This will require a change in the legislative framework.

**# 3. A communication campaign underscoring the need for complying with the building regulatory framework should be launched.** Key messages for citizens must refer to their right to safe, hazard-resistant homes, the fact that such homes are possible to make, and that the building permit system, when complied with, is intended to deliver on this possibility. With respect to the lattermost, the obligation of public institutions, licensed building professionals, and registered tradespersons to help citizens realize their right to safe, hazard-resistant homes would need emphasis. Among the public awareness and dissemination options that can be explored are documentary films.

A parallel outreach among key decision-makers in public institutions could dwell on the 'business case' for disaster mitigation, the disaster risks to which J&K is vulnerable,

<sup>11</sup> Since the writing of the report, a system has been put in place for self-certification of self-use homes in government colonies and in government approved colonies.





and low-hanging mitigation efforts that can reduce disaster risk and improve disaster resilience. Regional administrations, under whose stewardship these will have to be taken forward, can explore partnerships with

premier educational institutions in J&K, such as the National Institute of Technology (NIT), Srinagar and the Indian Institute of Technology (IIT), Jammu and professional bodies such as IE(I), IIA etc. Refer Table 1

Message	Target	Type of Messaging	Communication Methodology	Duration	Remarks
“Good and safe construction is a right of buyer/occupant”, Risk Perception	Home Buyer/ Occupant.	Sensitization	Pithy message through radio, TV, phone messaging, theatres, social media or print.	15-120 seconds audio/video messages	Useful for Disaster response, for Disaster mitigation
“Disaster Mitigation is better than Disaster Response”, Type of Exposure to Risk, steps for safe constructions	Bureaucrats and Stakeholders	Sensitization	Workshop	Crisp two to four-hour	Effective
“It is possible to prevent loss of lives through good construction and detailing for natural hazards”	Tradesmen- Masons, Carpenters, diploma holders	Training	Workshop for masons to promote Safe construction practices, earthquake detailing	Three to Five days	Very Effective
Planning and designing for disaster resistant construction etc.	Architects, Planners	Training	Workshop, Course Material handout	One day to One week	Effective
Detailed design for Earthquakes and other natural Hazards	Structural Engineers	Training	Workshop/ Course, Course Material handout	One week to One Semester	Very Effective

Table 1 Communication Strategy for Various Stakeholders

**# 4. A dedicated website furnishing information on permitted construction in various areas, uploading construction permit proposals, and updating construction permit**

**application status** exists but it needs a dedicated IT professional to manage & update the website and portal on a continuous basis



## Improved Engagement with Building Permit System

**# 5: Certain common features need to be incorporated in existing byelaws and implementation arrangements for all kinds of buildings,** including self-use homes, commercial buildings, and essential facilities for which additional requirements for/ changes to byelaws and implementation arrangements are discussed in Recommendations # 6- # 9 below. The following should be included with appropriate modifications as needed for various types of buildings:

- **# 5.1: A process flow chart should be prepared for making the building permit process safe.** This would locate all processes aimed at making buildings safe in the larger building permit process.
- **# 5.2: Do's and Don'ts in building construction practices should be clearly identified.** This would be useful for both ready reference and dissemination purposes.
- **# 5.3: Inspections and testing required from inspection and testing agencies at various stages of construction should be listed.**
- **# 5.4: A robust protocol for granting variances should be introduced.** This will ensure that variances are granted transparently, following clear outlining of their case and consideration of such case within an established framework.
- **# 5.5: Protocols need to be introduced for investigation of building failures, establishing causes of such failures, and penalties for different kinds of**

**failures.** This is critical to building failures being systematically examined, responsibility for them being pinned, and action to be taken against those responsible.

**# 6: Byelaws and implementation arrangements for self-use homes should be developed.** In line with the simplified building permit process recommended for such buildings, and in addition to the changes proposed under Recommendation # 5, these should include/ require/ provide for the following:

- **# 6.1: A manual for non-engineered/ self-use/ informal building construction, including checklists for various stages of construction, needs to be prepared.**
- **# 6.2: Third-party inspection should be provided for at specified stages through registered structural engineers, architects, and planners.**

**# 7: Byelaws and implementation arrangements for all buildings other than self-use homes, including commercial establishments such as malls and theaters and facilities such as schools and hospitals, need revision.** These will be in addition to those proposed under Recommendation # 5 and should specify/ require/ provide for the following:

- **# 7.1: A separate department/ unit should be identified for proof checking of structural, fire, and other safety checks of designs.** Construction should commence only after this department/ unit has satisfied itself of the robustness of the designs.
- **# 7.2: Checklists should be prepared**



**for inspection by registered third-party inspection agencies at different stages of construction.**

These inspections can take place for competency of founding soil, plinth level checking, material quality, scaffolding assessment, reinforcement placing, seismic detailing before pouring concrete, etc.

- **# 7.3: Testing procedures for all material should be laid out, and the adequacy of government approved labs for testing of these materials should be ensured.** The testing procedure could specify the minimum number of tests to be conducted for a particular volume/ weight of the material for all materials.
- **# 7.4: Soil testing should be mandatory.** This can be undertaken directly by a designated government agency or tests undertaken by private parties can be verified by such.
- **# 7.5: Instant testing procedures should complement routine testing procedures.** Instant tests like NDT, re-bar locator, core extraction, etc., carried out during inspections undertaken at various stages, will verify and validate routine testing reports.
- **# 7.6: Hiring structural engineers for certification of both designs and finished structures should be mandatory.** Clear descriptions of their roles, responsibilities, and liabilities need to be provided to enable this. Inter-alia, the structural engineer would be responsible for certification of structure design (prior to construction) as per prevalent IS norms and post-construction certification that the structure has been

executed consistent with the structure design.

- **#7.7: Qualified structural engineers should be part of the inspection squad to ensure that execution is as per the structural design.** Such structural engineers could belong to an independent third-party structural engineering company or a government institution.
- **# 7.8: There should be mandatory hiring of geotechnical agencies.** Clear descriptions of their roles, responsibilities, and liabilities need to be provided to enable this.
- **# 7.9: Owners should be required to furnish purchase bills for reinforcing/ structural steel.** This will help verify whether material used in construction is in line with the structural drawings.

**# 8: Byelaws and implementation arrangements for commercial buildings need revision.** These revisions are in addition to those proposed under Recommendations # 5 and # 7 and should specify/ require/ provide for the following:

- **# 8.1: Fire regulations should be in line with the NBC 2016, and regular fire audits are to be undertaken.**
- **# 8.2: Building contractors should furnish quality assurance undertakings, including an undertaking for safety at site to accompany building permit applications.**
- **#8.3: Construction firms should hire 25-30 percent Industrial Training Institute (ITI)-trained masons, plumbers, and electricians.**
- **# 8.4: Harsher penalty provisions**





for breach of byelaws should be provided for.

**# 9: Byelaws and implementation arrangements for essential facilities need revision.** These revisions are in addition to those proposed under Recommendations # 5 and # 7 and should specify/ require/ provide for the following:

- **#9.1: Use of certain types of building material (such as combustible material) should be prohibited.**
- **# 9.2: Additional rigor must be observed for building permit proposals for buildings proposed on slopes and higher contours.**
- **# 9.3: Every building promoting department/ agency must identify an on-site nodal officer to ensure adherence to safety requirements in new constructions.**
- **# 9.4: Every building promoting department/ agency must engage licensed engineers for day to day supervision of construction activity.** Clear descriptions of their roles and responsibilities need to be provided to enable this.
- **# 9.5: There should be compulsory and regular design and safety audit of all essential facilities.** This is confined to hospitals presently.

**# 10: A structural audit of existing essential facilities should be carried out on priority.** This needs to follow a structured plan of action and could commence with hospital and school buildings.

**# 11: The HCA needs to be activated, with greater representation of building professionals.** The HCA was constituted

late, has met rarely, and needs greater representation of building professionals to fulfill its mandate for steering the heritage protection and conservation agenda in J&K.

Among the emphasis areas for the activated HCA should be: (a) guiding local authorities in listing of heritage structures and precincts and developing measures for protecting and conserving the same; (b) promoting traditional hazard-resistant construction; and, (c) ensuring that heritage conservation and tourism growth considerations are balanced in tourist centers.

The Heritage of Ladakh needs special mention. The Hemis Monastery goes back to the seventeenth century. Similarly the Thikse Monastery attracts tourists from around the world. Special guidelines need to be developed for the maintenance and retrofit of the exquisite monasteries of the area. Presently the Archaeological Survey of India conducts the retrofit of these national heritage sites, but more local involvement would help to maintain the original culture and ethos of these monasteries.

Ladakh has a unique local building technology which is quite different from Jammu and Kashmir and responds to the dry and extreme weather of Ladakh. More attempts to repurpose existing (and often abandoned) old homes which respond to changing lifestyles are required in lieu of demolishing them and building “city-type” reinforced concrete structures.

**# 12: The Development Control Regulations for the Municipal Corporations and the Urban Local Bodies need to incorporate planning provisions for construction on slopes.** Unfortunately, codal provisions related to landslide and slope stability considerations do not find mention in most development control regulations (DCR), even in important



hill towns of India such as Mussourie, Shimla, Manali etc, despite their being subject to multiple annual occurrences of landslides or slope failures due to heavy rain, avalanche, cloudburst that result in significant damage to life and property. Some of the safety Bureau of Indian Standards mention requirements to be followed for construction on slopes. However they do not find a place in the DCR. Some cities have recently developed draft planning norms to control building activity on steep slopes. The draft development plan for Shimla 2021, for example, recommends the restrictions for

construction on slopes as mentioned below.

Average Slope (% age)	% age of site to remain in Natural State
10	32
17	36
20	45
25	57
30	72
35	90
40	100

### Slope Density Provisions (Adopted From Nelsen, 1979)

**Recommendation:** A contour map for each of the municipal corporations, councils and urban local areas in Jammu, Kashmir and Ladakh should be integrated with the development plan for the area marking clearly “no development zone”, “limited development zones” and “no-limit development zones” based on the slope of the area (criteria such as that shown above may be used). The dos and donts for construction on slopes has been discussed in detail in the manual for masons prepared under the project

#### # 13 The building permit system for LAWWDA needs to be strengthened.

There are no special requirements laid out for construction in marshy and lake areas and the building permit system for LAWWDA (Lake and Water Works Development Authority) and the building permit system is more or less similar to that of the Srinagar municipal corporation other than a couple of additional No-objection certificates from Collector Land Acquisition, Lake and Water Works Development Authority (LAWWDA),

the Executive Engineer, Lake Division No. 2nd, J&K LAWWDA and from Waterworks Division, Srinagar. As such, very limited permissions are granted for new construction of homes in the lakes. For the few permits that are granted for reconstruction of old houses, following are suggested:

#### Recommendation

- Only reconstruction of existing homes should be allowed in the lake areas. No new construction should be permitted in the lakes.
- Structures should be founded on wooden or concrete/augur piles
- Homes should be restricted to single storey or maximum one and a half storeys.

**# 14 Original Drainage System of the Valley need to be revitalized or new artificial lakes need to be built.** It is recognized that in the long-term, fixing plinth level of buildings with respect to the High flood level in the areas between the



river Jhelum and the flood soil channel will raise urban planning challenges. As a long-lasting solution to the flooding of the Kashmir Valley, **original Drainage System of the Valley as constructed by Raja Hari Singh as a response to the 1903 floods may need to be revisited or new artificial lakes need to be built.** To mitigate the problems of development on the west, Master Plan-1991 recommended three new artificial lakes. These lakes were never built. Large areas developed between the River Jhelum and the Flood Spill Channel without the creation of these lakes has been causing persistent problems of drainage. Additionally, while the construction of the Nallah Mar road may have eased some traffic woes, the construction of this road at the site of Nallah Mar without the underground sewer/water channel has blocked the originally planned drainage system of the valley and reduced Anchar, Khushalsar, Gilsar and Babdemb lakes into virtual marshes while adding pollution in

Dal Lake.

**# 15 The Floor Space Index (or Floor Area Ratio) may be considered to be increased in Leh to avoid wanton illegal construction.** Hotels of only up to Ground + 3 storeys are officially permitted in Leh but many hotels have illegally constructed up to 5 storeys. Due to the heavy demand from the tourism sector, and limited area available, due consideration may be given to the construction of up to five storeys, in consonance with the overall planning and terrain of the land.

**# 16 The Indian Army may be requested to vacate land at Kargil Lower Plateau to allow for a planned civilian township.** The Indian army has an opportunity to cede this land to Kargil town and will still be in possession of adequate land for their needs. Without this handover, the planned development of Kargil will continue to be a challenge.

## Improving Institutional and Implementation Capacity

**# 17 Government agencies, departments and authorities including Municipal Corporations and Development Authorities must be held to the account for non-compliance with Building Permit rules and regulations.** Compliance to the building permit system by the community will be easier to implement if there are no violations of the building permit system carried out by the State itself.

**# 18: Vacant technical positions in ULBs and other building regulatory institutions need to be populated with qualified personnel.** Among the key requirements is at least three civil engineers and at least one structural engineer each in the SMC and JMC, at least two civil

engineers in the SDA and JDA, and at least one civil engineer in each ULB. Appropriate (not diluted) candidates' qualifications and experience criteria will have to be set clearly and appropriately for envisaged benefits to be realized. A subject expert may be engaged for rewriting the job requirements/ descriptions, and qualifications and experience criteria for various positions.

**# 19 : A licensing and registering mechanism needs to be introduced for building professionals, tradespersons, and, in the longer term, building contractors.** Accreditation and licensing systems for building professionals, including both individuals and agencies, and registration of tradespersons will inspire





credibility, create accountability, incentivize performance, and enable targeting of CB efforts at them for preparedness for envisaged roles.

The accreditation and licensing system for building professionals will have to specify qualifications and experience criteria, provide for competency-based tests, and have a continuing education requirement. Continuing education requirements would be important for tradespersons too. In time, registration of building contractors may also be undertaken to improve accountability.

**# 20: A comprehensive Capacity Building (CB) strategy and implementation plan should be drawn up.** This should:

- target all relevant stakeholder groups, including different categories of personnel in various public institutions, licensed professionals, and registered tradespersons;
- focus on CB around themes of hazard-resistant design and construction, experiences and recent developments therein, applicable standards and byelaws, and building preparedness for envisaged roles;
- consider a mix of approaches, including sensitization exercises, training events, and exposure visits, supported by

manuals and other suitable reference material;

- involve reputed experts and institutions of eminence such as the Bureau of Indian Standards, the Indian Institute of Architects, and the IITs in planning and delivery of the CB agenda; and,
- explore collaborations with premier educational institutions in J&K, such as NIT, Srinagar and IIT, Jammu, professional organisations and NGOs involved in the task.

The above would include awareness programs on Disaster Mitigation, Preparedness, and Response for all officials and professionals involved in the building permit system, including design architects, masons, and carpenters.

**# 21: New technology and know-how, both in terms of latest equipment and latest construction techniques, need to be promoted.** To take this forward, it would be appropriate to nominate officials who can undertake necessary research and explore appropriate institutional collaborations. This can be undertaken in Srinagar and Jammu before being promoted elsewhere. Incentivizing contractors would further this. One option for incentivizing contractors would be introducing pre-qualifying criterion for innovation and introduction of new technologies.



## Typology and Time Horizons

The recommendations above can fall in the domains of disaster mitigation, preparedness, and response and be implemented in the short (0-2 years), medium (2-4 years), and long term (more than 4 years). Table (1) presents the typology of, and potential time horizons for, the recommendations.

<b>TABLE (1): RECOMMENDATIONS: TYPOLOGY AND TIME HORIZONS</b>			
<b>Sl. No.</b>	<b>Recommendation</b>	<b>Typology</b>	<b>Time Horizon</b>
<b>Improved Engagement with Building Permit System</b>			
# 1	Introduce separate, simplified permit system for small self-use homes	Mitigation	Medium
# 2	Allow added ways for establishing ownership claims over building sites	Mitigation	Medium (Linked to Land Title Act 2019 which is yet to be passed)
# 3	Launch communication campaign for encouraging compliance with building regulatory framework	Mitigation	Short
# 4	A website with information on permitted construction in various locations and uploading and updating permit applications exists but it needs a dedicated IT professional to manage & update the website on a continuous basis	Mitigation	Short
<b>Improved Byelaws and Implementation Arrangements</b>			
# 5	Incorporate certain common features in byelaws and implementation arrangements for all kinds of buildings		
# 5.1	Prepare process flow chart clarifying safety aspects in building permit process	Mitigation	Short
# 5.2	Identify clear do's and don'ts in construction practices	Mitigation	Short
# 5.3	List inspection and testing requirements at various stages of construction	Mitigation	Short
# 5.4	Introduce robust protocols for granting variances	Mitigation	Short
# 5.5	Introduce protocols for investigating, analyzing, and penalizing building failures	Response	Short



**TABLE (1): RECOMMENDATIONS: TYPOLOGY AND TIME HORIZONS**

Sl. No.	Recommendation	Typology	Time Horizon
# 6	Develop byelaws and implementation arrangements for small self-use homes (in addition to those under # 5 above)		
# 6.1	Prepare reference manual, including checklists for various stages of construction	Mitigation	Short
# 6.2	Provide for inspection by registered third parties at specified stages	Mitigation	Short
# 7	Revise byelaws and implementation arrangements for buildings other than self-use homes, including commercial establishments such as malls and theaters and facilities such as schools and hospitals		
# 7.1	Identify/ create separate department/ unit for proof checking building designs for safety	Mitigation	Short
# 7.2	Prepare checklists for use during envisaged inspection visits at various stages	Mitigation	Short
# 7.3	Lay out testing procedure for all material and ensure adequacy of government approved testing labs	Mitigation	Short
# 7.4	Make soil testing mandatory	Mitigation	Short
# 7.5	Introduce instant testing procedures to complement routine testing procedures	Mitigation	Short
# 7.6	Mandatory hiring of structural engineers for certification of designs, finished structures	Mitigation	Short
# 7.7	Ensure qualified structural engineers in inspection squads	Mitigation	Short
# 7.8	Mandatory hiring of geotechnical agencies	Mitigation	Short
# 7.9	Require owners to furnish purchase bills for reinforcing/ structural steel	Mitigation	Short
# 8	Revise byelaws and implementation arrangements for commercial buildings (in addition to those under # 5 and # 7 above)		
# 8.1	Provide for fire regulations in line with NBC 2016 and regular fire audits	Mitigation and Preparedness	Short
# 8.2	Require building contractors to furnish quality assurance undertakings	Mitigation	Short



**TABLE (1): RECOMMENDATIONS: TYPOLOGY AND TIME HORIZONS**

Sl. No.	Recommendation	Typology	Time Horizon
# 8.3	Construction firms should hire 25-30 percent ITI-trained masons, plumbers, etc.	Mitigation	Short
# 8.4	Consider harsher penalty provisions for byelaw breach	Mitigation	Short
# 9	Revise byelaws and implementation arrangements for essential facilities (in addition to those under # 5 and # 7 above)		
# 9.1	Prohibit use of certain types of material (such as combustible material)	Mitigation and Preparedness	Short
# 9.2	Undertake stringent assessment of applications for buildings proposed on slopes and higher contours	Mitigation	Short
# 9.3	Require identification of an on-site nodal officer for adherence to all safety aspects during construction	Mitigation	Short
# 9.4	Require engagement of licensed engineers for day to day supervision of construction	Mitigation	Short
# 9.5	Compulsory and regular safety audits	Preparedness	Short
# 10	Structural audit of existing essential facilities on priority	Preparedness	Short
# 11	Activate HCA, with greater representation of building professionals	Mitigation and Preparedness	Short
#12	Require Planning Norms to incorporate constraints on construction on hill slopes.	Mitigation	Short
#13	The building permit system for LAWWDA needs to be strengthened and special provisions for foundations for building in marshes and in water needs to be specified	Mitigation and Preparedness	Short
#14	Original Drainage System of the Valley as constructed 1903 floods may need to be revitalized or new artificial lakes need to be built for a longterm solution to Srinagar flooding..	Mitigation and Preparedness	Long



**TABLE (1): RECOMMENDATIONS: TYPOLOGY AND TIME HORIZONS**

Sl. No.	Recommendation	Typology	Time Horizon
#15	Floor Space Index (FSI/FAR) may be considered to be increased in Leh to avoid wanton illegal construction.	Mitigation and Preparedness	Medium
#16	The Indian Army should vacate land at Kargil Lower Plateau to allow for a planned civilian township.	Mitigation and Preparedness	Medium
<b>Improved Institutional and Implementation Capacity</b>			
# 17	Institutional framework to be revised to hold Government agencies, departments and authorities including Municipal Corporations and Development Authorities to account for non-compliance	Mitigation and Preparedness	Short
#18	Fill vacant technical positions in ULBs and other institutions with qualified personnel	Mitigation and Preparedness	Short
#19	Introduce licensing and registering mechanism for building professionals, tradespersons, and building contractors	Mitigation	Short (Medium for contractors)
#20	Draw up comprehensive CB strategy and implementation plan	Mitigation, Preparedness, and Response	Short
#21	Promote new technology and know-how	Mitigation	Medium

### Final Workshop

As a part of the final deliverable and dissemination, VMS Consultants and Taru Leading Edge supported by JTFRP and the World Bank organised a final workshop **“Promoting Safe Habitat and Structural Safety Through A Robust Building Permit System”** in the form of a webinar on Tuesday, **6th October 2020** between **04.00 PM to 06.30 PM**. The workshop saw an overwhelming positive response and was attended by over 120

participants from various organizations and institutions from over the country. This workshop served as an informative platform for understand the current issues of vulnerabilities of habitat and map the roadmap for safe and resilient habitat, sectoral and cross-sectoral learnings, best practices and towards dissemination for the key findings and recommendations under the project “Upgrading Design Guidelines and Building Codes cum Material Specifications with respect to the Multiple Disasters in the State of J&K, with specific reference to the



Seismic Zone 4 & 5 under the Jhelum & Tawi Flood Recovery Project (J&TFRP) supported by the World Bank. Moreover, the webinar served as a platform for knowledge on the concept of safe habitat, challenges, issues etc. and to bring all concerned institutions, experts, decision-makers, academicians, researchers, and practitioners under one umbrella.

The workshop started with the warm welcome of Speakers and Participants by Mr. Manu Prakash, CEO, Taru Leading Edge. He provided a quick brief, objective of the event and set the tone of the workshop while introducing all the Speakers to the Participants.



**Mr. Kamal Kishore**  
Member, NDMA



**Mr. Hemang Karelia**  
Senior Disaster Risk Management  
Specialist, The World Bank



**Dr. Umamaheshwaran Rajasekar**  
Chair- Urban Resilience, NIUA



**Dr. Syed Abid Rasheed Shah**  
Chief Executive Officer, JKERA/JTFRP



**Prof. C.V.R Murty**  
Professor, IIT Madras



**Ms. Alpa Sheth**  
Managing Director, VMS Consultants  
Pvt. Ltd.



**Mr. Manu Prakash**  
CEO & Managing Partner, Taru Leading  
Edge Pvt. Ltd.

Mr. Kamal Kishore, Member, NDMA provided key insights on the Policy Perspectives on Safe Habitat and Structural Safety. He started with the concept of carbon neutral buildings with emphasis on the carbon cutting during construction activities and operations and maintenance. He further added inputs on aspect such as Finance, Planning, Enhancing Livelihood, Heritage Conservation and Integration of Policies with flagship programs. He also provided insights on how to build capacity and social demand for safety.

Prof. C.V.R. Murty, esteemed professor at IIT Madras, presented his viewpoints on multi-hazard vulnerabilities and structural and habitat safety and emphasized on consideration of one hazard at a time rather than designing simultaneously for multi hazards. He further explained that the design

strategies for different type of buildings such as normal, critical etc. should be different and also, shed light on the handling of hybrid structures. He concluded with the remarks that everyone must play a critical role to achieve the objective of safe habitats.

Dr. Umamaheshwaran Rajasekar, Chair Urban Resilience – Global Resilience Cities Network, NIUA shared his thoughts on the role of planning and design in Safe Habitat, focussing on both urban and rural areas. He also discussed few ideas on planning such as Water-Centric Master Plan and Disaster Management inclusive Master Plan, Automation of Building Permit System, Tracking of Annual City Loss, API system, Urban Observatory with high resolution imaging to monitor illegal construction etc to increase the quality of living and making the system smart.



Ms. Alpa Sheth, Managing Director, VMS Consultants Pvt. Ltd. articulated on the background, objectives, project timelines, and disseminated key findings under the project “Upgrading Design Guidelines and Building Codes cum Material Specifications with respect to the Multiple Disasters in the State of J&K, with specific reference to the Seismic Zone 4 & 5” under Jhelum & Tawi Flood Recovery Project (J&TFRP) supported by the World Bank including the current situation and status, key challenges of the building permit and regulatory system in J&K. Ms. Alpa also presented a few case studies from Srinagar such as Bemina, Doodhganga area and Nallamar Road and emphasized on the designing of critical infrastructure such as schools, colleges, hospitals differently from the normal buildings. In addition to this, emphasis was laid on important points such as encouraging citizen engagement in building permit system, revisiting building byelaws, building institutional and implementation capacities, focus on traditional practices and heritage conservation. Recommendations to strengthen the Building Permit System as under the project focussing on Self use homes, digitization of land records and comprehensive capacity building were also highlighted.

Dr. Syed Abid Rasheed Shah, Chief Executive Officer, JKERA/JTFRP, provided a brief of the JTFRP project which is being supported by the World Bank. He briefly spoke about all the components of the project and brought special attention to Component 5 which

deals with the Building Permit System. Under this, he spoke about multi disaster risks such as Flood, Earthquake, Forest Fire, Avalanche, Climate Change etc. of Jammu & Kashmir and pointed out the important issues such as shift from traditional to modern construction practices, encroachments of wetlands, different settings of rural and urban areas. He provided some important insights on few areas of convergence such as mainstreaming of disaster management in construction practices, capacity building of local masons, carpenters, labours etc., training at grassroot level, better methodology and implementation of policies, mainstreaming the disaster management angle in construction practices and also appreciated the inputs from Taru-VMS JV on this project.

Mr. Hemang Karelia, Senior Disaster Risk Management Specialist, World Bank spoke on Practice and Promotion of Safe Habitat and Structural Safety. He emphasized on Preparedness rather than Response to bring a change in culture and perception of **Building Back Better** to **Build Back Before**.

The insightful thoughts of the renowned speakers were followed by a Q&A session around social demand on safety, traditional and heritage conservation, cost impacts and the pressing issue of COVID-19 in construction practices and safe habitats. This was followed by the closing remarks and Vote of Thanks to all speakers and participants by Mr. Manu Prakash.

Project of Review  
of Building Codes  
and Building  
Permit System





## CHAPTER 6

# Background of Jammu and Kashmir State

*Chapter 6 gives a historical background of the State of Jammu and Kashmir in terms of natural hazard exposure, topography and urban development.*

### 6.1 Background

The state of Jammu and Kashmir is steeped in history and diversity. The Kashmir Valley comprises of landscapes of immense natural beauty and ancient mosques and shrines. The valley's history dates back to Neolithic Era (circa 3000 BC). Jammu is seated on the ridges of the Sivalik hills and its ancient civilization can be traced to Harappan times and beyond.

#### 6.1.1 Kashmir Valley

The valley has seen a lot of political turmoil since Independence and there are socio-political and techno-legal complexities in this State as nowhere else in India. *Any discussion on improving the building regulatory capacity without acknowledging this reality will not yield any results.*

The urban population in the Kashmir valley has witnessed a decadal growth rate of 24 percent (Census of India 2001-2011) and is

mainly concentrated in Srinagar (extending into Anantnag, Sopore and Baramulla). The city of Srinagar is sited on the banks of the Jhelum River. Historical records of the city date back to the sixth century. It is the most populous and important city in the mountainous valley and is the centre of economic, commercial and civic activity. In recent decades, it has witnessed accelerated growth in terms of population and geographical expansion. In the process of urbanisation, there has been large migration from the rural regions of the valley into Srinagar city.

The city demonstrates a multilayered cultural past as is evidenced in the rich heritage buildings and monuments. The archaeological site of Burzahom north of the river Jhelum in Srinagar displays four important prehistoric phases of culture and civilization (3000 BC to 1000 BC). The city originally developed to the north of the river which is relatively higher ground. In the past three decades, there has been extensive development south of the river which is low lying. Jhelum, unlike most rivers of North India flows from South to North. It flows from foothills of Pir Panjal (Anantnag) in Kashmir down to the low-lying, flat Srinagar valley and then through the Wular lake into Pakistan. The topography of the river's course is such the river surges down into the valley where it loses speed due to Srinagar's



Figure 1 Topography of Srinagar Valley



flat terrain (slope less than 2 degrees) and in the event of very heavy rainfall, the plains of the valley are highly susceptible to flooding.

The Valley has a long history of floods- In the past century floods have been recorded during twenty five years with the most devastating floods experienced in 1903, 1959 and most recently and, arguably perhaps the worst floods ever, in 2014. Post 1903 floods, Maharaja Hari Singh had constructed



Figure 2 Srinagar- Floods of 1903



Figure 3 Srinagar- Floods of 2014

the flood spill channel Padshahi Bagh to Wular for a discharge of 17,000 cusecs and undertook dredging of Jhelum at Baramulla. However, over the years the supplementary flood channel has been neglected and encroached upon, reducing its carrying capacity to about 5,000 cusecs. Much adhoc development has been carried out on the flood channel (*including some development by the state authorities*).

Consequent to political developments in the Kashmir Valley since the early nineties, there was a decadal exponential growth in new housing along the marshlands and wetlands in the Srinagar metropolitan region. The urban sprawl was horizontal- Poor soils in the flood plains and marshes ensured that there was no vertical growth (which would have needed good soil bearing capacity) and the region saw single and double storeyed constructions in contrast to the old city core



Figure 4 "Nalla" Mar (Stream) turns to Nalla Mar Road



Figure 5 Shopping Complex on Doodh Ganga Stream in Srinagar

which typically had four to five storeyed traditional homes founded on good soils.

The spatial extent of lakes and wetlands in the city has shrunk during the period 1911-2004 by nearly 9,119.92 hectares. This is equivalent to the loss of about 50% of open water surface and wetlands to other land uses during the period.

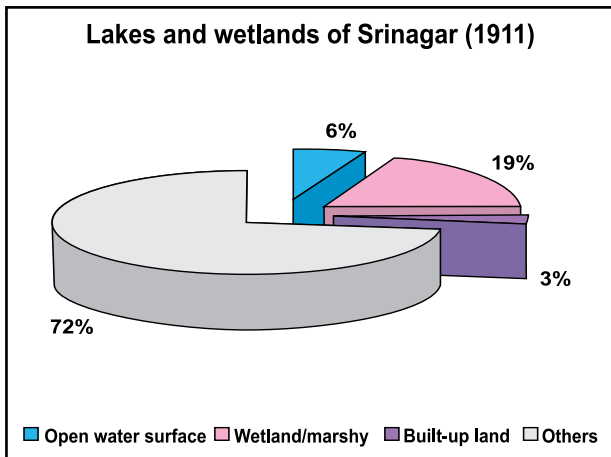


Figure 6 Srinagar- Lakes and Wetlands 1911 (downtoearth.org)

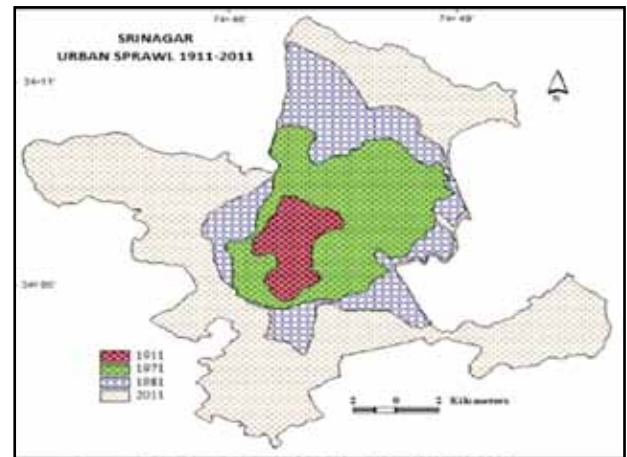


Figure 8 Srinagar Urban Sprawl 1911-2011

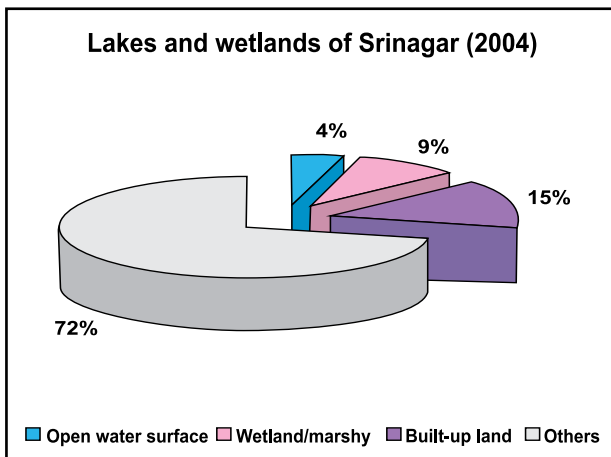


Figure 7 Srinagar- Lakes and Wetlands 2004

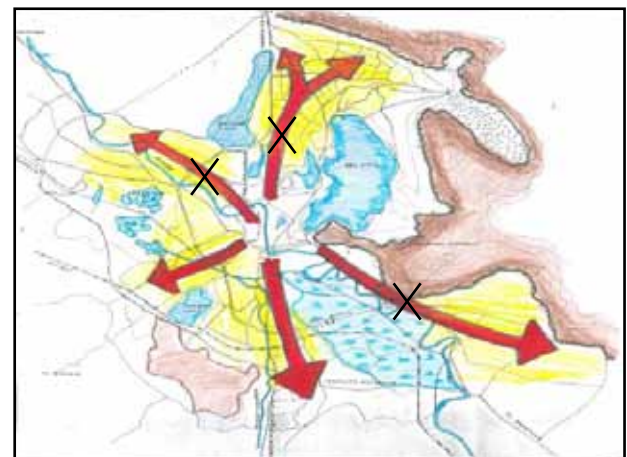


Figure 9 Planned Vs Actual Development in Srinagar (Crossed developments did not happen)

The inner city has some beautiful traditional **taq and dhajji diwari** homes built in wood and masonry of up to five storeys high. Many of them are facing impending demolition or reconstruction. A large number of these buildings have not been maintained and the building byelaws drawn from the past two master plans have willy-nilly accelerated their neglect and deterioration. The inner city thus looks hollowed out – Some of these extraordinary heritage buildings give a glimpse of the glory of the inner city in the past. It appears that most people who could do so have moved out of their homes in the city core which wears a forlorn, abandoned look, especially beyond business hours. As in most medieval cities, the city core has narrow and winding lanes which could perhaps pose a challenge for efficient rescue and relief during a disaster. As per 2011 Census, about

25% of people in Srinagar live in dilapidated or over populated housing with inadequate access to light, ventilation and sanitation. The newer, outer city area has more recent constructions and is not as densely populated. However some of this new construction is in flood prone areas with incorrect plinth levels and will be chronically vulnerable to flooding. Many of the new buildings too, have not been designed to resist earthquake.

Across all past Master Plans from 1971 onwards, areas in the north-west, south-east and east have been persistently proposed to be developed but have remained underdeveloped and areas to the south show more development *warranting course correction or rethinking of urban development strategy*. The present day city of Srinagar extends on both banks of the



river Jhelum. History illustrates that areas north of river Jhelum have been typically less affected during floods than the areas to the south of the river. Ironically some of the newer and more upmarket areas of Srinagar in the recent decades such as Rambagh are in the most flood prone areas south of Jhelum and witnessed flood waters up to sixteen feet high during the 2014 floods.

### 6.1.2 Jammu City



Figure 10, Jammu City 2018

Jammu is built on the banks of Tawi and lies in Seismic Zone IV. The old city of Jammu lies north of the river Tawi while the planned modern city is to the south of Tawi. While the river Tawi has also experienced floods in the recent past, the extent of the flooding is nowhere near what has been experienced in Srinagar. The existing stock of buildings in the old city of Jammu are in dilapidated condition and could experience significant damage in an earthquake. As in most older cities, the city core typically has narrow, winding streets and rescue and relief efforts are liable to be hampered due to the narrow lanes. Buildings in newer part of Jammu appear to be in better condition but based on extensive discussions with the architect and engineering community of the city, are not designed nor detailed for earthquake resistance as prescribed by the earthquake codes of the country. *Some of*

*the constructions on slopes may need to be reviewed for stability in an earthquake.* The water bodies in Jammu are also under threat. The city was once famous for its traditional ponds and tanks which have been erased to house commercial complexes and parks in the city.

### 6.2 Natural Hazard Exposure of Jammu And Kashmir

Jammu and Kashmir is exposed to multiple natural hazards, many of which are in severe and very severe category. As mentioned earlier, Kashmir Valley is in highest seismic zone (Zone V) while the rest of Jammu and Kashmir is in high seismic zone (Zone IV). Rampant and ill-advised construction in the flood plains has increased the vulnerability to liquefaction hazard. Apart from earthquakes, the natural topography compounded with construction on river flood plains has also heightened the flood risk of the Kashmir Valley. Fires lit in homes in winter together along with combustible blankets used in the valley cause numerous fire incidents each year in the Kashmir valley which are further complicated by poor access of fire tenders to the narrow winding lanes.

Jammu is exposed to seismic and flood-induced landslide hazard which has not been studied in great detail till date. Ladakh experiences sudden cloudbursts and due to a poor or almost non-existent drainage system (Ladakh is in rain shadow area), is prone to inundations. One of the most damaging cloudbursts in recent history occurred on August 10 2010 and triggered mudslides, flash floods and debris flow. Over 250 persons died in the incident. Other cloudbursts have occurred in 2015 and 2018. Besides the above, the State also has moderate exposure to hazards of cyclones and snow blizzards.



## 6.2.1 Earthquakes



Figure 11 Tectonic Plates in Indian Region

The state of Jammu & Kashmir houses the Pir Panjal, Zaskar, Karakoram and Ladakh ranges of the Himalayas. The Main Boundary Thrust (MBT) or the Pir Panjal Thrust underlies the Pir Panjal Range. Likewise, Zaskar Thrust underlies the Zaskar range. The Kashmir Valley lies between the Pir Panjal and the Zaskar thrusts, making it very vulnerable to earthquakes. Along the Zaskar and the Ladakh ranges runs a NW-SE trending strike-slip fault, the longest in the Jammu & Kashmir area. The State lies in Seismic Zones IV and V which correspond to severe and very severe earthquake categories. Srinagar lies in Zone V. The 2005 Kashmir earthquake centred 60.4 kms northwest of Uri in Kashmir, exposed the vulnerability of the rural housing stock. 1,309 persons died and 6,622 were injured in the earthquake in India, with maximum deaths (1190) from Kashmir division. Another area of special concern is the built habitat along the Jhelum in Srinagar and the Tawi river in Jammu, or its landfills and riverbeds. These areas comprise of deep soft soil deposits which cause amplification of earthquake effect and/or may be prone to liquefaction in an earthquake and need to be specially addressed.

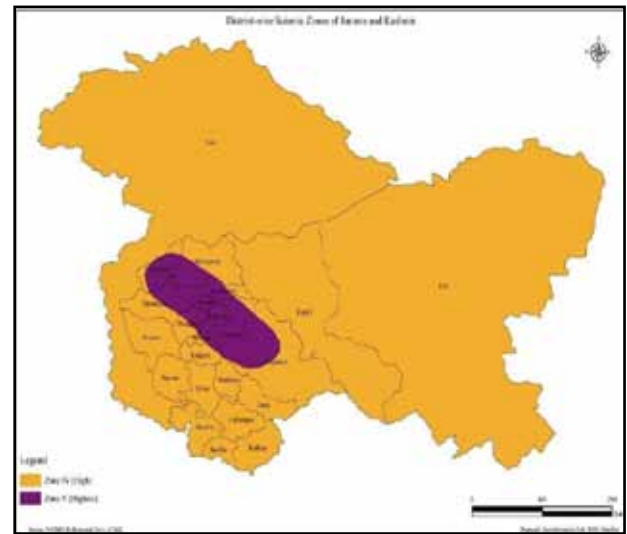


Figure 12 Seismic Zone Map of Jammu and Kashmir

Following are the earthquakes of note in the past two hundred years in and around Kashmir Valley greater than 6.0

- |                         |  |
|-------------------------|--|
| <b>30 May 1885</b>      | <b>NW of Srinagar (Jammu &amp; Kashmir), M 7.0</b>           |
| 22 June 1965            | Ladakh (Jammu & Kashmir), M 6.1                              |
| 28 December 1974        | NE of Malakhand, NWFP, (Indo-Pakistan Border region), Ms 6.2 |
| 28 April 1975           | Aksai Chin (Indo-China Border region), Ms 6.3                |
| 12 September 1981       | Gilgit Wazarat (P.O.K.), Mw 6.1                              |
| 6 July 1986             | Xizang (Indo-China Border region), Ms 6.1                    |
| 25 March 1990           | Gilgit Wazarat (P.O.K.), Ms 6.3                              |
| <b>19 November 1996</b> | <b>Aksai Chin (Indo-China Border region), Mw 6.9</b>         |
| 20 November 2002        | Astore Valley, P.O.K., Mw 6.3                                |
| <b>8 October 2005</b>   | <b>Kashmir-Kohistan, Pakistan-India border, Mw 7.6</b>       |
| 23 October 2005         | Kashmir-Kohistan aftershock                                  |



## 6.2.2 Flooding



Figure 13 Flooding in Srinagar 2014

The cities of Srinagar and Jammu are prone to high flooding due to the double effect of torrential rains and unplanned urbanisation which has also led to change in the topography of the cities. Many erstwhile water bodies have been converted to vulnerable landfills and there has been rampant diversion of nullahs under urban pressure. The floods of 2014 caused rivers to change course and the gauge at Ram Munshi bagh in Srinagar recorded highest ever reading at 29.5 feet on September 4 2014. The Valley as mentioned earlier has a long history of floods. In the book “The Valley of Kashmir (1895)”, Sir Walter Roper Lawrence makes mention of the historical flood of 879 AD which followed the slipping of Khadanyar mountains below Baramulla. The slip caused blockage of the channel of the Jhelum and a large part of the valley was submerged. Another flood mentioned in the book is that of 1841 which caused much damage to life and property. Worse floods however were experienced in 1893 when it rained incessantly for over 52 hours. The Valley recorded major floods at the turn of the century, with the most devastating one 10 years after the 1893 disaster. The floods, which in the day were classified as the

“greatest flood ever known”, came down the Valley and Srinagar on 23 July 1903, converting the city into “a whole lake”. (As mentioned earlier, the 1903 flood caused the construction of the flood spill channel by Maharaja Hari Singh). For the next quarter of a century, the Valley did not record major floods in the valley, largely thanks to lessons learnt and reparative measures which were put in place. However, in 1929, the Valley grappled with yet another major flood, which mainly affected parts of what is today Pakistan-occupied Kashmir.

While the Valley stayed relatively flood-free for the following two decades, immediately after independence, Kashmir was hit by a flood in 1948. Two years later, in September 1950, another major flood hit the state, with nearly 100 people losing their lives due to overflow of the Jhelum. Over 100 people lost their lives in the heavy rains and floods in Jammu district. In August-September 1957, another major flood was recorded in Jammu and Kashmir. Two years later, in July 1959, the state witnessed yet another massive “glacial” flood, perhaps its worst ever at the time, when four days of incessant rains lashed the valley and Srinagar, triggering the Jhelum. While the state did witness floods thereafter in the following three decades, the one in 1992 was unprecedented in terms of its fury. Recording its heaviest rainfall since 1959, the 1992 floods were most devastating, purely in terms of casualties. According to newspaper reports from 1992, over 200 people lost their lives. However, it is also worth noting that parts of Pakistan-occupied Kashmir bore the brunt of these floods, with over 2,000 deaths reported in that part. While flash floods in the region, mainly triggered by a combination of heavy rainfall and landslides are common, the state has also witnessed massive floods caused by a cloudburst in the

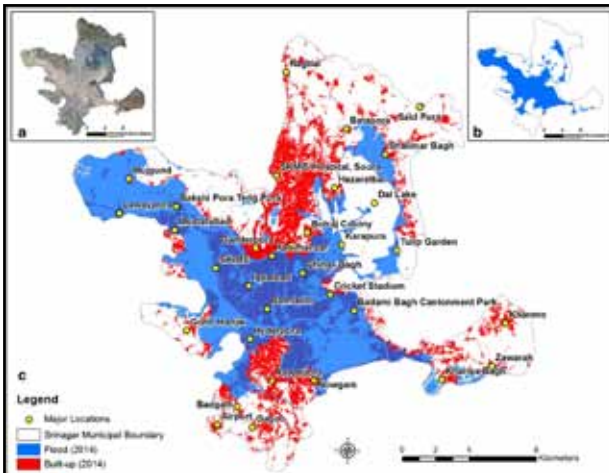


Figure 14 Flooding Map of Srinagar 2014

Leh-Ladakh region of Jammu and Kashmir. The cloudburst, which occurred on 6 August 2010, triggered flash floods in the area after a night of heavy downpour. While it only lasted for half an hour, the devastation caused by the cloudburst was enormous. It destroyed many buildings in the city of Leh, including hospitals and several communication lines that connected it with the rest of the state, and indeed the country. Over 250 people were reported dead in the floods triggered by the cloudburst.

### 6.2.3 Landslides

Both earthquakes and floods have had a history of triggering landslides in the region. There are some well documented and some as yet blind landslide zones in Jammu and Kashmir. The Geological Survey of India (GSI) has identified fifteen highly unstable landslide zones in Jammu and Kashmir in the survey conducted in 2014-16. Based on the survey, a compendium of Landslide susceptibility Maps for Chenab river basin and major towns (Udhampur, Leh and Ramban) has been published identifying these areas with maximum geomorphic hazard. As per the report, the highest five highly vulnerable zones are located in Ramban District, including three along the Jammu- Srinagar highway, while Leh and Poonch Districts have three each zones

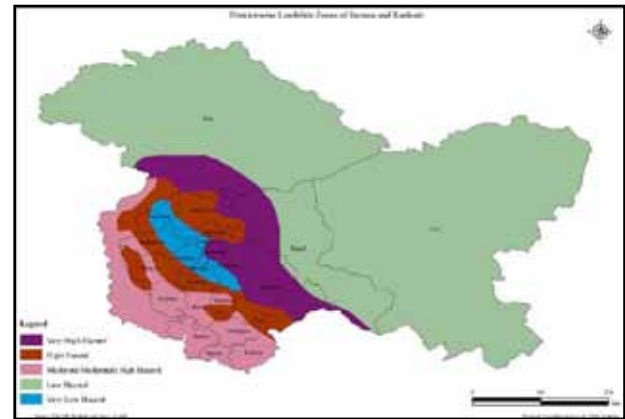


Figure 15 Landslide Hazard Map of J & K



Figure 16 Landslide along Jammu-Srinagar National Highway, January 30 2019 at Ramban

prone to the landslides. Village Tak, village Channgabra, village Rakh Jhrog, Tringula located along Jammu – Srinagar Highway, besides Village Dharam, Gool have been identified as highly unstable landslide zones, all falling in Ramban district. Similarly in Reasi district, two susceptible zones have been identified in Katra Tehsil including the section of track to Shri Mata Vaishno Devi Shrine near Devidwar, Ardhkwari and the Bhawan located near the shrine. In Udhampur district village Sadal, village Kheri located on Jammu- Srinagar Highway are vulnerable areas, while in Poonch district village Upper Potha and village Chela and Dangri and in Leh district Karu-Tangtse Road, Shyok-Agham Road, Rema-Rewari Road have been identified as the landslide prone areas.

The Jammu-Srinagar national highway is often required to be closed to traffic during the rains as a result of landslides along the route.



### 6.2.4 Fires

Fire hazard requires great attention due to

- 1) wood constructions- which is the traditional material of construction in the valley,
- 2) narrow streets which are a challenge for fire tender access and
- 3) large amount of inflammable woven materials (esp. Cotton and linen) including carpets and blankets in each home.

Narrow winding streets in the old cities of Jammu and Srinagar do not allow for quick access of fire tenders and other response

equipment and agencies thus making the task of dousing fires quite challenging.

Climate change is also manifesting itself in large scale forest fires in Bandipora, Kangan, Anantnag areas due to observed increase in temperatures over the summer exceeding five degrees Celsius. Large tracts of alpine forests in the Pir Panjal range are also being reported annually in recent times. In 2016, 71 forest fires were witnessed in Kashmir with areas of both north and south Kashmir reporting such incidents frequently. In 2015, 49 fire incidents in forests took place with north Kashmir reporting 24 of them.



**Figure 17** Fire gutted the 200-year old sufi shrine of 11th-century Iraqi saint, Sheikh Abdul Qadir Jeelani in Srinagar, June 2012



**Figure 18** Forest Fire in 2016







# CHAPTER 7

## Building Regulatory System

Chapter 7 discusses the current structure of the Urban Development Department and its constituent bodies and provides the framework for an ideal building permit system

### 7.1 Background

Buildings provide a safe and secure shelter for people to live in and operate from. Housing is of the three basic needs of humans, along with food and clothing. It is imperative therefore that buildings are built to prescribed performance standards. Groups of buildings make communities and groups of communities create a larger urban conglomeration which needs to satisfy human aspirations of good housing, efficient work places, education, health and entertainment facilities, and generally provide opportunities for economic growth and well being for the community.

The role of any civic authority requires it to create a building regulatory framework which enables an ecosystem for the achievement of the aforementioned objectives. A building regulatory system comprises of three important components:

- a) An Enabling Mechanism
- b) Standards- Planning Norms and Standards for safety
- c) An Enforcement Agency and an Enforcement Protocol.



Figure 19 Components of Development Control Regulation System





The Building Regulatory System is elaborated in Table 1.

**Table 1** Framework for Building Regulatory System

Sr. No	Component	Domain	J&K Status
1.	A primary legislation	Enabling Mechanism	Exists
2.	A system for framing development regulations, referenced to national / international standards	Standards	Exists but needs strengthening, especially for multi hazard disaster resilience
3.	An agency for enforcing development regulations	Enforcement Agency	Exists but very limited capacity
4.	A mechanism for verifying and approving designs for compliance to development regulations	Enforcement Protocol	Exists but system has some capacity for planning issues, almost no capacity for structural safety
5.	A mechanism for granting variances		Exists in theory but hardly implemented.
6.	A mechanism for testing and monitoring construction for compliance to approved designs		Almost Non-existent.
7.	A mechanism for granting permission to use		Exists but rarely used as not many building permit applicants apply for occupation or completion certificate
8.	A system for dealing with unauthorized construction		Exists but implementation is adhoc and perceived as a political tool
9.	A system for licensing professionals	Accreditation System	Poor system of registration which makes no clear distinction between architects, engineers and draftsmen
10.	A system for attributing responsibility for misconduct and building failures		Non-existent



## 7.2 Structure of Urban Development and Regulatory Bodies in Jammu and Kashmir



Figure 20 District Map of Jammu and Kashmir (www.imd.gov.in)

There are presently (June 2019) three regions in J & K State- Jammu, Kashmir and Ladakh. There are a total of twenty two districts in

the State. Jammu and Kashmir each have ten districts while Ladakh has two districts.

The districts in Jammu region are Jammu, Kathua, Udhampur, Rajauri, Poonch, Doda, Kishtwar, Ramban, Reasi and Samba. Kashmir has districts of Srinagar, Anantnag, Budgam, Pulwama, Kupwara, Baramulla, Ganderbal, Kulgam, Shopian and Bandipora. The region of Ladakh had Kargil and Leh districts.

The state has two **Municipal Corporation** (Jammu and Srinagar), **six Municipal Councils** (Kathua, Poonch, Udhampur, Anantnag, Baramulla, Sopore) and **seventy four Municipal Committees** in the State of Jammu and Kashmir. These bodies together administer the built habitat of an urban population (which comprises of 27% of total population) in excess of 3.85 million people.

The structure of the Urban Development Department is as shown below:

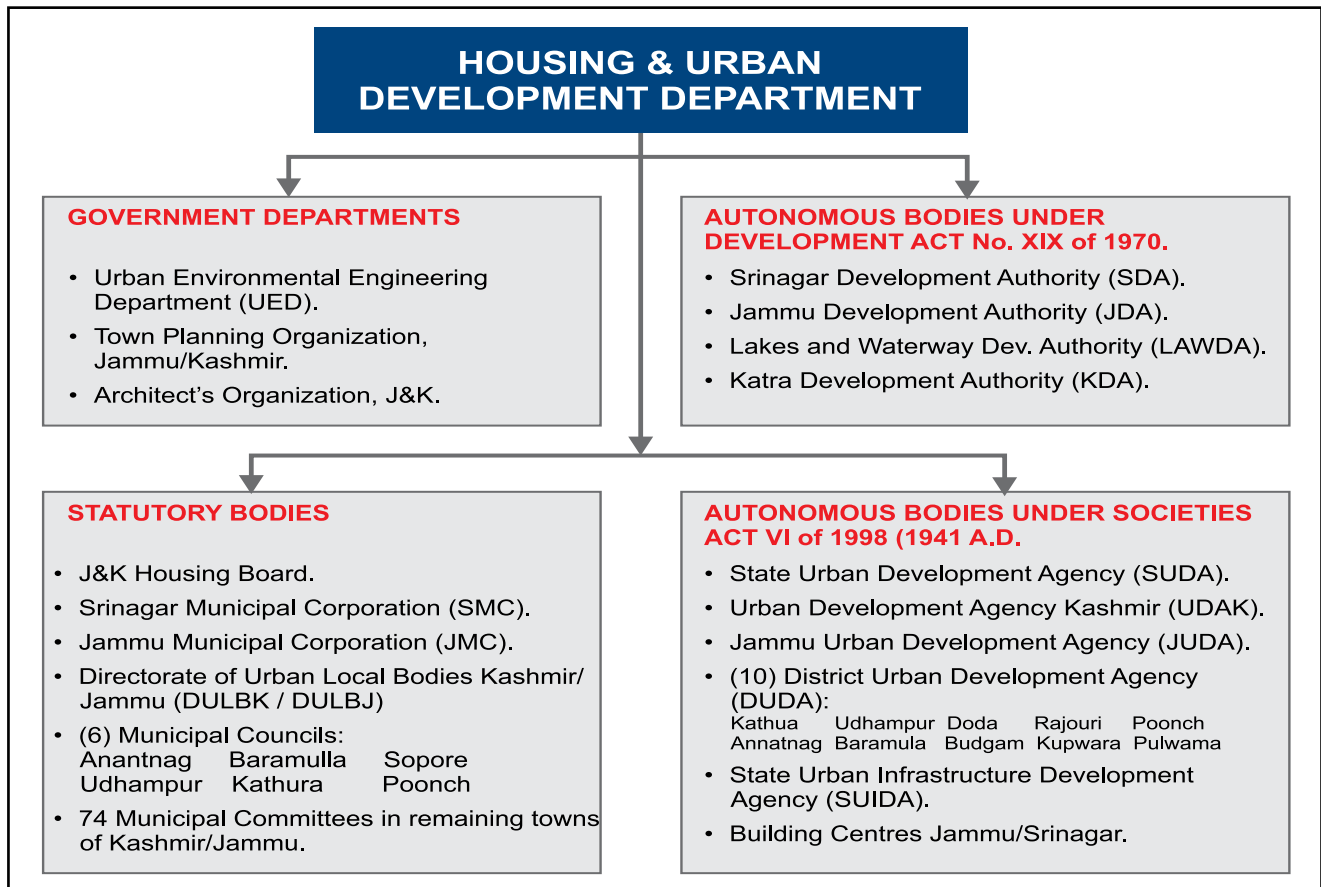


Figure 21 Structure of Urban Development Department, J&K

Project Tasks 1 &  
2: Assessment of  
Local Building  
Code and the  
Implementation  
Systems



## CHAPTER 8

# Objectives of Task 1 and 2: Assessment of Local Building codes from Multi-Hazard Point Of View and Implementation Capacity of the Urban Local Bodies and Local Authorities in Jammu and Srinagar

*Chapter 8 addresses Objectives of the Tasks 1 & 2 of the contract delivered in this report*

As per the terms of Reference, Tasks 1 and 2 are expected to provide a broader assessment of local regulatory implementation capacity and the inadequacy of the design code from multi-hazard perspective. Task 1 focuses on identification of bottlenecks, barriers and constraints with existing building permit system. It seeks to review the building approval process through the experience of users in navigating the system comprising of multiple stakeholders and departments and requiring submission of numerous documents and certificates. The entire building control process is mapped from the initial application for building permit up to the receipt of completion certificate. The task 2 focuses on the organization, efficiency and effectiveness of local regulatory implementation by local governmental entities responsible for compliance and enforcement of building laws and other jurisdictional ordinances relating to enhancing building safety within their jurisdictions, such as appropriate planning & siting with respect to slope stabilizing, landslides, structural safety, fire, zoning, flood zonation, heritage preservation, resource conservation or accessibility ordinances.

The principal activities of the SMC, JMC, JDA, LAWDA, SDA, Tourism Development Authorities and other municipal bodies are: (i) compliance support and public information; (ii) plan review; (iii) on-site inspection; (iv) issuance of construction permits; and (v) enforcement. The adequacy of these functions is dependent on the number of staff and their technical qualification. TARU-VMS LLP JV is to carry out the review based on the Building Regulatory Capacity Assessment Methodology (BRCAM)<sup>12</sup>, a standard regulatory capacity methodology developed by the World Bank.

The review will have special focus on the training and qualification requirements of building code officials within the local building department. It will identify potential gaps in specialization and qualifications of building officials and develop a proposal for restructuring and a capacity building program over the five years following the completion of this assignment. The task will include proposing the content of a new curriculum for training in priority areas. The proposal will include the delivery methodology, the objectives and the indicative costs of the training.



## **Deliverables (as per Terms of Reference)**

- 1.1 Master map / flow chart of existing process showing all agencies/local organizations involved in the construction and occupancy permit process;
- 1.2 Mapping of actual procedures within relevant approval agencies and the related input/output forms which need to be completed;
- 1.3 Survey findings of building permit applicants.
- 1.4 Recommendations report to improve process efficiency and transparency supported by a proposed new flow chart (or -target process). Based on the results of the process mapping and the results of the Survey, develop recommendations to improve the efficiency and the transparency of the construction permitting process. Proposed measures will include those that do not require preliminary legal and regulatory changes as well as measures requiring specific legal changes. For the second group of recommendations, the Consultant will specify the local legislation to be amended. The output of Task 1 is intended to inform recommendations for future reform activities. Support to the implementation of the proposed reform measures is not included in the scope of this assignment.
- 2.1 Report assessing local building code and fire code administration and capacity with recommendations differentiating short term (one-two years) to longer term measures (beyond two years).
- 2.2 A detailed assessment of training and qualification requirements, including a training curriculum in priority areas targeting building code officials, building and fire inspectors with a proposed delivery methodology, and terms of

reference for the training organization.

- 2.3 Relevant local legislation to be amended or added to support improved training and qualification requirements of local building code officials (if required).

In light of the above, the State of Jammu and Kashmir and specifically the cities of Jammu and Srinagar have been reviewed and assessed on the following parameters:

- Legislative framework.
- All Applicable Building Standards, Building Byelaws, Building Codes and Master Plans
- Building Permit System – Enforcement Protocol
- Functioning of the Building Permit System – The agencies involved in the building permit system and inherent Capacities and Inadequacies of the Enforcement Agencies to perform the assigned tasks
- Accreditation System – Presence or otherwise of a system to register/ license building professionals and system for study of building failures and attributing liability to relevant stakeholder.

The objective is to review and develop a robust framework for preparing a revised regulation system capable of ensuring safe and sustainable development that is

1. Rooted in legislation
2. Contextually relevant
3. Inclusive of all sections of society
4. Sensitive to regional variations
5. Responsive to change
6. Decentralized responsibility/decision-making
7. Practically enforceable
8. Encourages good practices
9. Addresses multi-hazard resistant construction
10. Will not impede economic growth
11. Low fiscal impact
12. Transparent and accountable





## CHAPTER 9

# Legislation Related to Build Environment

*Chapter 9 lays out the legislative framework and discusses the Acts underpinning the Building Permit System*

### 9.1 Legislations

The significant Acts addressing for the Building Permit System in Jammu and Kashmir (J&K) are:

- i. The Jammu and Kashmir State Town Planning Act, 1963. Act No. XX of 1963
- ii. The Jammu and Kashmir Development Act, 1970. Act No. XIX of 1970 and its Amendment 2011
- iii. The Jammu & Kashmir Development Authority Rules, 1976
- iv. The Jammu and Kashmir Building Operations Controlling Authority Act, 1988
- v. The Jammu and Kashmir Municipal Act, 2000
- vi. The Jammu & Kashmir Metropolitan Region Development Authorities Act, 2018
- vii. The Jammu and Kashmir Heritage Conservation and Preservation Act, 2010
- viii. The Jammu & Kashmir Real Estate (Regulation and Development ) Act, 2018

#### 9.1.1 The Jammu and Kashmir State Town Planning Act, 1963.

This Act enables the development of the state as per the Plan(s) and for all matters ancillary thereto.

#### 9.1.2 The Jammu and Kashmir Development Act, 1970.

This Act provides for the development of the state according to the Master Plans at city level and local body level. Also, it also enables creation of the Development Authorities of Jammu and Srinagar (JDA/SDA) and the local area bodies (ULBs) in the state. It facilitates preparation of the Zonal and City master plans. Further, it regulates the acquisition and disposal of land for development purposes and allows for the development of government land (Nazul land) by the relevant local body.

The Amendment to The Jammu and Kashmir Development Act, 1970 is aimed at facilitates housing for the economically weaker sections of society. It mandates reservation of 10% of the plot area (if plot size exceeds 1000 m<sup>2</sup>) for housing for economically weaker section. Also, it incentivizes the developer through a bouquet of instruments such as higher floor space index, TDR (transfer of development



rights), change of use (from residential to commercial or vice versa). This scheme mirrors the national scheme of housing for EWS (economically weaker section). The scheme does not appear to have been utilised extensively in the state as compared to other states due to the cultural ethos of the state and relatively higher standards of living in the state.

### **9.1.3 The Jammu & Kashmir Development Authority Rules, 1976.**

These are the Rules and Regulations for The Jammu and Kashmir Development Act, 1970.

### **9.1.4 The Jammu and Kashmir Control of Building Operations, 1988.**

The COBA Act was introduced to amend and consolidate the law relating to control of building operations in the State. This legislation brought all building construction activities within the state under the purview of the municipal corporations or urban local bodies. Any construction activity subsequent to enactment of this legislation had to procure a building permit to proceed in the matter of construction. The Act empowered authorities to take action against “illegal” construction. This Act has been the major guiding framework under which all planning and building activity (those which are under purview of law) has been carried out in the State in the past three decades.

### **9.1.5 The Jammu and Kashmir Municipal Act 2000.**

This Act was passed with the objective to consolidate, amend and replace all laws pertaining to the Municipalities of Jammu and Kashmir State. It defines the methodology to exclude and include lands in a municipal area, the functioning of the municipalities and its members, the powers and authorities of the municipalities. All other Acts, building byelaws, rules and

regulations function within this mother Act.

### **9.1.6 The Jammu and Kashmir Municipal Corporation Act 2000.**

This Act stipulates the constitution and functions of the Corporation, the municipal bodies under the corporation and the framework under which all the functionaries within the corporation must perform. It further defines the broad categories of regulatory authority vested with the corporation vide this act- such as for buildings, streets, water supply and sewerage, fire, tree cutting etc.

### **9.1.7 The Jammu & Kashmir Metropolitan Region Development Authorities Act, 2018.**

This new act enables the formation of two regional authorities- the Jammu Metropolitan Region and The Srinagar Metropolitan Region, similar to the Mumbai Metropolitan Regional Development Authority. The Act is yet to be put in place and hence details on its implementation are not available at time of writing the report. The Act is similar in letter and spirit to similar such metropolitan region acts across the country and is focussed principally on urban infrastructure development of the larger metropolitan region, especially transport. Metropolitan Region Development Authorities could play a pivotal role in planning, coordination and execution/ supervision of projects and schemes for infrastructure development. If implemented well, there may not be significant overlap in the functioning of the Municipal Corporations (JMC/SMC), as both will be functioning in different domains and at different scales. The MRDA will function at the macro-scale. It will originate and support or augment basic infrastructure at the city level. The local authorities (JMC, SMC) will continue to provide services such as water, sewerage, sanitation, street lighting etc at the user level. These entities (MRDA and local MCs) have the potential to work





in conjunction with and support each other rather than operate at cross purposes.

*However caution is advised with regard to possible duplication of roles and responsibilities between the JDA and JMRDA and also between SDA and SMRDA. In the long run, it may be advisable to collapse the two bodies (JDA and JMRDA/ SDA and SMRDA) into a single body.*

### **9.1.8 Jammu and Kashmir Heritage Conservation and Preservation Act, 2010.**

This is an Act to provide for conservation and preservation of heritage both tangible and intangible, including buildings, structures, monuments, precincts, areas/sites, artifacts, sculptures, paintings, handicrafts, manuscripts etc. and music, dance, drama, performing arts, poetry, living traditions like crafts and cuisine, traditional knowledge systems, folklores, spiritual traditions; respectively of historic or cultural or religious or aesthetic or architectural or environmental significance and for matters connected therewith or incidental thereto. While the Act had been well drafted there are no rules and regulations defining the constitution of the Authority in terms of the members. Also the act has not been implemented until 2019.

### **9.1.9 J&K Real Estate (Regulation and Development ) Act, 2018.**

Has been passed but is yet to be implemented. The State has limited real estate activity (there is some growth of real estate industry in Jammu) and implementation of this Act is not urgently required presently.

## **9.2 Comments**

The above legislations together govern the planning and construction norms for buildings and infrastructure across the state. They are reasonably robust and far-reaching in its scope but they do not address

the following issues:

- a) The special features of the multilayered history and heritage of Srinagar and other heritage towns in the State demand a more nuanced approach to city planning so as to conserve the heritage buildings, heritage infrastructure and the city planning features of these old cities. Not just Heritage Buildings but also Heritage Precincts need to be conserved and preserved. Heritage issues cannot simply be dealt with in Building byelaws, rules and regulations; they need to be strongly protected by a separate enabling legislation. While a Jammu and Kashmir Heritage Conservation and Preservation Act, 2010 has been enacted, it has remains confined on paper and as per available records, no meeting of the Authority created under this legislation has been convened since 2013. It was only on December 27 2018, that the Jammu and Kashmir administration ordered constitution of the State Heritage Conservation and Preservation Authority. The non-official members of the authority include former Chairman of the Pollution Control Board, former Director General of Archives, Archaeology and Museums, former Head of Department of History in Kashmir University; while an alumni of the National School of Drama, would be the co-opted member. However, there is no architect, town planner or structural engineer inducted into the authority so the functioning of the authority for preservation and conservation of built heritage is suspect. There is already large ongoing activity of demolishing old heritage buildings and construction of new insensitive buildings in heritage precincts with no regard to the fabric of the precinct.





The Heritage Conservation Authority should be reconstituted with at least three architects (two of whom are conservation architects or have worked in the field), at least one town planner and one structural engineer. Further, the development of Pilgrimage centres and tourist towns should be subject to control by this authority; while pilgrimage places may constitute the state's cultural heritage, tourist towns are the state's natural heritage.

- b) The regions of Jammu, Kashmir and Ladakh (which includes Leh and Kargil) comprise of tens of thousands of self use homes which form the majority of the built construction in the State. Such self-use homes generally do not lend themselves to complex building permit requirements which are normally applicable for developer-built construction and need a more simple procedure for building permit system. As a result much of the legislation and byelaws are practised in their breach. There are international documents (such as the International Residential Code (IRC), Small Building Code of Trinidad and Tobago etc.) for building and construction of small, self-use homes and a separate legislation (or at least separate building byelaws) needs to be formulated to govern such development.
- c) Pilgrimage centres (such as Vaishnodevi) provide ample opportunities for a new approach to develop sustainable religious tourism. This has not been explored. The constructions in the town of Katra are not regulated adequately and there is adhocism in the planning of the region. A special policy for development of such towns which focuses on the proper planning and development control of

cities (and infrastructure) in such tourist towns should be formulated in conjunction with the State Heritage Conservation And Preservation Authority. Further, permissions for new developments should have a process that requires approval from the Heritage Conservation Authority for any development beyond a stipulated area and height. Presently development in these towns is being done under local byelaws and regulations (such as Pahalgam etc.). But a special policy, which would include issues of natural and built heritage and sustainable development should be released, which would empowers the local authorities to ensure well-planned future growth. Presently power and authority is vested in the tourism department for planning tourist towns. This may not achieve the best results as the tourism department is not be equipped with adequate subject experts for planning and development and there is a tendency to take quick, short-term decisions to augment tourism-oriented growth at the cost of long-term sustainable development.

- d) Adequate attention to safety against hazards, such as floods and earthquakes is not mainstreamed into the legislative framework. It may be argued that these are better addressed in the rules and regulations. But when they do not find any mention in the main legal system, it does not adequately reflect the main objectives of Building Permit System.
- e) The State of Jammu and Kashmir has a special place in India. It was formed differently than other states in the country, and hence, a simple adaptation of the legislative framework for built habitat from other Indian states may not work effectively for the state.



## CHAPTER 10

# Review of Applicable Building Standards, Building Byelaws, Building Codes and Master Plans

*Chapter 10 documents and reviews all applicable Building byelaws, Master Plans, National Building Codes that govern the building permit system, construction and design in urban areas of the State*

Besides the Rules and Regulations of the Acts mentioned in 4.1, the following are the governing Master Plans, Building Byelaws and Building Standards:

1. The Jammu and Kashmir Building Operations Controlling Authority 2001 (Rules and Regulations),
2. The Building Bye Laws – 2011 of Municipal Corporation, Jammu,
3. The Building Bye Laws – 2011 of Municipal Corporation, Srinagar,
4. Building Regulations And Bye-laws –For All ULBs Of Jammu and Kashmir,
5. Jammu Master Plan, 2032,
6. Srinagar Master Plan, 2035, and
7. National Building Code (NBC).

### **10.1 The Jammu and Kashmir Building Operations Controlling Authority 2001 (Rules and Regulations)**

#### **10.1.1 General Description**

As mentioned above, The BOCA Act was introduced to amend and consolidate the law relating to control of building operations in the State. This Act has been the major guiding framework under which all planning and building activity (those

which are under purview of law) has been carried out in the State in the past three decades. BOCA 2001 Rules and Regulations importantly lays down the conditions for “deemed” approval and conditions when post-construction approval may be given to a building. It also acknowledges the ground realities in the old city where setbacks cannot be provided in reconstruction on a plot as may be possible in a green field area. BOCA Rules lay down the building permit protocol and the line departments from which no-objection certificate is required. Some of these requirements have been superseded by the online building permit system.

#### **10.1.2 Comments on BOCA**

The 2001 BOCA Rules and Regulations enable post-facto approval of construction. Thus, it acknowledges the reality that most constructions in the state are carried out outside of the building permit system. The estimation of the percentage of constructions that seek building permit varies but from stakeholders within the system and from ordinary citizens varies between 5% to 10%. There has been no systematic survey to establish this figure. When most of the construction is technically illegal, there is an arbitrariness in selection of structures that



may or may not be demolished or penalised. The Directorate of Enforcement, which is tasked with this task, is thus often seen as being non-transparent. Further, political patronage is often used as a tool to protect or punish.

The enforcement of BOCA 2001 Rules and Regulations, which is well drafted but poorly implemented, should be done in a transparent manner. Details of such non-compliant structures should be posted in the public domain (such as the authority's website) that is easily accessible to all with remedial measures such as penalty, sealing or part/full demolition, along with the due process followed in arriving at the decision.

## **10.2 The Building Bye Laws – 2011 of Municipal Corporation, Jammu and The Building Bye Laws – 2011 of Municipal Corporation, Srinagar and Building Regulations And Bye-laws (Kashmir Division) –For All ULBs Of Kashmir**

### **General Description**

The Building Byelaws lay down the procedure for obtaining building sanction (including format of the building plans and other documents for application of building permit) and the procedure of approvals during construction. Also, they also regulate the zoning norms, setbacks, heights, ground coverage, floor area ratio (FAR) and other building parameters. The Bye-laws specify the approved signing authority for submission. They make mention of requirements for services, such as fire protection, light and ventilation, mechanical and electrical, elevators, sewerage, waste disposal, drainage and water supply, parking space requirements. The requirements are specified as per the building use, area zonation. Minimum habitable room sizes for different functions has been specified. Access and other requirements for physically

challenged have been covered in an exclusive chapter.

### **10.2.1 Comments on Building Bye-laws**

1. There is a passing mention on Heritage “artefacts” and structures but without any listing of heritage buildings and precincts, this appears as tokenism. A comprehensive listing exercise of Heritage Structures should be conducted under the aegis of the State Heritage Conservation and Preservation Authority.
2. Effluent disposal requirements for industrial buildings are not clearly specified. There are other state agencies monitoring effluent disposal and the requirements of pollution control agencies should be incorporated in the byelaws.
3. Requirements of generator are given, without mention of when such an alternate power source is required.
4. There is mention of all building finishing materials to be non-combustible. But, even the airport of Jammu has been clad with combustible Aluminium composite panels. The profession of Interior Design is not regulated. In the short term, for public structures, the state should prepare a list of materials and specifications that are not permitted to be used in interiors due to their combustible nature.
5. The requirements for rain water harvesting and solar water heating systems can at best be described as sketchy. The present requirements may be considered as placeholders for the issues and the next revision of the building byelaws will have more details and clarity on rain water harvesting and solar heating requirements. The building byelaws should be reviewed and made more granular for this item.



6. The building byelaws make no distinction between buildings which exist in the core cities of and buildings which exist in Greenfield areas. As a result of this, a lot of the existing buildings are in violation of the building byelaws. Hence it is not possible for the homeowners to approach the authorities for permit to repair, retrofit or alter, extend these structures which then tend to descend into a spiral of neglect and decay. A separate, distinct set of guidelines should be prepared for buildings in the old city core in consultation with the State Heritage Conservation and Preservation Authority.
7. The building byelaws allow for an architect to sign-off on the structure. While “Structural Engineer” is mentioned in the byelaws, his/her role has not been spelt out in the building permit process. Clear, unambiguous roles, responsibilities and liabilities of the Structural engineer need to be enumerated in the Regulations. Hiring of structural engineer should be mandatory for all buildings other than self use, single family homes of not more than two storeys.
8. The Building byelaws make no mention of the need for establishing the founding soil competency by means of soil investigation. With most of the state in highest seismic zones of IV and V and much construction built in flood channels, requirement for soil investigation needs to be made mandatory at least for commercial and real estate projects. Hiring of geotechnical agency engineer should be mandatory for all buildings other than self use, single family homes of not more than two storeys. Clear, unambiguous roles, responsibilities and liabilities of the Geotechnical agency need to be enumerated in the Regulations.
9. Another issue is towards Draftsmen being permitted to sign off drawings as technical personnel. The regulations should be amended to disallow draftsmen to sign off on structures.
10. There is no established testing and inspection protocol to monitor quality of the built construction including specifications and quality assurance for building materials (such as timber, masonry, concrete, steel), building products and systems such as walls, doors, windows, electrical cabling and finishing materials (such as for facades and interiors) As a longterm measure, the state should initiate registration of building contractors to ensure accountability.
11. The byelaws need to be fleshed out in greater detail. Many issues that need to be addressed by byelaws are missing. A few examples are enumerated:
  - i. Requirements for recreation ground (RG) areas in large green field projects
  - ii. Minimum open space requirements for movement of fire tender.
  - iii. Special Construction requirements near water bodies
  - iv. Special Construction requirements or no-construction zones on land susceptible to liquefaction.
  - v. Designing for Landslide Hazard. While the byelaws do not allow any building to be developed on a site with slope exceeding 30 degrees, there is no mention of checking landslide hazard on sloping grounds.
  - vi. National Building Code has been referred to in the byelaws. This essentially covers all the Bureau of Indian Standard Codes relevant to building construction. However, NBC is very wide and far



reaching in its scope. There is no explicit mention as to what clauses of NBC need to be followed. Similarly there is need to mention which clauses of NBC need not be adhered to.

- vii. Transfer of Development rights in lieu of handing over part of plot for Road widening or other infrastructure needs is required to compensate landowners for loss of property due to infrastructure projects.
  - viii. Change of Occupancy- Conversions of Residential property to Commercial/ Industrial or vice versa.
  - ix. Revocation of permission
  - x. There is no mention of minimum width of a plot size for commercial or real estate development. This should be mentioned to clearly prohibit developments which may not adequate egress options in time of disaster (such as the Sarovar Portico in Srinagar).
12. The Fire regulations should be more stringent depending on the Occupancy. For example fire regulations for assembly halls and theatres have been made more rigorous in the NBC. These need to be reviewed and incorporated.

### 10.3 Jammu Master Plan 2032

As mentioned “The primary objective of the Revised Master Plan is to develop spatial decision framework, which can support urban and economic growth with adequate infrastructure development, in conformity with existing natural resources, land utilization and ecological aspects”. The Master Plan of 2032 covers a total area of 652 Sq. Kms as against the 2021 Master Plan of Jammu that covered 305 Sq. Kms

### Srinagar Master Plan 2035

Local Area limits of Greater Srinagar have been extended from 416 Sq. Kms

to 766 Sq. Kms i.e.; 84% increase from the existing Master Plan limits. The area includes Srinagar Municipal Corporation, Cantonment Board and four municipalities of *Budgam, Ganderbal, Pampore, Khrew* towns— notified as the Local Area Limits of SDA1— to be designated as “Srinagar Metropolitan Region [SMR]. A detailed presentation of the Master Plan is annexed as Annexure I

### 10.4 National Building Code (NBC)

The Jammu and Srinagar Building Byelaws make reference to the National Building Code. The NBC had been completely modified in 2016. As per their website, “The National Building Code of India (NBC), a comprehensive building Code, is a national instrument providing guidelines for regulating the building construction activities across the country. It serves as a Model Code for adoption by all agencies involved in building construction works



Figure 22 should be there under NBC 2016



be they Public Works Departments, other government construction departments, local bodies or private construction agencies. The Code mainly contains administrative regulations, development control rules and general building requirements; fire safety requirements; stipulations regarding materials, structural design and construction (including safety); building and plumbing services; approach to sustainability; and asset and facility management... A Project for comprehensive revision of the Code was taken up under the aegis of the National Building Code Sectional Committee, and a revised Code was brought out in 2016 as National Building Code of India 2016 reflecting the state-of-the-art and contemporary applicable international practices. The comprehensive NBC 2016 contains 12 Parts some of which are further divided into Sections totalling 33 chapters. NBC contains all data and designing norms for all types of loading conditions, including for seismic hazard, wind loads, fire hazard and snow loads etc.

The salient features of the revised NBC include, apart from other changes made, the changes specially in regard to further enhancing our response to meet the challenges posed by natural calamities. The major changes incorporated in this third revision of the Code are as follows:

1. Provisions for association of need based professionals and agencies have been updated to ensure proper discharge of responsibilities for accomplishment of building project.
2. With a view to ensuring ease of doing business in built environment sector, a detailed provision for streamlining the approval process in respect of different agencies has been incorporated in the form of an integrated approval process through single window approach for enabling expeditious approval process, avoiding separate clearances from various authorities.
3. Further, with a view to meeting the above objective, the provision on computerization of approval process has been detailed, enabling online submission of plans, drawings and other details, and sanction thereof, aiding in speedier approval process.
4. The mechanism of ensuring certification of structural safety of buildings by the competent professional and peer review of design of buildings, have been further strengthened.
5. Requirements for accessibility in buildings and built environment for persons with disabilities and the elderly have been thoroughly revised and updated.
6. Provisions on fire and life safety have been thoroughly revised to meet the challenges of modern complex building types including the high rises.
7. Latest structural loading and design and construction codes including those relating to wind load, earthquake resistant design of buildings, steel design and foundations have been incorporated with a view to ensuring structural safety of buildings including against a disaster.
8. Provisions relating to all building and plumbing services have been updated keeping also in view the latest international practices as related to the country.
9. Provisions have been updated to ensure utilization of number of new/alternative building materials and technologies to provide for innovation in the field of building construction.
10. Construction management guidelines have been incorporated to aid in timely



completion of building projects with desired quality in a safe manner within the budgeted cost.

11. Guidance has been provided for making buildings and built environment energy efficient and environmentally compatible, through the newly introduced and updated chapter on sustainability, namely Part 11 'Approach to Sustainability'
12. New chapters have been added on structural use of glass; escalators and moving walks; information and communication enabled installations; solid waste management; and asset and facility management.

There are many discrepancies between NBC 2016 and the Building Bye-laws and the latter need to be updated in line with NBC 2016.

For illustrative purpose a few of these variations are enumerated:

- a) There is now a provision in the Jammu Master Plan 2032 to promote open ground storeyed buildings to cater for the parking needs but the NBC 2016 discourages such type of construction vide earthquake Code 1893- 2016.
- b) Here is a requirement of a structural engineer, site supervisor and geotechnical engineer for every project as per NBC 2016 but this is not required as per Jammu Building Byelaws.

- c) There is special focus in NBC 2016 towards multi-hazard resistant construction for following hazards which is not reflected in the building byelaws :
  - i. Floods
  - ii. Landslides
  - iii. Earthquakes
  - iv. Fire
  - v. Snow
  - vi. Cyclones
- d) There are no regulations for maintenance and retrofitting in building byelaws which exist in NBC
- e) There is no procedure in place in building byelaws for validating safety of existing buildings
- f) There are no criteria in byelaws for fixing the plinth levels which should be mandatory given the floods experiences in Jammu and more recently in Srinagar.
- g) The Fire Safety requirements in building byelaws are outdated and do not conform to NBC 2016.
- h) Accessibility norms need to be updated as per NBC 2016.

The Building Byelaws need to be upgraded to bring them in line with NBC 2016.







## CHAPTER 11

# Building Permit System – Enforcement Protocol

Chapter 11 documents the Enforcement protocol for obtaining Building Permits in the different regulatory authorities in Jammu and Kashmir. As mentioned earlier, The state has two Municipal Corporation (Jammu and Srinagar), six Municipal Councils (Kathua, Poonch, Udhampur, Anantnag, Baramulla, Sopore and seventy four Municipal Committees in the State of Jammu and Kashmir. These bodies together administer the built habitat of an urban population. This Chapter documents the Protocols in the two Municipal Corporations, Area Development Authorities and the Urban Local Bodies.

### 11.1 Jammu Development Authority Building Permit System

The current building permit system for all practical purposes is a single window system. Internally, there is a system of about seven to nine departments that are involved in the process.

#### 11.1.1 Jammu Development Authority Building Plan Approval & Inspection Procedure

The current approval and inspection procedure involves the following steps

**Step 1.** Applicant submits the application to Vice Chairman, JDA seeking approval of the Building Plan along with requisite aforementioned enclosures

**Step 2.** Application marked by the Vice Chairman (VC), JDA goes to Sr. Town Planner(STP),JDA on same or next working day.

**Step 3.** STP, JDA sends the application on the date of receipt to Assistant Building Officer (ABO) for preliminary examination of the case.

**Step 4.** After preliminary examination of the Building Proposal and Revenue Papers,

the application is entered into the computer system and an on-line Submit Number and date is given to file/case by the Town Planning section.

**Step 5.** Case file is sent to Computer Section for scanning and uploading of documents and other details. The file is forwarded electronically to following departments for providing their respective ‘NOC’ online to JDA:-

- a) Assistant Commissioner Revenue (Jammu/Samba) – For NOC stating the type of land and ownership verification.
- b) Assistant Commissioner Nazool (Jammu) – For NOC stating that the land in question is not ‘Nazool’ land.
- c) Power Development Department (Inspection Division) – For NOC stating that no HT/LT Power Transmission line is crossing over the said land.
- d) PHE (Division I/II/Rural/Akhnoor/Samba) – For NOC stating that no PHE infrastructure is passing through the said land.
- e) UEED – For NOC stating that no UEED infrastructure is passing through the said land.



f) Director Land Management, Jammu Development Authority – For NOC stating that the land in question is not 'JDA' land.

**Step 6.** At this stage, the case file is also referred electronically to the ABO for site visit and furnishing of Inspection Report at Level-I.

**Step 7.** NOCs from aforementioned departments are received online.

**Step 8.** After receiving all NOCs and positive site report from Inspection Level-I, Building Permission case is prepared and placed in Building Operations Controlling Authority (BOCA) meeting.

**Step 9.** If case is approved in BOCA, Inspection Level-II (ATP)/ Level-III (STP)/ Level-IV (VC) are cleared online on the same day of approval at step 8.

**Step 10.** Fee challan is generated in the Computer Section and handed over to the applicant for making payment.

**Step 11.** Fee is paid by the applicant in J&K Bank, Rail Head Complex Branch and payment challan is submitted back to JDA.

**Step 12.** Final Sanction Order is generated in Computer Section and issued by the Sr. Town Planner, JDA.

Note: Total time for processing of Building Proposal is 60 days subject to NOCs from departments mentioned at step 5 above.

### 11.1.2 Remarks on the Jammu Development Authority Building Permit System

The Jammu Development Authority reviews only those projects, which do not fall within the municipal limits. Also, it oversees the development and construction of government buildings and projects -.

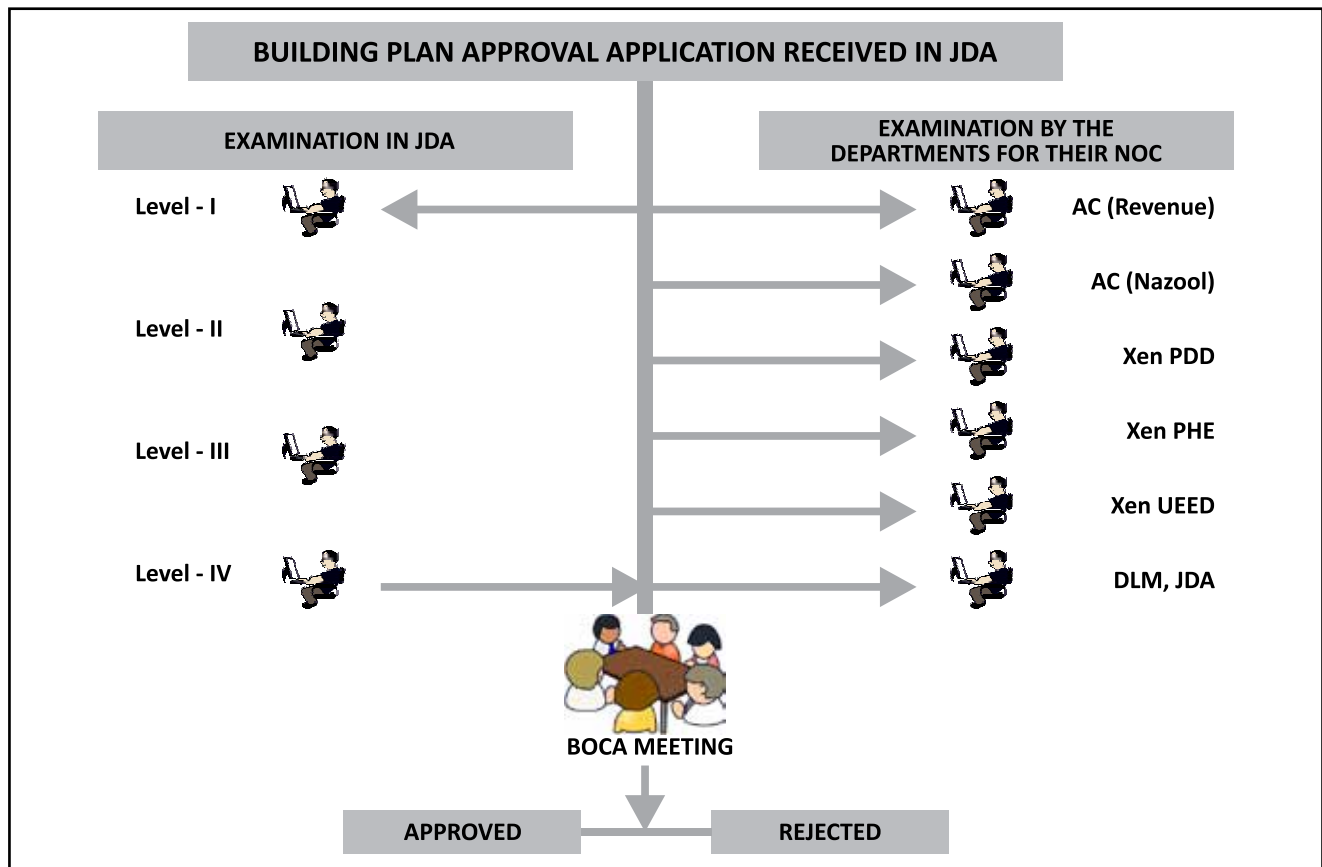


Figure 23 Flow Chart of Building Permit Procedure for Jammu Development Authority





## 11.2 Srinagar Development Authority Building Permit System

### 11.2.1 Srinagar Development Authority Building Plan Approval & Inspection Procedure

**Step 1.** Applicant submits the application to Vice Chairman, SDA seeking approval of the Building Plan along with requisite aforementioned enclosures

**Step 2.** Application marked by the Vice Chairman (VC), SDA goes to Sr. Town Planner(STP), SDA on same or next working day.

**Step 3.** STP sends the application on the date of receipt to Assistant Town planner for preliminary examination of the case.

**Step 4.** After preliminary examination of the Building Proposal and Revenue Papers, the application is entered into the computer system and an on-line Submit Number and date is given to file/case by the Town Planning section.

**Step 5.** Case file is sent to Computer Section for scanning and uploading of documents and other details. The file is forwarded electronically to following departments for providing their respective 'NOC' online to SDA:-

- a) Assistant Commissioner Revenue – For NOC stating the type of land and ownership verification.
- b) Assistant Commissioner Nazool – For NOC stating that the land in question is not 'Nazool' land.
- c) Power Development Department (Inspection Division) – For NOC stating that no HT/LT Power Transmission line is crossing over the said land.
- d) PHE Division/master plan limits – For NOC stating that no PHE infrastructure is passing through the said land.

- e) UEED – For NOC stating that no UEED infrastructure is passing through the said land.
- f) Director Land Management, Srinagar Development Authority – For NOC stating that the land in question is not 'SDA' land.

**Step 6.** At this stage, the case file is also referred electronically to the Assistant Town Planner for site visit and furnishing of Inspection Report at Level-I.

**Step 7.** NOCs from aforementioned departments are received online.

**Step 8.** After receiving all NOCs and positive site report from Inspection Level-I, Building Permission case is prepared and placed in Building Operations Controlling Authority (BOCA) meeting.

**Step 9.** If case is approved in BOCA, Inspection Level-II (DTP), Level-III (STP), Level-IV (VC) are cleared online on the same day of approval at step 8.

**Step 10.** Fee challan is generated in the Computer Section and handed over to the applicant for making payment.

**Step 11.** Fee is paid by the applicant and payment challan is submitted to Financial Advisor/CAO SDA.

**Step 12.** Final Sanction Order is generated in Computer Section and issued by the Sr. Town Planner, SDA.

### 11.2.2 Remarks on the Srinagar Development Authority Building Permit System

The Srinagar Development Authority reviews only those projects which do not fall within the municipal limits. Like the Jammu Development Authority, it oversees the development and construction of government buildings and projects.



### 11.3 Jammu Municipal Corporation Building Permit System

#### 11.3.1 Jammu Municipal Corporation Building Plan Approval & Inspection Procedure-1

The following is an enumeration of the Procedure for obtaining building permit as given on the websites

(1) <http://ulbjammu.org/building.php>

(2) <https://www.jmcjammu.org/PermissionForm.aspx>

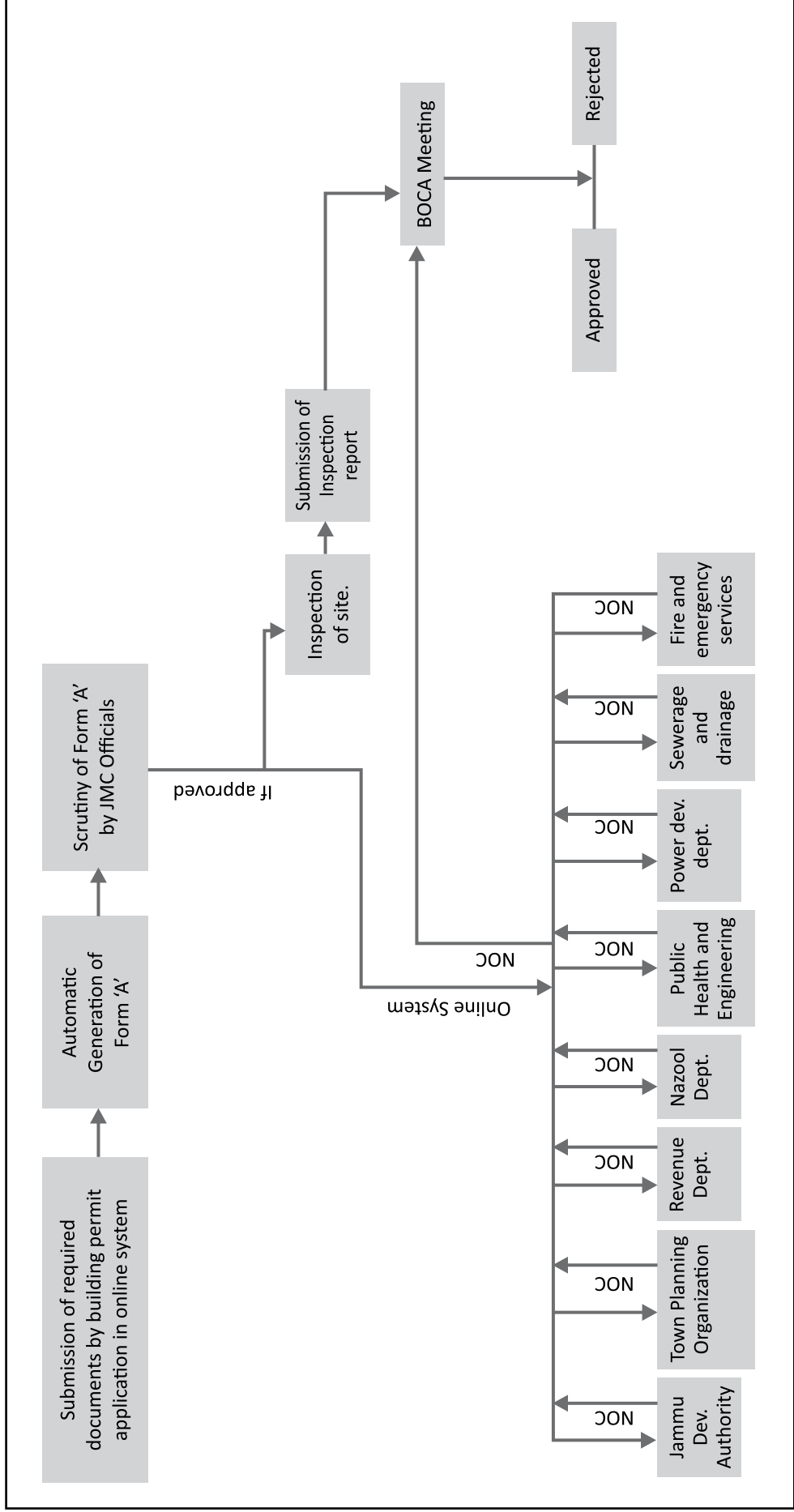


Figure 24 Flow Chart of Building Permit Procedure of Jammu Municipal Corporation





**Step 1.** Citizens can fill online form, attach their photograph, land documents etc in a PDF format. A confirmation SMS & e-mail will be send to the applicant on the spot. Application Form A for building permission will be automatically generated and send to the concerned Officer/Officials online.

The following documents are required for building plan approval :-

- i. Site plan
- ii. Building plan
- iii. Service Plan
- iv. Parking & Circulation plan
- v. Landscape plan
- vi. General Specifications Plan
- vii. Ownership Title plan
- viii. Other documents if any.

**Step 2.** The Form A is then scrutinized by JMC officials and if accepted then the case file will be sent online for NOC to the concerned departments. If Form A is having any deficiencies then the applicant will be informed via e-mail to provide the requisite documents.

The following line departments are empanelled in the online building permission for granting NOC's online :-

- i. Jammu Development Authority
- ii. Town Planning Organization
- iii. Revenue Department/Nazool Department
- iv. Public Health & Engineering
- v. Power Development Department
- vi. Sewerage & Drainage
- vii. Fire & Emergency Services
- viii. Lakes and Waterways Development Authority
- ix. JK Tourism Development Authority

**Step 3.** Inspection of Site by the Concerned Field Staff.

**Step 4.** Submission of Inspection Report by Concerned Field Staff.

**Step 5.** Once the NOCs are received online from the line departments the case is placed before Building permission authority for final approval and ink signed authorization. There after the applicants were informed via registered e-mail regarding acceptance & rejection of their cases.

**Step 6.** The cases which are approved by the Building permission authority, online generated building permission fee details are sent to the applicant via registered e-mail for depositing the fee online or offline

**Step 7.** Once the requisite fee received, building plan approval is communicated via e-mail and also handed over in hard copy to the applicant.

### **11.3.2 Challenges in Jammu Municipal Corporation Building Permit System**

#### **Quoted from Website of JMC...**

“This section which is instrumental in ensuring planned development of city is suffering with following weaknesses :

- 1) We have one Senior town planner from town planning organization. Proposal for transfer of post of STP and a Divisional architect has been sent to the Administrative Deptt.
- 2) Deficient staff- we have 2 building officers, 4 surveyors for handling such vast area of 288 sq kms. We receive 5-10 building permission cases every day. For handling these cases, we have 11 contractual employees to handle this. Their proposal for regularization of these employees has been sent to the govt for approval.
- 3) **Building permission is online in JMC, but partly.** The cases are



submitted offline. The cases are further processed online. Tenders have already been floated for making the entire process online on the pattern of Indore Municipal Corp. It is further decided that from 1st of Jan'2016, building permission cases shall be accepted in scanned format through email.

- 4) **Building permissions are still being given under BOCA, when a new chapter has been inserted in the Municipal Corporation Act.** The existing byelaws needs to be reviewed in light of rapid growth of city and development activities. To update the bye laws as per the changing requirements, the bye laws have been put for review and architect association and experts in the relevant field have been asked to send their inputs....
- 5) The policy for urban poor i.e. for EWS/ LIG has been specified in the amendments of JK Municipal Corporation Act 2000 & JK Dev. Act 1970. There are certain clarifications required as it becomes difficult to adhere these guidelines.... In absence of the clear policy/ guidelines it becomes very difficult to process the group housing case. A detailed note has been submitted to administrative department in this regard along with approved guidelines of Govt. Of Punjab and Andhra Pradesh.
- 6) As per the provisions of the J&K Municipal Corporation Act 2000 & Approved Building Bye laws of JMC.... **The water connection, electric connections and sewer connections to commercial projects and group housings projects are to be given on production of the completion certificates issued by JMC. But PHE deptt. And PDD deptt. Has never asked for completion certificate**

**from JMC before issuing the water and electric connection** in favour of any group housing project or Commercial project.”

### **11.3.3 Remarks on the Jammu Municipal Corporation Building Permit System**

1. The online system is not fully functional. List of projects submitted for approval are not available on the website. Similarly status of project is not available and the submissions are not uploaded.
2. There is apparently a list of registered technical personnel (which includes draftsmen and architects, engineers) but this is not available on website. Also, there is no transparency on how this registration takes place.
3. There is no online application form available online for registration as technical personnel.
4. JMC should appoint a special Information technology manager to update the website on an ongoing basis to address the above three issues.
5. There is no requirement for soil investigation and certification of competency of soil for the structure. Hiring of geotechnical agency and/or engineer should be mandatory for all buildings other than self-use, single family homes of not more than two storeys. Clear, unambiguous roles, responsibilities and liabilities of the Geotechnical agency need to be enumerated in the Regulations.
6. There is no requirement for Stability certificate from Structural Engineer. Clear, unambiguous roles, responsibilities and liabilities of the Structural engineer need to be enumerated in the Regulations. Hiring of structural engineer should be



mandatory for all buildings other than self-use, single family homes of not more than two storeys.

7. In absence of utilisation of an engineer for design, JMC should prepare a technical manual of “rules of thumb” design template that needs to be followed in a highly seismic zone. Such a manual is not available.
8. There is presently no site inspection being carried out except to check the plinth area. JMC should build capacity in the staff to follow the building permit protocol as laid out in the byelaws.
9. The timelines for each of the tasks assured by the JMC are extremely unrealistic and are almost never met. JMC would be well advised to revise the timelines and moderate the expectations of the building permit applicants.



## 11.4 Srinagar Municipal Corporation Building Permit System

### 11.4.1 Srinagar Municipal Corporation Building Plan Approval & Inspection Procedure-1

The protocol is similar to the Jammu Municipal Corporation and is explained through the flow Chart below.

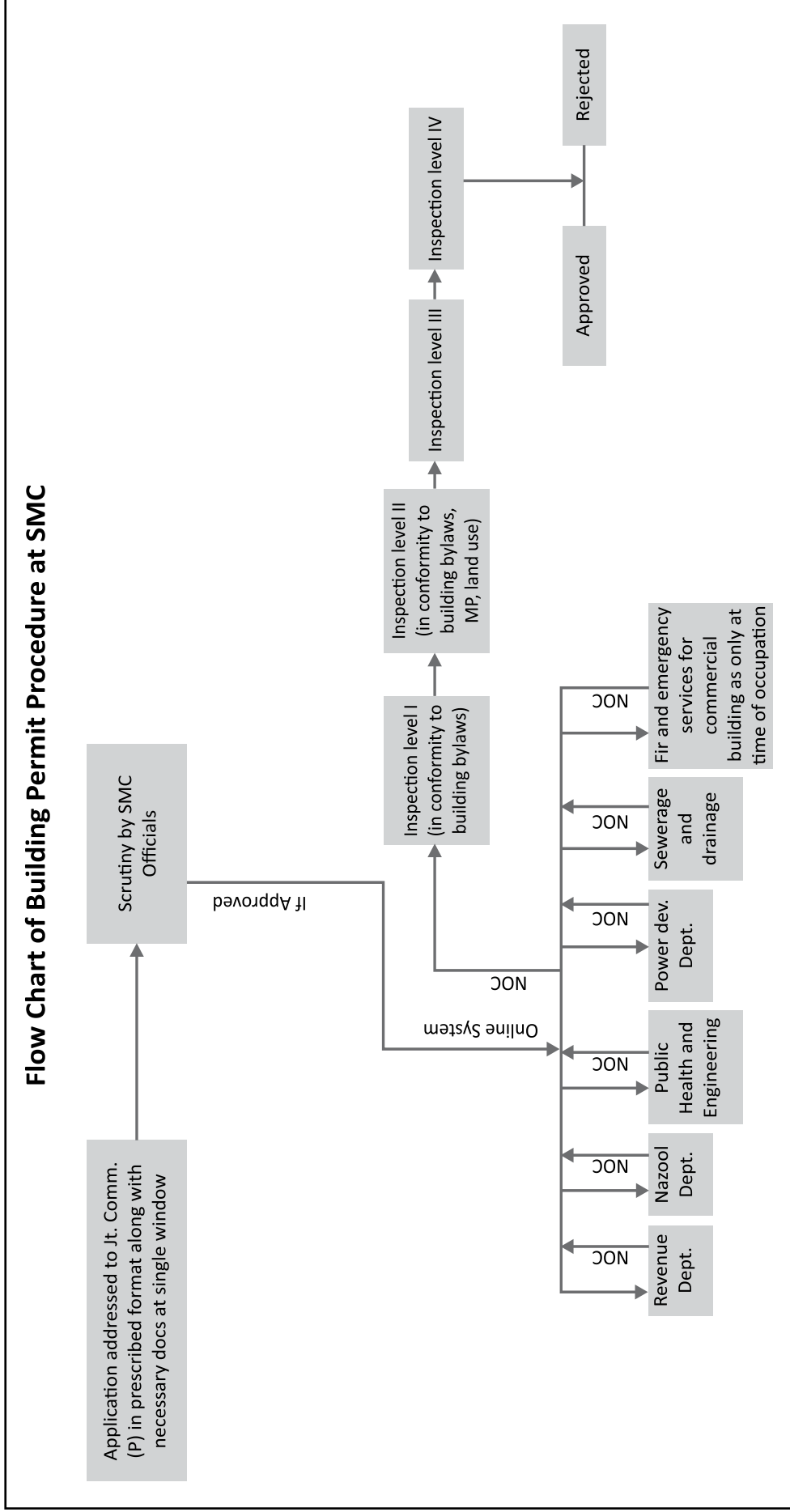


Figure 25 Flow Chart of Building Permit System at Srinagar Municipal Corporation







### **11.4.2 General Observations on the Srinagar Municipal Corporation Building Permit System**

1. The online procedure is fairly streamlined. The website is well-organised and the facility for online application is fully operational
2. Online Forms are available for all types of building applications including registration as building professional.
3. There is transparency in the procedure with online listing of projects along with the status of the application - Approved/ Rejected/Deferred
4. There is an online list of approved registered technical persons with their contact information for the benefit of applicants
5. Most of the other procedures are similar to Jammu Municipal Corporation (JMC).

### **11.4.3 Remarks on the Srinagar Municipal Corporation Building Permit System**

Besides the Remarks for JMC which are equally valid for SMC,

1. There is no differentiation between Engineer, Architect and Draftsmen as “technical person”
2. Structural drawings are not required to be submitted and it is doubtful if structural drawings are ever made. Most of the “structural design” is done by the mason or draftsman based on experience. Only

architectural drawings are submitted and approved.

3. There is no requirement for submitting Structural stability certificate by engineer for conforming to design standards for multi-hazards such as earthquake, wind or for protection against floods.
4. There are no separate requirements for self-use home and commercial project except from fire point of view Commercial and real-estate projects need to get three approvals from the Fire department at various stages of the project.

In the ensuing Figures are sample approval drawings. Figure 26 is a submission drawing for a Students’ Hostel. The sheet is rubber stamped by a Technical Authroised Person, namely a “Draftsman”. There are not structural details, even though there is an reinforced concrete slab on the first level. The is no cross section nor an elevation along the transverse direction. All the three plans, site plan, elevation and section are shown on the same drawing.

Figure 27 is a submission drawing for a house. The drawing does not have a Title Block. There are no material specifications, no structural detail, no elevation and no plan.

Consultant, during visits to Jammu and Srinagar conducted meetings with JMC, SMC and related line departments to discuss various issues of building permit system. Presentations made for these meetings are attached as Annexure II and Annexure III.



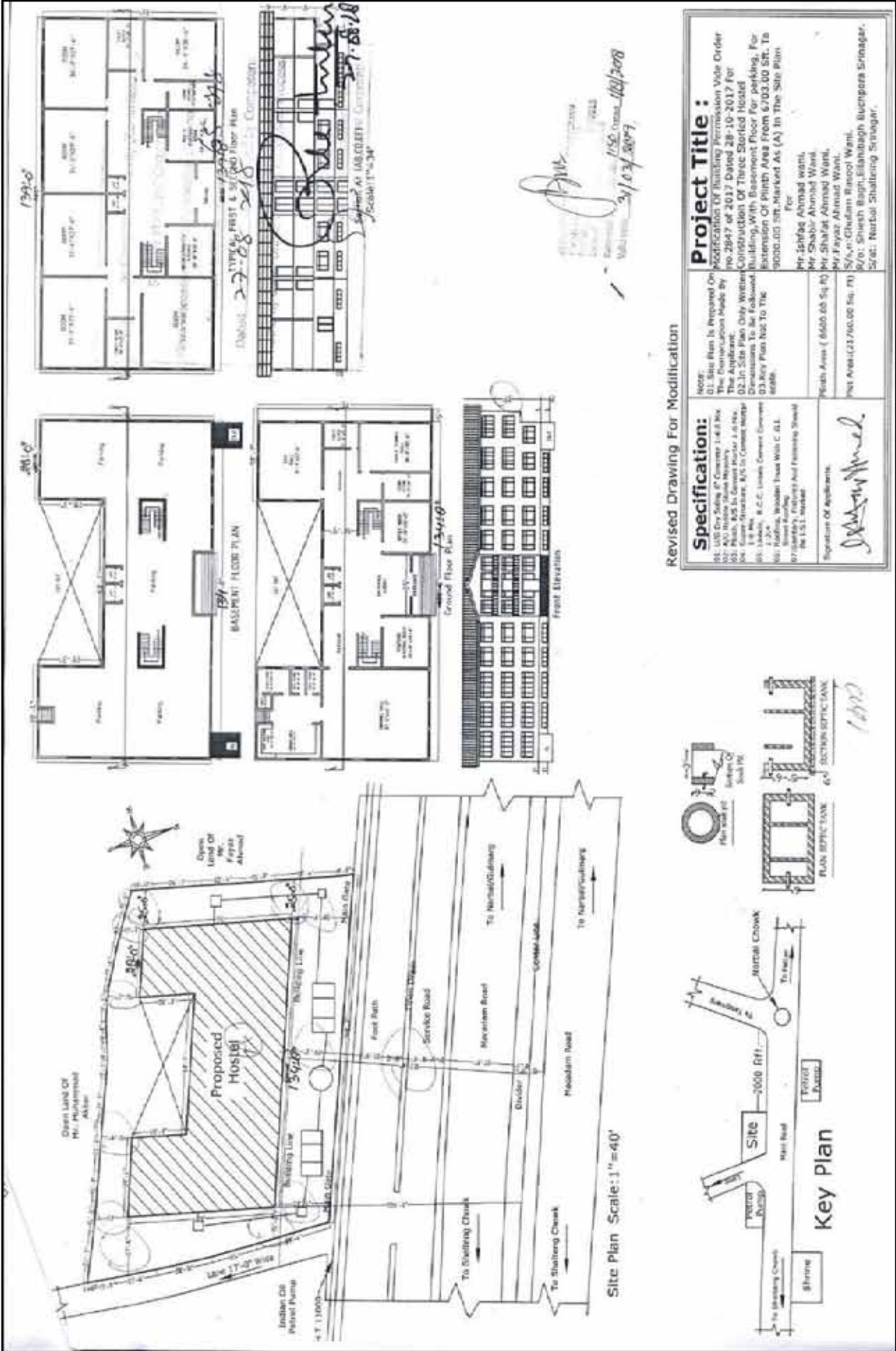


Figure 26 Sample Submission Drawing for Building Approval of a Hostel taken from the Simagar Municipal Corporation website.







## 11.5 Procedure For Approval/Revision of Building Plan In Urban Local Bodies (ULBs)

### 11.5.1 Basic Information

Procedure for Approval of Building Plans in pursuance to Municipal Building Bye-Laws/Master Plan 2011 is similar to the process in SMC and JMC. The procedure for obtaining building permit as put up on the website of Jammu Urban Local Body on the procedure is presented in Tables 2 and 3..

As per the procedure, copy of plans is to be forwarded by CEO/EO to the concerned agencies within 2 days. That is an aggressive timeline. NOCs from all departments are to be received within a period of 2 weeks. Inspection report by the designated officer is to be submitted within 7 weeks. Completion Certificate is to be provided within 8 days from receipt of notice of completion for residential building.

The timelines are highly unrealistic and are followed in the breach. There seems to be an unseemly hurry to issue permits possibly to attain high score for “ease of doing business”. However, in a country where papers are rarely in order, there is often delays due to incomplete submissions and finger-pointing between the permit applicants and the authorities is a common phenomenon.

**Table 2** Procedure for Approval/Revision of Building Plan in ULBs. Part I

Designated Officer	Chief Executive Officer/Executive Officer
Checklist for Building Plan Approval	Application on prescribed Form-A for building Permission.
	6 copies of the building plans showing the site plan, key/location plan, section and elevation of each floor and specifications.
	An attested copy of sale deed/lease deed/gift deed/court decree/mutation order in support of ownership.
	Two photographs (Passport size).
	Qualification/Registration Certificate of consultant with respective authority.
Fee:	As per criteria.
Timeline	Building plan approval is provided within 30 days.
	Timeline: 30 days.
Procedure for users:	Applicant shall get building cum site plan on prescribed drawing format prepared by the empanelled Draftsmen/Engineers with Municipal Council/Committee or Architects duly registered with the Council of Architecture.
	NOTE: During verification of the application, the Authority may ask for any clarification if required any time. The applicant can track the status of building plan approval process anytime at: <a href="http://www.ulbjammu.org">www.ulbjammu.org</a> (citizen services).



**Table 3** Procedure for Approval/Revision of Building Plan in ULBs. Part II

Procedure by Department:	<p>Accordingly the applicant is intimated through phone call and SMS to get approved building plan at Single Window at Municipal Council/Committee Office within the period of 30 days. Once the applicant submits building cum site plan along with all relevant documents, the case file is accordingly put into online mode through concerned Municipal Council/Committee Office.</p>
	<p>The building cum site plan along with all relevant documents is being scanned by Single Window Assistant and necessary data entry is being done on the said window as per prescribed format (<a href="https://http://ulbjammu.org/BuildingPermission%20Application%20Form.xps">https://http://ulbjammu.org/BuildingPermission%20Application%20Form.xps</a>) for onward submission to concerned line departments for obtaining of NOCs.</p> <p>Timeline: 2 days.</p>
	<p>NOCs from all departments.</p> <p>Timeline: 14 days.</p>
Procedure by Department:	<p>The pre-construction inspection and reporting (Khilafwarzi Assistant).</p> <p>Timeline:3 days.</p>
	<p>The recommendations at Level-II (Khilafwarzi Inspector).</p> <p>Timeline:2 days</p>
	<p>The recommendations at Level-III (CEO/EO) in conformity to Building bylaws, Master plan and Land use plans.</p> <p>Timeline: 2 days</p>
	<p>Accord of approval at Level-IV (President/Administrator).</p> <p>Timeline: 3 days</p>
	<p>After final approval from Competent Authority at Level-IV the case is being forwarded to Level-I for Fee Assessment. Accordingly the applicant is intimated through phone call and SMS for submission of Fee at Single Window at Municipal Council/Committee.</p> <p>Timeline: 2 days.</p>
	<p>After fee submission, the building plan approval certificate is being generated online as per prescribed format.</p> <p>Timeline: 2 days</p>





**Table 4** Procedure for Plinth and Occupation Certificate in ULBs.

**Table 4.1:** Procedure for Plinth Inspection

Designated Officer	Chief Executive Officer/Executive Officer
Check list for plinth level approval	Approved Building Plan
	Intimation of completion through application.
Procedure:	The Applicant should submit the application along with all relevant documents at concerned Municipal Council/Committee. The CEO/EO will forward the application to Khilafwarzi Inspector for inspection of the site. Timeline: 1 day.
	The Concerned Khilafwarzi Inspector in conformity to Building Bye-laws/ Sanctioned Building plan submit report to CEO/EO. Timeline: 3 days.
	The CEO/EO shall approve or reject plinth completion certificate and forward to applicant. Timeline: 3 days.

**Table 4.2:** Procedure for obtaining occupation certificate

Designated Officer	Chief Executive Officer/Executive Officer
Obtaining of completion/ occupancy certificate	Approved Building Plan.
	Plinth inspection Certificate.
	Application form for Occupancy Certificate
	Fee/charges to be paid to get the service: NIL
	Timeline: 7 Days
Procedure for user:	After the construction of building as per approved building plan the applicant can apply for grant of occupation certificate at concerned Municipal Council/Committee office on prescribed form available at office website ( <a href="http://www.ulbjammu.org">www.ulbjammu.org</a> ).
Procedure by Department:	The application on prescribed format along with all relevant documents by the applicant is submitted at concerned Municipal Council/Committee office and the same is forwarded to Khilafwarzi Inspector by CEO/EO. Timeline: 2 days.
	After Final Inspection by Concerned Khilafwarzi Inspector, the application along with inspection report is being forwarded to CEO/EO for recommendation. Timeline: 3 days.
	Final approval is accorded and intimated to the applicant through phone call/SMS for collection of Occupancy Certificate. Timeline: 2 days.





### 11.5.2 Municipal Committees:

Of the 74 Municipal Committees in J&K, Leh, Kargil and Kupwara Municipal Committees were visited and detailed information of building permit procedures and challenges were observed and understood.

#### 11.5.2.1 Kupwara Municipal Committee

##### Building Plan Approval & Inspection Procedure

**Step 1:** Applicant submits application to Executive officer along with following documents.

1. Submission of site plan
2. Building Plan
3. Application form
4. Revenue Records (Intikhab, Girdawari, Jamabandi, Khakadasti)

**Step 2:** Executive officer forwards these documents to following line departments for NOCs

1. Tehsildar Revenue
2. Executive Engineer R&B
3. PDD
4. PHE
5. Chief Town Planner.

**Step 3:** After receiving NOCs from line departments, Building permission section forwards it to Building Inspector for site inspection.

**Step 4:** Building inspector submits the ground / site report to clerk and he writes office notes and submits to Executive officer.

**Step 5:** Executive officer recommends the file to president (Chairman of MC) for approval.

**Step 6:** President after giving approval forwards file to Executive Officer for final permission

### General Observations:

Permission approved by Municipal Committee Kupwara in last three years

1. 2016 = 71
2. 2017 = 53
3. 2018 = 35

#### 11.5.2.2 Kargil Municipal Committee (under Ladakh Autonomous Hill Development Council)

##### Building Plan Approval & Inspection Procedure

**Step 1:** Applicant is required to submit application with Photo, building plan and site plan.

**Step 2:** Dept puts this application online for NoC from following department.

5. Revenue dept
6. PHE
7. R&B
8. Irrigation
9. P.D.D.
10. Tehsildar for out of city area

**Step 3:** After receiving NOC from all NOC, Building permission meeting is conducted in which Additional deputy commissioner, chairman and administrator of all municipal committee, executive engineer are present. Such Meetings happen twice in a year

##### General Observations in Kargil and Kupwara:

1. In Kargil, the system of conducting BOCA meeting for approvals is being followed till date. This was not observed in any other Council or committee. These



meetings at Kargil are conducted twice in an year and 15-20 cases are discussed per meeting. On an average 30% of the files are rejected. Maximum rejection comes from Revenue Dept. But, the files can be resubmitted and if the missing documents are submitted, the permit is granted.

2. Cost of approvals: Rs 3/sqft for residential and Rs 5/sqft for commercial for the permission.
3. There is no requirement of NOC from Fire department in any of the Municipal Committees. In the long term, after the capacity has been built in terms of fire fighting infrastructure, the byelaws should be amended for hotels and other commercial structures to require mandatory Fire approval.
4. There is no proper drainage system in place. Households use septic tanks system. For solid waste management, landfill area 30-40 km from city are used. In the medium term a comprehensive town-level drainage system should be put in place.

### **11.5.2.3 Leh Municipal Committee**

#### **Building Plan Approval & Inspection Procedure**

Step 1: Applicant is required to submit application with Photo, building plan and site plan prepared by Architect.

Step 2: The Planning Department puts this application online for NOC from following line departments:.

1. Revenue
2. PHE (Public Health Engineering)
3. R&B (Roads and Buildings)
4. LDA (Leh Development Authority)
5. Tourism (only for commercial)

6. P.D.D. (Power Development Department)
7. Antiquity
8. Fire (only for commercial)
9. Pollution (only for commercial)

**Step 3:** After getting NOCs from all the above line departments permission is granted.

#### **General Observations at Leh Municipal Committee (under Ladakh Autonomous Hill Development Council)**

1. According to officials of Leh Committee, maximum rejections are from PDD department and revenue department.
2. Officials also pointed out that permissions are given for construction up to 3 storeys but up to 5 storeys are constructed illegally. Thus the building byelaws are being followed in their breach. However, they also mentioned that it should be allowed to construct floors upto 5 storeys with appropriate measures for earthquake resistance as there is unavailability/shortage of land for construction. A review of the building byelaws is urgently needed and if found meritorious and sustainable, the building height and Floor Space Index restrictions should be relaxed to allow for expanding tourism demand. Once that is put in place, the byelaws should be followed rigorously.
3. It is observed that Commercial buildings and institutions which have applied for loan for construction only apply for building permit. A carrot and stick policy should be adopted to incentivise other potential structures to seek permission and should be punished by means of stop-work notices, demolition, and penalty all of which should be incorporated in the byelaws







4. Cost of building permission was estimated to be about Rs 3/sqft for residential and Rs 5/sqft for commercial
5. 186 building applications for the three years (2015-2018) were filed. Only 2% to 3% of the files are rejected.
6. Generally, of the building permit procedure is completed in one month.
7. There is no role of fire department in building permit process for self-use homes.
8. There is no role of Hill development council in building permit process.
9. Only Commercial buildings apply for Occupation Certificate (OC). Executive Engineer R&B along with assistant of MC visits site and they jointly submit report prior to OC being granted. Photographic evidence of the structure is a necessary document for OC. After OC is received, these commercial structures, mainly hotels, are registered with Tourism dept.
10. There is no proper drainage system in place. Households use septic tanks system. Suction trucks are used, and hotels are charged Rs 1/ lit for cleaning of STP
11. There is only one fire station with 3 fire engines in the city.
12. No Master plan is available for this area. Draft of 1995-2015 is still in use. A new Master Plan exercise should be immediately undertaken.



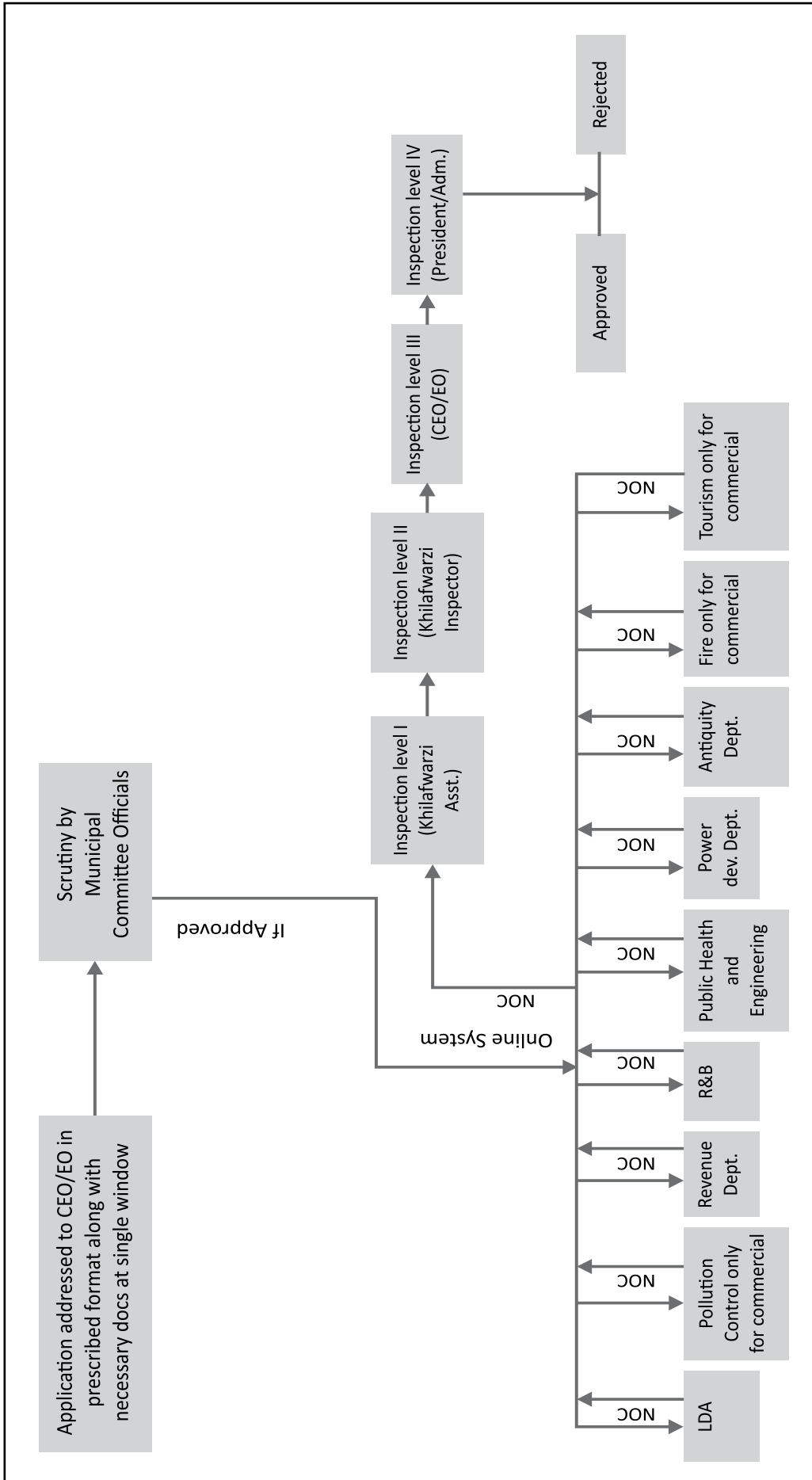


Figure 28 Flow Chart of Building Permit Procedure of Leh Municipal Committee





### **11.5.3 Municipal Councils:**

#### **11.5.3.1 Anantnag Municipal Committee**

Building Plan Approval & Inspection Procedure

**Step 1:** Applicant submits application to Executive Officer along with these documents.

1. 1 Submission of site plan
2. 2 Building Plan
3. Application form
4. Revenue Records (Intikhab, Girdawari, Jamabandi, Khakadasti)

**Step 2:** Executive Officer forwards to line departments for NOCs

1. Tehsildar Revenue
2. Executive Engineer R&B
3. PDD
4. PHE
5. Chief Town Planner.

**Step 3:** After receiving NOCs from line departments, Building Permission Section forwards it to Building Inspector for site inspection.

**Step 4:** Building Inspector submits the ground / site report to clerk and he writes office notes and submits to Executive Officer.

**Step 5:** Executive officer recommends the file to president (Chairman of MC) for approval.

**Step 6:** President accords approval and returns file to Executive Officer for issue of permission.

#### **General Observations:**

Building Permission application approved by Municipal Council Anantnag:

From 04-2018 to 06-2019: 90 Building permit applications have been approved.

#### **11.5.3.2 Baramulla Municipal Committee**

In Baramulla Municipal Council, procedure similar to that of Anantnag Council is followed except that the Drainage dept is not involved here.

#### **General Observations:**

Building Permission application approved by Municipal Council Baramulla in last three years

1. Applications Received = 570
2. Applications Approved = 495

**75 Applications are pending because of NOCs clearance**



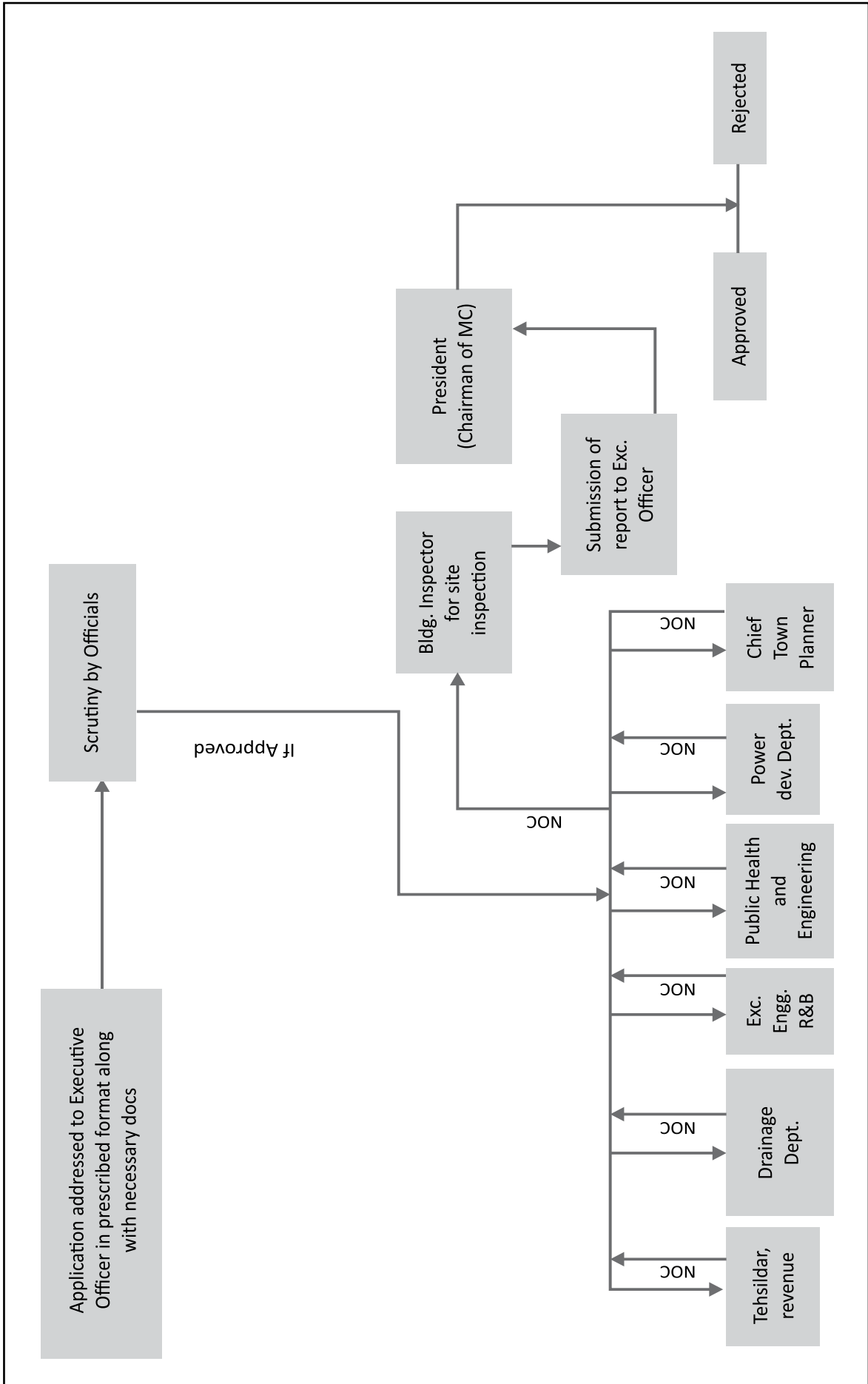


Figure 29 Flow Chart of Building Permit Procedure of Anantnag Municipal Council





The comments for municipal committees of Baramulla and Anantnag are similar. There is no system to ensure safety of the built structures as there is no need for issue of any structural plans or a structural engineer's certificate. As mentioned for SMC, for buildings other than single family, self use homes, all commercial and multi storey structures must follow due process as laid out in SMC building byelaws.

#### **11.5.4 Tourism Development Authorities**

##### **11.5.4.1 Sonamarg Development Authority:**

Building Plan Approval & Inspection Procedure

**Step 1:** For Building permit NOC are required from the following line departments,

1. Revenue (title verification),
2. CTP
3. R&B (PWD)
4. DFO, (Divisional Forest Officer)
5. Wildlife (Warden)
6. P.D.D.
7. PHE (Rural)
8. Pollution Control Board
9. Environment.

**Step 2:** After getting all NOCs file are discussed in BOCA meeting and BOCA members take final decision for the building permission.

##### **General Observations:**

1. Since last two years construction permission is on hold as per Court order.
2. Authority confirmed that each and every hotel project has violated the permission.

3. Only two to three application are received for the new construction in a year.
4. Authority suggested that for the present construction activities, permission can be given with a penalty. No further permission should be given as the land in this area is very limited. Only Tent and farming should be allowed. Pahalgam and Gulmarg are bigger in area hence in those area construction permissions can be given.

##### **11.5.4.2 Kargil Development Authority/ Tourism Development Authority**

1. Authority officials informed that master plan of area is submitted for approval.
2. No application for building permit is received till date
3. It was also informed that only 4 out of 25 tourism authorities in force.
4. Director Tourism handles projects from Srinagar

#### **11.5.5 General Comments on Tourism Development Authorities (TDAs)**

The Tourism Development Authorities, as seen in Sonmarg, Kargil and other towns have ceased (as of 2019) to issue and building permits due to court decree in view of the rampant degradation of the environment and natural habitat on account uncontrolled and ill planned and illegal construction. In Sonmarg, there is a blanket ban on any new constructions and even small modification in existing hotels requires a special permission from the judiciary. A lot of this construction has political patronage or is directly owned by a senior politician or powerful stakeholder.

#### **11.6 Procedure for Approval/ Revision Of Building Plan In Lakes & Waterways Development Authority**

##### **11.6.1 Permission for construction purposes:**



As stated on Website of LAWDA, Government has vested powers to LDA under J&K Control of Building Operations Act, 1988 for regulation of building activities in the local jurisdictional area. Under this activity, building permissions are granted to any desirous person by following a procedure laid out as per the standing norms. The requirements for building permit at LAWDA include:-

- a. Application by Owner on prescribed form
- b. Revenue documents stating thereon the title of the landowner. The document is prepared by the concerned Patwari and needs to be attested by the Tehsildar of the area;
- c. 16 copies of building plan duly prepared and authenticated by a registered Architect /Draftsman to be submitted by the owner;
- d. NOC from Assistant Commissioner, Revenue regarding title of land;
- e. NOC from Assistant Commissioner, Nazool, Srinagar;
- f. NOC from Custodian General in case of Evacuee property;
- g. NOC from Chief Town Planner, Town Planning Organisation, Kashmir;
- h. NOC from PDD;
- i. NOC from UEED (S&D) Division;
- j. NOC from Collector Land Acquisition, LDA;
- k. NOC from Executive Engineer, Lake Division No. 2nd, J&K LDA; and
- l. NOC from Waterworks Division, Srinagar.



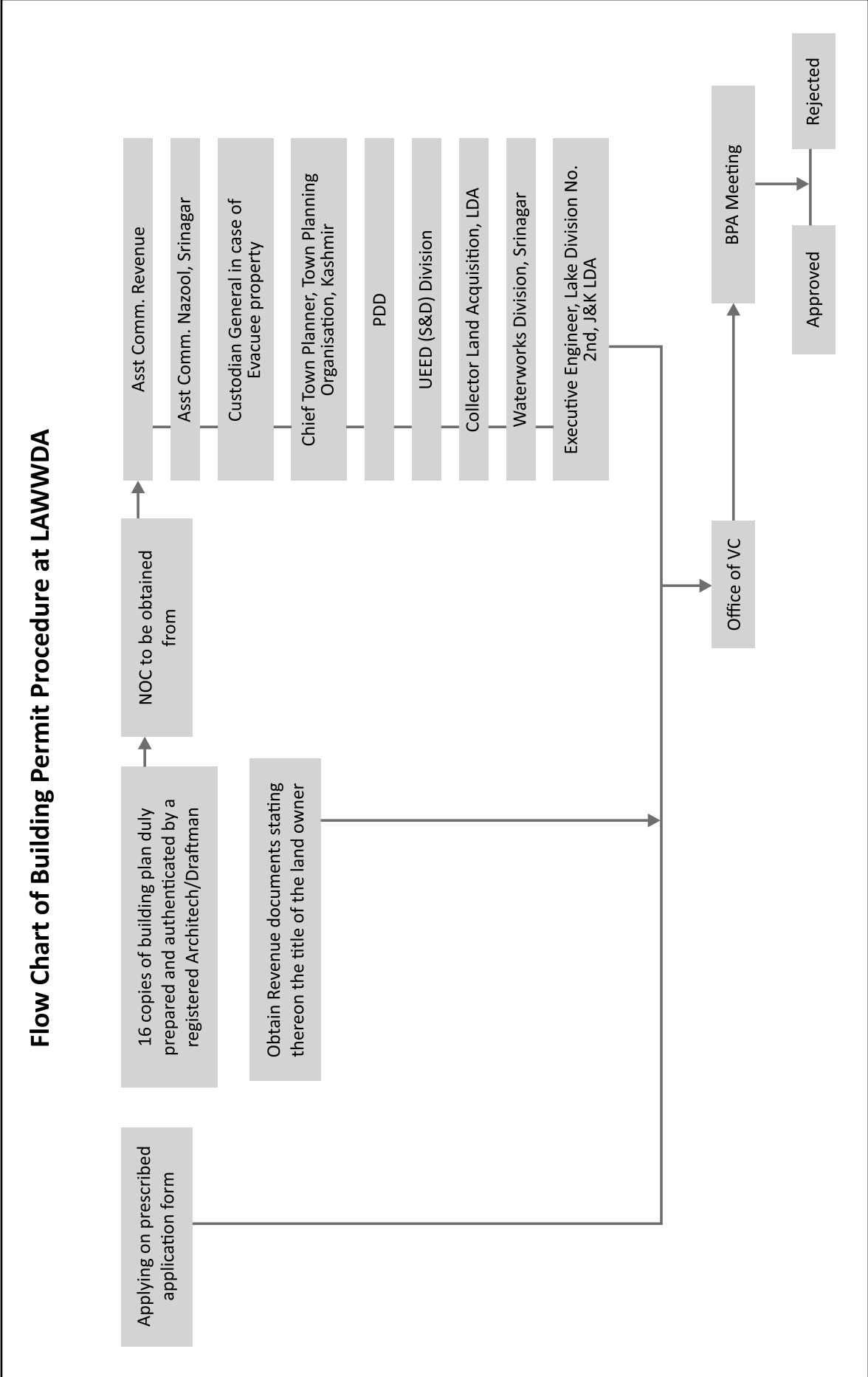


Figure 30 Flow Chart of Building Permit Procedure of LAWWDA





Authenticated Revenue documents as well as the requisite NOCs from various offices needs to be obtained by the applicant himself /herself. After obtaining the revenue documents along with the NOC's as quoted above, the desirous persons need to deposit the documents with the VC's office along with the prescribed application form. Format of the application as well as the format for seeking NOCs from various offices can be downloaded from downloads section (BOCA forms). The case is then put up for deliberations before the BPA which meets at regular intervals of 02 weeks app. The cases cleared in the meeting are immediately disposed off by asking the clients to deposit the BP fee which is as under:

#### **For residential houses**

- Ground floor - Rs.3/Sft
- 1st floor - Rs.2/Sft
- Boundary wall - Rs.5/Rft

#### **For commercial establishments**

- Ground floor - Rs.25 /Sft
- 1st floor - Rs.20 /Sft
- Boundary wall - Rs.15 /Rft

#### **Following members participate in the meeting of the BOCA**

1. VC LAWDA ( Chairman)
2. Secretary LAWDA (Member Secretary)
3. Chief Town Planner (Town Planning Organisation Kashmir)
4. Joint Commissioner SMC
5. Collector land acquisition LDA
6. Enforcement officer LDA
7. Tehsildar Nazool
8. Tehsildar north
9. Executive Engineer PDD

10. Executive Engineer lake division 2nd LAWDA

11. Executive Engineer water works division Srinagar

For places of worship, religious, trusts, there is concession in the fee, which is as follows: Providing, however, no construction fee except the registration fee shall be charged on account of erection/re-erection of places of worship, religious/social trusts but for erection/re-erection of commercial assets 50% of building fee in vogue shall be chargeable from them.

**The building permission granted is valid normally for a period of 3 years from the date of decision in the Building Permission Authority. Renewal is possible only and after obtaining the NOCs as per norms and deposition of BP fee afresh.**

#### **11.6.2 Remarks on the Lakes and Waterways Development Authority Building Permit System**

LAWDA has a system but such rampant illegal construction in the Dal Lake is evidence that the enforcement of the system is not effective.

The problem assailing LAWDA is the same as in other regulatory bodies- non-availability of qualified and trained personnel, non-sensitisation to multi hazard risks amongst other challenges mentioned for SMC.

#### **11.7 Common Challenges In All Building Permission Procedures –Safety Issues**

1. There is no requirement for soil investigation.
2. There is no requirement of design by qualified and registered technical engineer.
3. Submission of structural drawings is not required.





4. There is no requirement for submission of STABILITY CERTIFICATE.
5. There is no accountability for safety on any stakeholder.
6. Requirement for design for the multi hazards that the state is exposed to is non-existent.
7. Procedure of issue of NOC by town planner is not transparent – How does TP for example ensure the plot is not on filled up lake? What are the tools at his/her disposal to reject such a proposal?
8. There is no hazard vulnerability map showing areas of landslide, flooding vulnerability available. Such a map is urgently required and must be dovetailed into the permit process.
9. There is no clear mention of how to handle slums.
10. There is no clear direction on how the enforcement directorate would work on illegal constructions. As a result, there is perception of fear and favour in the process and people do not have confidence in the conduct and handling of illegal constructions by Enforcement Directorate.
11. In almost all building permit applications reviewed, the submitted plan and the actually built structure bear very little resemblance.





## CHAPTER 12

# Functioning of the Building Permit System – The Agencies Involved and Inherent Capacities and Inadequacies of the Enforcement Agencies to Perform Assigned Tasks

Chapter 12 documents the Various Agencies involved in the Building Permit Process, their functioning and identifies their capacities and assesses their training needs. It also suggests detailed Training Programs with curriculum for training the building officials.

### 12.1 Agencies in the Building Permit System

As mentioned in 12.3.1, following agencies are vested with the powers to approve (give NOC) or reject the application in their respective domain:

1. Jammu Development Authority/ Srinagar Development Authority
2. Jammu Municipal Corporation/ Srinagar Municipal Corporation

Within the above are the following departments

- a) Town Planning Organization
- b) Revenue Department
- c) Nazool Department
- d) Public Health & Engineering Dept.
- e) Power Development Department
- f) Sewerage & Drainage Dept.
- g) Fire & Emergency Services Dept.

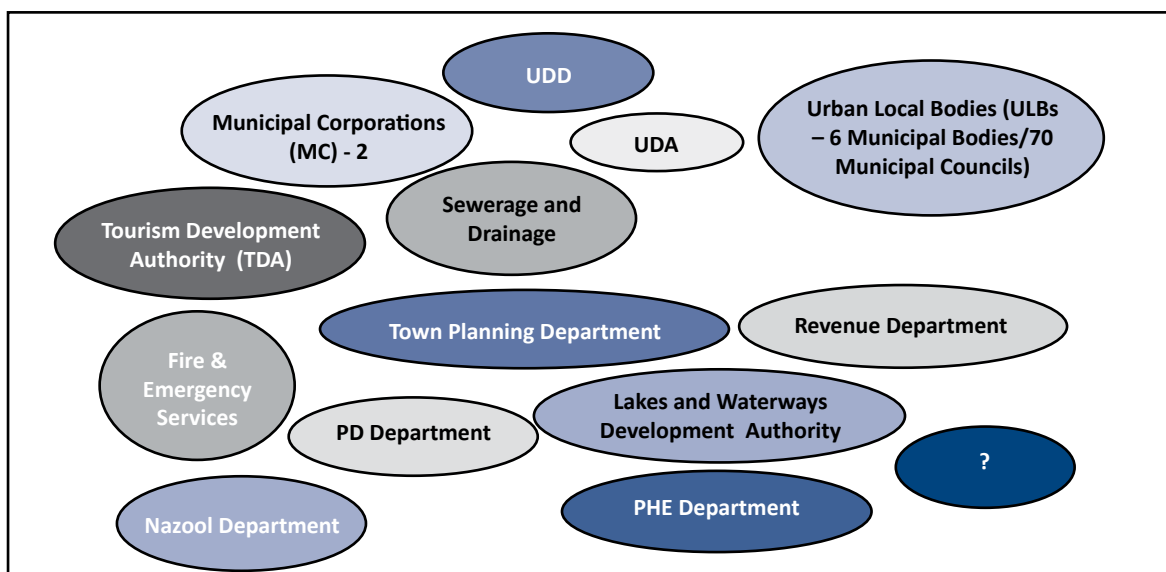


Figure 31 Mapping Connections and Overlaps between Agencies





## 12.2 Capacity Assessment Of Building Officials - Inherent Bottlenecks, Capacities and Inadequacies of The Enforcement Agencies And Training Needs Assessment

For a reference, one Development Authority (SDA) and One Municipal Corporations (JMC) are studied for capacity assessment and detailed comments have been provided.

### 12.2.1 Jammu Municipal Corporation

Staff Strength at Building Permit Department of JMC given in Table 5.:

Table 5 JMC Staff Strength for Building Permit System at Jammu Municipal Corporation

Sr. No.	Position	Status	Qualification	Remarks
1	Senior Town Planner	Vacant		
2	Junior Assistant Town Planner	1		
3	Inspector/Clerk	2	Draftsmen	
4	Building Officer	2	Draftsmen	Should be minimum graduate civil engineer or architect or planner
5	Surveyor/Technical Assistants	6*	Draftsmen	
6	Executive Engineers (C, T, E)	Vacant		
7	Assistant. Executive Engineer	Vacant		
8	Assistant. Engineer	Vacant		
9	Junior Engineer	Vacant		
10	Computer Operator	1		
11	Chief Enforcement Officer		BA	
12	Enforcement Officer		MA	
13	Assistant. Enforcement Officer	3	Matriculate / Graduate	Building Enforcement officers should be at least having a diploma in civil engineering.
14	Enforcement Inspector		Matriculate	
15	Computer Operators	2*		
16	Peon	1*		

\*On Contract/Outsourced to NGO





The role of JMC in issuing building permits is quite extensive. In a year, JMC receives about 300 building permit applications on an average.

Besides administering the Building Permit System, projects executed by JMC include Rehabilitation of slum/urban poor, Construction of Government colonies, development of green spaces, development of path ways and installation of traffic signals, amongst others.

### 12.2.1.1 Comments on the Capacity of JMC Building Permit Department

- i) As can be seen above, not one of the three Town Planners' positions is occupied presently. There are only Assistant Building Officer and Assistant Inspectors, but there is no Senior Building Officer or Senior Inspectors.
- ii) The Building Officer and Assistant Inspectors are not technically qualified

and hence cannot look into any safety issues or design issues on the project. At most, they can ensure that the building constructed is as per the allowed building setbacks, building height, etc.

- iii) The system is not geared towards looking at any issues of structural safety under ordinary loads nor safety against any natural hazard such as earthquakes, floods, and fire.
- iv) The drawing submitted along with permit application is often not the building actually built.
- v) The department is not staffed adequately and also not staffed with appropriately qualified persons. There is an urgent need for capacity building, but the Department first needs to be populated with appropriate persons who may then be trained.

### 12.2.2 Srinagar Development Authority

Staff Strength at Building Permit Department of Srinagar Development Authority (SDA) is given in Table 6.:

Table 6 SDA Staff Strength for Building Permit System at Srinagar Development Authority

Sr. No.	Position	Total Strength	Present strength	Vacant position
1	Senior Town Planner	01	01	Nil
2	Divisional Town Planner	01	01	Nil
3	Divisional Architect	01	01	Nil
4	Assistant Town Planner	03	02	01
5	Assistant Architect	03	Nil	03
6	Planning Assistant	05	Nil	05
7	Architectural Assistant	05	Nil	05
8	Draftsmen	02	02	Nil
9	Printer	01	01	Nil



The Administrative Head of SDA is an Officer of the KAS and the Secretary, SDA also is an Officer of the KAS. The Srinagar Development Authority typically receives 150 building permit applications annually.

### 12.2.2.1 Comments on the Capacity of SDA Building Permit Department

- i) SDA is the best staffed amongst all the four authorities (JDA, JMC, SMC, SDA).
- ii) But, there is no culture of receiving and reviewing structural drawings of buildings. The system is not geared towards looking at any issues of structural safety under ordinary loads nor safety against any natural hazard such as earthquakes, floods and fire.
- iii) The drawing submitted along with permit application is often not the building actually built.
- iv) There is a huge potential for capacity building.

### 12.2.3 Other Urban Local Bodies:

#### 12.2.3.1 Kupwara Municipal Committee:

Staff Strength in building permission Section in Municipal Committee, Kupwara is given in Table 7.

Table 7 Staff Strength for Building Permit System at Kupwara Municipal Committee

Sr. No.	Position	Present strength	Vacant position	Qualification	Remarks
1	Building Inspector	01	00	Data Not available	
2	Khilafwarzi Assistant	01	02	Data Not available	
3	Khilafwarzi Guard	01	00	Data Not available	
4	Demolition Guard	03	01	Data Not available	





### 12.2.3.2 Kargil Municipal Committee

Staff Strength in Municipal Committee, Kargil is given in Table 8.

**Table 8** Staff Strength for Building Permit System at Kargil Municipal Committee

Sr. No.	Position	Present strength	Vacant position	Qualification	Remarks
1	Executive Officer	01	Data Not available	Data Not available	1 additional Charge
2	Accountant	01	02	B.A.	
3	Head Assistant	01	Data Not available	Graduate	
4	Sr. Assistant	01	Data Not available		Non technical
5	Sanitary Inspector	01	Data Not available		Non technical
6	Tax Collector	01	Data Not available	Diploma	
7	Assistant Officer	01	Data Not available	Enforcement Diploma	
8	Inspector	00		Data Not available	
9	Legal	00		Data Not available	
10	Executive Engineer	00		Data Not available	





### 12.2.3.3 Leh Municipal Committee:

Staff Strength in Municipal Committee, Leh is given in Table 9.

Table 9 Staff Strength for Building Permit System at Leh Municipal Committee

Sr. No.	Position	Present strength	Qualification
1	Executive Officer	01	Graduates or Under-graduates
2	Sr. Assistant	01	
3	Jr. Assistant	01	
4	Khilafvarzi Assistant	03	
5	Tax Collector	01	
6	Khilafvarzi Inspector	00	
7	Legal Assistant	00	
8	Head Assistant	00	
9	Tax Inspector	00	

### 12.2.4 Comments on the Capacity of Municipal Committees

1. Committee officials informed that the number of Enforcement Assistants (Khilafwarzi assistants) are too few and inadequate to meet the requirements
2. There is no trained engineer, planner or architect in any of the Municipal Committees.
3. The maximum qualification in any staff member is a graduate degree in Arts or Commerce.

### 12.2.5 Municipal Councils:

#### 12.2.5.1 Anantnag Municipal Council

Staff Strength in building permission Section in Municipal Council, Anantnag is given in Table 10.

Table 10 Staff Strength for Building Permit System at Anantnag Municipal Council

Sr. No.	Position	Present strength	Vacant position	Qualification	Remarks
1	Enforcement Officer	00	01	Data Not available	
2	Khilafvarzi/ Building Inspector	01	02	Data Not available	
3	Khilafvarzi Assistant	03	04	Data Not available	
4	Demolition Guard	05	05	Data Not available	



### 12.2.5.2 Baramulla Municipal Council

Staff Strength in building permission Section in Municipal Council, Baramulla is given in Table 11.

**Table 11** Staff Strength for Building Permit System at Baramulla Municipal Council

Sr. No.	Position	Present strength	Vacant position	Qualification	Remarks
1	Enforcement Officer	00	01	Data Not available	
2	Khilafvarzi/ Building Inspector	01	02	Data Not available	
3	Khilafvarzi Assistant	07	07	Data Not available	
4	Demolition Guard	07	03	Data Not available	

#### Comments on the Capacity of Municipal Councils

The Municipal Councils have limited capacity as seen from above and there are no positions available for any technical staff member. There is only a Demolition/Enforcement Officer, Inspector and Guard.







## 12.2.6 Tourism Development Authorities

Sonamarg and Kargil Tourism Development Authorities have been studied for this project.

### 12.2.6.1 Sonamarg Development Authority

Staff Strength in Sonamarg Development Authority is given in Table 12

**Table 12** Staff Strength for Building Permit System at Sonamarg Municipal Corporation

Sr. No.	Position	Present strength	Vacant position	Qualification	Remarks
1	CEO	01	Data Not available	Data Not available	KAS
2	Executive Engineer	01	Data Not available	Civil Engr	
3	Asst. Executive Engineer	01	Data Not available	Civil Engr	
4	Jr. Engineer	02	Data Not available	Civil Engr	
5	Jr. Engineer	01	Data Not available	Electrical Engr	
6	Clerk	00	01	Data Not available	
7	Landscape Architect	00	01	Data Not available	
8	Enforcement Officer	00	01	Data Not available	
9	Need based labour	Engagement as per requirements			





### 12.2.6.2 Kargil Development Authority/Tourism Development Authority

The total number of sanctioned posts of staff members is 21, out of which only 10 posts are filled, as shown in table 13.

**Table 13** Staff Strength for Building Permit System at Kargil Development Authority

Sr. No.	Position	Present strength	Vacant position	Qualification	Remarks
1	Executive Officer	01	Data Not available	Under Graduates/ Graduate	
2	Asst. Officer Account	01	Data Not available	Under Graduate	
3	Jr. Engineer	01	Data Not available	Civil Engineer	
4	Head Assistant	01	Data Not available	Under Graduate	
5	Junior Assistant	01	01	Data Not available	
6	Draftsman	01	01	Data Not available	
7	Steno	01	01	Data Not available	
8	Statistical Assistant	02	01	Data Not available	
9	Enforcement Assistants				

#### Comments on the Capacity of Tourism Development Authority

The Sonamarg Tourism Development Authority has been virtually at a standstill due to a Court Order restricting any new construction in the City since past two years. The Authority confirmed that each and every hotel project had violated building permission is an indication of the poor capacity of the enforcement of Building Permit System. Also, The Tourism Development Authority for all practical purposes is also not functioning in Kargil. It has no Master Plan by which it can regulate construction. Hence, the Kargil Development Authority is the only functioning development authority in Kargil.

#### 12.2.7 Fire Departments

The Fire Department plays a vital role in town planning and development of urban facilities. Applications for building permission in SMC/JMC SDA/JDA are forwarded to Fire Department for their no-objection certificate (NOC) with regard to the design and drawings of structure. Institutional and commercial applicants are mainly asked to get the NOC from Fire Department and as per the officials in Fire Department, nobody applies or is required to apply for NOC from fire department for residential purposes.

The Fire Department after receiving the application has its own designated technical team comprising of Divisional Fire Officer



(DFO) who visits the spot and after proper checking of the drawings and design of the structure, makes his recommendations and issues NOC during building permit approval stage. At the completions of project/ structure stage, the file is once again forwarded to Fire Department for approving completion certificate and at this stage Fire Department official again visits the site for verifying whether the safeguards as per recommended plan has been adopted are not. If the builder has committed violations, the department forwards the file with observations to be improved and modified so as to get the NOC and after proper verification that all the measures and safeguards have been followed, the department approves the NOC. The fire officials dealing with building permission are technically qualified with a diploma course from National Fire Service College, Nagpur.

Role of Fire and Emergency Department is not limited to fighting fires and encompasses following responsibilities:

1. To Safeguard life and property of common masses;
2. Disaster Management;
3. Fire fighting and mitigation of losses in fires even during encounters, attacks, cross firing, bomb/ mine blasts;
4. Rescue during floods/ flash floods;
5. Dewatering during floods and heavy rains;
6. Providing of potable water during floods as well as draught;
7. Evacuation of effected people in both rural and urban areas;
8. Search and rescue in the areas hit by Earthquakes.
9. Fire Prevention; Public Awareness through print and electronic media; conducting seminars, delivering lectures in public gatherings, educational institutes;
10. Conducting of inspections, fire auditing; risk assessment and recommendations thereof; mock drills in various industries and commercial/ Government institutions;
11. Establishment of Temporary Stations during VVIP visits, religious/ public gatherings, exhibitions, establishment of number of temporary Fire & Emergency Stations every year during Holy Amar Nathyatra and other festivities; and
12. Upkeep and maintenance of large fleet of appliances, equipment and Portable Pumps.

### 12.2.8 Comments on the Capacity of Fire Department

The organisational structure of Fire Department in Jammu and Kashmir is given in figure:

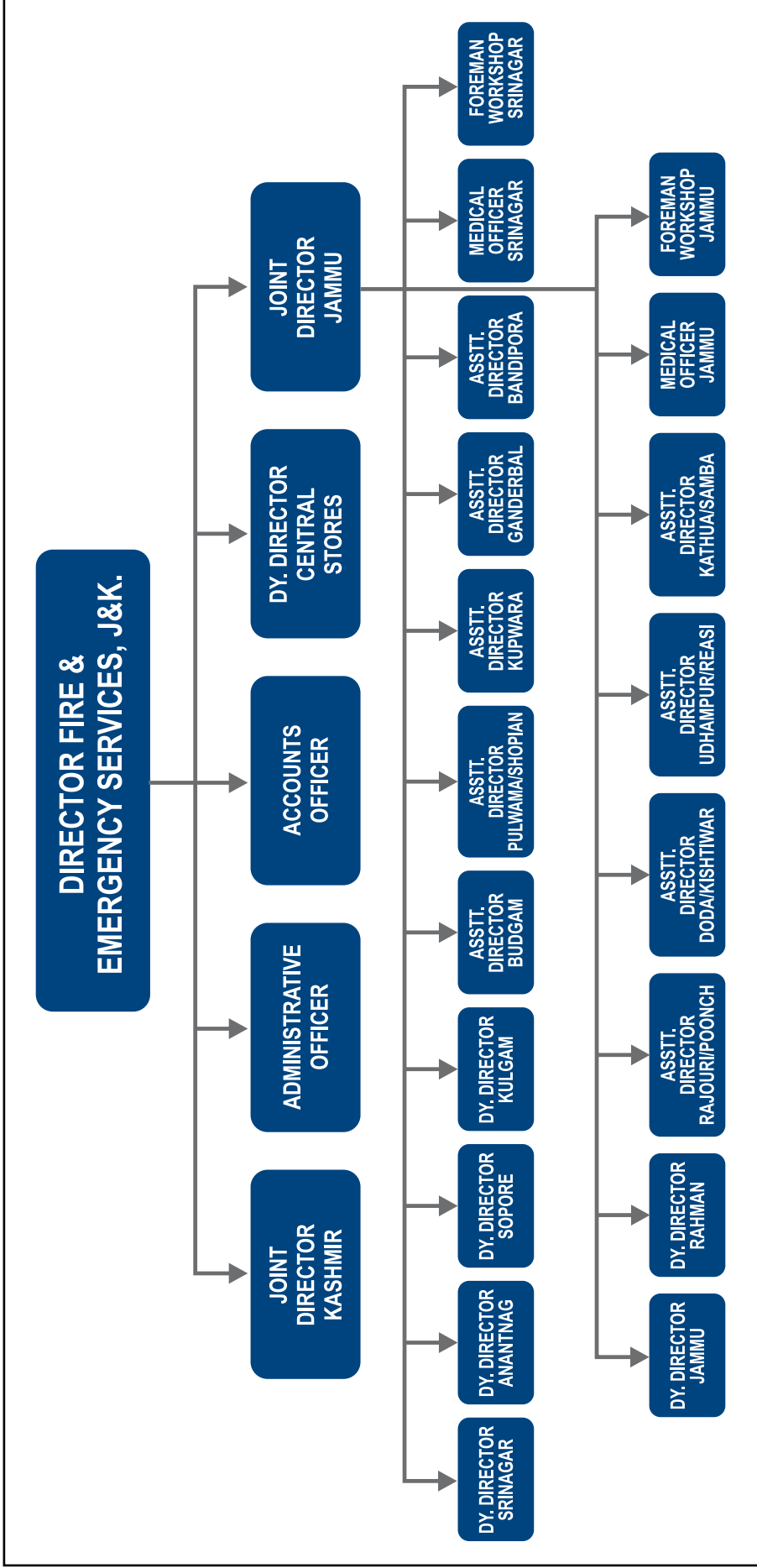


Figure 32 Organisational Structure of Fire Department in Jammu & Kashmir



1. The total Number of Fire Stations, Fire Posts and River Posts are:

1. Kashmir Division	=	131
2. Jammu Division	=	42
3. Ladakh	=	02
<b>Total</b>	<b>=</b>	<b>175</b>

2. The role of the Fire Department while reviewing projects needs to be more holistic. Projects must be looked at internally and reviewed for their siting. Projects where large public gathering is expected, such as shopping malls, cinema halls, educational institutions and commercial complexes, should not be allowed at locations where fire tender access is difficult.
3. The role of Fire Officers as mentioned in preceding paragraph is for disaster

management. Hence the state fire stations should be adequately equipped with tools and equipment, which is required not just for fire hazard but also for other hazards such as earthquakes. A visit to Ahmadabad fire station is encouraged to appreciate the disaster preparedness that is required for a zone with such high seismic risk.

4. Presently, the Fire Officers do not seem to be abreast of the latest NBC 2016.
5. Training programs needs to be conducted as part of continuing education and capacity building for the Fire Officers, especially in light of above. Such training programs are being conducted at national level and state's Fire Officers may be sent for such workshops and training programs.





## CHAPTER 13

# Accreditation System

*Chapter 13 reviews the Accreditation Systems that exist in the Regulatory System for all stakeholders including Private Professionals and agencies that service the building industry and those within the system and suggests the list of agencies that need to be brought within the ambit of the regulatory system through registration and licensing.*

**13.1** There is no Accreditation System for licensing of the following building professionals, who are intrinsic to construction and who in our opinion need to be included within the ambit of the regulatory process and held accountable :

- a) Architects and Planners (there is only a list of registered draftsmen and a few architects)
- b) Structural engineers (Only the Municipal Corporations have a registered engineers)
- c) Geotechnical consultants (Not registered)
- d) Site Supervisors (Not registered)
- e) Developers (Not registered)
- f) Tradesmen (carpenters, masons, plumbers, electricians etc.) A few are registered with the building centres in Jammu and Srinagar)
- g) Contractors, installers (Not registered)
- h) Soil investigation agencies and piling contractors (Not registered)
- i) Building inspectors for civil works, electrical and plumbing works, private fire inspectors (Not registered)

- j) Testing and Inspection Agencies - Concrete and steel testing laboratories, non-destructive testing agencies (Not registered)
- k) Third-party (Peer) reviewers for special projects (Not registered)

Some of these building professionals are not licensed in most of the cities and towns in India. But, the revised NBC 2016 makes it mandatory to have such registered professionals on every project. While it may not be required to have all these professionals at site for all projects, especially self-use homes, this should be required mandatorily at commercial and real estate projects.

**13.2** There is no established protocol for enquiry into a building failure and a system for attributing responsibility for misconduct and building failures. Most failures thus tend to go unreported or buried and opportunities to garner new knowledge from building failures is lost.

**13.3** Since there is no accreditation system, there is no continuing education requirement to enable capacity building and updation of building professionals with new state –of-art knowledge in the field through training programs workshops, seminars and conferences.



## CHAPTER 14

# Feedback of Building Permit Users- Survey Analysis and Findings.

Chapter 14 enumerates the findings of the Building Survey Conducted in Jammu and Kashmir amongst Building Permit Users who have applied for building permission between 2015-2018. The survey data has been analysed and reported herein.

The findings herein reflect the building permit users survey conducted in Jammu for 140 users. The salient responses of the survey conducted in Jammu is given in Table 14 captured herein.

**Table 14:** Survey Results from Building Permit Users in Jammu

(Note 0=No/Bad, 1=Yes/Good, 2=Other)								
a) How did you learn about the process of building permission and approval? i) From friend/relative ii) From architect /engineer iii) From internet iv) Other	From Friend/relative	From Arch/Engg	From internet	Other	Blank			
	70%	22%	1%	2%	5%			
b) Did you apply for residential or commercial building permit?	Residential	Commercial	Both	NA	Blank			
	88%	8%	2%	0%	2%			
c) If residential was it for self use or for sale?	Self Use	Sale	NA	Blank				
	91%	2%	4%	4%				
d) Was this your first time of building permit application?	Yes	No	Blank					
	94%	4%	2%					
e) When did you apply for building permission (dd/mm/yy)?								
f) How long did it take to get building commencement permit (months)?	0-3 months	4-6 months	7-9 months	10-12 months	More than a year	Pending	Blank	NA
	10%	25%	19%	28%	12%	2%	2%	1%
g) Did you get building completion (Yes/No)?	Yes	No	Blank	Not yet started				
	9%	89%	2%	1%				
h) Did you use a qualified architect to prepare your building plans and drawings?	Yes	No	Blank					
	99%	0%	1%					
i) Did you use a qualified engineer to prepare your structural (RCC) plans and drawings?	Yes	No	Blank	NA				
	97%	1%	1%	1%				
j) If yes to above, what was the experience with the engineers & architects?	Good	Bad	Blank					
	99%	0%	1%					
k) What was the scope of architect and engineer's involvement in project?	Good	Bad	Blank					
	97%	0%	3%					
l) Were Architect/Engineer helpful in building permit approval?	Yes	No	Blank					
	70%	28%	2%					
m) Did Architect/Engineer also ensure quality of construction and compliance?	Yes	No	Blank	NA				
	96%	1%	2%	1%				





(Note 0=No/Bad, 1=Yes/Good, 2=Other)								
n) Did you hire a contractor for construction? Or was it done by a mason?	Contractor	Mason	Both	Others	NA	Blank		
	59%	27%	1%	0%	9%	5%		
o) In your opinion, are there adequate number of Building Scrutiny Personnel in Building Permit Department?	Yes	No	Can't say	Blank				
	91%	6%	1%	3%				
p) Are the personnel adequately qualified and trained?	Yes	No	Blank	Semi-Qualified				
	81%	15%	2%	1%				
q) On scale of 1(least helpful) to 10 (most helpful) are the personnel helpful and supportive to building permit applicants?	1-3	4-6	7-8	9-10	Blank			
	9%	39%	41%	9%	2%			
r) Have you had an experience with building permit personnel which left you feeling harassed ? If yes, what percentage of your experiences have been such?	Yes	No	Blank					
	26%	65%	9%					
s) If answer to above is yes, pl expand	1.Slow/Delay in process, slow transfer from one dept to another 2.Tedious/Lengthy Process 3. Non Cooperative staff 4. Unskilled and non technical staff 5. Unnecessary harassment by officials 6. Online system is Poor 7. Corruption 8. Agent is required							
t) Did you get the approvals within the time limit stipulated by the Municipal Corporation?	Yes	No	Under Process	Blank				
	16%	80%	2%	1%				
u) On scale of 1(very slow) to 10(very rapid) how would you rate the speed of building permit?	1-3	4-6	7-8	9-10	Blank			
	31%	43%	21%	4%	2%			
v) Where is the max bottle neck in the building permit system?	JDA/JMC	Revenue	Town Planning	No issues	NOC	Blank	NA	
	50%	16%	1%	5%	15%	10%	4%	
w) Which permission takes the longest time?	JDA/JMC	Revenue	Town Planning	NOC	No issues	Blank	NA	ACR
	36%	24%	1%	14%	4%	14%	6%	1%
x) After obtaining building permit system, is the plinth checking carried out in prescribed time?	Yes	No	Under Process/ Not yet started	NA	Blank			
	71%	17%	2%	4%	6%			
y) What are the constraints faced during plinth checking?	No Constraints	NA	Under process	Blank	Not aware	Yes		
	27%	17%	1%	53%	1%	1%		
z) At completion time, is the final inspection done in prescribed time?	Yes	No	Under Process/ Not yet started	NA	Blank			
	1%	9%	4%	40%	46%			
aa) What are the constraints faced during final inspection?	Under Construction	NA	Not carried out	Blank	No difficulties			
	4%	56%	6%	31%	3%			
bb) Is the completion certificate issued in prescribed time?	Yes	No	Under Process/ Not yet started	Did not apply	NA	Blank		
	1%	21%	3%	1%	40%	34%		







(Note 0=No/Bad, 1=Yes/Good, 2=Other)							
cc) Do the PHE deptt. and PDD deptt require completion certificate to give water and power connections?	Yes	No	Under Process/ Not yet started	NA	Blank		
	43%	46%	1%	6%	4%		
dd) How much time did the whole process from building permit application submission to issue of completion certificate take?	6 months	Year(s)	Under process	NA	Blank	No specific time period	In Time
	3%	9%	4%	47%	34%	4%	1%
ee) What were the difficulties faced at every stage in obtaining building permission?	1.Slow/Delay in process 2. Coordination between departments 3.Tedious/Lengthy Process 4. Non Cooperative, irresponsible staff 5. Unskilled and non technical staff 6. Unnecessary harassment by officials 7. Corruption 8. Have to hire an agent to get building permission 9.The guidelines for bank loan differ from government norms 10. 23% people said that they faced no difficulty						
ff) How much expenditure did you incur on building permit approval and subsequent completion certification for occupation? How much was total built up sq ft?	<20,000	20,000-40,000	41,000-60,000	61,000-80,000	By-laws	By-laws+ Corruption	Blank
	1%	10%	4%	1%	51%	1%	31%
gg) How did you ensure with your contractor that building is compliant with the approved design?	By laws	Followed Design	Blank	NA	Yes		
	36%	4%	60%	0%	1%		
hh) Do you feel the houses in your city are designed for earthquakes?	Yes	No	Blank				
	89%	9%	1%				
ii) Are you worried about your own building's safety in an earthquake?	Yes	No	Blank				
	91%	8%	1%				
jj) Do you feel that the present system of building permit ensures safe construction?	Yes	No	Blank	Don't Know			
	92%	6%	1%	1%			
kk) If the answer to above question is a 'NO', then what do you think needs to be changed in the building permit system to ensure safe constructions?	1.No follow up to sites from respective agencies and violation of rules 2. Approved design is not followed 3.Master plan to be followed strictly 4. Requirement of new building code 5. Guidelines are not followed 6. Proper Drainage system is required 7. Road Construction is not proper						
ll) Any suggestions/ feedback to improve the system?	(Findings Recorded in the Analysis)						



The survey forms filled up by Building Permit Applicants are available for reference on request.

### 14.1 Survey Findings Jammu - Highlights

The survey highlights the following experiences and impressions of the present building control system of recent users

- a) The system is complex and needs to be simplified.
- b) The technical manpower available with the authorities is highly inadequate.
- c) Collection and submission of documents in the prescribed format as per the revenue department appears to be a major challenge for most users.
- d) Pervasive corruption in the system has been mentioned by many building permit users.
- e) The manpower available in the system is inadequate for the applications at hand
- f) The system is perceived to be very slow and full of delays, especially when compared to a very aggressive timeline assured for permissions online and in the documents.
- g) The building permit users had on average spent between Rs 25000 to Rs 70,000 as expense for the entire building permit process. While the official rate for building permission is in range of Rs 4 to Rs 5 per square foot for residential self use homes, the building permit user appears to be spending up to 4 to 5 times that amount.
- h) It may be mentioned however that almost 50% of the building permit users seem to be reasonably satisfied with the system.

The findings herein reflect the building permit users survey conducted in Srinagar for 160 users. The salient responses of the survey conducted in Jammu is given in Table 15 captured herein.

**Table 15 - Survey Results from Building Permit Users in Srinagar**

(Note 0=No/Bad, 1=Yes/Good, 2=Other)								
a) How did you learn about the process of building permission and approval?	From Friend/relative	From Arch/Engg	From internet	Other	Blank			
	39%	1%	0%	56%	4%			
b) Did you apply for residential or commercial building permit?	Residential	Commercial	Both	NA	Blank			
	98%	1%	0%	0%	1%			
c) If residential was it for self use or for sale?	Self Use	Sale	NA	Blank				
	99%	1%	0%	1%				
d) Was this your first time of building permit application?	Yes	No	Blank					
	88%	11%	1%					
e) When did you apply for building permission (dd/mm/yy)?								
f) How long did it take to get building commencement permit (months)?	0-3 months	4-6 months	7-9 months	10-12 months	More than a year	Pending	Blank	NA
	33%	46%	13%	6%	1%	0%	1%	0%
g) Did you get building completion (Yes/No)?	Yes	No	Blank	Not yet started				
	0%	23%	76%	0%				



(Note 0=No/Bad, 1=Yes/Good, 2=Other)									
h) Did you use a qualified architect to prepare your building plans and drawings?	Yes	No	Blank						
	99%	0%	1%						
i) Did you use a qualified engineer to prepare your structural (RCC) plans and drawings?	Yes	No	Blank	NA					
	89%	9%	3%	0%					
j) If yes to above, what was the experience with the engineers & architects?	Good	Bad	Blank						
	98%	0%	2%						
k) What was the scope of architect and engineer's involvement in project?	Good	Bad	Blank						
	94%	0%	6%						
l) Were Architect/Engineer helpful in building permit approval?	Yes	No	Blank						
	2%	88%	11%						
m) Did Architect/ Engineer also ensure quality of construction and compliance?	Yes	No	Blank	NA					
	93%	1%	6%	0%					
n) Did you hire a contractor for construction? Or was it done by a mason?	Contractor	Mason	Both	Others	NA	Blank			
	32%	67%	0%	0%	0%	1%			
o) Are there adequate number of Building Scrutiny Personnel in Building Permit Department?	Yes	No	Can't say	Blank					
	85%	9%	1%	5%					
p) Are the personnel adequately qualified and trained?	Yes	No	Blank	Semi-Qualified					
	86%	10%	4%	0%					
q) On scale of 1(least helpful) to 10 (most helpful) are the personnel helpful and supportive to building permit applicants?	1-3	4-6	7-8						
	4%	55%	39%						
r) Have you had an experience with building permit personnel which left you feeling harassed ? If yes, what percentage of your experiences have been such?	Yes	No	Blank						
	1%	94%	5%						
s) If answer to above is yes, pl expand	1. Slow/Delay in process, slow transfer from one dept to another 2. Tedious/Lengthy Process 3. Non Cooperative staff 4. Unskilled and non technical staff 5. Unnecessary harassment by officials 6. Online system is Poor 7. Corruption								
t) Did you get the approvals within the time limit stipulated by the Municipal Corporation?	Yes	No	Under Process	Blank					
	39%	59%	0%	2%					
u) On scale of 1(very slow) to 10(very rapid) how would you rate the speed of building permit?	1-3	4-6	7-8						
	13%	81%	4%						
v) Where is the max bottle neck in the building permit system?	SDA/SMC	Revenue	Town Planning	No issues	NOC	Blank	NA		
	56%	10%	0%	3%	17%	1%	0%		
w) Which permission takes the longest time?	SDA/SMC	Revenue	Town Planning	NOC	PHE	Blank	LAWDA	Sewerage	
	14%	33%	0%	31%	8%	7%	1%	6%	
x) After obtaining building permit system, is the plinth checking carried out in prescribed time?	Yes	No	Under Process/ Not yet started	NA	Blank				
	29%	46%	1%	0%	24%				



(Note 0=No/Bad, 1=Yes/Good, 2=Other)							
y) What are the constraints faced during plinth checking?	No Constraints	NA	Under process	Blank	Not aware	Yes	
	7%	1%	0%	93%	0%	0%	
z) At completion time, is the final inspection done in prescribed time?	Yes	No	Under Process/ Not yet started	NA	Blank		
	0%	3%	3%	3%	91%		
aa) What are the constraints faced during final inspection?	Under Construction	NA	Not carried out	Blank	No difficulties		
	43%	16%	1%	38%	1%		
bb) Is the completion certificate issued in prescribed time?	Yes	No	Under Process/ Not yet started	Did not apply	NA	Blank	
	0%	4%	3%	8%	2%	83%	
cc) Do the PHE deptt. and PDD deptt require completion certificate to give water and power connections?	Yes	No	Under Process/ Not yet started	NA	Blank		
	25%	68%	2%	4%	1%		
dd) How much time did the whole process from building permit application submission to issue of completion certificate take?	6 months	Year(s)	Under process	NA	Blank	No specific time period	In Time
	58%	11%	3%	0%	24%	3%	0%
ee) What were the difficulties faced at every stage in obtaining building permission?	1. Slow/Delay in process 2. Coordination between departments 3. Tedious/Lengthy Process 4. Non Cooperative, irresponsible staff 5. Delay in approval by SMC 6. Unnecessary harassment by officials 7. Difficulty in collection of NOC						
ff) How much expenditure did you incur on building permit approval and subsequent completion certification for occupation? How much was total built up sq ft?	<20,000	20,000-40,000	41,000-60,000	61,000-80,000	By-laws	By-laws+ Corruption	Blank
	0%	0%	0%	0%	0%	0%	100%
gg) How did you ensure with your contractor that building is compliant with the approved design?	By laws	Followed Design	Blank	NA			
	19%	56%	26%	0%			
hh) Do you feel the houses in your city are designed for earthquakes?	Yes	No	Blank				
	99%	1%	1%				
ii) Are you worried about your own building's safety in an earthquake?	Yes	No	Blank				
	1%	98%	2%				
jj) Do you feel that the present system of building permit ensures safe construction?	Yes	No	Blank	Don't Know			
	89%	3%	1%	6%			
kk) If the answer to above question is a 'NO', then what do you think needs to be changed in the building permit system to ensure safe constructions?	(See Data Analysis)						
ll) Any suggestions/ feedback to improve the system?	(See Data Analysis)						





The survey forms filled up by Building Permit Applicants are available for reference on request.

#### **14.2 Survey Findings Srinagar - Highlights**

The survey highlights the following experiences and impressions of the present building control system of recent users and their recommendations and comments as under:

- a) The approved design is not followed
- b) The system should be fully online.
- c) No follow up to sites from respective agencies and violation of rules
- d) There is an urgent requirement for a new building code.
- e) The building permit fee should be reduced
- f) Building guidelines and byelaws are not being followed.
- g) There should be digitisation of land and revenue records.

Other comments mentioned for Jammu are also applicable.





## CHAPTER 15

# Recommendations on Improving Efficiency and Transparency of Permit Process.

*Chapter 15 is a summary of the key findings and recommendations emerging from Tasks 1 and 2. The Chapter highlights the important and urgent, important but not urgent, and urgent challenges that confront the building permit system and offers recommendations for mitigating them in the short and long term. Also, the recommendations identify any legislative changes or government orders that need improvements.*

One of the key findings of the study is that the institutional framework and the regulatory mechanism are broken in the State of Jammu and Kashmir. There is no quick fix to mend the system but numerous small and big steps need to be taken in the short term and some bold steps will need to be taken in the longer term to make the system whole and robust.

While much of the building permit process is now online and it could be said that J&K is on par with the rest of India in terms of application of Information Technology for processes, the state is significantly behind

other developed states in terms of regulatory capacity and evolution of building byelaws.

There is inadequate perception of risk due to natural hazards in the State, especially earthquakes which is a real and ever-present risk especially in Srinagar. Additionally, there is inadequate interaction with other states and not enough subject experts from other parts of the country come to the State (or officials from J&K visit other States) and share new knowledge as a result of which the exposure level of the local community is low.





Some of the important and urgent challenges that need fixing are as below:

Aspect	Challenges	Recommendations
<b>Manpower</b>	Presently the technical staff available with JDA, JMC, SDA and SMC is highly inadequate	<b>Recommendation:</b> The first step would be to populate the positions lying vacant with qualified persons. (No change in existing legal framework)
	The existing capacity of the regulatory authorities is inadequate for the current building permit system	<b>Recommendation:</b> Contracting out verification of Building Permit proposals and review of building plans to Architects and Planners: It is fairly evident that the building authorities do not presently possess the capacity to review the building drawings and conduct site inspections exhaustively. Further there is almost no checking of any structural drawings. The Municipal corporations and development authorities may consider contracting out this work to private licensed architects (or architects registered with CoA), and private licensed structural engineers and planners. This may be deemed to be a compulsory Third-Party audit of any project of size exceeding twenty thousand square feet built-up area. A government regulation (GR) or order needs to be passed at the earliest to rectify this situation and give clear directions of qualifications and experience required for the positions. (No change in existing legal framework)
<b>Competence of Manpower</b>	Most of the municipal building authority departments are very inadequately staffed both in terms of quantity and quality	<b>Recommendation:</b> The positions existing in the building authorities needs to be occupied by persons who are qualified to do the job. The qualification requirements for even technical positions has been significantly diluted and positions needing architects and engineers are currently occupied by draftsmen, Arts graduates or even Metric pass persons. This will need a change in the current organisational structure. A government regulation (GR) or order needs to be passed at the earliest to rectify this situation and give clear directions of qualifications and experience required for the positions. (No change in existing legal framework)
	<i>Urgent need for Civil engineers-</i> Most of the authorities do not have a civil/ structural engineer trained to look at technical details and review the adequacy of designs for hazard resilience	<b>Recommendation:</b> The first step would be to ensure that there are at least three qualified civil engineers and one electrical with minimum one structural engineer in each of the municipal corporations (JMC and SMC), atleast two qualified civil engineers in Jammu and Srinagar development authorities and at least one qualified civil engineer in other municipal bodies. This will need a change in the current organisational structure. A government regulation (GR) or order needs to be passed at the earliest to rectify this situation and give clear directions of qualifications and experience required for the positions. (No change in existing legal framework)



Aspect	Challenges	Recommendations
<b>Regulations</b>	The present building permit system is too cumbersome and complex for small self-use homes	<p>Recommendation: There needs to be a separate and simplified building permit system for small self-use homes of up to 2000 square feet and not exceeding 2 storeys and multi storey multi user housing blocks and commercial developments. Self-use home-builders must be encouraged to use traditional systems like Dhajji Diwari or Taq. If this is not possible they could use brick or block load bearing confined masonry walls system. The simplified system will be permitted only for load bearing structures and not for reinforced concrete frame structures for which in-depth engineering knowledge is required, especially in high seismic hazard zones. In the simplified system, an architect, planner or civil engineer can issue certificate that the house has been designed as per the design and detailing norms given in the manuals supplied by the building authorities (authorities need to prepare and disseminate the manuals along with the building permit they issue) and follows all the planning requirements of the building byelaws. This certificate should be adequate and there would be no further requirement on part of the building authorities to check the adequacy of the building siting, planning and design. (This measure will need a change in the present local legislation/legal system or government regulations earlier issued)</p>
	There is no state-side licensing of structural engineers	<p>Recommendation: There should be a state-wide LICENSING SYSTEM and registration system for structural engineers and once licensed an engineer should be free to practice design and certify designs across the State.</p> <p>There is a general lack of appreciation and importance of technical expertise in the state and professions of architecture or structural engineering are interchangeable with the trade of civil draughtsmanship. Going forward, there will be more multi-storey housing construction in the state and it is dangerous if these buildings are not designed by a competent structural engineer who should certify the safety and stability of such buildings. The licensing of engineers should be based on competency tests. A government order or regulation (GR) needs to be passed at earliest to rectify this situation and give clear directions of qualifications and experience required for the positions. (No change in existing legal framework)</p>
	Presently it is not easy for architects to get registered with the building authorities and they often need to use a draftsman's license for submission of building proposal.	<p>Recommendation: If an architect is registered with the Council of Architecture, by default he/she should be deemed to be registered with any of the municipal or development bodies and all architects registered with COA should be permitted to submit building proposals as an architect throughout the State. However, an architect should not be allowed to sign or certify structural drawings and design. (A government order or regulation (GR) needs to be passed at earliest to rectify this situation and give clear directions of qualifications and experience required for the positions. (No change in existing legal framework)</p>
	As of date (June 2019) most of the building permit proposals are submitted through draftsmen who are registered with the authorities for this purpose.	<p><b>Recommendation:</b> Draftsmen should not be allowed to practise as architects or engineers and cannot submit building proposals. (A government order or regulation (GR) needs to be passed at earliest to rectify this situation and give clear directions of qualifications and experience required for the positions. (No change in existing legal framework)</p>





Aspect	Challenges	Recommendations
Regulations	<p>As of date (June 2019) not all multistoried buildings are being designed and certified by structural engineers. There is also no enforcement of a requirement for them to certify structural stability of the buildings and occupation certificate is being granted with a structural stability certificate.</p>	<p><b>Recommendation:</b> All multi-storey reinforced concrete frame structures must be certified for structural stability by a licensed structural engineer. (A government order or regulation (GR) needs to be passed at earliest to rectify this situation and give clear directions of qualifications and experience required for the positions. (No change in existing legal framework)</p>
	<p>All building proposals should be uploaded on the website with their drawings and the complete status report of the proposal should be available on the website. Presently there is a requirement to that effect, but it is not being implemented</p>	<p>a) Recommendation: All proposals should be uploaded and updated weekly as a standard operating procedure. This system will bring about much needed transparency (This does not need any changes in existing legal framework)</p> <p>b) Recommendation: Building Byelaws need to be upgraded as per latest byelaws and best practices across the more developed regions in India. NBC gives model building byelaws. (This does not need any changes in existing legal framework)</p> <p>c) Recommendation: The roles of each building professional in the design and construction of buildings is unique and the building permit system should recognise the same. Building byelaws should be modified to include registration of all building professionals-including geotechnical engineer, soil investigation agencies, testing and inspection agencies etc. (This does not need any changes in existing legal framework)</p> <p>d) Recommendation: Attached below is a Proposed Regulatory Framework for the State of Jammu and Kashmir. As can be seen in the figure, we are proposing the following:</p> <ol style="list-style-type: none"> <li>i. The Urban Development Department of J &amp; K should mandate state-wide building standards which govern all aspects of safety-structural, electrical, mechanical, fire and the enforcement protocols and procedures for the same. These building standards should be applicable for all Municipal Corporations, Development Authorities, Urban Local Bodies, Municipal Corporations and Committees for all building exceeding the self-use homes category. There should also be separate, simplified building permit system for self –use homes</li> <li>ii. Development Control Regulations should be reviewed and modified through a consultative process of the state’s Chief Town Planner and the local town planning team with input from architects and engineers’ professional bodies and associations and with input from academic institutions such as NIT, IIT and government architecture colleges.</li> </ol>



Aspect	Challenges	Recommendations
<p><b>Regulations</b></p>	<p>All building proposals should be uploaded on the website with their drawings and the complete status report of the proposal should be available on the website. Presently there is a requirement to that effect, but it is not being implemented</p>	<ul style="list-style-type: none"> <li>• The Development Regulations must include the Professional licensing for engineers, testing and inspection agencies and also registration of Trades such as masons, carpenters, plumbers and so on.</li> <li>• Development Regulations or Building Byelaws should also include specifications of when (at what stage) and what testing and inspection is required from testing and Inspection agencies.</li> <li>• Building Byelaws should also include the continuing education requirement for the registered/licensed structural engineers and other tradesmen to maintain their registrations.</li> <li>• Building Byelaws must incorporate the Protocols for investigation of building failures and establishing causes of the same. It should specify the protocol of appointment of a committee, its composition and specify the penalties for such failures.</li> </ul> <p>iii. Local building authorities (JDA, SDA, JMC, SMC, JMRDA, SMRDA etc.)</p> <ul style="list-style-type: none"> <li>• Must develop local planning regulations including zoning</li> <li>• Must establish a local heritage committee and norms and a heritage listing</li> <li>• Must prepare maintenance regulations and implement them.</li> <li>• Local Authorities are accountable for implementing and enforcing the building byelaws</li> <li>• Responsible for maintenance of records</li> <li>• Responsible for granting variances for which a robust protocol needs to be established</li> </ul>

This measure will need a change in the present local legislation/legal system or government regulations earlier issued

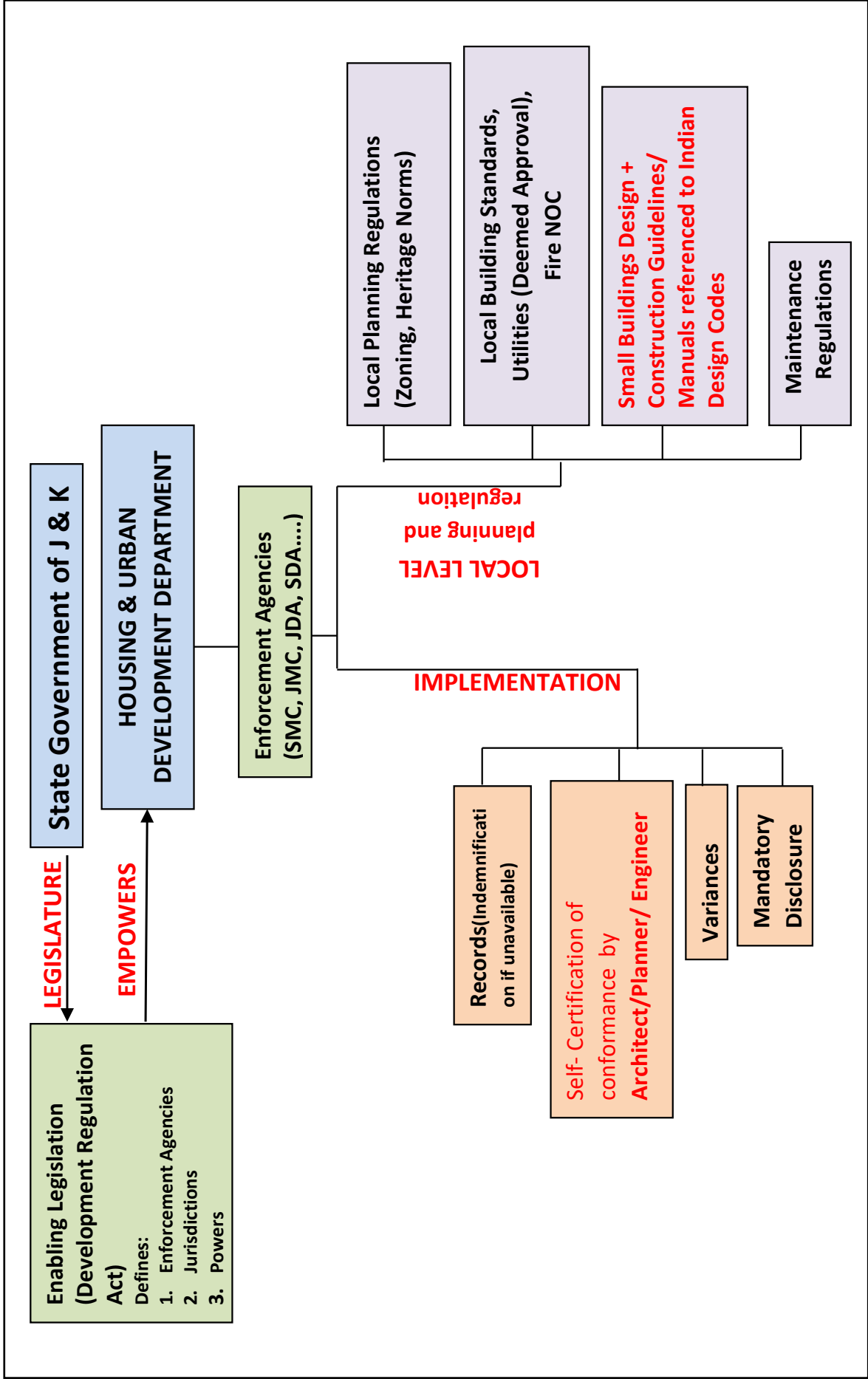


Figure 33 Organisational Structure of Fire Department in Jammu & Kashmir



## CHAPTER 16

# Removing Bottlenecks and Improving the Overall Experience of Building Permit System

*Chapter 16 gives recommendations based on the surveys conducted with 300 building permit system users on how bottlenecks perceived by permit users may be alleviated.*

### 16.1 Biggest Bottle Neck-Revenue Department

Building permit users' survey suggests that the department which seems to cause maximum stress and delays in the building permit process is the Revenue department. Discussion with department officials suggests that many permit applicants do not have the necessary documents pertaining to title deed and other documents as proof of land ownership of land ownership in the required format.

**Recommendation:** If there is sufficient evidence to indicate that the permit applicant is indeed the owner but does not have the records in order, the department could consider at cost to advertise in local papers asking for objections for issue of the building permit to applicant. Further the authority could also ask for indemnification from the applicant and provide building permit with condition that if the permit was found to have been fraudulently obtained, the authority reserved the right to demolish the house. (This measure will need a change in the present local legislation/legal system or government regulations earlier issued)

### 16.2 Reducing corruption in system

As mentioned earlier, some of the building permit users have claimed to have spent many times more than official rate on obtaining permit or have to hire the services of a "liaisoning" agent to get the building permit.

**Recommendation:** While it is difficult to legislate virtue, more transparency can be brought to the system by streamlining processes. The positive aspect of the permit system presently is that it is a single window permit and the applicant does not have to run from pillar to post and coordinate with the numerous (7-9) departments.

At every stage of the process, the authority is required to keep an online log of the status of an application and document the department where the application is at any given time. In practice this is not followed. One of the reasons is the lack of adequate trained professionals for the job but the other reason also probably is the lack of accountability in the system. To bring in more transparency, the processes as already laid down need to be strictly followed and a system of "carrot and stick" or rewards and penalties for following/contravening the systems needs to be put in place.



### 16.3 More Speedy System

The timelines given on the website for completion of each process are the in fact unrealistic and need to be modified suitably so that the user is prepared for a longer process time than presently promised. (This measure will need a change in the present local legislation/legal system or government regulations earlier issued). And once the timelines are suitably revised, there is need on part of the agency to honour them. Measures such as mentioned elsewhere in the report will go a long way in eliminating or mitigating delays in the permit process.

**Recommendation:** An important step that needs to be taken is to MODERATE BUILDING PERMIT USER EXPECTATIONS. Another feature that

should be implemented is adding more qualified technical persons who will be in a position to support the permit user. One of the repeat comments in the surveys was the non-availability of technical persons in building authorities to answer queries of building users.

### 16.4 Comments on Current Transaction Costs

The present official cost for building permit process is very reasonable and should not be reduced. The cost of this is not a problem for the users- it is the hidden costs that are many times more than the official cost. By making the system more transparent and accountable, these costs can be controlled to a large extent.



## CHAPTER 17

# Training Curriculum for Sensitization Programs and Short Courses for Stakeholders and Building Officials

*Chapter 17 gives detailed training courses with curriculum for the entire spectrum of stakeholders and building officials.*

Once there are adequate technical personnel available, a comprehensive training program needs to be put in place to build capacity in the system. The following in the given sequence is suggested:

1. Half day Sensitisation program for building officials, technical inspectors, fire officers, engineers, planners and architects of the authorities towards hazard resistant design and construction. A similar sensitisation program has already been conducted by the consultant in this project both at Jammu and Srinagar.
2. A five day training for the structural/civil engineers to understand all aspects of earthquake resistant design. Engineers could be sent to an IIT such as IIT Madras and IIT Roorkee for a resident program. Alternately, IIT faculty could be invited to give such a course in Jammu or Srinagar.
3. The Fire Officers in Jammu and Kashmir are not fully acquainted with the new fire norms of National Building Code (NBC) 2016. Bureau of Indian Standards holds courses regularly for understanding the modification in the fire safety norms. The authorities may coordinate with Bureau of Indian Standards and hold such courses.
4. IIA (Indian Institute of Architects) holds training workshops for architects for designing in earthquake regions. They may be asked to conduct such courses in J&K. Alternately IIT Madras and IIT Roorkee conduct courses for architects for multi hazard resistant design. Training Curricula for such programs are provided herein
5. There are also private expert trainers and resource persons who could be tapped for special training. A list of such personnel could be supplied on request.

Another important step would be to increase the level of exposure of building officials in the state by facilitating visits to other states to review their building permit systems.



The details of the proposed Sensitization Programs and Short Training Courses are given in the section below

### **17.1 One-Day Sensitization Program for Architects and Planners on Earthquake Safety**

<b>Time</b>	<b>Topic</b>
9:00 - 10:30	Multi-hazard setting of the State of Jammu & Kashmir
10:30 - 10:45	Tea Break
10:45 - 13:00	Structural Systems and Load Paths
13:00 - 14:00	Lunch Break
14:00 - 15:30	Good Earthquake/Seismic Structural Configuration - including Seismic Joints to prevent Pounding
15:30 - 15:45	Tea Break
15:45 - 17:30	Building Bye-laws - with focus on Retrofitting
17:30 - 18:00	Question & Answer Session

### **17.2 One-Day Sensitization Program for Structural Engineers on Earthquake Safety Seminar for Engineers of Building Authorities and Practising Structural Engineers in J&K for Multi Hazard Safety**

<b>Time</b>	<b>Topic</b>
9:00 - 10:30	Hazard setting due to Earthquake of the State of Jammu & Kashmir
10:30 - 10:45	Tea Break
10:45 - 13:00	Dynamic Behaviour of Buildings
13:00 - 14:00	Lunch Break
14:00 - 15:30	Good Earthquake/Seismic Structural Configuration - Provisions of IS 1893 (Part 1) : 2016
15:30 - 15:45	Tea Break
15:45 - 17:30	Design and Detailing of Earthquake RC Buildings - Provisions of IS 13920 : 2016
17:30 - 18:00	Question & Answer Session



### 17.3 Two Day Sensitization Program for Practising Architects, Planners and Engineers on National Building Code 2016.

Day 1	
930-1000	Inaugural Session
1000-1130	History Of Past Earthquakes, Floods, Landslides and Cyclones With A Special Emphasis On Disasters In J&K
1130-1145	Tea
1145-1315	Overview of National Building Code 2016; Administration and Enforcement of the Code
1315- 1415	Lunch Break
1415- 1515	Fire and Life Safety
1515- 1615	Asset and Facility Management
1615-1630	Tea
1630- 1730	Building Services - Electrical Installations
Day 2	
1000-1100	Structural Design: Loads, Forces and Effects
1100-1115	Tea
1115- 1215	Introduction to Earthquake and Wind Codes
1215-1315	Plumbing Services
1315-1415	Lunch Break
1415- 1515	Building Services: Natural Lighting & Ventilation;
1515- 1615	Approach to Sustainability
1615-1630	Tea
1630-1730	Feedback and Concluding Session

#### Kit for All Participants for above courses:

- Earthquake Tips (In colour). If you do not have adequate copies, please order them from NICEE. <http://www.nicee.org/>
- Copy of IS 1893, IS 4326 and IS 13920.
- Relevant Chapters of NBC 2016





## 17.4 Two-Day Sensitization Program for Architects and Planners on Earthquake Safety

<b>Day 1:</b>	
<b>Time</b>	<b>Topic</b>
9:00 - 10:30	Hazard setting of Earthquake of the State of Jammu & Kashmir
10:30 - 10:45	Tea Break
10:45 - 13:00	Consequences of Earthquake Ground Motion
13:00 - 14:00	Lunch Break
14:00 - 15:30	Competent Soil and Good Foundation
15:30 - 15:45	Tea Break
15:45 - 17:30	Structural Systems and Load Paths
17:30 - 18:00	Question & Answer Session
<b>Day 2:</b>	
<b>Time</b>	<b>Topic</b>
9:00 - 10:30	Basics of Safe House Building - Provisions of IS 4326 : 2013 and IS 1893 (Part 1) : 2016
10:30 - 10:45	Tea Break
10:45 - 13:00	Ductile Design and Detailing of RC Buildings Provisions of IS 13920 : 2016
13:00 - 14:00	Lunch Break
14:00 - 15:30	Good Structural Configuration – including Seismic Joints to prevent Pounding
15:30 - 15:45	Tea Break
15:45 - 17:30	Building Bye-laws – with focus on Retrofitting
17:30 - 18:00	Question & Answer Session



## 17.5 Two-Day Sensitization Program for Engineers of Building Authorities and Practising Structural Engineers in J&K on Earthquake Resistant Design

<b>Day 1:</b>	
<b>Time</b>	<b>Topic</b>
9:00 - 10:30	Hazard setting of Earthquake of the State of Jammu & Kashmir
10:30 - 10:45	Tea Break
10:45 - 13:00	Dynamic Behaviour of Buildings
13:00 - 14:00	Lunch Break
14:00 - 15:30	Competent Soil Strata and Good Foundations
15:30 - 15:45	Tea Break
15:45 - 17:30	Earthquake Resistant Houses – Provisions of IS 4326 : 2013
17:30 - 18:00	Question & Answer Session
<b>Day 2:</b>	
<b>Time</b>	<b>Topic</b>
9:00 - 10:30	Good Structural Configuration – Provisions of IS 1893 (Part 1) : 2016
10:30 - 10:45	Tea Break
10:45 - 13:00	Design and Detailing of Earthquake and Ductile RC Buildings – Provisions of IS 13920 : 2016
13:00 - 14:00	Lunch Break
14:00 - 15:30	Earthquake Seismic Evaluation and Strengthening of Buildings – Provisions of IS 15988 : 2013
15:30 - 15:45	Tea Break
15:45 - 17:30	Reinforced and Confined Masonry Constructions
17:30 - 18:00	Question & Answer Session



## 17.6 Five-Day Short Course for Engineers of Building Authorities and Practising Structural Engineers on Earthquake Resistant Design of Buildings

<b>Day 1:</b>	
<b>Time</b>	<b>Topic</b>
9:00 - 10:30	Multi-hazard setting of Jammu & Kashmir
10:30 - 10:45	Tea Break
10:45 - 13:00	Earthquake Hazard in Jammu & Kashmir
13:00 - 14:00	Lunch Break
14:00 - 15:30	Performance of Buildings in Past Earthquakes
15:30 - 15:45	Tea Break
15:45 - 17:30	Introduction to Earthquake Resistant Constructions
17:30 - 18:00	Question & Answer Session
<b>Day 2:</b>	
<b>Time</b>	<b>Topic</b>
9:00 - 10:30	Earthquake Ground Motions
10:30 - 10:45	Tea Break
10:45 - 13:00	Configuration of Earthquake Resistant Multistorey Buildings
13:00 - 14:00	Lunch Break
14:00 - 15:30	Earthquake Resistant Design Philosophy
15:30 - 15:45	Tea Break
15:45 - 17:30	Design Spectrum
17:30 - 18:00	Question & Answer Session
<b>Day 3:</b>	
<b>Time</b>	<b>Topic</b>
9:00 - 10:30	Earthquake Analysis of Multistorey Buildings
10:30 - 10:45	Tea Break
10:45 - 13:00	Slope Stability
13:00 - 14:00	Lunch Break
14:00 - 15:30	Buildings on Hill Slopes
15:30 - 15:45	Tea Break
15:45 - 17:30	Ground Improvement and Design of Foundations
17:30 - 18:00	Question & Answer Session



<b>Day 4:</b>	
<b>Time</b>	<b>Topic</b>
9:00 - 10:30	Stiffness of Earthquake Resistant Buildings
10:30 - 10:45	Tea Break
10:45 - 13:00	Strength of Earthquake Resistant Buildings
13:00 - 14:00	Lunch Break
14:00 - 15:30	Ductility of Earthquake Resistant Buildings
15:30 - 15:45	Tea Break
15:45 - 17:30	Seismic Evaluation and Strengthening of Buildings
17:30 - 18:00	Question & Answer Session
<b>Day 5:</b>	
<b>Time</b>	<b>Topic</b>
9:00 - 10:30	Protection of Nonstructural Elements in Buildings
10:30 - 10:45	Tea Break
10:45 - 13:00	Special Devises including Base Isolation
13:00 - 14:00	Lunch Break
14:00 - 15:30	Fire Safety of Multstorey Buildings
15:30 - 15:45	Tea Break
15:45 - 17:30	Discussion, Feedback and Closure
17:30 - 18:00	High Tea



## 17.7 Five-Day Short Course for Architects and Planners of Building Authorities and Practising Architects and Planners on Earthquake Resistant Design of Buildings

<b>Day 1:</b>	
<b>Time</b>	<b>Topic</b>
9:00 - 10:30	Multi-hazard setting of the State of Jammu & Kashmir
10:30 - 10:45	Tea Break
10:45 - 13:00	Earthquake Hazard - The State of Jammu & Kashmir
13:00 - 14:00	Lunch Break
14:00 - 15:30	Performance of Buildings in Past Earthquakes
15:30 - 15:45	Tea Break
15:45 - 17:30	Slope Stability and Ground Improvement
17:30 - 18:00	Question & Answer Session
<b>Day 2:</b>	
<b>Time</b>	<b>Topic</b>
9:00 - 10:30	Factors Affecting Earthquake Loads on Buildings
10:30 - 10:45	Tea Break
10:45 - 13:00	Earthquake Resistant Design Philosophy and Code Requirements
13:00 - 14:00	Lunch Break
14:00 - 15:30	Vertical Distribution of Base Shear including importance of Inter-Storey Drift
15:30 - 15:45	Tea Break
15:45 - 17:30	Horizontal Distribution of Storey Shear including concept and importance of Lateral Load Resisting System
17:30 - 18:00	Question & Answer Session
<b>Day 3:</b>	
<b>Time</b>	<b>Topic</b>
9:00 - 10:30	Good Plan Configuration
10:30 - 10:45	Tea Break
10:45 - 13:00	Earthquake and Stone Wall Buildings Including importance of Bands
13:00 - 14:00	Lunch Break
14:00 - 15:30	Confined Masonry Houses
15:30 - 15:45	Tea Break
15:45 - 17:30	RC Buildings with Shear Walls
17:30 - 18:00	Question & Answer Session



<b>Day 4:</b>	
<b>Time</b>	<b>Topic</b>
9:00 - 10:30	Load Paths and Cantilevers Projections
10:30 - 10:45	Tea Break
10:45 - 13:00	Pounding and Seismic Joints
13:00 - 14:00	Lunch Break
14:00 - 15:30	Vibration of Buildings
15:30 - 15:45	Tea Break
15:45 - 17:30	Protection of Nonstructural Elements in Buildings
17:30 - 18:00	Question & Answer Session
<b>Day 5:</b>	
<b>Time</b>	<b>Topic</b>
9:00 - 10:30	Retrofitting and Base Isolation of Buildings
10:30 - 10:45	Tea Break
10:45 - 13:00	Building Bye-laws
13:00 - 14:00	Lunch Break
14:00 - 15:30	Urban Planning
15:30 - 15:45	Tea Break
15:45 - 17:30	Discussion, Feedback and Closure
17:30 - 18:00	High Tea



## 17.8 Five Day Training Program for Structural Engineers of JMC, JDA, SMC, SDA, JKPC, JTFRP and other Line Departments & Practising Engineers on Disaster Resistant Design of Buildings.

Time	Day 1
930-1000	Inaugural Session and Introduction of Participants
1000-1130	Introduction to Concept of Multi Hazard Resilient Construction- (Causes of earthquakes, basic terminology, magnitude, intensity, peak ground motion parameters, Cyclones, Floods, Landslides)
1130-1145	Tea
1145-1330	History Of Past Earthquakes, With A Special Emphasis On Disasters In J&K
1330- 1430	Lunch Break
1430- 1600	History Of Past Floods, Landslides and Cyclones , With A Special Emphasis On Disasters In J&K
1600-1615	Tea
1615- 1745	Introduction to Codes, References and Books for Multi Hazard Resistant Design
Day 2	
1000-1130	Concepts of seismic design, lateral strength, stiffness, ductility, and structural configuration. Design spectrum. Part 1
1130-1145	Tea
1145- 1330	Seismic Design of Masonry Structures, Review of JTFRP Manuals
1330-1430	Lunch Break
1445-1600	Seismic Design of Masonry Structures Review of IS 4326 and other masonry codes
1600-1615	Tea
1615- 1745	Site Visit to Masonry Structures to Identify Typical Elements
Day 3	
1000-1130	Lateral force analysis of buildings, floor diaphragm action, moment resisting frames, shear walls-Part 1
1130-1145	Tea
1145- 1330	Lateral force analysis of buildings, floor diaphragm action, moment resisting frames, shear walls-Part 2
1330-1430	Lunch Break
1445-1615	Concepts of seismic design, lateral strength, stiffness, ductility, and structural configuration. Design spectrum. Part 2
1615-1630	Tea
1630-1800	Site Visit to RC Building to identify framing and structural elements



<b>Day 4</b>	
1000-1130	Provisions of IS:1893 for buildings -Part 1
1130-1145	Tea
1145- 1330	Provisions of IS:1893 for buildings -Part 2
1330-1430	Lunch Break
1445-1615	Seismic Design and Detailing of RC buildings, provisions of IS:13920. Part 1
1615-1630	Tea
1630-1800	Seismic Design and Detailing of RC buildings, provisions of IS:13920. Part 2
<b>Day 5</b>	
1000-1130	Soil response to earthquakes, liquefaction, landslides and remedial measures.
1130-1145	Tea
1145- 1330	Fire Safety- Provisions of NBC 2016 Part 1
1330-1430	Lunch Break
1445-1615	Fire Safety- Provisions of NBC 2016 Part 2
1615-1630	Tea
1630-1800	Feedback and Concluding Session





## 17.9 Workshop on Earthquake Safety Assessment of School Buildings for Architects, Planners and Engineers of Sarva Shiksha Abhiyaan and JMC, SMC

Time	Day 1
930-1000	Introduction to Course
1000-1130	Background of Seismic Safety Assessment of School Buildings – Discussion of Scope and Work Done Earlier. Introduction to Earthquake Tips
1130-1145	Tea
1145-1330	Earthquake engineering Concepts for Masonry Buildings – Introduction to IS 4326
1330- 1430	Lunch Break
1430- 1600	Discussion on Survey Forms – Rationale and how to collect and collate data, fill forms, data analysis etc.
1600-1615	Tea
1615- 1745	Visit to a School (Load Bearing) and Filling sample form
Day 2	
1000-1130	Earthquake Engineering Concepts for RC buildings & Introduction to IS 1893 and IS 13920
1130-1145	Tea
1145- 1330	Non-Structural Elements in RC Buildings
1330-1430	Lunch Break
1445-1615	Fire Safety
1615-1630	Tea
1630-1800	Visit to a School (RC frame ) and Filling sample form

### Kit for All Participants:

- Earthquake Tips (In colour). If you do not have adequate copies, please order them from NICEE. <http://www.nicee.org/>
- School Survey Form
- Copy of IS 1893, IS 4326 and IS 13920.



### 17.9.1 School Survey Form

1.	School Name	
2.	School ID	
3.	School category (Pre-Primary - A, Primary- B, Secondary – C, Higher secondary – D)	
4.	Address a) Location b) Village/Town/City: c) Census Code: d) Taluka: e) District: f) Nearest Town	
5.	GPS Coordinates of School (Any center point)	..... N ..... E ..... m
6.	Communication System a) Telephone b) Fax c) Internet / Email d) Any other emergency communication facility	
7.	School Area (meter square) a) Plot Area: b) Footprint Area: c) built up Area	
8.	Number of (indicate as per shifts if any) a) Pupils b) Teachers c) Other Staff d) Physically challenged staff	
9.	Number of Rooms a) Class Rooms b) Other Rooms	
10.	Passage and Veranda a) Width of Passages (Less than 1.5m) b) Veranda Area (In m2)	



11.	Width of Stair flight (m)	
12.	Number of Exit	
13.	Compound Wall (Yes/No, If yes then height of wall)	
14.	Year of Construction	
15.	Plan shape : Draw Plan and elevation with major dimensions (See also last sheet)	
16.	Plan Regular/ Irregular : If irregular. T- shape/L-shape/U-shape/Cruciform/ other complex shape:	
17.	Number of storeys : a) Basement (Yes / No ) b) Storeys c) Mezzanine (Yes / No)	
18.	Typical storey height (m)	
19.	Stilt at Ground floor: (Yes/No)	
20.	Type of load carrying system : a) Stone Masonry Bearing walls b) Brick Masonry Bearing walls c) RCC Frames d) Steel Structure e) Other (elaborate)	
21.	Partition walls : Reinforced concrete/ Wood/ Masonry/ Mixed/ Other (Specify)	
22.	Floor slabs : Reinforced concrete/Wood/Other (Specify)	
23.	Floor Finish: Wood/ Ceramic/ Mosaic /IPS/ Other (specify)	
24.	Roof : Reinforced concrete flat roof/ Reinforced concrete sloping roof/ Wood/Asbestos/Metal sheets/ Other (Specify)	



25.	<p>Seismic/other disaster safety features in the building(in case of masonry)</p> <p>a) Plinth Band b) Lintel Band c) Roof Band d) Other features</p> <p>Seismic/other disaster safety features in the building(in case of RC frame)</p> <p>a) Proper framing grid of more than 3 frames of min 3 bays each in both direction b) Max cantilever projection (m) c) Any floating columns? If yes, give details</p>	
26.	<p>Quality of Building</p> <p>a) Workmanship b) Maintenance</p> <p>Grade on a scale of 5. (5 for excellent and 1 for poor)</p>	
27.	Any Existing visible damages (Yes/No) If yes: Description	
28.	<p>Last repair &amp; reconstruction works</p> <p>a) Repaired (Year) b) Strengthened (Year)</p>	
29.	<p>Fire Protection : (Yes / No)</p> <p>a) High voltage electric transformers not protected within campus or 25m periphery of school b) Loose electric wares within campus and not fenced c) Any highly flammable/ hazardous goods lying in the school or surrounding buildings</p>	
	<p>d) Petrol Pump (25m periphery of school) e) Hydrants (Yes / No) f) Fire extinguishers (Yes / No) g) Fire Alarms (Yes / No) h) Smoke detectors(Yes/No)</p>	
30.	<p>Surroundings of School</p> <p>a) High Rise/Low Rise Buildings b) Congested/Market Area c) High traffic/Normal traffic/ Low traffic Area</p>	



31.	Technical documentation available a) Architecture (Yes / No) b) Structural design (Yes / No)	
32.	Site – Soil conditions : Rock/Firm/Medium/Soft	
33.	Slope : Flat /Slight slope/Moderate slope/Steep slope	
34.	Seismic exposure : (To be filled by Reviewing Engineer) a) Seismic Zone b) Unknown	
35.	History of Disaster (Mention month, year, frequency and damages due to the disaster) a) Earthquake b) Cyclone c) Floods d) Fire	
36.	Awareness in School a) Among Teachers b) Among Students c) Any Formal course/training for disasters	
37.	Preparedness for Disasters a) Contingency plan b) Escape Routes c) Safe Shelters during cyclone d) Other preparedness	
38.	Photographs	
39.	Remarks & recommendations	

Surveyor

Principal of School Surveyed

Name: .....

Name: .....

Signature: .....

Signature: .....

Date: .....

Building ID (Attach Line Plan and sketch of the floor of the School Campus with buildings labelled clearly )



### 17.10 3 Day Training of Trainers (TOT) for Training of Masons for Seismic and Fire Resistant Construction Training Modules

S. N.	Time	Topic	Details
<b>Day 1</b>			
<b>Introductory Session</b>			
<i>Objective:</i>			
To create a common understanding of the training objective and identify expectations of the participants.			
	09:00 to 10:00	Registration and introduction session.	<ul style="list-style-type: none"> <li>Registration of participants</li> <li>Inauguration &amp; welcome address by GoJK.</li> <li>Introduction of training by PiC / VMS.</li> <li>Introduction of participants and trainers.</li> </ul>
	10:00 to 11:00	Interactive session <ul style="list-style-type: none"> <li>Listing of expectations.</li> <li>Emphasizing common objective of safe construction.</li> </ul>	<ul style="list-style-type: none"> <li>One participant from each pair would mention the expectation of the training, which will be put on chart paper.</li> <li>The expectations would be categorized and one of the participants would summarize it.</li> </ul>
	11:00 to 11:15	Tea break	
<b>C 1</b>	<b>Building Typologies of Jammu and Kashmir</b>		
	<i>Module Objective:</i>		
	To understand building typologies of different regions in Jammu & Kashmir.		
C 1.1	11:15 to 13:00	Building typologies of different regions of Jammu and Kashmir & trends of construction.	<ul style="list-style-type: none"> <li>An explanation for categorization of building typologies.</li> <li>Narration from the participants about building typologies from their regions</li> <li>Discussion on changing trends of construction with respect to building typologies, construction technology, and building materials.</li> </ul>
	13:00 to 14:00	Lunch break	



S. N.	Time	Topic	Details
C 2	<b>Overview of Natural Hazards</b> <i>Module Objective:</i> To understand the history of disasters and risks associated with them in Jammu and Kashmir and some incidences of disasters throughout the country.		
C 2.1	14:00 to 14:30	History and risks of natural disasters in Jammu and Kashmir.	<ul style="list-style-type: none"> <li>Participatory identification of past disasters in Jammu and Kashmir and their own experiences.</li> <li>Preparation of timeline/ frequency charts.</li> </ul>
C 2.2	14:30 to 15:30	Impact on buildings due to natural disasters.	Presentation about various types of damages to masonry buildings by trainers, followed by discussion on participants' experiences.
C 3	<b>Module 3: Disaster Resistant Construction - Principles and Features</b> <i>Module Objective:</i> To understand the disaster resistant features of load-bearing masonry buildings.		
C 3.1	15:30 to 16:30	Design exercise for a good house for each typology existing in Jammu and Kashmir.	Groups will be formed as per typologies. Group work on chart paper and presentation by the above formed groups with description of their views of a "good house" for each typology. Typologies covered: <ol style="list-style-type: none"> <li>Load bearing masonry building - stone</li> <li>Load bearing masonry building - brick</li> </ol>
C 3.2	16:30 to 17:30	Basic rules of disaster resistant construction.	PowerPoint presentation on: <ul style="list-style-type: none"> <li>Site selection</li> <li>Building configuration</li> <li>Building layout</li> </ul>



S. N.	Time	Topic	Details
<b>Day 2</b>			
C 3.3	9:00 to 9:30	Recapitulation of day 1	Interactive discussion
C 3.4	9:30 to 12:00	Basic rules of disaster resistant construction.	<p>Presentation on basic rules of disaster resistance in construction for elements enumerated below:</p> <ul style="list-style-type: none"> <li>• Foundation</li> <li>• Wall</li> <li>• Roof</li> </ul> <p>Followed by listing of rules with interactive discussion on chart paper.</p>
C 3.5	12:00 to 13:00	Selection of building materials.	Listing and identifying building material with variation in size, quality (good and bad) with actual samples.
	13:00 to 14:00	Lunch break	
<b>C 4</b>	<b>Module 4: Fundamentals of Confined Masonry</b> <i>Module Objective:</i> To understand the basic principles and features of confined masonry construction.		
C 4.1	14:00 to 15:00	Basic principles of confined masonry construction.	<ul style="list-style-type: none"> <li>• Presentation by trainers.</li> </ul>
	15:00 to 15:15	Tea break	
C 4.2	15:15 to 17:30	Construction sequence and details of confined masonry.	<ul style="list-style-type: none"> <li>• Presentation by trainers.</li> <li>• Design exercise by participant groups on a sample plan.</li> </ul>





S. N.	Time	Topic	Details
<b>Day 3</b>			
<b>P 5</b>	<b>Module 5: Hands-on Practical Training</b>		
	<i>Module Objective:</i> To build the practical skills of the participants on disaster resistant features in construction.		
P 5.1	09:00 to 11:00	On-site hands-on training through mock construction. (Load-bearing masonry)	Demonstration on site of: <ul style="list-style-type: none"> <li>• Layout and centre lines</li> <li>• Foundation details.</li> <li>• Corner reinforcements.</li> <li>• Horizontal bands.</li> <li>• Masonry bonds particularly corners and junction details.</li> <li>• Through stones in stone masonry.</li> <li>• Gable band or hipped roof</li> <li>• Roof to wall connection (wall plate and rafters).</li> <li>• Roofing sheets and under-structure connection with 'J' bolts.</li> </ul>
	11:00 to 11:15	Tea-break	
P 5.2	11:15 to 13:00	On-site hands-on training through mock construction. (Confined masonry)	Demonstration on site of: <ul style="list-style-type: none"> <li>• Foundation details.</li> <li>• Confined masonry walls.</li> <li>• Vertical reinforcement and junction details.</li> </ul>
	13:00 to 14:00	Lunch break	



S. N.	Time	Topic	Details
P 6	<b>Module 6: Building Capacities of Trainers to conduct training of Masons using this curriculum.</b> <i>Module Objectives:</i> To build capacities of the participants as trainers and take training sessions.		
P 6.1	14:00 to 16:30	Preparation of participants to conduct further trainings.	<ul style="list-style-type: none"> <li>• Hold sessions, wherein participants do mock presentations on some of the topics covered in this workshop, to aid future trainings that they may conduct,</li> <li>• Self-assessment of their performance.</li> <li>• Provide feedback for improvement.</li> </ul>
P 6.2	16:30 to 17:00	Discussion and Conclusion.	Interactive session.
<b>Feedback and Vote of Thanks</b>			



## CHAPTER 18

# Concluding Remarks

*Chapter 18 provides concluding remarks*

The report has attempted to provide a fairly comprehensive review of the Process Mapping, Assessment of Local Building Codes Implementation Capacity of the Urban Local Authorities, and Recommendations for Re-engineering of Building Control Processes. Even though the Task has been completed prior to 30 June, 2019, the concluding remarks are being revised in view of changes in the political structure of the State of Jammu and Kashmir in August 2019.

The Jammu and Kashmir Reorganisation Bill, 2019, was passed in Rajya Sabha on 5 August 2019 and in Lok Sabha on 6 August 2019. The Bill reorganises the State of Jammu and Kashmir into two union territories, namely Jammu and Kashmir, and Ladakh. This Bill was preceded by a Presidential Order declaring, that all the provisions of the Indian Constitution would be applicable to the UT of Jammu and Kashmir under Article 370 of the Indian constitution.

As mentioned elsewhere in the report, the Kashmir valley has seen a lot of political turmoil since Independence and more so post mid- 1980s. There are socio-political and techno-legal complexities in this State as nowhere else in India. Any discussion on improving the building regulatory capacity without acknowledging this reality will not yield any results. The jury is out on the repercussions of the Reorganisation Bill (now Act).

Regardless of the above, the larger component of the building permit system presently deals with housing, mostly self-use homes. This is likely to change very rapidly in the near future with more developer and multi-storey flat-type housing in Jammu and Kashmir, with the promulgation of the New Act, which may allow Indians from across the country to invest and own homes and land in the UTs of Jammu and Kashmir, and Leh. But, until then, there are some very simple, easy-to-implement measures that can be taken in hand for improving the quality of self-use home construction and bringing more of this type of construction within the ambit of the legal building permit system which have been suggested in this report. Presently, there is over 90% of self-use home construction (especially in Kashmir) that does not seek or complete the building permit process.

It needs to be underlined that there is very little capacity existing presently within the regulatory authorities due to political and other considerations in revising criteria and selection procedures for building officials. The system needs to be ring-fenced from such interventions. The morale in the building regulatory authorities is rather low, and efforts should be made to motivate and inspire them by various means, some of which have been suggested herein.

Project Task  
3: Improving  
Effectiveness  
of Building  
Inspections



## CHAPTER 19

# Objective of Task 3 – Improving the Effectiveness of On-Site Building Inspections

*Chapter 19 describes the objectives of Task 3*

### 19 Background

A well-defined regulatory framework and building permit processes will prove to be efficient only when a competent enforcement of these systems is ensured. Onsite inspections of building construction at various stages provide information about the effective functioning of the regulatory framework. They further act as deterrent for non-compliance of building code requirements. Local building permit officials with a mandate to inspect buildings should be trained adequately for their task and be required periodically to demonstrate competence for inspection of the particular type of construction or operation requiring inspection. Most importantly the building officials tasked with inspection should “own” the task of inspection.

The technical review conducted in Task 3 consists of an analysis of current inspections practices with a primary focus on fire and structural aspects. It addresses issues such as:

#### 19.1 OBJECTIVES

Review of

1. Regulatory framework for inspection process and documentation of building code violations and follow-up remediation measures;

2. Actual practices through targeted surveys;
3. Adequacy of staffing level within the fire department and local authorities and urban local bodies;
4. Adequacy of their capacity to verify compliance and practices of major aspects such as structural, mechanical and electrical engineering as well as water & sanitation;
5. Availability and adequacy of competence and training programs for on-site building inspections;
6. Process to develop risk-based inspections consistent with the risks associated with the types of buildings or builders;
7. Enabling legislation and processes to involve private sector engineers/architects/planners to carry out third party on-site inspections on behalf of building departments.

#### 19.2 DELIVERABLES

1. Report analysing the current status of on-site building inspections with phased recommendations on relevant aspects that may contribute to improving their effectiveness;



2. Detailed annexure to the report with a proposed incremental staffing and training plan for the fire and building department with achievable timelines;
3. Relevant local legislation to be amended or added to support improved effectiveness of inspection processes and practices.

Keeping in view deliverables mentioned in the Terms of Reference, Chapter 17 discusses provisions for site inspections with respect to structure and fire in building byelaws of J&K State and comments on current onsite practices are made in subsequent chapter.

Chapter 19 offers recommendations to make improvements in building byelaws for effective site inspection techniques. Existing capacity of departments responsible for site inspection and staff qualifications is discussed in chapter 20 and comments/suggestions to improve capacity are also stated subsequently.

### **19.3 INTRODUCTORY NOTE ON FIRE SAFETY IN INDIA**

Fire services come under Twelfth Schedule of the Constitution. It is a State subject and hence, fire prevention and firefighting services are organized and managed by the concerned states, Union Territories (UTs) and Urban Local Bodies (ULBs). In some states (Maharashtra, Haryana, Gujarat, Chhattisgarh, Madhya Pradesh and Punjab), the Fire services come under Municipal Corporations while in rest of the states it comes under Home Ministry.

National Building Code of India, 2016 Part 4 - 'Fire and Life Safety' covers the following areas:

1. Fire prevention: Design and construction of buildings. Also, buildings materials and their fire rating.

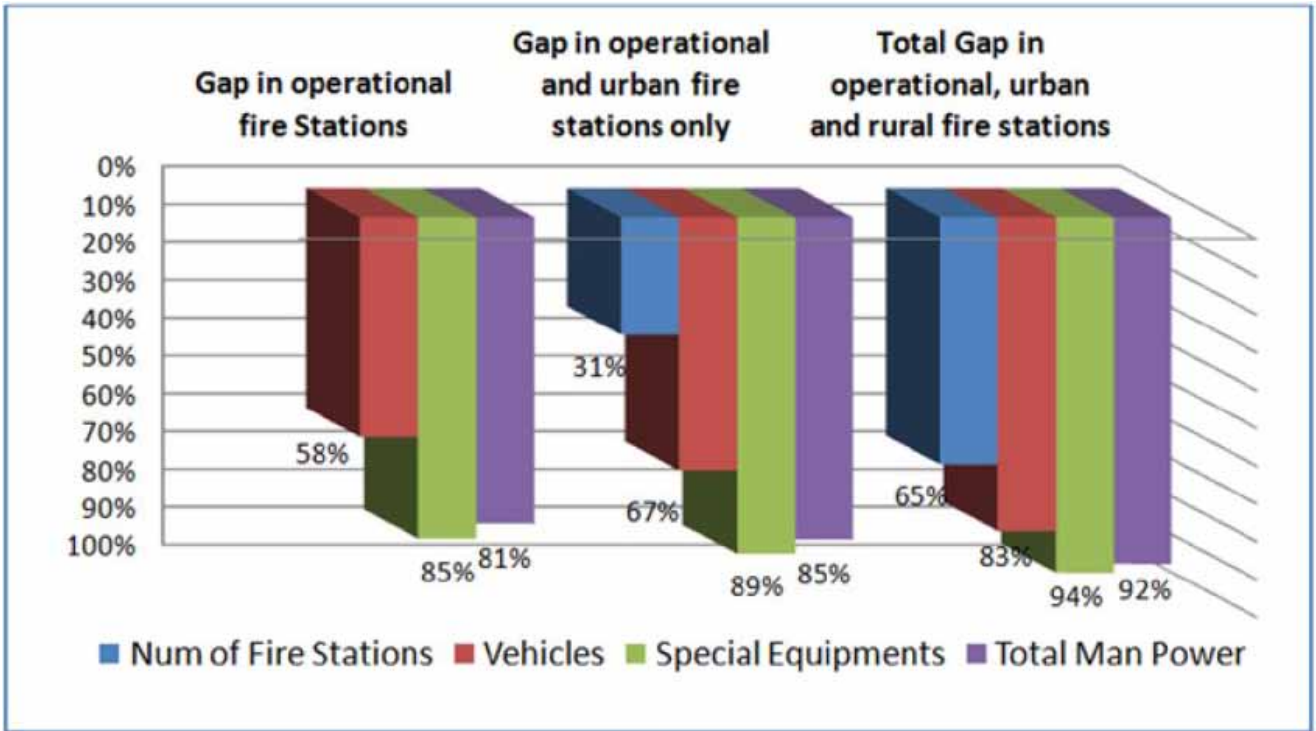
2. Life Safety: Provisions in the event of fire and similar emergencies, construction and occupancy features to minimise danger to life from fire, smoke, fumes or panic.
3. Fire Protection: Accessories, components and guidelines for suitable fire protection equipment and installations.
4. Fire drills and evacuation guidelines for high-rise buildings.

A Standing Fire Advisory Council (SFAC) was formed early on to streamline fire preparedness and firefighting measures across the country. The objectives of this committee are to upgrade and homogenize fire services across the country. The SFAC has members from each state fire service, Ministry of Home Affairs (MHA), Ministry of Defence (MoD), Ministry of Road Transport and Highways (MoT), Ministry of Communications and Information Technology (MoC) and Bureau of Indian Standards (BIS). The National Building Code prepared by BIS is the main guiding document for establishing norms for fire safety and preparedness across the country.

As per the stated objectives of SFAC, response time\* for attending to a fire is 3 to 5 minutes in urban areas and 20 minutes in rural areas. SFAC also stipulates the scale of the population to be served by a fire station, the number of minimum standard equipment that are needed and manpower required for its operation.

As per SFAC norms, there must be one Fire Station in for 10 sq km in urban area and 50 sq km in rural area.

\*Response time in other countries in Urban Areas: Germany: 8 to 15 minutes, Japan: 5 to 10 minutes, USA: 3 to 8 minutes UK: 5 to 8 minutes.



**Firefighting and Rescue Vehicles and Specialized Equipment Gap Analysis**

Figure 34 Gap Analysis of Fires fighting Equipment and Manpower- National Report on Fire Hazard and Risk Analysis, Infrastructure and Institutional Assessment, and Key Recommendations, Final Report (2012)- Directorate General NDRF & Civil Defence (Fire) Ministry of Home Affairs.



Figure 35 Traditional roof of house under construction in Leh.



Figure 36 Typical House in Kargil



Figure 37 Urban Sprawl of Multi-storey reinforced concrete hotels in Leh



Figure 38 Urban Sprawl of Multi storey buildings in Kargil



## CHAPTER 20

# Regulatory Framework for Building Inspection with Respect to Fire and Structural Safety

*Chapter 20 describes provision of building byelaws related to structure and fire aspects.*

### **20 Regulatory Framework for Building Inspection with respect to Fire and Structural Safety**

Following are the requirements related to site inspection as laid in applicable building standards, byelaws and master plans.

#### **20.1 The Building Bye Laws – 2011 of Municipal Corporation, Jammu**

20.1.1 Under the provision of these byelaws, it is mandatory to carry out site inspection at building permit approval stage by designated officers for verification of ownership claim of applicant.

20.1.2 It is required to visit the site periodically during construction and submit reports duly signed by designated officer in prescribed format to owner or his architect/engineer/supervisor.

20.1.3 The byelaws specify that “Where tests of any materials are made to ensure conformity with the requirements of the bye-laws, records of test data shall be kept available by owner for inspection during the construction of the building and for such a period thereafter as required by the Authority.”

20.1.4 On completion of project, owner needs to submit notice of completion to JMC along with clearance from

chief fire officer (for commercial buildings more than 200 sqm plinth area or over G+1), clearance from chief controller of explosives (wherever required) and Structural Safety certificate duly signed by the Structural Engineer for construction (wherever required). On receiving such notice local

20.1.5 authority shall inspect the site in prescribed format and gives approval/rejection accordingly.

2.1.6 No permanent connection of the water, sewer line and power to be given to the building by the concerned agencies unless completion certificate has been issued by the Municipal Corporation Jammu.

20.1.7 For multi-storeyed buildings (above 4 storeys and 15m height) there are specific requirements of dire safety in architectural planning which are in compliance with National Building Code (NBC).

#### **20.2 The Building Bye Laws – 2011 of Municipal Corporation, Srinagar**

In addition to above mentioned conditions Srinagar municipal byelaws have some additional rules.





20.2.1 A rule “Right to Inspect Construction” allows the authority to inspect buildings for which building permit is required at any time during the Period of Construction without giving prior notice of its intention to do so.

20.2.2 The structural design, constructional standard etc.; of all multi-storeyed buildings are required to be supervised during construction at three stages at (1) Basement/plinth stage (2) halfway of superstructure and (3) Roofing stage in the manner described below:

a) The individual /promoter is required to get his/her construction checked at above mentioned three stages of construction by the Authority. Necessary certificate in the format prescribed by the authority shall be submitted to the Building Operations Controlling Authority (BOCA) at each stage before proceeding with next stage of construction Next stage of construction shall not be proceeded with unless certificate of completion of preceding stage is examined and cleared by BOCA. The clearance through “Go-Ahead Certificate” at each stage shall be issued by BOCA within seven days from the date of receipt of completion certificate at each stage. Failure to comply with these provisions shall be deemed that the building permission has been revoked.

b) The individual promoter/developer is required to employ technical personnel of suitable competence for daily supervisions of construction work.

20.2.3 The Owner has to appoint following personnel for quality assurance of construction work as per byelaws

a) Appoint a Registered Technical Person to ensure compliance with all procedural requirements specified in these Building Bye-Laws, and to certify that the architectural design and specifications of the proposed building comply with these Building Bye-Laws

b) Appoint a Structural Engineer on Record to certify that the structural design and specifications of the proposed building comply with these Building Bye-Laws

c) Appoint an independent Structural Engineer on Record to undertake third-party verification of the structural design and specifications of the proposed building and, to verify and certify that the design and specifications comply with these Building Bye-Laws

d) Appoint a Construction Engineer on Record to certify that the construction of the building has been undertaken as per detailed design and specifications stipulated by the Registered Technical Person and the Structural Engineer on Record.



Figure 39 Reinforced Concrete Construction under quality control measures



Figure 40 Load Bearing Brick wall construction



## BUILDING INSPECTION DURING CONSTRUCTION

At Pre-construction level	At Plinth Level completion	At Mid-superstructure Level	At Roof Level
To check planning of building with respect to norms of building byelaws setbacks, built up area, clearance from roads etc.	To check the execution of work as per structural and architectural design, dimensions etc. with help of working drawings.	To check the execution of work as per structural and architectural design, dimensions etc with help of working drawings.	To check the execution of work as per structural and architectural design, dimensions, compliance with fire norms etc with help of working drawings.

Figure 41 Building Inspection During Construction



# CHAPTER 21

## Current Practices Related to On-Site Building Inspection

Chapter 21 gives comparison between building byelaws and actual implementation on site.

**Table 16** Comparison between provisions and actual practices of on-site inspection

Sr. No	Rules as per building byelaws	Actual implementation
1	Mandatory to carry out site inspection at building permit approval stage by designated officers for verification of ownership claim of applicant.	This is usually carried out.
2	Visit the site periodically during construction and submit reports duly signed by designated officer in prescribed format to owner or his architect/engineer/supervisor	This provision of byelaws allow authority to make sure that quality of works on site are as per the rules and keeps contractor alert. However, such visits are very rare or non-existent.
3	Rule “Right to Inspect Construction” allows the authority to inspect buildings for which building permit is required at any time during the Period of Construction without giving prior notice of its intention to do so.	
4	Where tests of any materials are made to ensure conformity with the requirements of the byelaws, records of test date shall be kept available by owner for inspection during the construction of the building and for such a period thereafter as required by the Authority.	There is no established testing and inspection protocol to monitor quality of the built construction including specifications and quality assurance for building materials (such as timber, masonry, concrete, steel), building products and systems such as walls, doors, windows, electrical cabling, finishing materials such as for facades, interiors etc.
5	On completion of project, owner needs to submit notice of completion to JMC along with clearance from chief fire officer, from chief controller of explosives and Structural stability certificate duly signed by the Structural Engineer for construction (wherever required). On receiving such notice local authority shall inspect the site in prescribed format to give approval/ rejection accordingly.	Submission of Structural drawings is not compulsory for building permit application and it is uncertain whether these drawings are ever made for most of the small structures.  Qualification of structural engineer required to issue the certificate is not stated in byelaws



Sr. No	Rules as per building byelaws	Actual implementation
6	No permanent connection of the water, sewer line and power to be given to the building by the concerned agencies unless completion certificate has been issued by the Municipal Corporation Jammu	PHE deptt. and PDD deptt. has never asked for completion certificate from JMC before issuing the water and electric connection in favour of any group housing project or Commercial project. (mentioned on website of JMC)
7	The structural design, constructional standard, etc. of all multi-storeyed buildings are required to be supervised during construction at three stages at (1) Basement/plinth stage (2) halfway of superstructure, and (3) Roofing stage	There is presently no site inspection being carried out except to check the plinth area.
8	The individual promoter/developer is required to employ technical personnel of suitable competence for daily supervisions of construction work.	This is followed for commercial and public buildings
9	<p>The Owner has to appoint following personnel for quality assurance of construction work as per byelaws</p> <ul style="list-style-type: none"> <li>a. Appoint a Registered Technical Person to ensure compliance with all procedural requirements specified in these Building Bye-Laws, and to certify that the architectural design and specifications of the proposed building comply with these Building Bye-Laws</li> <li>b. Appoint a Structural Engineer on Record to certify that the structural design and specifications of the proposed building comply with these Building Bye-Laws</li> <li>c. Appoint an independent Structural Engineer on Record to undertake third-part verification of the structural design and specifications of the proposed building and, to verify and certify that the design and specifications comply with these Building Bye-Laws</li> <li>d. Appoint a Construction Engineer on Record to certify that the construction of the building has been undertaken as per detailed design and specifications stipulated by the Registered Technical Person and the Structural Engineer on Record</li> </ul>	This requirement is not being enforced



## Self Use Homes in Kashmir

Traditional homes as seen in the old city of Srinagar were built principally in the “Dhajji Dewari” or “Taq” style. These houses have excellent intrinsic seismic resistance features and have historically performed well in earthquakes. The Dhajji-Dewari houses are made of timber–brick masonry construction where a framework of timber frames the brick masonry to create a quilt of timber and masonry i.e. brickwork is confined in small panels formed by the surrounding timber elements. This type of masonry performs differently from ordinary brick masonry and has very high in-plane stiffness due to the stiff and strong timber frame bounding the small panels of brick masonry. The studs are provided at close spacing and prevent formation of diagonal cracks in the small panels. These houses are sometimes built of even 115 mm thick brick. These houses performed exceptionally well in the 2005 Kashmir earthquake and were not reported to have collapsed. Sometimes houses have a more traditional masonry construction on lower storeys and have Dhajji-dewari system

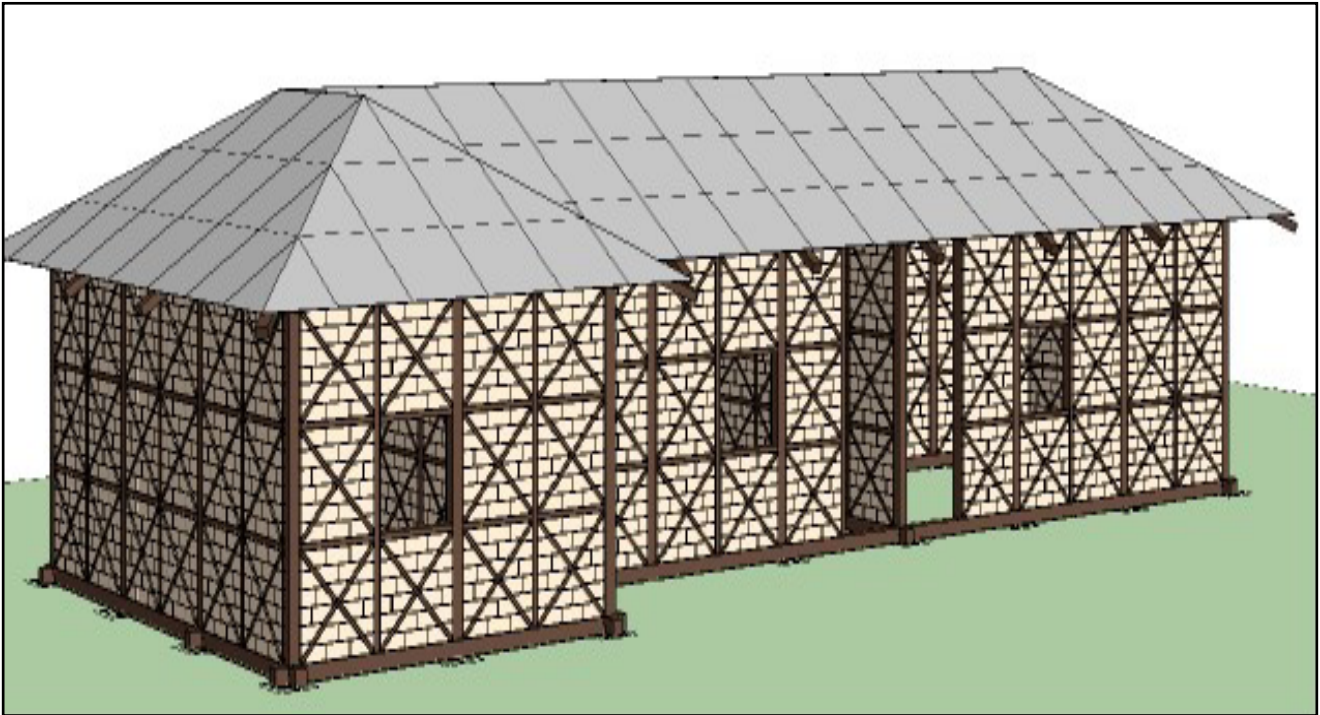
on upper floors and gable walls that are more susceptible in earthquakes. Another variation of Dhajji Dewari is the use of stone pieces in lieu of brick masonry for the infills. Houses where Dhajji Dewari was not used in gable walls show partial failure in earthquakes. The quality of construction of these houses has been excellent, but the houses have degraded due to poor maintenance. The city of Srinagar is losing a large stock of such traditional, earthquake resistant homes to new load bearing (reinforced and unreinforced) masonry houses with wooden roofs. The new houses unreinforced masonry houses are not built with earthquake resistant features but the light wooden roof helps in reducing the mass and thus improves its behaviour during an earthquake. There is a large stock of non-engineered reinforced concrete frame houses being built in Jammu and elsewhere in the Jammu and Kashmir which may not perform adequately in an earthquake. Fortunately, Jammu is not exposed to the same earthquake hazard as the Valley.



Figure 42 Traditional Taq House



Figure 43 Dhajji Dewari House



**Figure 44** Modelling of Dhajji Dewari House – Courtesy Arup



**Figure 45** Construction of Dhajji Dewari House – Arup



**Figure 46** Completed Wall of Dhajji Dewari House – Arup



Another form of timber-brick masonry practiced in Kashmir is the Taq system, wherein large boles of wood are inserted and embedded at each storey level. These boles act as dampers at each floor and thus enhance the lateral load resistance capacity of the building. It is interesting to see many Taq buildings in old Srinagar, which are not vertically aligned but are still very robust. Taqs refer to the vertical elements between the windows of the house. The number of Taqs in a home was considered to represent the relative prosperity of the homeowner.

**It is recommended that a detailed documentation and condition survey of the existing stock of Taq and Dhajji Dewari houses be carried out and a program for their restoration be undertaken. Testing and Inspection of heritage homes is as important as that of new buildings.**



Figure 47 Development in downtown Srinagar showing closely spaced houses

Despite the requirement of obtaining building permission having been introduced since past 30 years ago (1988 BOCA, 1976 J&K Development Authority Rules), there is still a large number of self-use small homes in J&K, which do not apply for building permit procedures due to various reasons already discussed in report of Tasks 1 and 2, and no site inspections are done for such houses. These buildings are being constructed by violating provisions of byelaws related to setback, FSI, zonal requirements etc. which has led to uncontrolled and unplanned urbanization and consequently downgraded the living standards. The main reason for such development is there is no control of authorities on construction once it has been initiated on site.



Figure 48 Narrow Streets make it difficult to conduct rescue operations



Buildings can fail due to reasons like natural disasters (such as earthquakes, fires and cyclones) and use of defective material, improper construction practices, poor founding soil characteristics or bad workmanship and could cause number of casualties in busy and congested areas. In Mumbai, after studying a collapse of building in a crowded area, which was constructed in 1980s, officials suspected that inferior quality of cement was used to construct the building and many buildings constructed during the same era could also have the potential to collapse.

If quality of construction is maintained and regular testing of all materials – cement,

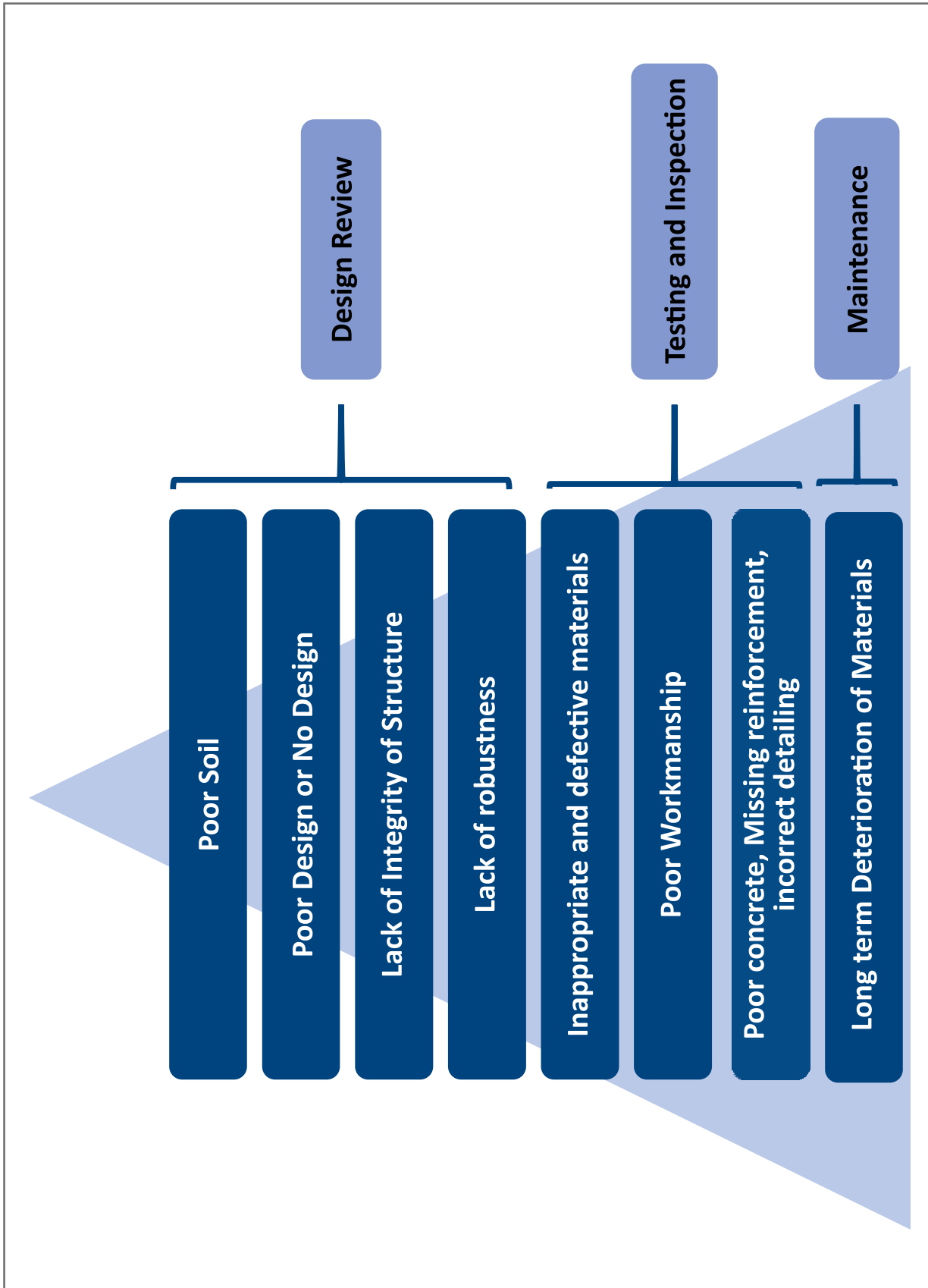
steel, bricks, etc., is conducted, possibility of such failures can be mitigated and ensuring quality supervision by qualified personnel becomes an absolute necessity even for self-use homes. The minimum number of tests to be conducted for all materials for a particular volume / weight of the material should be ensured so that proper quality control is achieved and at the same time testing shall be conducted by a certified laboratory.

**Investing in Site Inspections and Testing of Materials should be seen both by the state officials and the homeowner not as an additional cost, but as a long-term investment in the safety of homes.**



**Figure 49a and b** Site Inspections are an important aspect of the construction methodology





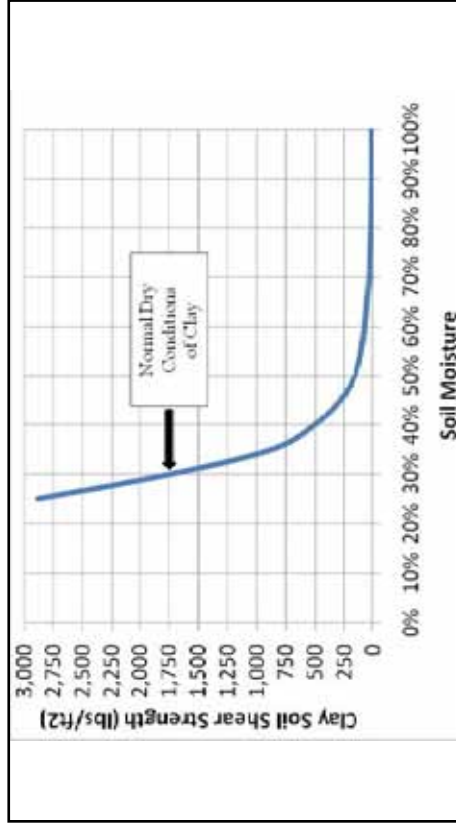
**Figure 50** Possible Reasons for failure of a building (without natural disaster) that can be mitigated by design review, material testing and building inspection



**Figure 51a** Cracking of Foundation due to rotation/settlement of soil



**Figure 51b** Bracing of trusses is essential to keep trusses vertical and to help carry loads along the length of the house



**Figure 51c** Variation of Shear Strength of Clay with moisture



**Figure 51d** Failure of Mosque in Indonesia in earthquake due to poor integrity and seismic resistance of brick structure

**Figure 51** Poor Soil conditions and highwater table are detrimental for buildings; Robustness is an important feature for safety

**Small failures due to lack of inspections can cause big failures.**



## CHAPTER 22

# Suggestions for Improvement in Provisions of Byelaws

*Chapter 22 enumerates suggestions for additions and alterations in byelaws which can improve their implementation on site.*

Conformance of laws should be through realisation and persuasion as first line of action. Laws are meant to protect welfare of citizens, especially for safety (structural and fire aspects). Warnings and opportunities to fall in line with regulations can be given to homeowners, developers, contractors through certain amendments in byelaws and subsequent modification in implementation techniques. While discussing and imposing use of building byelaws, Grandfathering clause for existing self-use houses of one and two storeys is essentially required till existing buildings comply with minimum standards for the general safety and welfare of the public and occupants of a building.

### **22.1 Suggestions to improve provisions of byelaws and their implementation on site**

Towards improving existing byelaws, bifurcation of rules is needed for commercial projects and self-use homes in the state. This distribution will help authorities to maintain violation of laws in check and better control can be achieved in maintaining quality of construction.

#### **For Self-use Homes:**

22.1.1 Need to develop a guide for non-engineered / self-use / informal building construction which will form a part of byelaws. This should contain a self-check list for various stages of

construction i.e. plinth, lintel level, roof level and completion.

22.1.2 As recommended in Tasks 1 and 2, system of Third-Party Inspection can be implemented for this sector of building construction by method of “self-certification” through qualified architects, planners and structural engineers from private sector for stability and safety requirements. Suitable provisions in byelaws can be made to regularise this practice.

22.1.3 Disaster Risk Reduction provisions need to be integrated into the construction and should be monitored during inspection stage. These include: checking of plinth level vis-a-vis the high flood level, accessibility of fire fighting vehicles to attend to a disaster, incorporation of earthquake resistant construction features, and provision of holding down bolts in sloping roofs.

#### **For Commercial projects:**

22.1.4 A checklist should be made available for site inspection at different stages of construction to facilitate effective and thorough checking and to make owner/contractor aware of various requirements of quality construction. It should be made mandatory to maintain checklists for different



purposes like checking competency of founding soil, plinth level checking with respect to high flood level, material quality assessment, scaffolding assessment, reinforcement placing, and proper seismic detailing before pouring concrete.

- 22.1.5 For building material especially locally available material (e.g. stone, bricks, and wood) a well-documented testing procedure should be made available. There has to be sufficient number of Government approved laboratories for testing of these materials.
- 22.1.6 Quality assurance and quality control policy should be made compulsory for contracting firms and it should be made part of documents required for building permit approval.
- 22.1.7 Contracting firms should be mandated to hire at least 20-35% of certified ITI masons, plumbers and electricians to mainstream good construction practices
- 22.1.8 As mentioned in bye-laws, Owner needs to appoint an independent Structural Engineer on Record to undertake third-party verification of

the structural design and specifications of the proposed building. Authorities can share this responsibility and can officially panelise qualified structural engineers, architects or technical institutes to do a mandatory peer review of design to make sure that building byelaws and code are being followed strictly.

The above stated suggestions (4.1.3 to 4.1.5) should be provided as separate annexure to bye-laws for emphasis and clarity.

- 22.1.9 There has to be provision of strong legal actions against breach of bye laws apart from penalty.
- 22.1.10 The fire regulations need to be more stringent depending on the Occupancy. For example, fire regulations for assembly halls and theatres have been made more rigorous as per the revised NBC 2016. These need to be reviewed and incorporated.
- 22.1.11 Provision for fire safety on under-construction sites is required. Fire safety audits by authorities can be conducted at regular intervals.

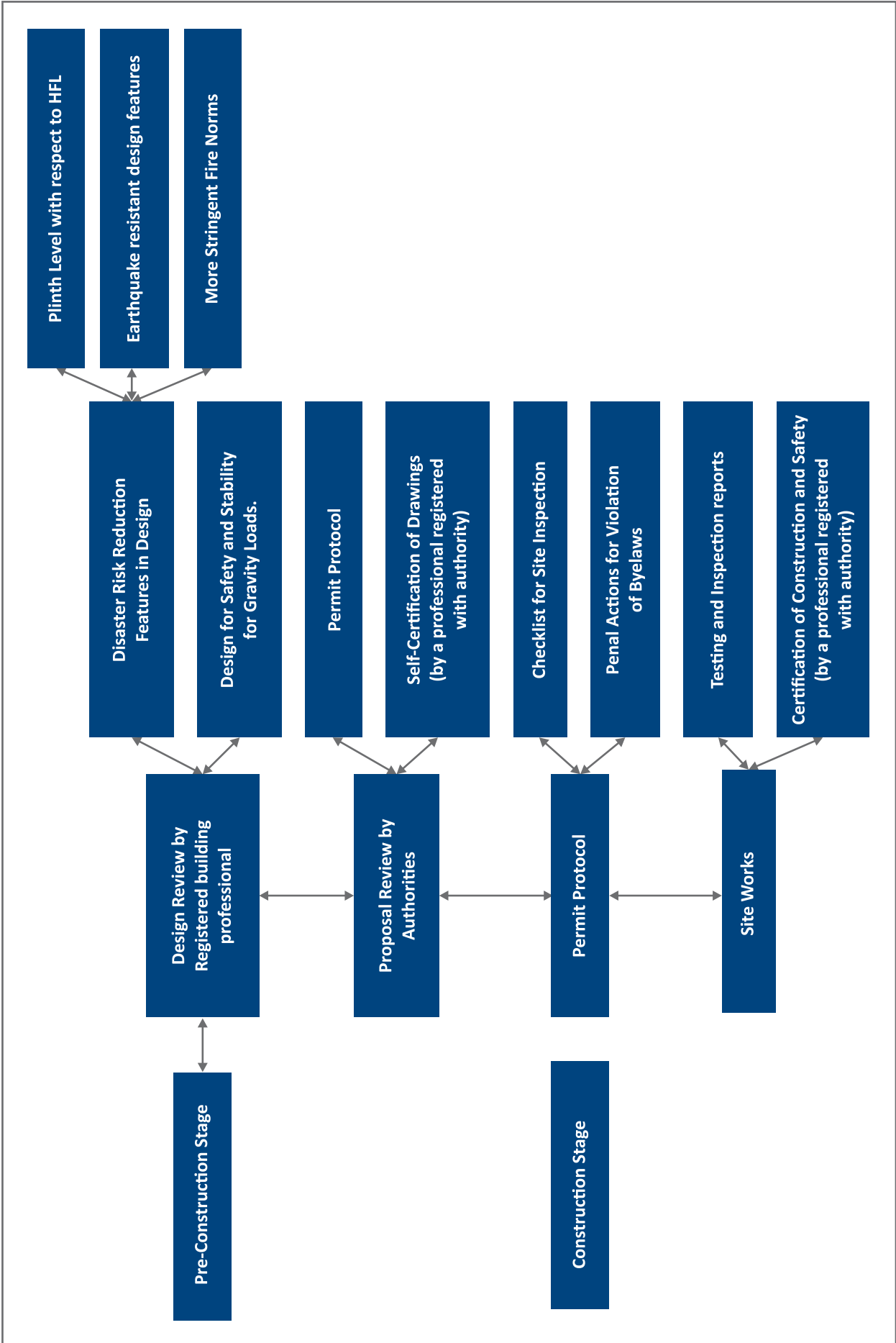


Figure 52 Components for effective construction site control and inspection





Figure 52a and 52b Dense Constructions in Old City of Srinagar



Figure 53a and 53b Urban Spravils in Srinagar and Leh



Table 17 Sample checklist for small homes.

S. No	Feature	Compliant	Non-Compliant	Remarks
1	Competency of Founding Strata			
2	Ground Slope (should be less than stipulated)			
3	Plinth Level vis-à-vis High flood level			
4	Maintenance of Open Space requirements			
5	Conformance to Parking Space requirements			
6	Conformance to Fire Requirements			
7	Foundation Steel Placement			
8	Column Reinforcement			
9	Beam and Slab reinforcement of 1st level			
10	Conformance to Seismic Detailing			
11	Beam and Slab reinforcement of upper level			
12	Beam and Slab reinforcement of terrace level			
13	Brick Masonry Quality and conformance to seismic details			
14	Brick quality			
15	Concrete Strength			
16	Steel Elongation Test and tensile strength			
17	Staircase Detailing			
18	Truss Details			
19	Roof Sheeting and Holding Down details			
20	Doors and Windows			



Table 18 Sample pre-pour checklist for concrete.

<b>Pre-Pour Checklist:</b>	
Wall forms meet the design, drawings, and layout.	
Wall forms are aligned level, plumb, square and straight and braced every 6 feet.	
Wall heights meet the plans.	
Window and door openings are located correctly.	
Window and door bucks are braced inside horizontally and vertically every 2 feet and are square.	
Window and door bucks are braced for plumb within the wall.	
Window and door buck anchors are in place.	
Intermediate floor connections are in place and supported.	
Sleeve penetrations for dryer vents, electrical, HVAC, cable, telephone, solar, and plumbing services are in place.	
Penetrations for outside fixtures and outlets are in place.	
Beam pockets are located and marked.	
Brick ledge (in applicable) is reinforced and supported.	
Concrete is ordered to meet the recommended mix (5.5” - 6.5” slump, 1/2: maximum aggregate, proper concrete compressive strength).	
The correct concrete volume is ordered.	
The concrete pump (boom type preferred) is reduced to 3 inches with an “S” bend or double “L”	
The corners are securely braced.	
Horizontal and vertical rebar is properly installed to meet the structural design.	
Special cut forms are properly reinforced and braced.	
Bulkheads and intersecting wall are adequately braced.	
Ladders and scaffolding are place.	
Adequate labor is available.	
The site is organized and clean.	
The concrete pump truck and ready-mix trucks have easy access to the jobs site.	
If applicable, get building inspector’s and engineer’s approval.	
No construction debris (including saw dust, ICF scraps, blocking materials, or tools) have been left in the form cavities.	





## CHAPTER 23

# Comments on Existing Capacity of ULBs

Chapter 23 evaluates and discusses capacity in the existing urban local bodies and other authorities.

Table 19 Assessment of Capacity of staff based on strength and qualification

S. No.	Question	Comment
1.	<p>What is the number of staff and in each Planning Department, Building Department and Fire Department (or equivalent), who are responsible for reviewing and approving land use, zoning, building and fire regulation compliance, in the country, region or city(ies) covered by the project, such as:</p> <ul style="list-style-type: none"><li>a) site review;</li><li>b) plan / drawing review and approval;</li><li>c) calculation verification;</li><li>d) permit issuance, and for what (e.g., foundation, construction, ...);</li><li>e) site inspection, and for what (e.g., foundation, structure, materials, electrical, mechanical, plumbing, fire, ...);</li><li>f) witnessing of commissioning tests; and</li><li>g) Issuance of certificate of occupancy?</li></ul>	
2.	<p>Identify the types, turnaround times and frequency of review and approval activities undertaken by relevant Planning Departments, Building Departments and Fire Departments (or equivalent), who are responsible for enforcing land use, zoning, building and fire regulation compliance, in the country, region or city(ies) covered by the project, such as:</p>	



S. No.	Question	Comment
	a) site review; b) plan / drawing review and approval; c) calculation verification; d) permit issuance, and for what (e.g., foundation, construction, ...); e) site inspection, and for what (e.g., foundation, structure, materials, electrical, mechanical, plumbing, fire, ...); f) witnessing of commissioning tests; and g) Issuance of certificate of occupancy.	
3.	What actual, verifiable qualifications are held by fulltime staff of the Planning Departments, Building Departments and Fire Departments (or equivalent, such as third-parties), who are responsible for reviewing and approving land use, zoning, building and fire regulation compliance, in the country, region or city(ies) covered by the project?	
4.	What is the number of staff in each Planning Department, Building Department and Fire Department (or equivalent), who are responsible for enforcing land use, zoning, building and fire regulation compliance, in the country, region or city(ies) covered by the project, such as: a) wetlands infringement; b) improper building use; c) building modification, including increase in area, height, change of use; d) improper storage of hazardous materials; and e) inadequate upkeep of required safety systems (e.g., fire systems)?	There are no separate designated officers to carry out such tasks. All these tasks are with the Enforcement officers who are not technically qualified.



S. No.	Question	Comment
5.	<p>Identify the types and frequency of enforcement activities undertaken by relevant Planning Departments, Building Departments and Fire Departments (or equivalent), who are responsible for enforcing land use, zoning, building and fire regulation compliance, in the country, region or city(ies) covered by the project, such as:</p> <ul style="list-style-type: none"> <li>a) site inspection;</li> <li>b) building inspection;</li> <li>c) stop work orders; and</li> <li>d) stop use of building orders.</li> </ul>	<p>Enforcement Officers carry out enforcement activities. But, these officers (and their subordinates) are not technically qualified. They are often times non-graduates.</p>
6.	<p>What actual, verifiable qualifications are held by staff of the Planning Departments, Building Departments and Fire Departments (or equivalent), who are responsible for enforcing and use, zoning, building and fire regulation compliance, in the country, region or city(ies) covered by the project?</p>	<p>For a population of 12.55 million, J&amp;K should be having almost 100 planners to plan development of cities and towns. But, there are currently only 5 planners in J&amp;K and of them, two of them are working in non-planning departments. The Fire Departments have trained fire personnel but the building departments do not have trained and qualified engineers who have the capacity built for checking building designs and drawings. The Testing and Inspection is carried out by non-engineers.</p>
7.	<p>To what extent are land use planning, building and fire regulations used in the education of professionals in the country, region or city(ies) covered by the project? What are the different types of trainings and capacity-building programs available for building officials (course titles, content) and are they carried out by the government, associations of engineers/architects, or other training institutions, and what level of expertise do they have in the topic areas?"</p>	<p>There is currently no such ongoing program in any part of J&amp;K or Ladakh. The numerous educational seminars conducted by the Consultant for various stakeholders such as architects, structural engineers, engineering students, building officials, bureaucrats and masons was a unique exercise in the region.</p>



S. No.	Question	Comment
8.	To what extent are land use planning, building and fire regulations used as educational tools for describing the benefit of regulation to be applied to any informal sectors which exist in the country, region or city (ies) covered by the project?	There is currently no such ongoing program in any part of J&K or Ladakh

The available staff and qualifications at SDA and JMC are produced from Tasks 1&2 report for quick reference.

**Table 20** SDA Staff Strength for Building Permit System

Sr. No.	Position	Total Strength	Present strength	Vacant position
1	Senior Town Planner	01	01	Nil
2	Divisional Town Planner	01	01	Nil
3	Divisional Architect	01	01	Nil
4	Assistant Town Planner	03	02	01
5	Assistant Architect	03	Nil	03
6	Planning Assistant	05	Nil	05
7	Architectural Assistant	05	Nil	05
8	Draftsmen	02	02	Nil
9	Printer	01	01	Nil



**Table 21** JMC Staff Strength for Building Permit System

Sr. No.	Position	Status	Qualification	Remarks
1	Senior Town Planner	Vacant		
2	Junior Assistant Town Planner	1		
3	Inspector/Clerk	2	Draftsmen	
4	Building Officer	2	Draftsmen	Should be minimum graduate civil engineer or architect or planner
5	Surveyor/Technical Assistants	6*	Draftsmen	
6	Executive Engineers (C, T, E)	Vacant		
7	Asstt. Executive Engineer	Vacant		
8	Asstt. Engineer	Vacant		
9	Junior Engineer	Vacant		
10	Computer Operator	1		
11	Chief Enforcement Officer		BA	
12	Enforcement Officer		MA	
13	Asstt. Enforcement Officer	3	Matriculate / Graduate	Building Enforcement officers should be at least having a diploma in civil engineering.
14	Enforcement Inspector		Matriculate	
15	Computer Operators	2*		
16	Peon	1*		

\*On Contract/Outsourced to NGO



### **Commentary on Capacity of various departments:**

1. There are a large number of vacancies in the building proposals department in the category of inspectors and enforcement officers e.g. In JMC, posts of Chief Enforcement Officer and Junior Engineers are vacant. The posts need to be filled up at the earliest.
2. Qualification requirements given in JMC Recruitment Rules (given on website) do not provide requirements of all the technical posts. The system should be transparent and all posts and requisite qualifications should be listed on the website
3. Qualification requirements of enforcement Officers in force are inadequate for the role they have to play in site inspection, e.g. assistant enforcement officer in JMC should be matriculate / graduate from any field, whereas for this post a person with civil engineering background should be selected. The specifications, qualifications and experience for different positions need to be articulated clearly and correctly. The Department may consider the use of a professional consultant for rewriting the job requirements and qualifications for the positions.
4. As there is inadequate inhouse capacity, the role of review of structural design should be outsourced to competent private structural engineers through an empanelment system.

### **23.1 Recommendations**

1. Comprehensive reforms are required urgently in the recruitment of personnel in the building permit regulatory system.

2. Multi-hazard issues should be taken up at all levels Municipality, Municipal Corporation and Development Authority level, keeping one (1) officer responsible to check that all hazards are addressed, while an individual officer for each hazard may be recruited for site inspections.
3. A detailed note needs to be prepared on the ideal number of personnel and their qualifications vis-à-vis the available positions in JDA, JMC, SDA, SMC, Municipal Councils, Municipal Committees, Hill Councils, Area Development authorities and Urban local bodies along with data on the positions currently filled (with the qualifications of incumbent staff), positions vacant and vacant) along with current mode of selection of the candidates.
4. The selection of personnel needs to be done in a transparent, free and fair manner and the official should be provided adequate security so that she/he may conduct her/his work confidently without fear or favour.

### **23.2 Comments on Capacity of Fire Department**

The organisational structure of fire department in Jammu and Kashmir is as under:

#### **Total Number of Fire Stations/Fire Posts/River Posts**

1. Kashmir Division	=	131
2. Jammu Division	=	42
3. Ladakh	=	02
<b>Total</b>	<b>=</b>	<b>175</b>

1. The role of the fire department while reviewing projects needs to be more holistic. Projects must be examined



only internally but also for their siting. Projects where large public gathering is expected, such as shopping malls, cinema halls, educational institutions and commercial complexes should not be allowed at locations where fire tender access is difficult.

2. The state fire stations should be adequately equipped with tools and equipment which is required not just for fire but also for hazards such as earthquakes. A visit to Ahmadabad Fire Station of the Policymakers of J&K is encouraged to appreciate the disaster preparedness that is required for a zone with such high seismic risk.

### 23.3 Requirement of Training of staff

1. Training programs need to be conducted for officials involved in site inspection to understand all the applicable building byelaws and codes and their latest updates for structural safety, specifications for building planning, electrical and mechanical aspects. Such programmes can be conducted by authorities at departmental level at regular intervals.
2. Sensitization of people working in informal sector to carry out site inspection to ensure structural and fire safety. Certain NGOs or private expert trainers and resource persons can be tapped for such special training. A list of such personnel could be supplied on request.
3. Sensitization in informal sector can also be carried out by publishing small interactive books on tips on construction practices, material testing etc. Books with self-explanatory illustrations can reach maximum labours in informal sectors. Small Handouts can also be printed and distributed amongst masons for self-learning.

4. Training programs needs to be conducted as part of continuing education and capacity building for the fire officers. Such training programs are being conducted at national level and state's fire officers may be sent for such workshops and training programs.
5. Increasing the level of exposure of building officials of the state should be a high priority item by facilitating their visits to other states to study good practices especially their systems of site inspection and fire safety procedures.
6. **The Fire Officers in Jammu and Kashmir may be made acquainted with the new fire norms of National Building Code (NBC) 2016. Bureau of Indian Standards holds courses regularly for understanding the modification in the fire safety norms. The authorities may coordinate with Bureau of Indian Standards and hold such courses.**

### 23.4 General

1. Rather than getting the Safety Certificate on completion from the Structural Engineer, it should be mandatory to get the structure designed as per latest IS-norms with certificate from the Structural Engineer prior to the construction stating that the structure has been designed as per the latest IS-norms and then a certificate be obtained from the Owner/ Site Engineer that the execution has been carried out strictly as per the structural drawings. Also, only qualified Structural Engineers should be made part of the inspection squad to check execution as per the tructural design. This could also be an independent Third-Party Structural Engineering company or Government institution.



2. SMC/JMC should develop a website wherein all buildings permissions shall be made available so that any person can check the built-up area / number of stories permitted by SMC/JMC before buying any property
3. To cross check on the quantity of Reinforcing steel / Structural Steel, it is suggested that on completion of the structure, the owner shall submit the purchase bills of these materials to SMC/JMC and these shall be tallied with the estimate as per the structural drawings.
4. It is suggested that the structural audit of existing critical buildings such as hospitals/school buildings should be carried out on a high priority
5. A separate department shall be identified whose responsibility shall be to carry out the proof checking of all Government Projects including major private structures like Hospitals, Nursing Homes, School Buildings, Shopping Malls and Theatres. It should be made mandatory for these structures to clear the Structural / Fire / Safety design checks and audits from this Department before taking up any execution work.
6. It is recommended that it should be made mandatory for structures like Hospitals, Nursing Homes, School Buildings, Shopping Malls and Theatres to get soil testing done through a nominated Government Agency or verified by this agency (if done by through private agency)
7. There should be investments in new technology and know-how (both in terms of latest equipment and latest construction techniques); Officials whose task shall be to carry out research on this subject shall be nominated so that these can be introduced in cities of Srinagar and Jammu. In fact, the Government can offer some benefits to the Contractors who will introduce innovation. Invitations towards Tenders can include a pre-qualifying criterion based on Innovation and introduction of new technologies.
8. In addition to routine testing procedures, some instant testing procedures like NDT, Re-bar Locator, Core Extraction etc shall be recommended to be carried out by the inspection team at various stages. This will have a cross-checking and validating effect on routine testing reports.
9. Do's and Don'ts' in Construction practices should be clearly identified and disseminated
10. Proof checking of Design of the essential structures like Hospitals and School Buildings (whether private or Government) should be made mandatory in the report
11. Critical, lifeline building system proposals on slopes and higher contours should go through rigorous scrutiny before building permits are issued
12. A Process Flow Chart for making the Building Permit process safe should be developed and this can be followed by the ULBs and UDAs





Figure 54 Interactive Sensitization program held by the Consultant for Mason Training in Srinagar



Honeycombing of concrete, crazy cracks in slab are result of poor workmanship and pose serious issue in later life of structure. These problems further lead to leakage in structures. Such problems can be avoided by taking adequate steps during construction activities. For example, if concrete slab is covered completely by tarpaulin sheet immediately after pouring concrete, shrinkage cracks can be avoided.



Poor quality of reinforcement bars can alter the life of structure. It is recommended to test the reinforcing bars after every batch of 30-30MT of bars.



Figure 55 Sample template for handouts showing challenges and solutions

# Quality Control of Essential Facilities



## CHAPTER 24

# Objective of Task 4 – Quality Control of Essential Facilities

*Chapter 24 describes the objective of task 4 as per TOR*

### Objective of Task 4

As defined in TOR, the term “critical facilities” is used to describe all manmade structures or other improvements that, because of their function, size, service area, or uniqueness, have the potential to cause serious bodily harm, extensive property damage, or disruption of vital socioeconomic activities if they are destroyed, damaged, or if their functionality is impaired. As part of an effective disaster risk reduction strategy, the functional continuity of essential facilities is a major issue during and following hazard events.

The scope of the proposed review will focus primarily on the design and sustainability of effective control measures that can ensure functional continuity of future essential facilities such as key government buildings, hospitals and schools. The firm will be expected to provide a diagnostic of the existing regulatory framework, identify regulatory and implementation systems gaps and provide phased recommendations to improve the effectiveness of design and inspections mechanisms.

Specifically, it will carry out the following tasks:

1. Review the current designation of essential facilities in the building code system and adequacy to prevalent risks and vulnerability;
2. Review of current building code and documentation process required for compliance with functional and structural requirements;
3. Current process, including risk-based procedures in place and resources available within the local authorities and urban local bodies to ensure an effective - first line of control over the design and the construction of critical buildings;
4. Current process and resources of key specialized departments (e.g. Health, Education) that may provide technical guidance and control activities of the functional continuity on new buildings.



Figure 56 Fire in Hotel in Srinagar in 2018



Figure 57 Fire in Srinagar State Secretariat 2013

The objective of the task is to analyse the current regulatory requirements in terms of their adequacy and implementation and to suggest possible improvements in the technical aspects and in the regulatory systems including capacity building of the stakeholders.

### **Deliverables**

1. A report analysing the current status of regulatory requirements for essential facilities with phased recommendations on relevant aspects that may contribute to improve structural and functional performance to the expected level;
2. Proposed Road Map and reform approach to ensuring improved quality control for essential facilities including potential recommendations on technical design requirements, changes in the regulatory process and in the local legislation.

### **Scope of Study of Critical Facilities**

1. A sample survey was conducted on select critical facilities comprising of fire stations, hospitals and educational institutions.

2. Fire stations need to be fully functional 24x7, especially in every kind of disaster. Fire stations house fire tenders and also fire officers manning the fire tenders. They thus have to be designed and built for higher standards of performance and safety.
3. Hospitals are essential facilities which need to be functional in an eventuality such as an earthquake when there would be a lot of critically injured patients requiring emergency care. Also, in an earthquake, the indisposed patients of a hospital are unable to protect themselves and escape from a damaged building or a raging fire. Hence it is critical that hospitals need to be fully designed to meet all standards of fire, flood and earthquake safety.
4. Educational Institutions especially schools house our young and vulnerable children unable to protect themselves in case of a disaster. Additionally, in the time of a disaster, school become the default venue as temporary shelters post an earthquake or cyclone disaster. Like hospitals schools are required to be designed for higher levels of performance and safety. Refer to the figure below



**Figure 58** Fire Service Department in J&K is ill equipped and understaffed



**Figure 59** Fire Service men in Jammu

5. Unfortunately, the record in India for safety of schools and hospitals is not encouraging. There have been a spate of disasters between 2000-2019 in hospitals and educational institutions relating to fires, floods and earthquakes many of which have lead to staggering fatalities. Refer to the figure below



**Figure 60** Submerged SKIMS Hospital in Srinagar during 2014 Floods



**Figure 61** 92 children died in 2004 Kumbakonam school fire in TN



**Figure 62** 73% of schools made with Precast Construction collapsed or were severely damaged in 2001 Bhuj Earthquake



**Figure 63** 172 persons died in collapse of Bhuj Hospital in 2001 Bhuj earthquake



# Greater Kashmir

KASHMIR

Zehru Nissa

Srinagar, March 25,

2018, 12:14 AM

UPDATED: March 25,

2018, 1:33 AM

## Panic after fire erupts at SMHS hospital in Srinagar

Fire broke out in trauma theatre area of SMHS hospital in Srinagar on Saturday, creating panic and forcing the attendants to evacuate their patients from the adjoining ward.



Panic after fire erupts at SMHS hospital in Srinagar

Figure 64 Fire in SMHS Hospital, Srinagar in March 2019



## CHAPTER 25

# Importance of Essential Facilities and their Responsibilities

*Chapter 25 explains role and value of essential facilities and refers to previous studies on risk analysis in J&K, besides referencing them to national building code.*

### Background

The essential facilities have key role in maintaining social welfare of a community. Facilities like hospitals, long-term care facilities, Schools, Colleges, Police stations, fire stations, and custodial facilities, are considered essential as health, education, safety and security of a society are protected by smooth functioning of these facilities. Thus, a functionally well planned and structurally sound building structure of these facilities is an important requirement of an ideal building system. The most crucial role of these facilities is during and after disasters. The studies of disasters in past all over the world have highlighted this fact repeatedly.

In Bhuj earthquake, a two-storey largest civil hospital of the Kachh district, designated as referral hospital to treat the medical needs of about 1 million people collapsed and disrupted all medical services, killed 172 people, and left a large number of injured and sick persons without any medical treatment.

*In floods of 2014, four out of five major hospitals in Srinagar were completely shut down because flood water entered in hospital premises and some of the floors were submerged. Patients had to be relocated to other hospitals which were under tremendous pressure due to insufficient number of staff. The severity of damage to equipment's of hospitals was so high that it took months to restore hospital facilities.*

In Earthquakes in Bhuj, A total of 1,884 school buildings collapsed, resulting in a loss of 5,950 classrooms. 11,761 school buildings suffered major to minor damages, rendering an additional 36,584 rooms unfit for holding instruction sessions. The Department of Primary Education of Government of Gujarat had previously launched a massive program of providing 6,000 school buildings using precast structures April 1999 to November 2000 in phase I. About three-fourths of newly built classrooms using precast were either destroyed or damaged. Damage to buildings in school/college





premises caused serious disruption to academic activities. Classroom instruction was suspended for 30 days.

The above examples highlight the failure to address risk and vulnerability of structures in a disaster with respect to planning and structural aspect. Functional continuity (and not just preparedness) during and after the disaster should be of topmost importance. Additionally, these facilities are expected to respond immediately to requirements of affected people in disaster. In order to cater for this responsibility.

Critical Facility Buildings should be planned and built/ maintained by keeping in mind certain special requirements at planning,

design, construction stage and after commissioning.

1. At planning level: land selection, setback requirements, architectural planning with respect to fire safety, egress and evacuation pathways, high flood level, drainage
2. At Structural design level: Criteria for earthquake resistant structure, fire safety, cyclone resistance
3. Construction stage: Effective quality control of construction process and building materials.
4. After Commissioning: regular audits and repair works.



**Figure 65** Lalla Ded Hospital 2014 Floods



**Figure 66** Girls Hostel in Government Medical College in 2014 Floods



### Previous Studies on Fire Hazard and Risk Analysis

In December 2011 Directorate General NDRF & Civil Defence (Fire) (Ministry of Home Affairs) had published the Final Report – State Wise Risk Assessment, Infrastructure and Institutional Assessment of Pilot States (Delhi, Rajasthan, Maharashtra, Jammu & Kashmir, Puducherry and Andaman & Nicobar Islands) prepared by RMSI. Refer to the figure below:

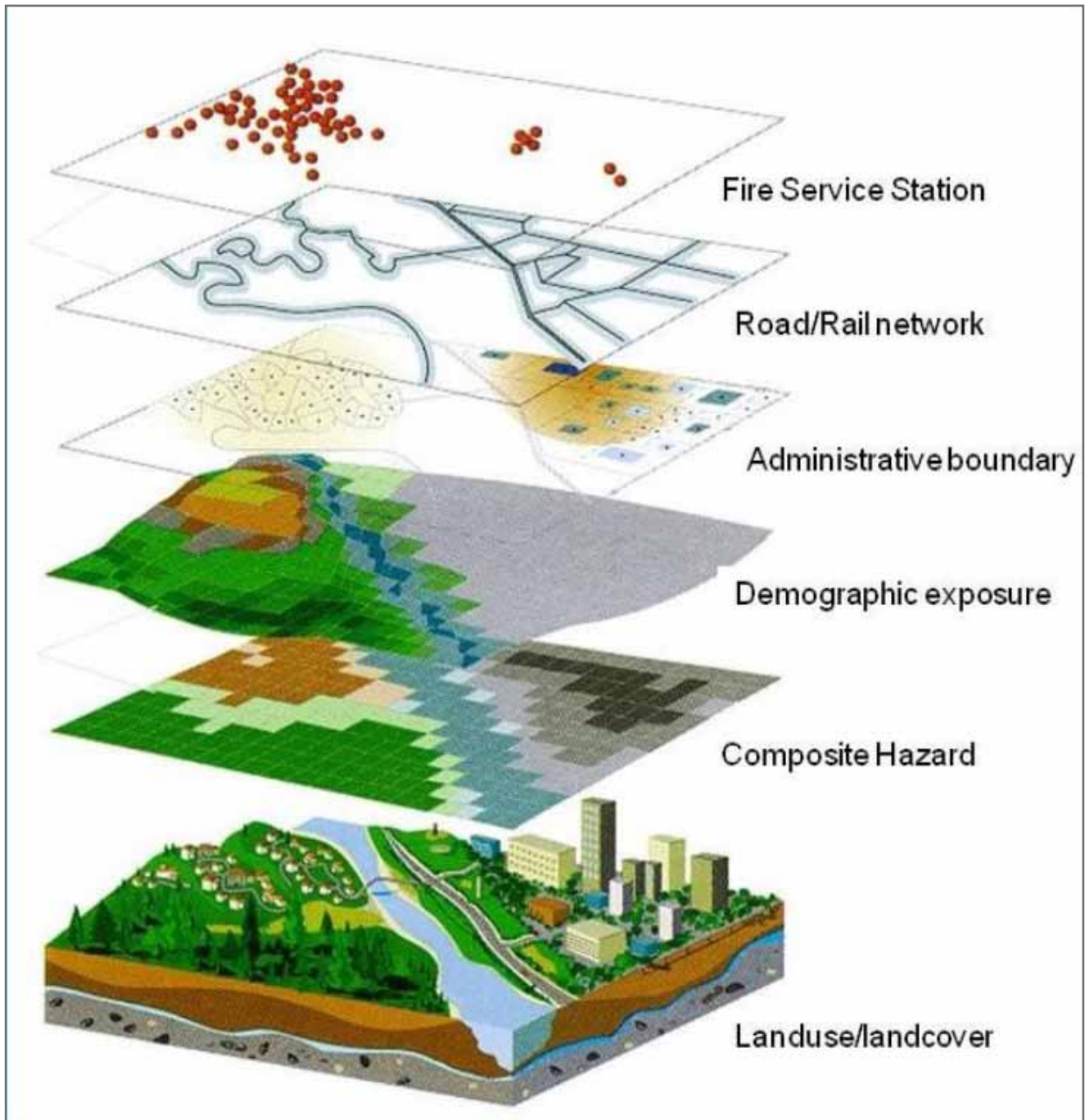


Figure 67 Overlay analysis for Fire Risk Assessment



As per the report, District level ranking for individual (earthquake, wind and climatic) hazard and integrated hazards is given below in Table 22

**Table 22** District level ranking for individual (earthquake, wind and climatic) hazard and integrated hazards

District	Population Density Ranking	Res Built-up Area sq km Ranking	Res Built-up Area Percentage Ranking	Industrial Area Ranking	Integrated Ranking	Overall District Risk Ranking
<b>Jammu &amp; Kashmir</b>						
Kupwara	2	2	2	1	6.9	Medium
Badgam	3	3	3	1	8.5	High
Leh (Ladakh)	1	2	1	1	5.5	Low
Kargil	1	1	1	1	5.2	Low
Poonch	2	1	1	1	5.9	Low
Rajouri	2	1	1	1	5.9	Low
Kathua	2	2	2	2	7.2	Medium
Baramulla (Barakula)	3	3	3	1	8.4	High
Bandipore	1	2	1	1	5.9	Low
Srinagar	4	3	4	2	10.1	Very High
Ganderbal	2	2	2	1	7.0	Medium
Pulwama	3	2	3	1	8.1	Medium
Shopian	3	1	3	1	7.5	Medium
Anantnag	2	2	1	1	6.6	Low
Kulgam	2	1	2	1	6.4	Low
Doda	1	1	1	1	5.4	Low
Ramban	2	1	1	1	5.9	Low
Kishtwar	1	1	1	1	5.5	Low
Udhampur	2	2	2	1	6.6	Medium
Reasi	1	1	1	1	5.4	Low
Jammu	3	4	3	2	9.2	Very High
Samba	2	2	3	3	8.4	High

As can be seen from the tables above, while Srinagar and Jammu are in very high fire risk, other districts such as Badgam, Baramulla and Samba are also exposed to high fire risk. Likewise, districts of Srinagar and Pulwama are exposed to very high seismic risk.

In view of the high risks for fires and other disasters and considering the critical nature of essential facilities under discussion, it is quite evident that such structures need to be designed for higher levels of safety and serviceability. Many of these buildings or parts of these buildings will need to be “fully operational” after a disaster – such a fire stations, operation theatres of hospitals to name a few. The NBC does not address the requirements for such performance standards. Besides following the national codes for earthquake, fire etc., it is opportune to begin deliberations on consideration of Performance-Based design for critical facilities. Unfortunately in J&K, even the National Building Code is not being followed and some of the new buildings are also not in conformance to the earthquakes codes of Bureau of Indian Standards nor are they in conformance to Part 4 (Fire Requirements) of the National Building Code.

This needs a critical review and early corrective action, especially for design of new critical and essential facility buildings which are ongoing.



## CHAPTER 26

# Observations and Comments on Building Byelaws and Current Scenario in State for Infrastructure of Essential Facilities

*Chapter 26 provides a brief report on the Rapid Visual Survey conducted on some of the critical facilities in Srinagar and Jammu*

### **Comments on building byelaws and master plan**

1. In byelaws, general requirements of minimum area of plot, FAR, Ground coverage, height of building, minimum set back, circulation area are provided for hospitals, health care facilities, police stations, fire stations, religious premises. But, in depth planning requirements are missing. For instance, for hospital buildings, sizes of wards, height of floors, proximity to hazardous structures (like petrol pumps) is not specified.
2. In case of areas having moderate to high vulnerability of flash floods and landslides, the buffer zones envisaged in Master Plan needs to be implemented while permitting any development in such areas.
3. National Building Code has been referred to in the byelaws for structural safety. This essentially covers all the Bureau of Indian Standard Codes relevant to building construction. However, NBC is very wide and far reaching in its scope. There is no explicit mention as to what clauses of NBC need to be followed. Similarly, there is need to mention which clauses of NBC need not be adhered to. Presently most clauses of NBC are followed in their breach.
4. There is no specific requirement to address risk and vulnerability of structures of essential facilities during and after disaster.
5. There is no provision for building permit application in byelaws for each of these special structures.



## 26.1 Comments on existing conditions of essential facilities (based on the Consultant's visit)

The Consultant along with officials of JTFRP visited some of the essential facilities and observations made which are presented in the following sub-sections

### 26.1.1 Rapid Visual Survey of SMHS Hospital (State Hospital)

The new building (G+2) constructed in 2011 with approx. area of 12000 Sq.m. was submerged in water up to 15' height during 2014 floods and hospital was shut for next few days. Firefighting system was being installed in hospital at time of inspection. Lateral load resisting system could not be identified. Stilt floor with no shear wall is being used for parking.

A new expansion of this hospital is a steel structure. Quality of construction was poor to average. There was no fire proof treatment provided to steel members. Visually, the orientation of steel columns was observed to be not in line with the standard practice. The moment frame connections appeared inadequate for the seismic design requirements. There were no concrete shear walls to take the lateral force.

Combustible Aluminium Composite Façade elements have been used in the new building which add another layer of fire risk to the hospital building.



Figure 68 SMHS Old Hospital, Srinagar



Figure 69 SMHS New Hospital clad with combustible aluminium composite panels



### 26.1.2 Rapid Visual Survey of Super Speciality Hospital

This hospital is completed recently in 2017 and CPWD has carried out the work. This is a G+3 storeyed (with part fourth storey) RCC framed structure without any shear walls. The lateral load resisting system is thus not understood as it would indeed be quite challenging to develop ductility required for a Zone V building to be designed for a high importance factor (1.5) without recourse to shear walls. A detailed design audit of this building would be worth carrying out.

This structure is supported on pile foundation with piles of 600mm dia and 15m length. External wall thickness is 350mm. The choice of 350 mm thick walls may have been based on insulation needs especially during winter but this appears to be ill advised in a city which is in the highest seismic zone and the attempt should be made to keep the structures as light as possible so as to in turn be subjected to lesser later loads in an earthquake.

Insulation needs could have been innovatively met with other means such as use of cavity walls, use of special light weight insulation panels and other such measures. Quality of construction is not up to the mark. On the rear side of building leakage signs were observed.



Figure 70a and 70b Super Speciality Hospital, Srinagar

### 26.1.3 Rapid Visual Survey of Super Speciality Hospital

This hospital is completed recently in 2017 and CPWD has carried out the work. This is a G+3 storeyed (with part fourth storey) RCC framed structure without any shear walls. The lateral load resisting system is thus not understood as it would indeed be quite challenging to develop ductility required for a Zone V building to be designed for a high importance factor (1.5) without recourse to shear walls. A detailed design audit of this building would be worth carrying out.



Figure 71 ACP Cladding on Lalla Ded Hospital



Figure 72 Spread of fire due to use of combustible ACP façade material – Representational picture



#### 26.1.4 Rapid Visual Inspection of Sri Pratap College, Srinagar

This is the oldest college in North India. A G+1 storey load bearing building in stone and brick masonry and wooden floors, this is a heritage site. During the flood in 2014, ground floor was submerged and caused damage to this building.

New block has been recently constructed and is a G+3 reinforced concrete structure. Stilt is provided from previous experience of flood. But, no shear walls are provided. This building should be reviewed urgently and be retrofitted appropriately on top priority in view of the high vulnerability of stilt buildings without shear walls, given the high seismic risk (Zone 5) in Srinagar.



Figure 73 Sri Pratap College, Srinagar



### 26.1.5 Rapid Visual Inspection of Fire station (Batamallo)

Structure is G+3 constructed by R&B in 1972-73. Fire station building is internally well planned and quality of construction appears to be good. Fire station is well equipped. Rescue operations for upto 42.5 m can be handled with the equipment available at the fire station.

The fire station is highly vulnerable to flooding. During the 2014 floods of Srinagar, Batamallo fire station was submerged in water up to the first floor. In view of the circa of the fire station, it is unlikely that the station has been designed for seismic resistance.



Figure 74 Fire Station at Batamallo



Figure 75 Rajbaug Police Station

### 26.1.6 Rapid Visual Inspection of Police station (Rajbagh police station)

This building was constructed in 1982. It is a G+2 building. This building is in low lying area and in 2014 floods it was submerged up to first floor.

#### **Comments on infrastructure of essential facilities based on visit report:**

1. Most of these facilities were affected during the floods. Locations of new structures are wrongly chosen or in case of old structures, increased ground levels due to surrounding new development these structures are now in low lying area.
2. In almost all new hospital buildings lateral load resisting system is missing. Structural design of these buildings lack due consideration for earthquake resistance even when the state falls in zone IV and zone V.
3. New block of Lalla ded hospital misses out some planning requirements of ramp and elevators. ACP sheets for facade pose danger of major losses in case of fire.
4. Quality of construction is also main concern. New expansion of SMHS hospital which is in steel structure, no fire proof treatment is provided to structural members. In new super speciality hospital block leakage signs, flooring cracks are observed within 2 years of completion.

#### **To summarise,**

**Requirements of ideal structure in terms of arch planning and design, structural design, construction techniques, maintenance are not fulfilled. There should be a well-defined system to ensure adherence to building byelaws and there has to be certain amendments in building byelaws to ascertain quality of these structures in disaster mitigation. These are discussed in Chapter 26.**





## CHAPTER 27

# Proposed Road Map for Quality Control For Essential Facilities with Respect to Structural and Functional Aspects

*Chapter 27 offers recommendations for Quality Control and Quality Assurance for Essential Facilities*

The suggestions for effective quality control are explained in this chapter with respect to various stages of building construction as shown in below diagram. While giving these suggestions, roles and responsibilities of various stakeholders like byelaws, enforcing authorities, architects, structural designers, contractors, and masons at each of these stages are considered. These requirements are given with respect to visits to various essential facilities (visit report attached as

annexure) and different NDMA guidelines especially for disaster resistance. While J&K disaster management authority refers to various guidelines by NDMA on its website, it is necessary to prepare guidelines specific to state for each of the essential facilities and there should be sufficient changes in building byelaws to incorporate these guidelines. Enforcement of these revised building byelaws should also be ensured by concerned authorities.

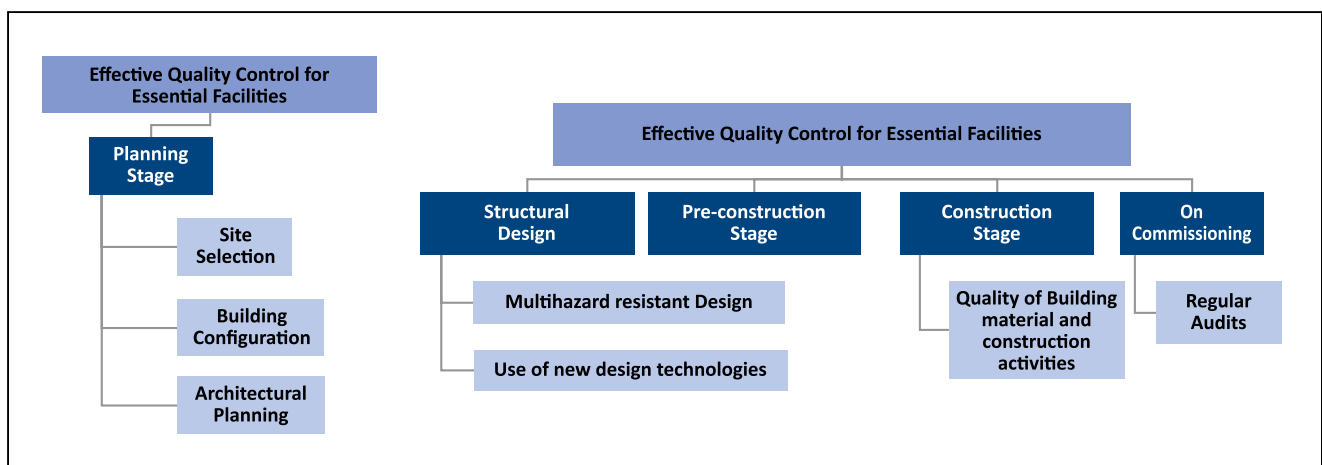


Figure 76 Stages for effective quality control for essential facilities.



## 27.1 Planning stage

### 27.1.1 Site Selection

1. Building byelaws shall clearly mention or refer the documents which specify the areas of cities which are natural flood plains, areas of flash flood in rainy season, liquefiable grounds, unstable hill slopes and constructions of new infrastructure for essential facilities should be prohibited.
2. A due consideration should be given by planning architect to accessibility of the proposed plot with respect to post disaster mitigation.
3. As per the hospital safety guidelines by NDMA, when existing hospitals are located in any of vulnerable locations, no future expansions shall be permitted in the hospital campuses. Also, critical assessment shall be undertaken to study the risks involved and appropriate actions shall be taken either to mitigate the effects or relocate the hospital. This condition holds true for all the essential facilities.

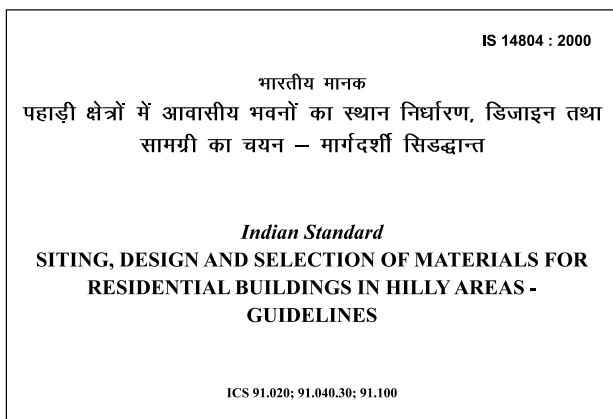


Figure 77 Stages for effective quality control for essential facilities.

IS 14804:2000

**This IS standard specifies requirements of planning, design and material selection for construction of residential buildings in hilly region.**

### 27.1.2 Building configuration and Architectural Planning

1. Building byelaws should state minimum requirements in detail, like room area, dimensions, height, opening, and circulation systems for essential facilities.
2. While preparing layout architect should avoid configurations that involves complex structural requirements, e.g. Long cantilever spans, and use of floating columns.
3. School Safety Guidelines by NDMA specify requirements child safety design, evacuation, ventilation, lighting requirements. These can be referred.

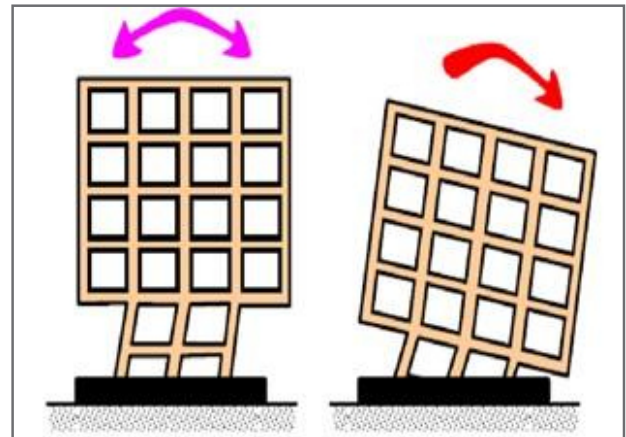


Figure 78 Failure of building with Floating column

### 27.1.3 Structural Design

1. Building byelaws refer to National Building Code and all the Indian standard codes for structural design. But, more detail specifications should be given considering geographic location and prevalent risk and vulnerability of state to natural hazards.
2. Special Guidelines for hospitals by NDMA list down special structural safety provisions to be made in earthquake prone areas other than those specified in standard documents such as (These can be applied to other essential facilities as well)

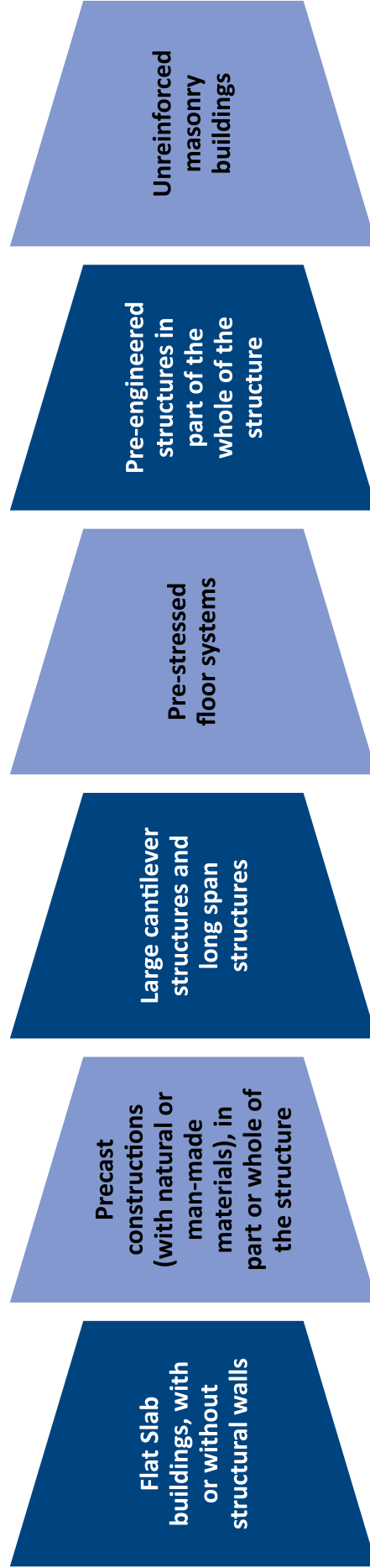


Figure 79 Structural systems Prohibited for essential facilities



- a) The structural system of new hospital buildings shall NOT be Moment Resisting Frames alone along any of the two mutually perpendicular plan directions of the building; structural system of all new hospital buildings shall have Structural Walls in each of the two mutually perpendicular plan directions of the building in addition to Moment Resisting Frames.
  - b) Structural configurations with open ground storeys or flexible or weak storeys at any other level shall be prohibited in hospital buildings.
  - c) Certain structural systems are Prohibited to be used in new hospital construction. Refer to Figure below
3. New design technologies should be used by structural engineers which make the structure more resistant in disasters

#### **27.1.3.1 Base Isolation Systems**

The design for a critical facility that needs to be functional post-earthquake requires a different design approach. The approach is to significantly reduce transmission of the earthquake energy and forces into the structure. This can be done by different methods. One is by isolating it from the ground shaking by an isolating layer. Typically, the isolating layer or the “base isolation system” is fairly flexible as compared to the structure and decouples the structure from the ground motion. Base Isolation systems typically include isolators, such as lead-rubber bearings (LRBs) and laminated rubber bearings.

This approach of reducing the transmission of earthquake energy deformation and forces into the structure requires rigorous site-specific studies to understand and establish various parameters which will affect the

choice of system to be adopted for achieving the “fully functional after seismic event” behaviour. The selection of an appropriate system ranging from base isolation methods, energy dissipation devices or a combination of both to achieve high performance level of the building, will depend on particular characteristics of the site- the underlying soil profile and the building characteristics along with the general geology of the area. It is an expensive technology option though effective to counter ill effects of strong earthquake shaking in new hospital buildings. Hence, Base Isolation System may be adopted in important structures in seismic zones IV and V. But, this system can help in minimising effects of earthquake shaking on NSEs. When the client owner insists on using such a system, it shall be adopted only when safety of such hospital buildings is established by:

- a) Analytical Methods, through nonlinear pushover analyses and nonlinear time history analyses under a suite of appropriate earthquake ground motions
- b) Full-scale experimental testing of base isolation devices demonstrating that they are capable of resisting expected strong earthquake shaking.

For hospitals or other critical facilities where the site is a filled-up river bed (such as hospitals in Srinagar on Jhelum) with deep soft soil deposits, significant caution needs to be exercised in the use of base isolation techniques as the flexibility of the soil can significantly increase the internal structural forces. This may present a unique set of challenges for the application of some of the seismic isolation methodologies (which in lieu of mitigating seismic effects) have the potential of amplifying the same. Therefore, the effects of soil-structure interaction should be taken into consideration especially in the case of a soft soil medium.

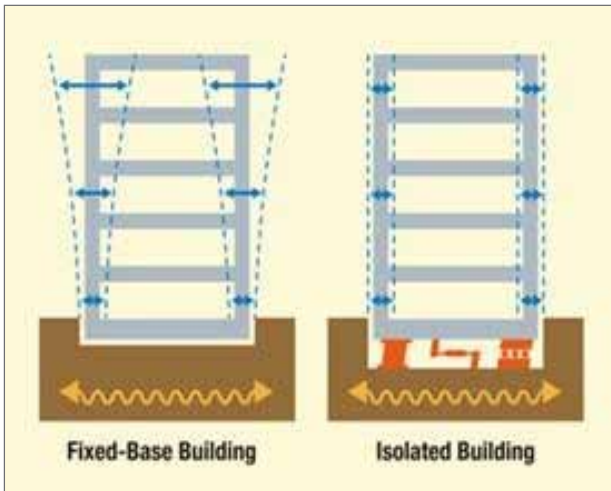


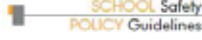
Figure 80 Base Isolation System

### 27.1.3.2 Viscous Dampers

Another way of reducing transmission of earthquake energy into the structure is by use of energy dissipation devices such as viscous dampers and other dampers.

### 27.1.4 Peer review of structural design:

Byelaws specify the need of peer review by an independent structural engineer. Additionally, for special structures, byelaws should mention qualification and experience criteria for these peer review consultants who should be registered with the authorities for review of Critical facilities.



## Annexure – 6

The Hon'ble Supreme Court of India, Justice Dalveer Singh in response in response to Writ Petition (Civil) No.483 of 2004, Avinash Mehrotra vs Union of India has laid down the following minimum specifications for school buildings:

**3.3. SCHOOL BUILDING SPECIFICATIONS:**

- i. The school buildings shall preferably be a 'A' Class construction with brick / stone masonry walls with RCC roofing. Where it is not possible to provide RCC roofing only non-combustible fireproof heat resistance materials should be used.
- ii. The nursery and elementary schools should be housed in single storied buildings and the maximum number of floors in school buildings shall be restricted to three including the ground floor.
- iii. The School building shall be free from inflammable and toxic materials, which if necessary, should be stored away from the school building.
- iv. The staircases, which act as exits or escape routes, shall adhere to provisions specified in the National Building Code of India 2005 to ensure quick evacuation of children.
- v. The orientation of the buildings shall be in such a way that proper air circulation and lighting is available with open space all round the building as far as possible.
- vi. Existing school buildings shall be provided with additional doors in the main entrances as well as the class rooms if required. The size of the main exit and classroom doors shall be enlarged if found inadequate.
- vii. School buildings have to be insured against fire and natural calamities with Group Insurance of school pupils.
- viii. Kitchen and other activities involving use of fire shall be carried out in a secure and safe location away from the main school building.
- ix. All schools shall have water storage tanks.

Figure 81 School Building Specifications as per NDMA Guidelines

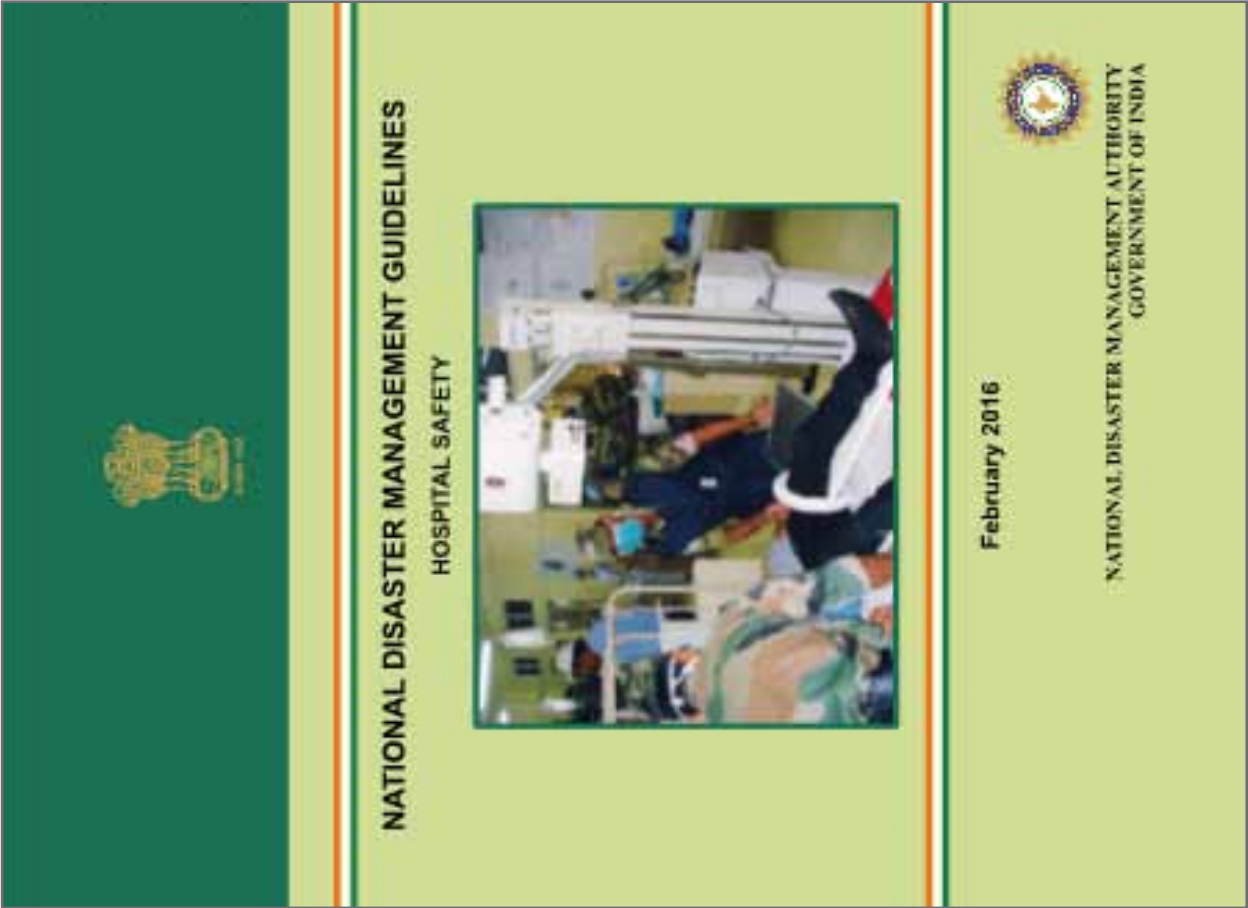


Figure 82 NDMA Guidelines for Hospital Safety

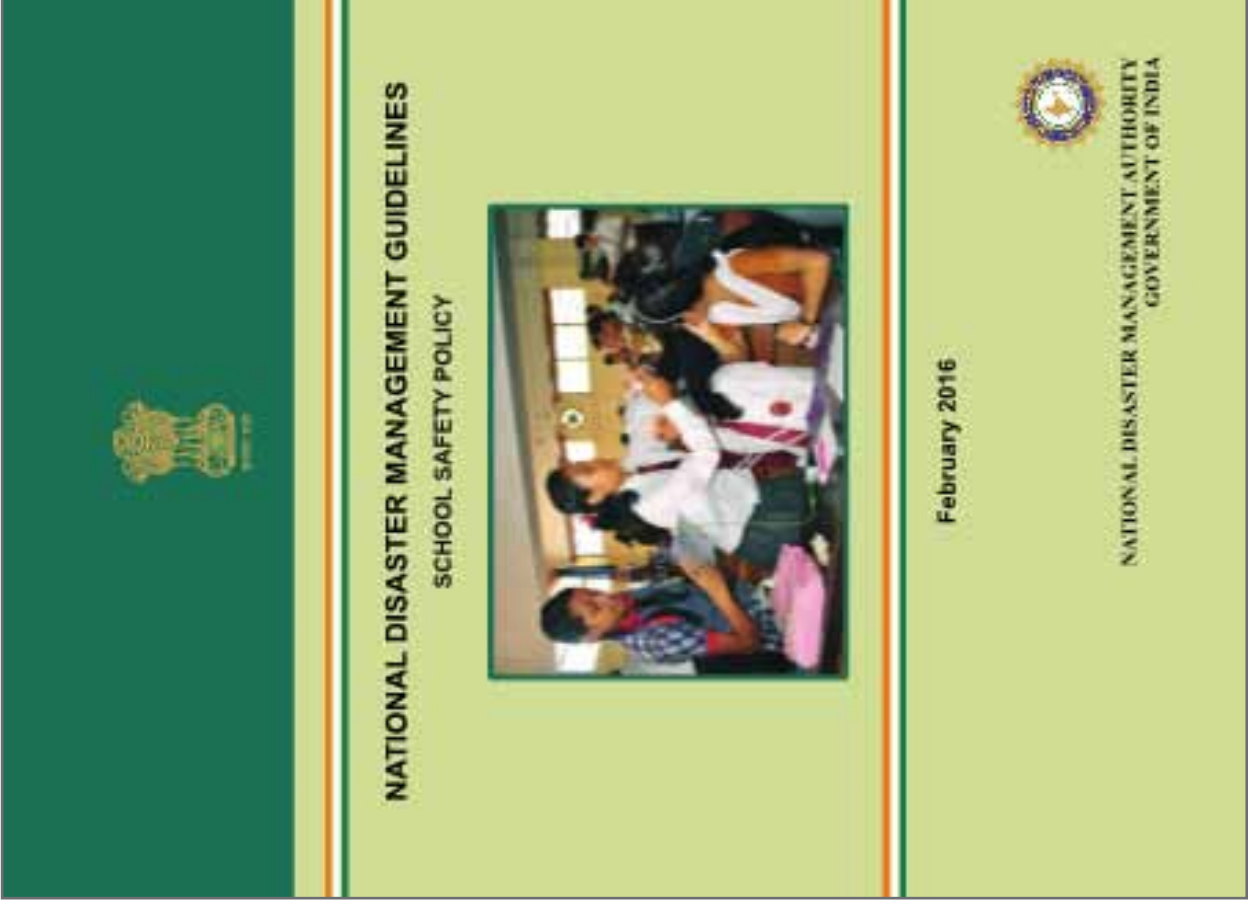


Figure 83 NDMA Guidelines for School Safety



### 27.2 Recommendations for changes in byelaws for additional permissions to be obtained before construction for critical facilities

1. In procedure of building permit application system, building byelaws should add a clause which should give list of additional permissions required.
2. For special structures disaster mitigation plan should be made compulsory for submission for building permit.

### 27.3 Recommendations for changes in byelaws for critical facilities during Construction

1. Responsible authority and structural designer should ensure regular checking at site for structural safety aspects, quality of building materials used etc.
2. Byelaws should specify list of materials prohibited to be used for construction. e.g. use of combustible materials. NDMA guidelines for school safety specifically mention that only non-combustible, fire-proof, heat resistant materials shall be used in school construction.
3. Construction of essential buildings shall be performed only by Certified Artisans and Licensed Engineers.

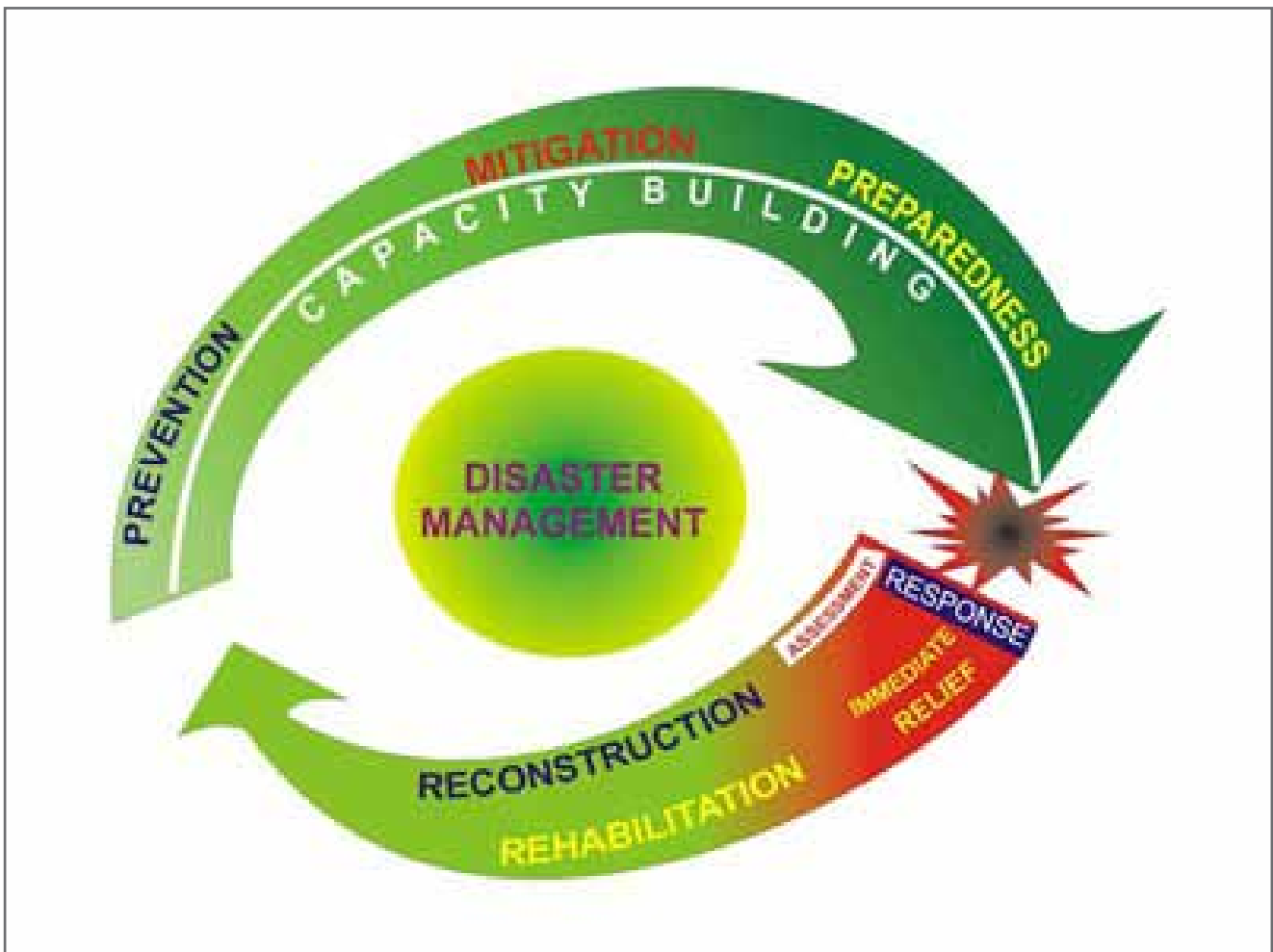


Figure 84 Disaster Management Cycle



#### **27.4 Recommendations for changes in byelaws for critical facilities on Commissioning of new buildings/ for existing buildings**

1. Periodic structural and fire audits of special structures shall be made compulsorily. Currently, only hospital buildings have this condition.
2. All the essential facilities should have a fully functional and regularly tested Disaster Management Plan.
3. As stated in The Jammu Master Plan: the facilities like hospitals, fire services, police, schools, water supply, bridges, flyovers and underpasses, electricity, grid stations, houses of VVIPs are critical in nature for post –disaster management. To ensure functioning of critical facilities, buildings occupying such facilities and falling in Seismic Zone-IV/V shall be retrofitted. JDA shall develop a clear cut retrofitting strategy at its own level for this purpose.

#### **27.5 Role of authorities to improve quality control**

1. Suggested in NDMA guidelines, Local municipal bodies should create the necessary implementation system for ensuring that all new health facilities comply with the provisions of this Guideline. In particular, a nodal officer shall be identified to coordinate this. Performance of all artisans involved in construction shall be assessed and recommended or otherwise for participation in future projects.
2. Regular Training programmes for structural engineers, architects to communicate advancements in design technologies, amendments in byelaws related to essential facilities shall be conducted.

#### **27.6 Role of state level and district level specialized departments**

1. Specialized departments like health dept., education authorities, fire departments can help in better quality control on infrastructure of essential facilities.
2. At State level, departments can develop strategies, policies and regulations for ensuring that all new construction are disaster resilient and up to date with respect to functionality requirements.
3. After completion of project, qualified technical personnel can carry out inspection to check if the construction has been done on the basis of guidelines as stated above.



Public Awareness  
and Educational  
Campaign



## CHAPTER 28

# Objective of Task 5 – Public Awareness and Educational Campaign

*Chapter 28 describes the objective of task 5 as per TOR*

### **Task 5.a**

The Consultant is expected to focus on designing and conducting awareness campaign for various stakeholders of building construction with the aim of promoting safe construction and compliance with building regulation to protect lives, livelihoods and economic assets. The activities included are:

1. Developing a proposed communications strategy targeting different categories of building professionals, including masons and trades, building practitioners and building owners;
2. Exploring potential partnerships with specialized NGOs to deliver appropriate training;
3. Defining key messages and communications solutions to demonstrate the benefits of safe building practices and support a broader community-wide commitment to safer building practices with a focus on masons traditionally operating in the - informal or unregulated building sector;
4. Supporting the GoJK in preparing a guide, a brochure or information and promotional materials;
5. Preparing and submitting a schedule of meetings and seminars;
6. Enlisting partners among professional bodies, media and academia.

### **Task 5.b**

The Consultant is expected to support designated authority to reach out to different local authorities, urban local bodies and Tourism Development Authorities to undertake out targeted communications efforts associated with the implementation of Tasks 1, 2, 3 and 4. The Consultant has to help in formation of Building Regulation Working Group, which will keep all relevant bodies engaged in technical reviews.

Deliverables (as per Terms of Reference)

1. Design of awareness campaign with a focus on masons and other trades operating in the - informal or unregulated building sector;
2. Participation in relevant workshops to inform stakeholders and keep them engaged in the reviews and recommendations;
3. Support to targeted awareness activities as agreed by the local authorities, urban local bodies and Tourism Development Authorities.

On broader view, Task 5 is divided in two sub tasks such that task 5.a targets the actual ground level parties of building community namely Masons, Structural Design Engineers, Architects, and House-owners and 5.b targets planning level organizations of building community, such as ULBs and Tourism Dept. etc. This bifurcation enables the design of training programs as per the roles of each of the stakeholders.



## CHAPTER 29

# Need of Awareness Campaign

*Chapter 29 explains the Consultant's method of approach to complete the task 5*

### Need of Awareness Campaign:

Because of its unique geographical location, Jammu, Kashmir and Ladakh are always at risk of severe natural disasters like earthquakes, cloudbursts, floods, landslides which in recent past have increased in number and caused havoc leading to large number of casualties and huge loss of houses and infrastructure. It is evident that manmade factors such as climate change and subsequent changes in disaster patterns, unplanned developments have contributed significantly to the increased frequencies and intensity of the disasters. The floods in 2014 were a cumulative effect of high intensity rainfall in a short time span, haphazard and massive urbanization and loss of wetlands, flood spillways and other natural and historic flood mitigation systems.

An important learning from past disasters is that while the community has developed skills as first responder in disasters for immediate rescue and relief, there is a gap in training people about disaster mitigation. This begins with the community understanding imminent risks and possible damages due to disasters. The greatest stumbling block thus is the **communication of risk** and building a culture of **risk perception**. While this is an uphill task in most geographical areas, Jammu and Kashmir region which is fraught with problems of insurgency, terrorism on a daily basis poses an extraordinary challenge.

Absence of risk perception to natural disasters exists at every level. In senior stakeholders, for example, while there is a general awareness of seismic risk, there is little deeper understanding of the extent of damage and loss of life that can ensue in the aftermath of a major earthquake. Likewise, while the experience of the devastating 2014 floods is still fresh in the collective memory, the memory of that disaster has not translated into building new infrastructure to tackle such a disaster in the future, nor has it stopped people from continuing to build homes in highly vulnerable, low-lying flood plains in the Valley. Most homeowners appear to have a fatalistic approach that in major disasters, homes will suffer extensive and perhaps irreparable damage and will need to be rebuilt. A mindset change needs to be brought about- That it is possible to build homes to withstand moderate earthquakes and floods with reparable damage.

One of the most important tasks of an awareness campaign for a project aiming to bring in Building Codes compliance is to create a demand for safe housing and disaster resilient planning and infrastructure. An aggressive campaign is required to sensitise the consumer - the homeowner about her rights to demand and get a home that is safe in earthquakes, fires and cyclones but also one which will not be vulnerable to floods.



What is also needed to be communicated is that for such a demand to be met, the homeowner must be aligned with the underpinning requirements to make this happen. A commitment to work within the building regulatory framework and follow all the building byelaws, rules and regulations – these have been created primarily to protect the interests and safety of the homeowner.

### **29.1 Sensitisation of Homeowners**

Sensitisation of the homeowner is paramount in bringing about compliance to building byelaws by both the building officials and the professionals. The homeowner must be made to realise that he has a right to two main demands: (a) Demand for a safe house which requires that the building professionals – architect, engineer, mason, etc. are competent together to design and build a house that is disaster resistant; and (b) Demand for obtaining building permissions within a prescribed time frame – this means that the building officials must do their job diligently and honestly and without fear or favour. Surveys conducted with building permit users (see report of Task 1 and 2) reflected that building officials are perceived to be inefficient and uncommitted and that corruption prevailed at all levels of functioning.

Sensitisation of a homeowner is not practically possible with workshops, but mass outreach campaigns have been used in the past by states such as Gujarat. While the jury is still out on the effectiveness of such campaigns, the seed of thought regarding safe houses and what constitute safe houses and what are the duties of building officials and the rights of citizens is effectively conveyed. Such campaigns are usually carried out through radio, television, short clip to be played in theatres or inserted as an advertisement on the internet such as in YouTube, online newspapers and magazines.

Sensitisation of Homeowners should be done through Mass Awareness Campaigns with following messages:

1. Everybody has a right to live in a home safe against natural disasters
2. It is possible to design homes to be safe against natural disasters
3. It is the right of the homeowner to demand and receive building permit in a time-bound manner if she has followed all the requirements
4. It is the right of the homeowner to demand that the architect, engineer, mason and other building professionals build a safe home

### **29.2 Sensitisation of Stakeholders in the Bureaucracy**

As mentioned earlier, while senior stakeholders have a general awareness of natural risks, there is limited understanding of the extent of damage and loss of life that can ensue in the aftermath of a major earthquake. In the past decade, post 2001 Bhuj earthquake, a concerted pan-India effort has been launched to create disaster management units at the village, taluka, district and state level. However, most of these measures are focussed on building capacity for rescue and relief rather than on disaster mitigation. Most state agencies view disaster mitigation measures as unwelcome speedbrakers in the path of the growth and development juggernaut.

It is very important to co-opt the senior government officials and other stakeholders into the disaster mitigation process. Unless they are aligned to the cause, not much changes can be affected. Training and sensitisation workshops for this group of senior people needs to account for their busy schedules and must necessarily be short and crisp two to four-hour programs.



Sensitisation of Senior Bureaucrats should be done with focussed two to four-hour seminars focussing on following messages:

1. Disaster Mitigation is better than Disaster Response
2. The types of disaster risks that the region is vulnerable to and the type of low hanging mitigation efforts that can help in Disaster reduction and resilience
3. It is the right of the homeowner to demand and receive building permit in a time-bound manner if she has followed all the requirements
4. It is the right of the homeowner to demand that the architect, engineer, mason and other building professionals build a safe home.

Capacity building at various levels of construction industry has become vital subject

in disaster risk mitigation. Such capacity building campaign needs to be carefully designed for each and every stakeholder (like House owners, Developers, Masons, Engineers, Architects, and Planners) as they have their own roles and responsibilities in this sector.

Keeping this in mind, at initial stage, the Consultant prepared basic outline of the training programme by developing different training modules for different stakeholders of the building community. Some of the activities involve, Training masons to promote Safe construction practices, Conducting Sessions for Architects and Engineers on planning and designing tips for disaster resistant construction, etc. Based on these modules, the consultant conducted training sessions as explained in next chapter.



**Table 23** Objectives of Capacity Building Programs for Stakeholders.

<b>SENSITIZATION AND AWARENESS PROGRAMS AND SHORT COURSES</b>	<b>OBJECTIVE</b>
Communication of Risk Perception for Public	<ol style="list-style-type: none"> <li>1. Create demand for homes safe against fire, earthquakes, floods</li> <li>2. Generate understanding of Accountability of All Stakeholders- Building Officials and building professionals, masons etc.</li> </ol>
Understanding and mitigating risks for Senior Stakeholders	Sensitise Bureaucrats in understanding the ever present hazards and risks that the region is exposed to and communicate that <b>THERE IS A WAY TO MITIGATE THESE RISKS</b>
For Building Officials	Create a competent team of building officials capable of reviewing building drawings and construction and check their compliance with hazard resistant construction requirements
Multi Hazard Resistant Planning and Design for Architects and Planners	Create a competent team of architects and planners who are aware of the risk exposure and use planning and design tools at their disposal to design a safe Habitat
Multi Hazard Resistant Design and Construction for Engineers	Create a competent team of structural design engineers fluent in design methodologies and detailing for hazard resistant buildings and construction engineers that can build them.
For Masons	Create a community of masons in Jammu and Kashmir and in Ladakh who are fully knowledgeable in construction materials, details and methods for building disaster resistant construction, especially for self-use homes



## CHAPTER 30

# Various Awareness Programmes Conducted in Jammu and Srinagar

*Chapter 30 describes the numerous awareness activities conducted by the consultant*

A half-day session was conducted at Institution of Engineers, both at Jammu and Srinagar for builders, architects, engineers as well as for officials in urban local bodies with two main purposes;

**Objective:** To understand the level of awareness about multi hazard resistant construction and perception of building permit system in engineers and architects community and to introduce the Concepts of Earthquake Resistant Design.

### 30.1 Brainstorming Session and Earthquake Hazard Sensitisation with Engineers, Architects and Builders at Jammu and at Srinagar

**Table 24** Schedule of Brainstorming Session and Earthquake Hazard Sensitisation with Jammu Engineers, Architects and Builders

Time	Agenda Topic	Presenter
16:00-16:15	Tea and Introduction	
16:15-16:30	Inaugural Session	
16:30-17:30	Brainstorming Session with Engineers, Architects and Builders of Jammu	All
17:30-18:15	Sensitisation to Earthquake Resistant Design Concepts - Talk and Presentation	Prof Rupen Goswami, IIT Madras Alpa Sheth, VMS Consultants, Mumbai
18:16-18:30	Concluding Session	

#### Background for Sensitisation Seminar in Jammu

A background note was prepared and circulated prior to the seminar. The note is reproduced herein:

“The Building Permit System in the State of Jammu and Kashmir and specifically of Jammu Municipal Corporation has undergone significant transformation in the past few years. What is the experience of engineers, architects and builders in Jammu using the system? Has the system



become more transparent, easy and has the building permission process become faster? Or is the reverse true? What are the further changes that need to be adopted and implemented?

As it is well-known, J & K is exposed to high and very high earthquake hazard.

1. Is there sufficient sensitisation amongst the Builder, Architect and Engineer Community regarding Multi-Hazard Resistant Construction?
2. How does the building permit system encourage and mandate that all new construction is built to be earthquake resistant?
3. What would the community of engineers, architects and builders like to see implemented to ensure that the built habitat is safer for all types of hazards- earthquakes, floods, cyclones, landslides and fire?"

**Objective:** As part of the ongoing review of the existing building permit system undertaken by the PMU (Project Management Unit) of JTFRP, the Review Team would like to have a free- wheeling discussion on the aforementioned and other issues regarding the Building Permit System. A meeting of 2 hours is proposed for these discussions, followed by a 40 min introductory presentation on Earthquake Resistant Design Concepts for Sensitisation of Engineers and Architects.

 <b>Programme</b> <u>Date</u> 4 <sup>th</sup> Feb., 2019 (Monday) <u>Time</u> 4:00 P.M. : Registration 4:30 P.M. : Introduction 4:40 P.M. : Technical Session 5:30 P.M. : Concluding Session 5:40 P.M. : High Tea <u>Venue</u> Institutional Complex, Sector- 3, Channi Himmat, Jammu.	<p><i>Er. Ravi Chanyal, FIE, Chairman &amp; Committee of</i> <b>The Institution of Engineers (India)</b> Jammu Local Centre,</p> <p>solicit the pleasure of your company on the seminar. on <b>Sensitisation to Earthquake Resistant Design Concepts</b></p> <p><b>Sh. Pankaj Magotra, KAS</b> Commissioner Jammu Municipal Corporation, . shall be the <i>Chief Guest</i></p> <p>Presentation will be given by <b>Prof Rupen Goswami</b> Associate Professor at IIT Madras</p> <p><b>Ms. Alpa Sheth</b> Managing Director, VMS Consultants Pvt. Ltd., Mumbai</p>
<p>R.S.V.P Ph. 0191-2462545 Cell : 94192 - 36579</p>	<p>Er. Vijay Kr Sharma, MIE Honorary Secretary</p>

Figure 85 Invitation for seminar on: Sensitisation to Earthquake Resistant Design Concepts





## Report on Seminar in Jammu:

Jammu Municipal Commissioner Mr Pankaj Magotra inaugurated the Seminar. About 120 people attended the seminar. Ms. Alpa Sheth and Professor Rupen Goswami made presentations on basic design concepts and outlined the main causes for building failures in earthquakes.

### Ms. Alpa Sheth discussed following topics in detail

1. Flaws and scope of improvement in existing building byelaws in viewpoint of hazard resistant construction
2. Hazard exposure of J&K State
3. Seismic Hazard in J&K state and it's reason based on tectonic plates
4. Various earthquake effects depending on design philosophy and type of construction in the world
5. Earthquake codes and their objectives
6. Important Issues for consideration in Earthquake Design
7. Requirements for Safe, Good Behaviour of Buildings

### Professor Rupen Goswami talked about

1. Continental Drift Theory and plate tectonics to understand the basis of earthquakes.
2. Type of construction in J&K State like traditional Dhajji Dewari and Taq construction, Masonry and Concrete and their response in earthquake resistance
3. International and national Earthquake design codes
4. Development in Indian Standard codes of Earthquake resistant design in latest revisions.



Figure 86 Seminar at Institute of Engineers, Jammu

Presentations of both resource persons at Jammu as well as in Srinagar are placed in Annexure.

The presentations were followed by an animated discussion on the topic. The participants also filled a survey form on the Building Permit System in Jammu.

## 30.2 Training Programmes at Educational Institutes

In the task of running public awareness campaign educational Institutions can play an important role as reach of these institutions is vast.

Students can be trained for awareness about disaster resistant safe habitat through lectures, workshops, competitions. The Consultant conducted two long lectures at educational institutes in Kashmir as follows

### 30.2.1 A presentation on topic “Design and Detailing Issues of IS 1893(1) & IS13920::2016 at NIT, Srinagar

A presentation was given by Professor Rupen Goswami on provisions of Indian Standard codes of Earthquake resistant designs and its updation in recent revisions were discussed in detail with participants. Presentation is placed as Annexure.



Figure 87 Prof. Rupen Goswami giving talk at NIT, Srinagar.

### 30.2.2 Session by Ms. Alpa Sheth

Ms. Alpa Sheth conducted a lecture on earthquake engineering concepts at SSM College of engineering in Parihaspura. The students had very little or no exposure to earthquake engineering. Faculty lamented that there was no exchange of students or faculty with other institutes in India and as a result, students lacked exposure and learning skills that are honed faster with interaction with peers from other parts of the country or internationally.

### 30.3 Training Programmes for Masons

As has been mentioned elsewhere in the report, most self-use homes in Jammu and Kashmir are designed and built primarily by the mason. Many buildings are built by such masons without any engineered guidance. A faulty practice by mason increases vulnerability of houses towards disaster hazards. Hence training masons for safe and disaster resistant buildings becomes very crucial. Two mason trainings were conducted. The first session was to understand the training needs and the second was an intensive three-day workshop.

### 30.3.1 Session with Masons at JKERA Office, Srinagar

A meeting cum session was arranged on March 31 2019 for masons in presence of officials of JTFRP and Building Centre. About 25 masons took part in meeting. Objective of the meeting was to discuss the current construction trends in valley and to understand the training needs. Some important information was shared by the masons during this meeting:

1. Most of the self-use homes are constructed by masons with help of drawing prepared by draftsman and in very few cases by architects.
2. The masons decide the depth of foundation. A raft generally, 3' wide and 6" thick with dia 10mm dia rings at 12" c/c and dia 12mm at 7" c/c.
3. All external walls are 14" thick and thickness of internal walls is usually 9"
4. Corner reinforcement in walls is mostly not provided and if at all it is given then a single bar of 16 mm is provided in between bricks.
5. Slab thickness is usually 6" with reinforcement of 12mm dia at 6" c/c as main reinforcement and 10mm dia bars at 7" c/c for a typical room size of 12'X14'. If room is larger, then a central beam is provided and reinforcement of such beam is often decided by mason.



Figure 88 Meeting with Masons organised by Building Centre



6. Cement to sand ratio is 1:8 and they believe since they are properly curing the brickwork richer mortar is not needed.
7. Knowing the importance of the Dhajji Dewari and Taq construction, JTFRP suggested that these type of constructions should be documented properly.
8. Masons requested for a manual and a demo building.
9. JTFRP suggested that Building Centre should develop and construct a model house which is disaster resistant and economical and JTFRP would provide all financial and institutional support.

The Consultant gave following recommendations based on discussions of the meeting

1. Since foundation of depth is usually decided by masons, use of hand penetrometer to get an approximate assessment of firmness of soil was suggested. The Consultant explained the tool and its use to masons.
2. As a cost-effective solution, the Consultant suggested use of HDPE film in place of DPC layer.
3. At room corners, instead of providing 1 vertical bar, 4 number of bars were suggested.
4. The Consultant suggested that documentation of old construction techniques may be undertaken by PhD students at NIT Srinagar as their thesis topic.

5. The Consultant suggested a 3 days' workshop for masons as a start of capacity building. An institutional mechanism was needed to be set up to enable such workshops to be conducted three or four times through the year so as to train all the existing masons.
6. A manual specifically designed for J&K valley should be developed. This manual should contain important thumb rules for self-use homes with disaster resistant features.
7. These documents should be made available on SDA and SMC websites and should be published and distributed freely.
8. An animation film on masonry construction would also help in better and faster understanding.



Figure 89 Traditional construction technique: Taq



Figure 90 Traditional construction technique: Dhajji Diwari

### 30.3.2 3 days Training of Trainers (ToT) on Training of Masons in Jammu & Kashmir for Disaster Resistant Construction

Considering suggestions and discussions during earlier meeting with masons at Srinagar, a 3 day mason training programme was conducted by Consultant in association with their partners on the project, M/s People in Centre. The training program was conducted at Building Centre, Srinagar. About 50 participants including head masons from Srinagar and nearby areas, Junior Engineers, Architects and Engineers working in SDA and SMC attended this workshop.

#### Background

In most parts of India, the owners themselves carry out house construction with the assistance of the masons and contractors. The same applies for house construction in Jammu and Kashmir too. A significant number of houses are built solely by the

masons or petty contractors and are non-engineered. Most masons acquire their skills on the job through practice and not through any structured/ formal training process. Also, traditional ways of construction have been gradually replaced by modern techniques where the skill level of traditional building artisans is limited. As a result, a majority of the houses are built poorly, often violating the basic rules of good construction. They also ignore potential hazard risks. This ultimately manifests in highly vulnerable stock of buildings putting people's lives at risk when a disaster strikes.

#### Training Objectives

In this broad context, the training aims at capacity building of practicing masons and to strengthen their knowledge of hazard resistant construction. This training imparts knowledge of construction necessary for safer construction for mitigating risks due to earthquakes, landslides and floods, as demarcated in the vulnerability maps of NDMA. This training curriculum is designed to prepare trainers for the subsequent mason trainings. The training curriculum is envisaged considering the following construction practices:

1. Non-engineered buildings with load bearing masonry
2. Confined Masonry

#### Training Objectives

- 1 To train the trainers on disaster resistant construction for new constructions, particularly houses, in the local context of the state of Jammu and Kashmir.
2. To impart ToTs on non-engineered load bearing masonry construction and confined masonry construction.
3. To prepare the trainers on theoretical as well as hands-on practical aspects with respect to the above construction types.



4. To prepare the trainers to build capacity of practicing masons on disaster resistant construction with respect to the above construction types.

### **Scope**

1. The training of Trainers (ToT) covered disaster resistant construction rules and techniques for non-engineered load bearing masonry and confined masonry.
2. The curriculum mainly addressed owner constructed buildings, maximum up to two stories high.
3. The training was aimed to train junior engineers and master masons as trainers.

### **Methodology**

The training sessions were divided between classroom sessions and practical hands-on sessions. Following pedagogy followed for this training:

### **Classroom Activity**

1. Participative as well as informative Classroom sessions. They were conducted using audio-visuals in the form of blackboard/ whiteboard/ presentations, slide shows and videos to better demonstrate the concepts and the subject.
2. Group discussions and group exercises were employed to encourage participation as well as bring out ideas, issues and clarity of thoughts.
3. Combination of teaching sessions and group to generate and retain participants' interest throughout the classroom sessions.

### **Field Activity:**

The participating masons worked with their hands on mock up structures. During these sessions, junior engineer trainees were present to guide the masons of their respective teams' treatment.



## Training Modules

Table 25 Schedule of 3 days' workshop for masons

Day 1			
S. No.	Time	Topic	Details
Introductory Session			
<b>Objective:</b>			
<b>To create a common understanding of the training objective and identify expectations of the participants.</b>			
	09:00 to 10:00	Registration and introduction session.	<ol style="list-style-type: none"> <li>1. Registration of participants</li> <li>2. Inauguration &amp; welcome address by GoJK.</li> <li>3. Introduction of training by PiC/VMS.</li> <li>4. Introduction of participants and trainers.</li> </ol>
	10:00 to 11:00	Interactive session	
		<ol style="list-style-type: none"> <li>1. Listing of expectations.</li> <li>2. Emphasizing common objective of safe construction.</li> </ol>	<ol style="list-style-type: none"> <li>3. One participant from each pair would mention the expectation of the training, which will be put on chart paper.</li> <li>4. The expectations would be categorized and one of the participants would summarize it.</li> </ol>
	11:00 to 11:15	Tea Break	
<b>C1</b>	<b>Building Typologies of Jammu and Kashmir</b>		
	<i>Module Objective:</i>		
	To understand building typologies of different regions in Jammu & Kashmir.		
<b>C1.1</b>	11:15 to 13:00	Building typologies of different regions of Jammu and Kashmir & trends of construction.	<ol style="list-style-type: none"> <li>1. An explanation for categorization of building typologies.</li> <li>2. Narration from the participants about building typologies from their regions</li> <li>3. Discussion on changing trends of construction with respect to building typologies, construction technology, and building materials.</li> </ol>
	13:00 to 14:00	Lunch Break	



<b>C2</b>	<b>Overview of Natural Hazards</b> <i>Module Objective:</i> To understand the history of disasters and risks associated with them in Jammu and Kashmir and some incidences of disasters throughout the country.		
<b>C2.1</b>	14:00 to 14:30	History and risks of natural disasters in Jammu and Kashmir.	<ol style="list-style-type: none"> <li>1. Participatory identification of past disasters in Jammu and Kashmir and their own experiences.</li> <li>2. Preparation of timeline/ frequency charts.</li> </ol>
<b>C2.2</b>	14:30 to 15:30	Impact on buildings due to natural disasters.	Presentation about various types of damages to masonry buildings by trainers, followed by discussion on participants' experiences.
<b>C3</b>	<b>Module 3: Disaster Resistant Construction - Principles and Features</b> <i>Module Objective:</i> To understand the disaster resistant features of load-bearing masonry buildings.		
<b>C3.1</b>	15:30 to 16:30	Design exercise for a good house for each typology existing in Jammu and Kashmir.	Groups will be formed as per typologies. Group work on chart paper and presentation by the above formed groups with description of their views of a “good house” for each typology. Typologies covered: <ol style="list-style-type: none"> <li>1. Load bearing masonry building - stone</li> <li>2. Load bearing masonry building - brick</li> </ol>
<b>C3.2</b>	16:30 to 17:30	Basic rules of disaster resistant construction.	PowerPoint presentation on: <ol style="list-style-type: none"> <li>1. Site selection</li> <li>2. Building configuration</li> <li>3. Building layout</li> </ol>



Day 2			
<b>C3.3</b>	9:00 to 9:30	Recapitulation of day 1	Interactive discussion
<b>C3.4</b>	9:30 to 12:00	Basic rules of disaster resistant construction.	Presentation on basic rules of disaster resistance in construction for elements enumerated below: <ol style="list-style-type: none"> <li>1. Foundation</li> <li>2. Wall</li> <li>3. Roof</li> </ol> Followed by listing of rules with interactive discussion on chart paper.
<b>C3.5</b>	12:00 to 13:00	Selection of building materials.	Listing and identifying building material with variation in size, quality (good and bad) with actual samples.
	13:00 to 14:00	Lunch Break	
<b>C4</b>	<b>Module 4: Fundamentals of Confined Masonry</b> <i>Module Objective:</i> To understand the basic principles and features of confined masonry construction.		
<b>C4.1</b>	14:00 to 15:00	Basic principles of confined masonry construction.	Presentation by trainers
	15:00 to 15:15	Tea Break	
<b>C4.2</b>	15:15 to 17:30	Construction sequence and details of confined masonry.	1. Presentation by trainers.
			2. Design exercise by participant groups on a sample plan.
Day 3			
<b>P5</b>	<b>Module 5: Hands-on Practical Training</b> <i>Module Objective:</i> To build the practical skills of the participants on disaster resistant features in construction.		





<b>P5.1</b>	09:00 to 11:00	On-site hands-on training through mock construction. (Load-bearing masonry)	Demonstration on site of: <ol style="list-style-type: none"> <li>1. Layout and centre lines</li> <li>2. Foundation details.</li> <li>3. Corner reinforcements.</li> <li>4. Horizontal bands.</li> <li>5. Masonry bonds particularly corners and junction details.</li> <li>6. Through stones in stone masonry.</li> <li>7. Gable band or hipped roof</li> <li>8. Roof to wall connection (wall plate and rafters).</li> <li>9. Roofing sheets and under-structure connection with 'J' bolts.</li> </ol>
	11:00 to 11:15	Tea Break	
<b>P5.2</b>	11:15 to 13:00	On-site hands-on training through mock construction. (Confined masonry)	Demonstration on site of: <ol style="list-style-type: none"> <li>1. Foundation details.</li> <li>2. Confined masonry walls.</li> <li>3. Vertical reinforcement and junction details.</li> </ol>
	13:00 to 14:00	Lunch break	
<b>P6</b>	<b>Module 6: Building Capacities of Trainers to conduct training of Masons using this curriculum.</b> Module Objectives: To build capacities of the participants as trainers and take training sessions.		
<b>P6.1</b>	14:00 to 16:30	Preparation of participants to conduct further trainings.	<ol style="list-style-type: none"> <li>1. Hold sessions, wherein participants do mock presentations on some of the topics covered in this workshop, to aid future trainings that they may conduct,</li> <li>2. Self-assessment of their performance.</li> <li>3. Provide feedback for improvement.</li> </ol>
<b>P6.2</b>	16:30 to 17:00	Discussion and Conclusion.	Interactive session.
<b>Feedback and Vote of Thanks</b>			



## **Day wise proceedings of Training of Trainers (From 31/07/2019 to 02/08/2019)**

### **Day 1**

#### **10:30 to 11:30 Introduction and Interactive session**

Mr. Vivek Rawal briefed participants about the need and general layout of training programme. Mr. Ifikhar Hakim addressed participants in Kashmiri language and spoke about what participants can expect from this training programme.

During Interactive session masons and engineers talked about their experience, general practices followed in Srinagar and nearby villages and expectations from workshop.

1. Average experience of masons: 12 to 30 years.
2. Most participants were from Srinagar and nearby Villages.
3. They requested to cover topics like soil type and foundation information.

#### **11:30 to 12:30 Building Typology of Jammu & Kashmir**

In this session, various type of structures in Jammu, Kashmir and Ladakh region were discussed with participants which included load bearing structures such as mud houses, Stone masonry houses, Dhajji Dewari, Taq Construction, Brick masonry and RCC construction etc.

It is interesting to note that many of the participants including engineers believed that the Dhajji Dewari construction was mainly for aesthetics purpose.

Participants talked about shift from traditional construction practices to modern practices and how it has affected the performance of structure in natural hazards.

1. Taq construction is not seen nowadays due to unavailability of good quality wood.
2. The unavailability of good earth has affected the production of bricks in area. People have started using concrete blocks for construction.
3. RCC construction is also gaining popularity even for small house construction.
4. As per mason's observations, provision of large windows, absence of sill level bands are reasons for collapse during earthquakes.

The session was summarised by stating that diversified use of construction material will lead to economical houses and will not cause strain on any particular natural resource. By adopting proper design and construction practices we can achieve target of earthquake resistant structure.

#### **12:30 to 13:00 History and Risks of natural disasters in Jammu and Kashmir**

Discussion about natural hazards faced by region which includes earthquakes, landslides, flooding etc. Some important observations by participants were

1. Landslides are more frequent now.
2. Many constructions are happening in natural waterways blocking them and causing floods.

#### **14:00 to 14:45 Impact on building due to natural disasters**

Each type of natural disaster was discussed in detail based on reasons for its occurrence, type of loads imposed during its occurrence and which parts of structures are mostly affected.



1. Participants correctly stated that the structures are damage mainly at corners, below and above openings during an earthquake.
2. Floods are increasing concern in this region because of failure of planning. Construction on filled lands near Dal lake and some natural floodplains of Srinagar has increased the risk of damages during disaster.
3. Comparison between requirements of safe structure during various disasters discussed.

**14:45 to 16:00 C3 Design Exercise for good house Design exercise for a good house for each typology existing in Jammu and Kashmir.**

Total 5 nos of groups (3 mason groups and 2 engg groups) were formed and asked to draw and list out requirements of “good house” as per their understanding of structures.

**16:00 to 17:00 Basic rules of disaster resistant construction**

General idea about “site selection” based on various points such as site topography, proximity to floodplains, and type of soil was discussed.



Figure 91 Day 1 of workshop

**Day 2**

**10:30 to 10:45 Basic rules of disaster resistant construction (Continued..)**

Detailed discussion about “Building Configuration and layout” based on Shape, Dimension ratios, Height, cantilever projections, layout plan of houses, extension.

1. Engineers informed that wall layout is not uniform on all floors and architects often ask masons to provide hidden beams below such walls.
2. Colony/House layouts were discussed in detail.

**10:45 to 11:00 Revision of previous day’s discussion**

1. Structures have unique requirements of safety in various types of disasters. Not all structures can be made disaster proof but we can make them disaster resistant to get enough time for rescue.
2. Hence if basic rules of construction are clearly understood we can construct a safe house with use of proper material based on availability, choice and money.



Figure 92 Interactive session with masons



### **11:00 to 11:30 Selection of building material**

1. Different building materials were discussed for their properties and tests for checking quality.
2. Masons have general idea about tests to be performed on construction materials before its selection to use.
3. However, even after knowing the facts, at some places defective material is used because of constraints like money and time. e.g. rounded aggregates are used because they are cheap.
4. About finish of concrete blocks it was clarified by trainers that a smooth finished block is not necessarily an indicator of superior quality, but it should be proportioned properly.
5. Curing of concrete blocks is not done for sufficient time.
6. Corroded steel is commonly used for construction.

### **11:30 to 13:00 Basic rules of disaster resistant construction**

Focus of this session was to make participants familiar with rules of construction with respect to foundation, walls and roof.

#### **Foundation**

1. It was noted that as a general practice, Reinforcement is provided in bottom most layer of foundation (locally called as raft). Size of this layer is 3'-4' wide and 8"-10" deep with 1-2 kg/cu.ft reinf. steel
2. Reasons listed out by masons and engineers for providing this layer is to avoid uneven settlement of wall, to increase SBC of soil etc.
3. It was explained to participants by Alpa madam, that providing strip of reinforced concrete does not necessarily

help in settlement issue. However, it unnecessarily increases cost. It was also pointed out that even if one has to alter settlement of walls, placing of reinf. should be in reverse order(reinf. in longitudinal direction is main reinf.) Alternate ways to lay foundations were also explained such as

- a. Stepped Footing to ensure load transfer at 45 degrees
  - b. A raft can be effectively used if it is provided on entire area of plan so that it will help in settlement as well as in areas of Low SBC.
  - c. Option of stone columns was discussed
4. The topic summarised by Vivek sir by following importing notes
  5. Apart from solutions given by Alpa Madam, we can address issue of differential settlements of walls by providing a plinth band throughout. This solution was supported further by the fact that, a settlement at plinth level is visible and can be repaired however settlement at foundation raft cannot be dealt with.
  6. For low SBC area, proper structural design is required for houses.

#### **Plinth Level**

Appropriate level of plinth in the region based on disasters and developments was discussed with participants and some observations made as

1. Generally Plinth should be provided above HFL however HFL in some areas is as high as 6'-8' hence it is not practical.
2. In Srinagar, Road level is increasing after every repair works and hence the houses which were once above road level are now in low lying area.



3. Snow levels are also considered while deciding plinths.
4. Keeping all these points in mind, generally plinth is kept at 2.5'-3' from ground level.

### **Stone Masonry**

1. Vivek sir stated as a general rule thickness of masonry should be ideally between 13" to 18". However, masons informed that it is generally 20" in valley because from quarries the stones come in large sizes.
2. Provision of through stones, Seismic bands (at sill ,lintel, roof), ratio of thickness/length of wall discussed.
3. It was suggested by participating engineers that we can provide timber bands at lintel levels. Use of locally available material should increase.

### **14:00 to 17:00 Basic principles of Confined Masonry and Construction sequence and details**

Explanation of basic Principals and sequence of construction to be followed. While discussing some important questions raised by participants such as

1. Foundation in bricks is not practiced in Kashmir and hence it has to be replaced by stone masonry
2. Masons pointed out that visible vertical and horizontal band may not be liked by client aesthetically.
3. Can arch windows be provided in this type of masonry?

### **Day 3**

Day 3 was entirely utilised for practical application purpose. Participants performed following group activities

1. Use of hand penetrometer and its result interpretation

2. Detailing of reinforcement in 'L' and 'T' Junctions of plinth beams
3. Placing of bricks above plinth level in confined masonry structure

### **Use of hand penetrometer and its result interpretation**

1. Tool, its working and how to interpret results was explained to masons and engineers.
2. The penetrometer was used at two places by masons viz. on ground level and at 1' below ground. The result as per table showed that SBC was in range of 20T/Sqm which was a false result as per practicing engineers of region.
3. Vivek sir explained that these false results may be attributed to the fact that, level at which test was performed was wrong. This area is Filled up with soil so it is quite possible that due to regular movements it is now compacted and hence the results. Other reason is in clayey soils Penetrometer does not give accurate results.
4. After discussion it was concluded that, Nowadays in Srinagar many floodplains are being filled up with soil and are used for construction and one cannot lay foundations on such soils. Hence, on these lands, masons alone cannot take decisions about foundations. Role of planning department is crucial in this matter.

### **Detailing of reinforcement in 'L' and 'T' Junctions of plinth beams**

1. Masons were divided in three groups and were asked to place reinforcement in L and T Junctions and after finishing the task Trainers checked each group's work along with all masons to discuss mistakes/ learning.



2. Most commonly observed mistake was at plinth beam level links to hold the vertical bar of column in place were missing.

Placing of bricks above plinth level in confined masonry structure

1. Three groups of masons were given task of setting out plan of a room of size 15'X18' on ground (with one door and one window) and placing brick in confined masonry(toothing)

2. Setting out of foundation was satisfactory. For confined masonry, Vivek sir advised everyone that “toothing width” can be smaller.

3. While placing door and windows, distances should be such that vertical bands can be provided on sides of openings.

More training programmes at various places can be useful. This workshop can be considered as base point for the future workshops.



Figure 93 Practical session on detailing at T shape junction of beams



Figure 94 Practical session on use of hand penetrometer



Figure 95 Practical session on Placing of confined masonry



Figure 96 Felicitation of participant masons

## Mason's Handbook

A set of mason's training manuals has been developed by consultant. The manual talks about factors to be considered while building a house based on topics like site selection, soil conditions, exposure to natural hazard etc. It explains detail procedure on confined brick masonry construction and stone masonry construction and its effectiveness in earthquake prone areas. Consultant has tried to keep it simple to be understandable by masons. This manual is in English language. It will reach to maximum people if it gets translated in local languages (Urdu and Hindi).



**Mason's Handbook  
on Disaster-Resistant  
Construction  
in Jammu and Kashmir**

**Part B:  
Confined Masonry**



Figure 98 Mason's handbook (Part B)

**Mason's Handbook  
on Disaster-Resistant  
Construction  
in Jammu and Kashmir**

**Part A:  
Stone Masonry**



Figure 97 Mason's handbook (Part A)



## CHAPTER 31

# Support to Designated Authority for Communications Efforts Related to Proposed Reforms

*Chapter 31 gives details about meetings arranged with various stakeholders of project at initial stage of project.*

At the beginning of the project, the Consultant arranged a meeting with all relevant parties both in Srinagar and Jammu. This meeting was intended to inform all the concerned people from various building departments about the project.

For the meeting held at In JTFRP Office, Jammu, along with JTFRP officials (Mr. I Hakim, Director Planning and Coordination, Mr. I Kakroo, Director Technical, Mr. Sajad Rafiq, Engineer, PMU and others) Town Planners, Asstt. Town planners, Planning assistants, Tech Officers and Building officials from JDA and JMU were present. Procedure of building permit system in both JDA and JMC, comparison between procedure of two authorities and their limitations were discussed in detail.

Another similar meeting was conducted at conference hall of JMC with all stakeholders of JMC, JDA and line departments including tourism department, PDD, fire services, water resources, sewerage and others. Secretary, HUDD opened the meeting stating that the department should participate as the main stakeholders and stated that the tourism department had an important

role to play in this regard. CEO JKERA added that rural and panchayat areas remain gray areas presently and special regulations need to be framed for them. Industrial areas may also be reviewed, he added. The task group planned to be constituted required to interact with the consultant on regular basis. He reiterated the need for some government buildings to be reviewed as sample cases. Similar kick off meeting was also held in Srinagar where people from JTFRP, SMC, SDA were present. Building permit system procedures followed in SMC and SDA were explained to consultant. Consultant was informed about Construction practices in Srinagar. People have stopped constructing traditional houses as the material required for such houses is scarcely available and there is a common belief that building with brick and concrete is more modern and stronger.

These discussions gave consultant a general idea about people's perception of building permit system, administrative flaws in system, suggestions from official. Overall, this discussion helped consultant to set base line for further working of Tasks 1 and 2.



**Figure 99** Meeting with JDA officials



**Figure 100** Meeting with JMC officials





## CHAPTER 32

# Observations on Capacity Building Programs

Awareness and Sensitization Programs, and Short Courses were conducted for various stakeholders in Jammu and Srinagar including

- a) Students of NIT Srinagar,
- b) Students of SSM College of Engineering Parihaspora,
- c) Municipal Engineers, Engineers and Architects of various Government Bodies in Jammu,
- d) Municipal Engineers, Engineers and Architects of various Government Bodies in Srinagar,
- e) Private Engineers and Architects at Institution of Engineers, and
- f) Masons (Roundtables and Intensive 3-day workshop).

The most important communication to get across is that building regulations are meant for the safety of the citizens and residents. Unless citizens are on-boarded into this line of thinking, it will not be possible to make much headway in the task of disaster risk reduction through the building regulatory process.

The process of education and information dissemination on building safety is a dynamic one and we believe that this should be an ongoing effort. This needs to

be mainstreamed into the curriculum of engineering and architecture students (this already exists in most other states), in the initiation of new engineering, planning and architecture recruits into municipal bodies and for all government stakeholders.

The following pointed suggestions may help in sensitisation of people of all walks of life towards understanding the need for disaster risk reduction and thus broaden the base of homeowners and other builders within the building regulatory system:

- a) Creating an exploratorium in Srinagar and Jammu where young and old can come and explore all different types of materials for construction, how to construct safe houses, what materials are combustible and should not be used, what happens in disasters such as earthquakes. The exploratorium should have touch and feel models, short animation films, prototypes or samples of safe houses deconstructed so that people can see how to build such houses.
- b) Every few months, have a mass media campaign on local television and radio stations regarding the need for protecting a house from earthquake effects and floods and where to get information on this subject.



- c) Have a calendar of training programs for engineering and architecture students, practising engineers, architects and planners for disaster resistant construction and building byelaws and understand form them practical difficulties. It is important to include them in the byelaws-writing process. If the community takes ownership of building byelaws, there will be very high compliance.
- d) Calendar of training courses for Municipal Engineers, architects and planners. This community needs to be motivated and recognised. The biggest motivation will be acknowledging their role in safety of the habitat.
- e) Recognition of stakeholders such as firemen, doctors, brave hearts, first respondents who have done yeoman service in any disasters and organising talks by them to explain the biggest difficulties faced during disasters due to unsafe building practices.
- f) Awareness programs to be conducted regarding Mitigation, Preparedness and Response for all the Professionals/ Officers dealing with the Building Permit System including Design Architects, Masons, and Carpenters
- g) A general awareness program for the public through documentary films can be organized by the Government and Local Administration. Also, premier educational institutions like NIT Srinagar and IIT Jammu can also play a

vital role in imparting training to all the concerned relevant personnel. But, these programs need to be well coordinated by the Administration

Training courses for architects, engineers, municipal architects and engineers, government stakeholders have been conducted during this program. Such programs should be repeated on a quarterly basis. Report of Tasks 1 and 2 gives complete details including syllabus and day to day planning for such one day to one-week programs.

Also, the task of getting both building officials and homeowners and builders aligned to the building regulatory system will not happen overnight. Much patience and a 5-10 year plan is required. Unless there is a disaster such as an earthquake or devastating floods, human nature is inclined to believe that disasters happen to other people. Additionally, Jammu and Kashmir is subject to strife, terrorism and other political disturbances on a regular basis. Hence building safety is not high priority for residents since in normal times they see more than their fair share of manmade extreme situations. Also in normal times, they do not see too many building failures, prompting them to believe that regardless of how structures are built they generally hold up - this mindset dilutes the cause of building regulatory systems. A dual approach of subtle and aggressive messaging to keep the subject in the forefront of the mind space of the general public is required.



Figure 102 Disaster Survival Guide by NDM



Figure 101 Homeowners Guide by NDM

# References



## References

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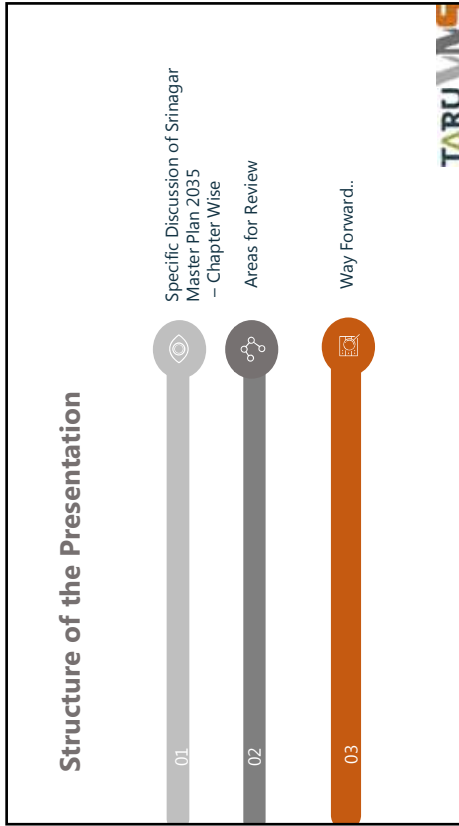


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Note: If there are references that have been inadvertently missed, kindly bring the same to our attention. Thanks.



# Annexure I - Detailed Presentation of the Master Plan



## Review of Master Plan- Srinagar

29 March- 02 April 2019

### Brief History of Srinagar

CIRCA	RULERS	NAME/LOCATION/MILESTONES
250 BC	ASOKA	PANDRETHAN VILLAGE/SHANKARACHARYA HILL - SRINAGARI
6 <sup>th</sup> C AD	PARVARASEN	PRAVARAPUTRA @HARI PARBAT HILL (UPTO RIGHT JHELUM BANK) - SRINAGARI
UPTO 14 <sup>th</sup> CTRY	OTHER HINDU RULERS	USED OTHER CITIES AS CAPITALS BUT ONLY SRINAGAR SURVIVED
1320-1700s	MUGHALS (RINCHAH, ALAUDDIN, SHAHA-BUDDIN, QUTUBUDDIN, SULTAN SIKANDER, ZAIN-UL-ABDIN, YUSUF SHAH CHAK, AKBAR, SHAH JAHAN, AURANGZEB)	RINCHAH PORA, ALLAUDINPORA, HARI PARBAT, SRINAGAR, QUTUBUDDINPORA, NAU SHAHR (with Mar Canal that survived till recently) - <b>AKBAR AND HIS PROGENY BUILT A NUMBER OF GARDENS OF WHICH A FEW EXIST TILL DATE.</b>
~1704-1800	AFGHAN DURRANI EMPIRE	FORT OF SHERGHARI, FORT ON HARI PARBAT, AMIRA KADAL BRIDGE
1814-1947	DOGRAS	M RANJIT SINGH ANNEXED KASHMIR VALLEY IN 1816. MAHARAJA GULAB SINGH BECAME RULER AS PER TREATY WITH BRITISH. CITY DESCRIBED AS "CONFUSED MASS OF ILL-FAVoured BUILDINGS, FORMING A COMPLICATED LABYRINTH OF NARROW AND DIRTY Lanes. SCARCED BROAD ENOUGH FOR A SINGLE CART TO PASS. BADLY PAVED WITH NEGLECTED HOUSES 2-3 STOREYS HIGH"
1947		M HARI SINGH SIGNED LETTER OF ACCESSION TO INDIA

## Historical Perspective

Chapter 1 -

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## Graphical History of Urbanisation of Srinagar

The graphical history consists of six maps arranged in a 2x3 grid, illustrating the urban expansion of Srinagar over time. The maps are titled as follows:

- 1971:** Shows the initial urban footprint with a legend including Residential, Commercial, Industrial, and Green spaces.
- 1981:** Shows increased residential and commercial areas.
- 1991:** Shows further expansion, particularly in residential zones.
- 2001:** Shows significant growth in residential areas and some commercial zones.
- 2011:** Shows continued urban sprawl and the emergence of new residential clusters.
- 2017:** Shows the most recent urban configuration, highlighting the impact of the Master Plan 2017-91.

## Historical Framework for Development

- Master Plan 1971-91 triggered growth in (west and southwest direction of Srinagar) in flood prone areas. New plan delayed for a decade due to unrest. Massive conversion of residential into commercial development.
- Conversions (Residential to Comm.) continued after Srinagar Master Plan-2021. PILs against the Master Plan violations filed and a number of properties sealed by Srinagar Municipal Corporation (SMC).
- J&K Civic (Provisions) Act promulgated in 2017 and policies framed for regularization of these violations which came into being

## Historical Framework for Development

- Recent trends (~2000 onwards) show **large scale urbanization in the Kashmir Valley** around Srinagar. *Balanced urbanization with towns (Baramulla, Sopore in North, AnantNag, BijBehara-Mattan in South) contributing significantly* to growth of urban population.
- **This healthy trend needs to be supported and reinforced by a public policy that gives impetus to the development of satellite as part of a Macro-Regional Plan of Jhelum Valley Floor.**

## Tracking Past Planning Efforts

Chapter 2 -





## History of master plans

YEAR	RULER, PLANNER
1902	MAHARAJA GULAB SINGH, BY ENGR W. G. HARRIS IN LIGHT OF 1902 FLOODS – Creation of Flood Channel
1960s	1971-1991 SRINAGAR MASTER PLAN
1980s	2000-2021 SRINAGAR MASTER PLAN
2010s	REVISED MASTER PLAN 2035



A satellite image of Srinagar, as viewed on Google Crisis Maps, September 2014. The flood channel dug in 1904 exits from a bend in the Jhelum and goes to the left of the picture.

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## Review of Past Master Planning Attempts...

1. Has the actual growth of Srinagar followed the master plans?
  2. Why the city continues to be vulnerable?
  3. Why such **serious drainage and wastewater treatment problems?**
  4. Why severe congestion and traffic snarls?
  5. Why have rampant violations despite SMC and SDA?
- Prior to 2014 floods, silt accumulated in all major tributaries and the flood channel. Minister for flood control and irrigation, Taj Mohi-ud-Din, is on record that even the **Srinagar Development Authority has constructed a shopping complex on the flood channel.**



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## Review of Past Master Planning Attempts...

6. Rampant violations result of faulty planning or ineffective regulatory mechanism?
7. Is the **archaic legal framework** chief?
8. Is poor master planning reasons for the underdevelopment?
9. How can **planning give impetus to the underdeveloped parts of Srinagar?**



## Past errors in implementation

- To mitigate the problems of development on the west, **Master Plan-1991** recommended three new artificial lakes. But large areas developed between the River Jhelum and the Flood Spill Channel **without the creation of these lakes**, causing persistent problems of drainage.
- Worst damage done to the ecology with the construction of road at site of Nallah Mar without the underground sewer/water channel. This reduced Anchar, Khushalsar, Gilsar and Babdemb into virtual marshes, & added pollution in Dal Lake.



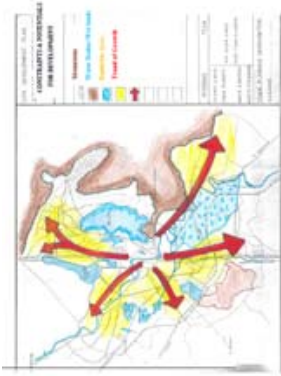
The Nallah Mar gave Srinagar the title of "Venice of the East"

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## Review of Master Plans....



- Across all past Master Plans from 1971 onwards, areas in the north-west, south-east and east have been persistently proposed to be developed **but have remained underdeveloped warranting course correction or rethinking of urban development strategy.**

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## Western building regulations are impractical in walled and core city

- Application of setback rules and ground coverage in the core city problematic- it causes most of the buildings to be non-conforming;
- The Circular Road Project which preceded the first master plan is not even 50% yet continued to be part of Master Plan; involves the acquisition of structures in old city, adversely affecting the built heritage.
- The byelaws applied to the heritage core city caused a complete stagnation of maintenance, repair and rejuvenation leading to its dilapidation. Need for heritage policy incentivising the conservation of heritage in the core city.



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## Way Forward

- The major highlights of the Master Plan 2035 :
  - Srinagar Metropolitan Planning limits **766 Sq. Km.** from **416 Sq. Km.** ;expected population 32.50 lac in 2035 from 21.90 L in 2015
  - **Green FAR, TDRS and Town Planning Schemes.**
  - Comprehensive land suitability analysis based on scientific and Mathematical models w.r.t. topographical features. Use of GIS technology
  - **Comprehensive identification and mapping of heritage buildings/precincts**
  - Policies for promotion of local craft and tourism on sustainable norms.
  - **Focus on variable FSI/FAR, vertical development.**
  - Smart and Sustainable road network development supported by robust Public Transport and Non-Motorized Transport system.

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## Review of Master Plans....

- The Master Plan 1971-91 did not address sanitation problem of the city. Discouraged the conservation of the built heritage and repair/reconstruction of old structures, converting city into slum.
- Continued same policy in Master Plan 2000-21 adversely affecting redevelopment, conservation and rejuvenation of core city. Historic core at threat of disappearing soon. Being replaced by buildings in glass and aluminium



POOR SOLID WASTE MANAGEMENT – Open Community Dumps, & Poor Drainage

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# Future Planning Strategy

Chapter 4 -



## Layers used to evolve the Land Suitability map

- Flood vulnerability
- Water bodies, wetlands etc
- Elevation/Slope
- Forest/hills/wildlife
- Saffron fields
- Defense and Special Areas (graveyards and cremation grounds)
- Parks and Gardens

Limited land suitable for development. Out of 766 sq. km., 160 sq. km. already developed, 57% in reservations. 15,000 housing units to be constructed annually for 75,000 additional population. Thus alternative development strategy is needed



# Planning Process

Chapter 3 -

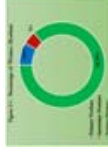
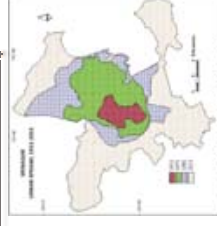


## Extension of Limits of Greater Srinagar & Demography

Notification of Local Area—Srinagar Metropolitan Region [SMR]

- Local Area limits of Greater Srinagar -The area to Srinagar Municipal Corporation, Cantt Board and municipalities of *Budgam, Ganderbal, Pampore, Khrew* "Srinagar Metropolitan Region [SMR]".

- Population growth projected at 1.8-2.0%
- Share of gainfully occupied persons—Work Force Participation Rate (WFPR)— is 26%.





# Community Development, Housing and Human Habitats

Chapter 6



## Density Increase in New Areas...

- Gross residential densities to increase from 200 PPH to over 300 PPH (increased FAR)
- **Can historic heritage Old city to be preserved?**
- Originally a pedestrian city with high density, streets have been widened to accommodate vehicles, and "the historic city with extraordinary streetscape started converting into eclectic architecture destroying the invaluable heritage".



## Economic Development

Chapter 5 -Outside Scope of study



## Urbanisation..

- Growth in Urban Population in State
  - 2001-2011 - 36% (Stands at 3.35 mil in 2011 census)
- Growth in Rural Population
  - 2001-2011 – 19.5% (Stands at 9.2 mil in 2011 census)
- While urbanisation is happening at a fast pace, J&K still has a large rural population (73%).
- Srinagar fares better than most cities in housing stats.
  - 76% houses in "good" condition, 22% in "liveable" condition.
  - 10% live in 1 room house, 18% in two room house and 68% have > 2 rooms accommodation.
- Problem is the density of Walled City and Core City.





## Suburban Housing..

- "It is as such strongly recommended that the **formulation of Zonal Plans** be fast-tracked to ensure the planned development of residential neighbourhoods as envisaged in this master plan.
- The Master Plan also has a spotlight on the identification of blighted and grey areas in Zonal Plans for their redevelopment with active participation of locals.
- Also, urban fringe settlements notified as part of local area SDA are also envisaged to be improved by way of upgrading the amenities, utilities and services on neighbourhood concept. *Linkages between the mother city and new townships and urban villages have to be significantly upgraded to reduce travel time and cost.*

## Urbanisation..

- In the DPR prepared for Srinagar city under Rajiv Awaz Yojna (RAY)5, Srinagar city has 77 slums pockets with **all of them un-notified**. Around 18,000 households spreading across 77 slum pockets have been identified in Srinagar city
- Slums constitute less than 10% of the total population of Local Area.
- The Master Plan proposes additional about 7500 hectares for accommodating around 2.50 lac additional households over next twenty years. The Local Area of 766 sq. km is presently inhabited by around 3.0 lac households with about 15.0 lac residing within urban areas and the remaining in rural settlements.

# Governance and Public Institutions

Chapter 7

## Policy Formulation and Implementation

- Housing Policy at City Level? State Level?
- RERA?
- Housing for ALL? PMAY schemes?
- EWS/LIG Schemes?
- Group Housing Schemes? Incentive FAR?
- Loan Facilitation?





## Saving the lakes....

- Last four decades of —urbanization has compromised many water bodies, and fragmented the complex ecosystems connecting these water bodies.
- So far the focus has only been on the Dal Lake as a tourism asset. The Dal Lake is connected to Jhelum, its outfall channels go to *Brari Numbal, Khushalsar*, and *Gilsar*. Water from *Khushalsar* goes to *Anchar Lake* which is also fed by *Sindh Nallah*. The *Sindh Nallah* also feeds the *Rakhi Shalabag, Harran Forest* and then joins *Jhelum River* at *Sangam*. The complex systems of these water bodies and their relationships need to be studied in detail.
- *Khushalsar* and *Anchar Lake*, the major urban lakes are facing serious urbanization challenges and their death in turn will lead to the death of the Dal Lake.

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## Increase Community Participation

- Strengthen Institutions and enable them to work for the people Increase Citizen Participation
- Greater Accountability of Government Machinery- RTI, etc. (Unfortunately government apparatus and government institutions/stakeholders have a poor record of intimidation of citizenry\*)

\* Rage of Kashmir- David Devadas

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## Ecology and Environment intervention points...

### Dal Lake Issues

- i. Rampant construction of houses within the lake;
- ii. Shrin kage in area due to development of hamlets and conversion of water body into floating gardens within the lake;
- iii. Lake pollution: Sewage, Solid waste, agriculture run-off with harmful pesticides etc.;
- iv. Drastic reduction in the capacity of water channels leading to reduced circulation;
- v. Reduction in fresh water inflow;
- vi. Excessive weed growth and eutrophication;
- vii. Depletion of lake bed and choking of springs within the lake;
- viii. Loss of habitat of many aquatic species;

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## Ecology and Environment

Chapter 8

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# Tourism and Culture

Chapter 9



## Ecology and Environment intervention points...

### Dal Lake Issues

- ix. Resettlement of Dal dwellers;
- x. Large-scale destruction of forests and erosion in the catchment area;
- xi. Ecologically unsound irrigation practices;
- xii. Water and soil contamination from uncontrolled use of pesticides; raw sewage disposal and lake siltation;
- xiii. Uncontrolled urban and other forms of development;
- xiv. Pressure from increasing and uncontrolled tourism development;



## Role of JK Tourism Department

The J&K Tourism Department is a single governing body responsible for the development regulations of all tourism activities in Srinagar city. The Master Plan proposes to diversify with following stakeholders.

- ☑ Tourism Department
- ☑ Wildlife Department
- ☑ Forest Department
- ☑ Floriculture Department ☑ Agriculture Department
- ☑ Horticulture Department ☑ Sericulture Department
- ☑ Srinagar Municipal Corporation
- ☑ Srinagar Development Authority
- ☑ Lakes and Waterways Development Authority
- ☑ Archaeological Survey of India
- ☑ State Archaeology Department



## Ecology and Environment intervention points...

- Dal Lake Study - Report of the IIT Roorkee study should be reviewed and long term strategy should be formulated for implementation. Development strategy around Dal Lake and Nigeen Lakes and in buffer areas to be developed
- Weekly guided nature tours to Dachigam National Park to promote love for nature, birds, flora and fauna in locals and tourists. List of ornithology guides, botany guides etc should be made available by Tourism Department
- The Air Quality in Srinagar is overall a very good quality.
- But its big problem is Garbage and the inability of the state to control this menace.
- There is Garbage in the Dal lake, on the streets, in Dachigam National Park, at all heritage monuments and elsewhere.
- Swachha Bharat Andolan has not reaped the results it should have....



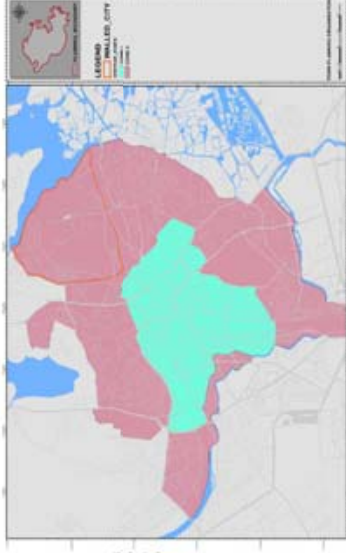


# Natural And Cultural Heritage

Chapter 10



# Tourism Development Strategies



# Srinagar is rich in Natural and Cultural Heritage

- “Very comprehensive and preserved pre modern vernacular and timber architecture”
- 20 national monuments (ASI) in planning area, 10 state level monuments, 300 m buffer zone around national monuments, 100 m around state monuments. – *Is that being implemented? This needs a Srinagar Urban Arts and Heritage Committee who should be tasked with creating a strategy for Conservation and Restoration of Heritage Sites (Mumbai has two agencies- MHC and MMRDA HCS)*
- *Are the heritage listings Graded (Heritage Grade I, II, III etc)?*



# Tourism Development Strategies

- Infrastructure adequacy of Tourism Department to manage all aspects of tourism development? Is there need for distribution to other departments?
- Projections of tourism development high, need to moderate it with political situation, else surplus already existing (10,000 demand vs. 40,000 supply)
- Need to review intended development of typical resort adventure such as water sports in Dal Lake, paragliding etc. which are available across other parts of India Concentrate instead on cleaning Dal Lake!
- Need for safe taxi service such as Uber/Ola in the tourist areas
- *Tourism Development can wait until there is greater stability in the valley and may not be immediate priority.*
- Kerala and Goa models may be studied as examples of very successful tourism development strategies, once lasting peace returns to valley







## Challenges for Conservation and Infrastructure Development in Areas of Heritage Significance

- xi. Inadequate conservation and upgradation of the buildings of heritage significance housing community facilities such as schools, primary health centres etc.
- xii. Absence of **guide lines for proper signages** to control haphazard visually disturbing hoardings.
- xiii. Need for community development activities for community engagement, education and outreach.
- xiv. Lack of a comprehensive urban design and conservation toolkit for the authorities.

**NEED FOR HERITAGE SENSITISATION AND CONSERVATION THROUGH PUBLIC AWARENESS AND INCENTIVISATION**

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## Challenges for Conservation and Infrastructure Development in Areas of Heritage Significance

- i. Absence of a **comprehensive approach** followed in identifying heritage resources.
- ii. The heritage structures of high significant value are in a serious state of **dilapidation** due to absence of technical and financial assistance from the Government for conservation. There are no incentives for conservation and maintaining them.
- iii. Absence of **Conservation, Revitalisation and Management Plans** for buildings of heritage values
- iv. Inadequate data and hence poor understanding of community needs in the historic areas, more specifically the down town area.
- v. **Poor quality** of roads and inadequate sanitation in the historic areas

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## Urban Mobility

Chapter 11

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## Challenges for Conservation and Infrastructure Development in Areas of Heritage Significance

- vi. Original owners are **disposing off** their properties due to increase in land value and maintenance cost of these heritage structures.
- vii. Non-availability of **parking space leads to on street parking** of vehicles which reduces the carriage width of road and **further blocks the visibility** of these heritage structures of high significance.
- viii. Inadequate public open spaces which adversely impacts quality of life more specifically for children
- ix. Lack of conservation and development of the water front, ghats and open spaces
- x. Streetscape and **street furniture** are not adequate.

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# Public Infrastructure and Community Services

Chapter 12



## Proposed Road Sections...



## Sports Facilities

- Need for a concrete plan to rejuvenate the city's youth through art, culture and sports.
- Real Kashmir Football team story inspiring not only for sports lovers but for peace and unity. TRC Football grounds, Bajshi Stadium, Sher-e- Kashmir...
- Gap Analysis of required vs available facilities?
- **And what about facilities for girls??**

Table 12-2: Proposed Structure of Recreational Facilities

S. No.	Facilities	Number of Organizational Units
1	Primary School	100
2	High School	200
3	Community	30
4	Distric Zone	7
5	Sports Centre	3
6	Dist city level multipurpose ground	4
7	Dist city level multipurpose ground	4
8	Community level Multipurpose ground	30



## Parking...

- As per parking survey conducted, need 5600 parking spaces city centre. There are eight parking lots within the city centre having parking capacity of approximately 1161 ECS against the total peak parking accumulation of 1528 ECS off and on-street
- The problem of parking in the city can be broadly divided into the following categories:
  - Along streets
  - in commercial centres.
  - in residential colonies.
  - in the large institutional complexes.
 Need multiple options study-  
 Car-on-car, Multi-storey parking garages, good public transport system in city centre and vehicle free zone in core city.





## Status of Sanitation.....

Lack of Drainage and Sewerage Facilities, Resulting into Damages to the Road Infrastructure and Poor Living Condition

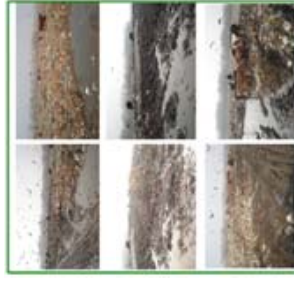


## Public Health and Sanitation

Chapter 13

## Status of Sanitation.....

Insanitary Landfilling at Saidapora Achan, Resulting into Leachats, Water Contamination and Ecological Problems.

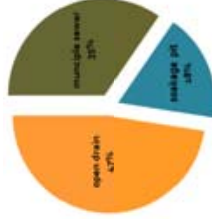


## Sanitation.....

- Objectives and Achievements for Toilets for ALL?
- Has Srinagar Achieved Zero Open defecation objective?
- What is the plan for plugging the sewerage gap?

Table 13-4: City Analysis-2015

S. No.	Parameter	Quantity	Physical Indicator	Gap
1	Existing Population	1.8 million and 3,000 (Average)	100% covered and	100% of MLED
2	Sewerage Connections	246,79 MLED	100% covered and	100% of MLED
3	Sewerage Treatment	18.78 MLED	100% covered and	100% of MLED



- What is Plan for Dal Lake?
- What is performance report of UJED, NBCC, LAWVDA, JKEKA in the pilot projects for sewerage systems in Srinagar?



## Hazards..

- Natural Hazards
  - High seismicity
  - Floods
  - Fires
  - Cyclones/Gust winds
- Others Hazards (Stampedes, Terrorist Attacks, Armed Conflicts...)

Present project dovetails well into the wishlist of this chapter -



## Disaster Mitigation and Management

Chapter 14



## Capacity Building Measures Dovetailed into Project...

### Built Environment

- ☑ Create a building inventory of the city, and keep it updated in real time
- ☑ Based on Rapid Visual Screening (RVS) of building stock – especially in old city, flood prone areas, along river edges and lake edges, and areas with soft soils or high slopes, an approach of assessments and targeted retrofitting is proposed. For this purpose a policy of building retrofitting needs to be put in place with appropriate incentives and disincentives, including tax, insurance, awareness and penalty based instruments
- ☑ Publicise in simple terms the key aspects of safe construction for new buildings, and maintaining and retrofitting for existing ones
- ☑ Strengthen training, certification and monitoring of architects, engineers, construction contractors, and masons for risk sensitive development



## Remarks on Chapter 14..

- Chapter 14 on Disaster Management is a comprehensive statement of risks and vulnerabilities facing city of Srinagar, based on natural hazards and vulnerable infrastructure & built habitat
- Vulnerabilities
  - Old town with ageing buildings and infrastructure
  - Narrow streets inaccessible for rescue and relief
  - High density
  - Abundant Use of inflammable materials like wood
  - Low-lying, inundation-prone areas; encroachment of water bodies
  - High water table and pockets of liquefiable soils





# Urban Design

Chapter 15



## Chapter 15- Urban Design

- Discussion of more pedestrian friendly streetscapes but not concrete measures.
- No attempt to regulate skylines- There are no specific height restrictions for Commercial areas and New Development Areas
- No clear plan for greening the city and a clear regulation on the type of horticulture to be practised- indigenous trees etc.
- Acknowledges that flyovers are eyesores but does not suggest any design guidelines for them, nor for any new buildings in the city- Need for a Srinagar Heritage and Urban Arts Committee
- Discussion of TDR (Transfer of Development rights) – But no serious attempt to introduce it. Would be very useful to reduce new development in the Walled city and Core City Zone
- More well defined guidelines on hoardings and street signs would have been useful



## Capacity Building Measures Dovetailed into Project...

### Built Environment

- ▣ Identify low income areas with non-engineered buildings, and apply Mandatory Rules of Thumb (MRTs)
- ▣ **Physical Infrastructure:** Ensure that the design of housing, roads, airports, electricity network, sewerage, water supply, public and commercial buildings, and public utilities are assessed for their exposure to disaster risks due to their location, quality of construction and maintenance. Follow up with risk reduction measures through planning and retrofitting.
- ▣ **Social Infrastructure:** Ensure that the schools, health facilities, and community spaces are assessed for their risk exposure, and appropriate mitigation and preparedness plans are put in place.



## Capacity Building Measures Dovetailed into Project...

- ▣ Capacity building of urban managers, planners, architects, engineers, construction workers, and communities to be taken up as an essential step for effective risk reduction.
- ▣ Community awareness and engagement in urban management to be a key aspect for ensuring the implementation of this risk reduction approach in Srinagar.
- ▣ Finally, the inclusion of all the above elements in bye laws, landuse and zoning regulation and codes is an essential requirement for seeing these plans translate into action on the ground. The techno-legal framework of the Master Plan will thus also deal with disaster risk reduction appropriately for meeting this purpose.





## Implementation Goals of New Master Plan...

New Plan has been focused on conceiving a viable urban policy for master plan with following objectives:

- a) effectively manage and enforce city development plans to harness the true benefits of urban development;
- b) provisions of major /critical infrastructure by urban development agencies and other players; Funding to implement Master Plan?
- c) ensure regular review of applicability and effectiveness of master plan proposals and policies;
- d) improve the financial health of SDA to take its mission of city development to logical conclusion;
- f) ensure effective enforcement, implementation, monitoring, governance, participation, decentralization, transparency and accountability.
- g) to create enabling rather than controlling environment for urban development with inbuilt mechanism for flexibility in every sphere of master plan implementation without eluding quality, amenity and standards.



## Tracking Implementation of Master Plans..

Chapter 16



## Revised Master Plan

Development Code – Rules and Regulations



## Acknowledgement in Master Plan 2035

- The perusal of Master Plan-19971 and Master Plan-2021 abundantly makes it clear that both have relied on *urban policy tools and institutional framework which has not yielded the desired benefits of urban development.* Urban development in Srinagar has rather been elusive with respect to implementation of the master plans. As a matter of fact, these master plans have turned redundant to address the city's issues. Growth of Srinagar city is going to be inescapable; therefore sheer scale of its future development has been taken care of in the Master Plan.





## Review of Mandatory Dev. Regulations

Sr No	Zone Description	Use	Min Size of Plot sq. m	Min Parking req (ECS)	Min Open Space (Green) %/ft	Baseme %/ft	Other Req	Remark/Comments
6	Public and Semi Public Bldgs (Govt/SemiGovt)	Public	?	?	?	?	Clearance from Fire Dept and Structural engineer certificate not Specified	More specs needed. Fire/Stc Engr requirements need to be specified. Min 6m open space reqd for fire tender access
7	Public and Semi Public Bldgs (Commercial Govt/NGO use/Private)	Public/Private	?	0.75 to 3 per 100 sq m depending on use	?	?	Clearance from Fire Dept and Structural engineer certificate not Specified	More specs needed. Fire/Stc Engr requirements need to be specified. Min 6m open space reqd for fire tender access
8	Tourism	Tourism	?	Not specified but should be	?	?	Clearance from Fire Dept and Structural engineer certificate not Specified	More specs needed. No ECS requirements? Fire/Stc Engr requirements need to be specified. Min 6m open space reqd for fire tender access
9	Tourist Village/Rural Tourism	Tourism	12000 sq m	?	NA	NA	Clearance from Fire Dept and Structural engineer certificate not Specified	Good specs but more specs needed to regulate over development in rural areas in name of ecotourism
10	Industrial	Ind.	?	0.75 per 100 sq m depending on use	?	?	Clearance from Fire Dept and Structural engineer certificate not Specified	More specs needed. Fire/Stc Engr requirements need to be specified.



## Remarks on Master Plan re. Disaster Preparedness

- Struggle between the aspirational India and good planning norms evident in the new Master Plan – impetus to allow for more growth with lesser constraints. Commercial activities appear to allowed almost everywhere, dilution of zoning norms evident.
- More unambiguous and consistent requirements for disaster preparedness needed- for e.g. at the very start, conformance to latest NBC should be specified and mentioned as non-negotiable- to be repeated in the document.
- Master Plan should also have a clear protocol of roles and responsibilities to implementation of NCB norms
- Fire safety, Open Space, Parking etc requirements specified should not be in violation of NBC



## Thank You

Master plan holiday from 1991 – 2001. The Master Plan 1971-91 more succinct and elaborate than Master Plan 2000-21 - Both Master Plans failed to give Sinagar a safe direction- Failure due to archaic (and toothless) institutional structure of urban local authorities



## Review of Mandatory Dev. Regulations

Sr No	Zone Description	Use	Min Size of Plot sq. m	Min Parking req (ECS)	Min Open Space (Green) %	Basement/Other Req	Remark/Comments
1	Residential- Plotted and flow Housing	Res.	75	?	?	Not Permitted	What is accessibility to fire tender? Should 7 storeys be allowed in such small plots?
2	Residential- Plotted Dev.	Res.	4000	1 per 100 sq m	15	Yes, but not beyond building or setback line	Why should you require such a large plot for flat development; Why different parking requirement for basement/plot/open. Min 6m open space reqd for fire tender access
3	Residential- Colonies	Res.	4000	15-20% for roads	(includes schools etc)	Clearance from Fire Dept and Structural engineer certificate	Are these colonies gated or public? If gated, why will municipality/DA maintain the roads and open spaces?
4	Commercial	Comm.	2000 for hotel, 500 for guest house	2 to 2.5 per 100 sq m, 1.5 per guest room or 0.5 per GR + 100 for banquet halls	?	Clearance from Fire Dept and Structural engineer certificate	Parking reqmt. for guesthouses seems high! Fire/Stc Engr requirements need to be specified. Min 6m open space reqd for fire tender access
5	Mixed Use	Mixed Use	?	?	?	Clearance from Fire Dept? and Structural engineer certificate?	Parking reqmt. for guesthouses seems high! Fire/Stc Engr requirements need to be specified. Min 6m open space reqd for fire tender access







# Annexure II - Detailed Presentation for the Srinagar Municipal Corporation, SDA and Line Department

## Upgrading Design Guidelines and Building Codes for Multiple Disasters in J&K

Discussion with SMC, SDA and Line Departments...



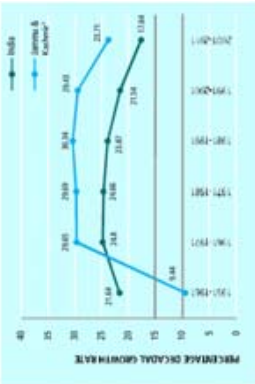
**TARUMS**  
TARU MUNICIPAL SERVICES

Dr. L. S. K. Singh  
Project Manager/PROFESSOR

March 30 2019


## Population Trend

REGION	DISTRICTS	TOTAL POPULATION (2011 CENSUS)
JAMMU	10	5,350,811
KASHMIR	10	6,894,279
LADAKH	2	290,492
<b>TOTAL</b>		<b>12,535,582</b>



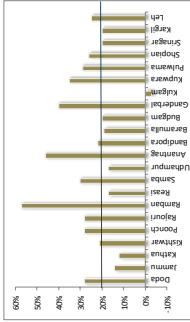
**Jammu & Kashmir**

## State At a Glance



- 2 Municipal Corporations (Jammu and Srinagar)
- 6 Municipal Bodies (Kathua, Poonch, Udhampur, Anantnag, Baramulla, Sopore (Baramulla))
- 70 Municipal Committees/Councils (33 in Jammu, 35 in Kashmir, 2 in Ladakh)

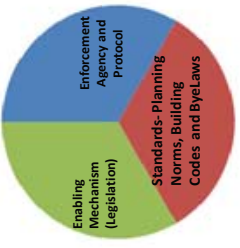
## District Population & Population Growth (2001-11)



District	Population
Doda	4,09,576
Jammu	15,26,406
Kathua	6,15,711
Kishtwar	2,31,037
Poonch	4,76,820
Rajouri	6,19,266
Ramban	2,83,313
Reasi	3,14,714
Samba	3,18,611
Udhampur	5,55,357
Anantnag	10,69,749
Badgam	3,85,098
Baramulla	10,15,503
Budgam	7,55,331
Ganderbal	2,97,003
Kulgam	4,23,181
Kupwara	8,75,564
Pulwama	5,70,069
Shopian	2,65,969
Srinagar	12,36,829
Kapthi	1,43,398
Leh	1,47,104




## Framework of Building Permit System




- A. Enabling Mechanism (Legislation) ----- YES**
  - a) JK MRDA Act 2018
  - b) JK RERA Act 2018
  - c) The Jammu and Kashmir State Town Planning Act, 1963 Act No. XX of 1963
  - d) The Jammu and Kashmir Building Operations Controlling Authority Act, 2001
- B. Standards ----- YES**
  - a) The Jammu Municipal Building Byelaws (2011)
  - b) The Srinagar Municipal Building Byelaws (2011)
  - c) Building Regulations And Bye-laws (Kashmir Division) -For All ULBs Of Kashmir
  - d) The Rules & Regulations of Urban Dev. Agency Kashmir (UDAK)
  - e) National Building Code
  - f) BIS Codes (IS 456, IS 1893 and IS 13920, IS 875 etc.)
- C. Enforcement Agency and Protocols --- YES**
  - a) JMC, SMC, ULBS...


## Exposure to Hazards



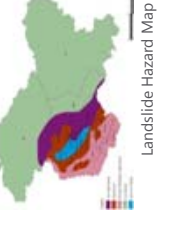
Seismic & Hazard



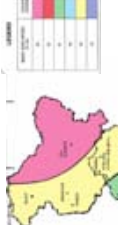
Flooding



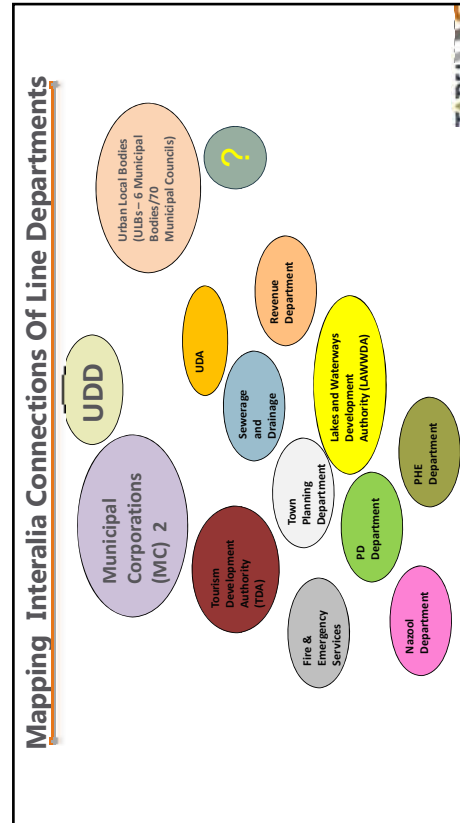
Fire Hazard



Landslide Hazard Map



Wind Speed Map



## Building Byelaws

**REVIEW, PROBLEM IDENTIFICATION OF EXISTING BUILDING BYELAWS**

Components of a Development Regulation System		Status
1. A primary legislative framework	Enabling Mechanism	Exists
2. A system for framing development regulations, referenced to national /international standards	Standards	Exists but multi-hazard resistance?
3. An agency for enforcing development regulations	Enforcement Agency	Exists, but capacity?
4. A mechanism for verifying and approving designs for compliance to development regulations		Only for Planning, not for structural safety
5. A mechanism for granting variances		Nonexistent/Not Transparent
6. A mechanism for testing and monitoring construction for compliance to approved designs	Enforcement Protocol	Almost Non-existent
7. A mechanism for granting permission to use		Exists
8. A system for dealing with unauthorized construction		Nonexistent/Not Transparent
9. A system for licensing professionals		Nonexistent/Not Transparent
10. A system for attributing responsibility for misconduct and building failures	Accreditation System	Nonexistent/Not Transparent



### Srinagar Municipal Corporation Building Plan Approval & Inspection Procedure

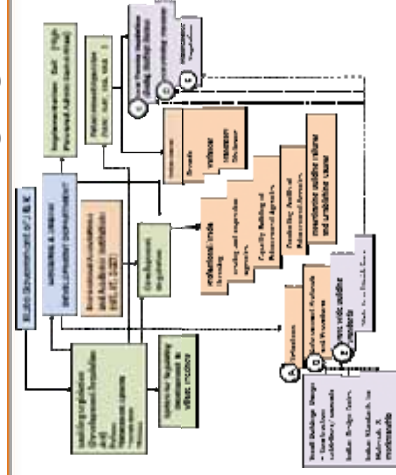
**Step 1.** Citizens can fill online form ,attach their photograph, land documents etc in a PDF format. A confirmation SMS & e-mail will be send to the applicant on the spot. Application Form A for building permission will be automatically generated and send to the concerned Officer/Officials online.

The following documents are required for building plan approval :-

- i. Site plan
- ii. Building plan
- iii. Service Plan
- iv. Parking & Circulation plan
- v. Landscape plan
- vi. General Specifications Plan
- vii. Ownership Title plan
- viii. Other documents if any.



### Framework for Ideal Building Regulatory System



### Srinagar Municipal Corporation Building Plan Approval & Inspection Procedure

- Step 3.** Inspection of Site by the Concerned Field Staff.
- Step 4.** Submission of Inspection Report by Concerned Field Staff.
- Step 5.** Once the NOCs are received online from the line departments the case is placed before Building permission authority for final approval and ink signed authorization. There after the applicants were informed via registered e-mail regarding acceptance & rejection of their cases.
- Step 6.** The cases which are approved by the Building permission authority, online generated building permission fee details were sent to the applicant via registered e-mail for depositing the fee either through online mode (RTGS,NEFT,Online Banking) or through offline mode at single window of SMC.
- Step 7.** Once the requisite fee was received then building plan approval was communicated via e-mail and also handed over in hard copy to the applicant.



### Review

- List of Codes Procured and Reviewed**
1. Srinagar Municipal Building Permissions Procedure
  2. Jammu Municipal Building Permissions Procedure
  3. Urban Local Bodies Kashmir Building Permission Procedure
  4. Urban Local Bodies Jammu Building Permission Procedure
  5. The Jammu Municipal Building Byelaws (2011)
  6. The Srinagar Municipal Building Byelaws (2011)
  7. The Jammu And Kashmir Building Operations Controlling Authority Act,2001
  8. Building Regulations And Bye-laws (Kashmir Division) -For All ULBs Of Kashmir
  9. MODEL BUILDING REGULATIONS & BYE-LAWS (DRAFT- ON WEBSITE For All J&K)
  10. J&K RERA Act 2018
  11. J&K MRDA Act 2018
  12. ALL INDIAN STANDARD SAFETY CODES
    - i. IS 1893- And IS 13920 (Earthquake)
    - ii. IS 875 Part 3 (Fire)
    - iii. NBC (For Fire)





### Srinagar Municipal Corporation

#### Procedure for Obtaining Building/Construction Permit Approval

Joint Commissioner (Planning)

Designated Officer: Assistant Building Plan Approval	<ol style="list-style-type: none"> <li>Application addressed to Joint Commissioner (P) on prescribed format (<a href="https://smcsite.org/download/Annexure-A.pdf">https://smcsite.org/download/Annexure-A.pdf</a>).</li> <li>Two passport size photographs of the applicant.</li> <li>Site plan building plan of A-1 Drawings on prescribed drawing format one copy, duly signed by the applicant (<a href="https://smcsite.org/download/Annexure-B1.pdf">https://smcsite.org/download/Annexure-B1.pdf</a>).</li> <li>Site Building Plan (A-3) size on prescribed drawing format) four copies duly stamped by approved Architect/Draftsman (<a href="https://smcsite.org/download/Annexure-B2.pdf">https://smcsite.org/download/Annexure-B2.pdf</a>).</li> <li>Commissioner, Nazool in case of vacant immovable property; Commissioner, Nazool for title verification of land in case of State land.</li> <li>Duly attested copy of Building cum Site Plan with the following attested revenue documents:               <ol style="list-style-type: none"> <li>Shajra Khwast (Survey plan)</li> <li>Shajra-Aks (Demarcation plan)</li> <li>Intikhabi-Girdawari (Record of Tenancy/ Possession)</li> <li>Intikhabi-Jamabandi (Record of Rights)</li> <li>Attached Gift deed for</li> <li>Attached</li> </ol> </li> </ol>
Fee	Ak.pdf Fee Criteria.
Time limit	<ul style="list-style-type: none"> <li>Building plan approval is provided within 30 days</li> </ul> <a href="https://smcsite.org/index.php?link=JK%20Public%20Services%20Department%20Act">https://smcsite.org/index.php?link=JK%20Public%20Services%20Department%20Act</a>

### Srinagar Municipal Corporation

- Well-organised website
- Facility for online application
- Online Forms available for all types of building applications
- Transparency – Online listing of projects: Approved/Rejected/Deferred
- Online list of approved registered technical persons

### Srinagar Municipal Corporation

**Procedure for**

- Applicant shall get building cum site plan on prescribed drawing format prepared by the empowered Architects/Draftsman with the Srinagar Municipal Corporation. List unqualified Architects/Draftsman is available on SNC website (<https://smcsite.org/download/Demarcation-B4.pdf>).
- Applicant shall submit Building cum Site Plan with all relevant documents at Single Window at Central Citizen Facilitation Centre.

**Note:** During verification of the application, the Authority may ask for any clarification if required any time.

The applicant can track the status of building plan approval process anytime at <https://www.smcite.org/index.php?link=Government%20Gateway> as shown in Fig.1.0 & Fig. 1.1



Fig.1.0

### Srinagar Municipal Corporation

**Procedure for Approval/Revision of Building Plan**

**Basic information:**  
 Procedure for Approval of Building Plans in pursuance to Municipal Building Bye-Laws/ Master Plan 2011 is given under:  
<https://smcsite.org/building%20byes%20laws%202.html>  
<https://smcsite.org/index.php?link=Srinagar%20Act%20Masters%20Plan>



**Timelines:**  
 45 days (under Public Service Guarantee Act-2013)  
<https://smcsite.org/index.php?link=JK%20Public%20Services%20Department%20Act>

- Building plan approval is provided within 30 days
- Plan inspection is done within 7 days of intimation
- Occupancy Certificate is provided with 8 days (7 days for Inspection & 1 day for Issuing the Certificate).

**Fee Criteria:**



Srinagar Municipal Corporation	
<p><b>Procedures by Department:</b></p> <ul style="list-style-type: none"> <li>✓ Once the applicant submits building cum site plan along with all relevant documents duly authenticated by empowered Architects/Draftsmen with the Srinagar Municipal Corporation, the same shall be scanned and upload into online mode at Single Window at Central Citizen Facilitation Centre.</li> <li>✓ The building cum site plan along with all relevant documents duly authenticated by empowered Architects/Draftsmen/Revenue Authorities is being scanned by Single Window Assistant and necessary data entry is being done on the said window as per prescribed format (<a href="https://mncsfc.org/download/Annexure-E.pdf">https://mncsfc.org/download/Annexure-E.pdf</a>) for onward submission to the concerned departments.</li> <li>✓ After obtaining NOC the case file is being forwarded to Inspection Level-I to get basic inspection and reporting done in conformity to building bylaws on prescribed format (<a href="https://mncsfc.org/download/Annexure-E.pdf">https://mncsfc.org/download/Annexure-E.pdf</a>). The case may be accepted or rejected as per the following:               <ul style="list-style-type: none"> <li>○ <b>Timeline: 7 days for the pre-construction inspection and reporting done in conformity to building bylaws.</b></li> </ul> </li> <li>✓ After pre construction inspection and reporting at Level-I in conformity to building bylaws, the case is being forwarded to Level-II for recommendations in conformity to building bylaws.               <ul style="list-style-type: none"> <li>○ <b>Timeline: 8 days for the recommendations at Level-II in conformity to building bylaws.</b></li> </ul> </li> <li>✓ After recommendations at Level-II in conformity to building bylaws, master plan and land-use plan the case is being forwarded to Level-III for recommendations for approval as per the following:               <ul style="list-style-type: none"> <li>○ <b>Timeline: 3 days for the recommendations at Level-III in conformity to building bylaws master plan and land use plan.</b></li> </ul> </li> </ul>	

Srinagar Municipal Corporation	
 <p><b>Fig.2.1</b></p> <p>✓ The applicant can track the status of NOC process anytime at <a href="https://www.smb.gov.in/public_noc_nocover.aspx">https://www.smb.gov.in/public_noc_nocover.aspx</a> firm as shown in Fig.2.0</p>  <p><b>Fig.2.1</b></p>	

Srinagar Municipal Corporation	
<ul style="list-style-type: none"> <li>✓ After final recommendations from Level-III to Level-IV, for accord of approval at Level-IV i.e. Competent Authority.               <ul style="list-style-type: none"> <li>○ <b>Timeline: 3 days for the accord of approval at Level-IV.</b></li> </ul> </li> <li>✓ After final approval from Competent Authority at Level-IV the case is being forwarded to Level-I for Fee Assessment. Accordingly the applicant is intimated through phone call and SMS for submission of Fee through cashless mode viz POS Terminals installed at Single Window at Central Citizen Facilitation Centre.</li> <li>✓ After fee submission the building plan approval certificate is being generated online as per prescribed format (<a href="https://mncsfc.org/download/Annexure-E.pdf">https://mncsfc.org/download/Annexure-E.pdf</a>)               <ul style="list-style-type: none"> <li>○ <b>Timeline: 2 days for the assessment &amp; submission of fee and generation of building plan approval certificate.</b></li> </ul> </li> <li>✓ After fee assessment and submission, the case is being forwarded to Level-III for Sign and the same is being forwarded to Single Window at Central Citizen Facilitation Centre for final disposal. Accordingly the applicant is intimated through phone call and SMS for delivery of the approved building plan as per prescribed format (<a href="https://mncsfc.org/download/Annexure-E.pdf">https://mncsfc.org/download/Annexure-E.pdf</a>) at Single Window at Central Citizen Facilitation Centre.               <ul style="list-style-type: none"> <li>○ <b>Timeline: 2 days for sign and final disposal.</b></li> </ul> </li> </ul>	

Srinagar Municipal Corporation	
 <p><b>Fig.2.1</b></p>	<p>✓ Accordingly the applicant is intimated through phone call and SMS to get approved building plan at Single Window at Central Citizen Facilitation Centre within the period of 30 days.</p>



## Srinagar Municipal Corporation

### Procedure for Obtaining Occupation Certificate

<b>Designated officer:</b> Check list for Occupation Certificate	Joint Commissioner (Planning) Sanctioned Plan Plinth inspection certificate ( <a href="https://smcscite.org/download/Annexure-J.pdf">https://smcscite.org/download/Annexure-J.pdf</a> ) Andhaar card State Subject Form of Rejection or Compliance in Respect of Occupancy Certificate ( <a href="https://smcscite.org/download/Annexure-K.pdf">https://smcscite.org/download/Annexure-K.pdf</a> ) Application form for occupancy certificate ( <a href="https://smcscite.org/download/Annexure-L.pdf">https://smcscite.org/download/Annexure-L.pdf</a> )
<b>Fee/charges to be paid for the service:</b>	Nil
<b>Time line</b>	7 days
<b>Procedure for User:</b>	After the construction of building as per approved building plan the applicant can apply for grant of occupation certificate at single window, Central Citizen Facilitation Centre. The applicants that want to obtain occupancy certificate need to apply on prescribed occupation certificate Form available at SMC website as well as at Citizen Facilitation Centre (CFC).

## Srinagar Municipal Corporation

### Procedure for Plinth Inspection

<b>Designated Officer:</b> Check list for Plinth Level Approval	Joint Commissioner (Planning) Relevant prescribed Drawings and Documents: 1. Sanctioned Building Plan 2. Form of notice of completion ( <a href="https://smcscite.org/download/Annexure-52.pdf">https://smcscite.org/download/Annexure-52.pdf</a> ) 3. Form of intimation of completion ( <a href="https://smcscite.org/download/Annexure-53.pdf">https://smcscite.org/download/Annexure-53.pdf</a> ) 4. Inspection Report ( <a href="https://smcscite.org/download/Annexure-1.pdf">https://smcscite.org/download/Annexure-1.pdf</a> ) 5. State subject 6. Andhaar Card
<b>Fee/charges to be paid for the service:</b>	Nil
<b>Time line</b>	7 days

## Srinagar Municipal Corporation

- Procedure by Department:**
- ✓ After submitting application on prescribed format along with all relevant documents by the applicant at Single Window, Central Citizen Facilitation Centre, on the same day the application is being forwarded to Joint Commissioner (Planning) for further t/a.
    - **Timeline: 1 day**
  - ✓ The Joint Commissioner (P) forwards the application to Chief Enforcement Officer.
    - **Timeline: 1 day**
  - ✓ The Chief Enforcement Officer forwards the application to Concerned Enforcement officers for inspection and Report.
    - **Timeline: 1 day**
  - ✓ After Final Inspection by Concerned Assistant Enforcement Officers/Ward Officers, the application is being forwarded to Concerned Enforcement officers.
    - **Timeline: 2 days**
  - ✓ The application is being forwarded to the Chief Enforcement Officer for recommendation.
    - **Timeline: 2 days**
  - ✓ After recommendation the application is being forwarded to the Joint Commissioner (P) for accord of approval.
    - **Timeline: 2 days.**
  - ✓ After approval the applicant is intimated through phone call/SMS for collection of Occupancy Certificate at CFC.
    - **Timeline: 1 day**

## Srinagar Municipal Corporation

### Procedure for Plinth Inspection

- Time line** 7 days
- Procedure**
- ✓ The Applicant can visit Central Citizen Facilitation Centre or download Form of notice of completion and Form of intimation of completion from the official website of SMC.
  - ✓ The Applicant should submit the application along with all relevant documents at Central Citizen Facilitation Centre.
  - ✓ After submission, the application will be forwarded to the Joint Commissioner (Planning).
  - ✓ The Joint Commissioner (Planning) will forward the application to Enforcement Officers for inspection and Report.
  - ✓ The Chief Enforcement Officer will forward the application to Concerned Enforcement Officers for Plinth Inspection and reporting.
    - **Timeline: 1 day for scrutinizing of documents.**
  - The Concerned Enforcement officers at conformity to Building Bye-laws/Regulations will submit their report to the Enforcement Officer.
  - **Timeline: 3 day for scrutinizing documents & submission of inspection report.**
  - ✓ The Chief Enforcement Officer shall forward the application to the Joint Commissioner (Planning) for accord of approval and signature.
    - **Timeline: 2 day for approval and Signature.**
  - ✓ The Joint Commissioner (Planning) shall approve or reject Plinth Completion Certificate and forward to Central Citizen Facilitation Centre for final disposal.
    - **Timeline: 1 day for final disposal.**





### Existing Building Permit System – Initial Queries

- No differentiation between Engineer, Architect and Draftsman as “technical person”?
- **No requirement for soil investigation?**
- No requirement of design by qualified and registered civil engineer?
- **No collection of structural drawings. Only architectural drawings submitted and approved. ?**
- No requirement for submitting Structural stability certificate by engineer conforming to design standards for multi-hazards. Earthquake, wind or for protection against floods?
- **No separate requirements for self-use home and commercial project?**
- Capacity availability in Municipal Bodies for review of Applications?
- **No accountability for safety on any stakeholder?**
- No procedure for penalising for failures or misconduct?

TARU

### Srinagar Municipal Corporation

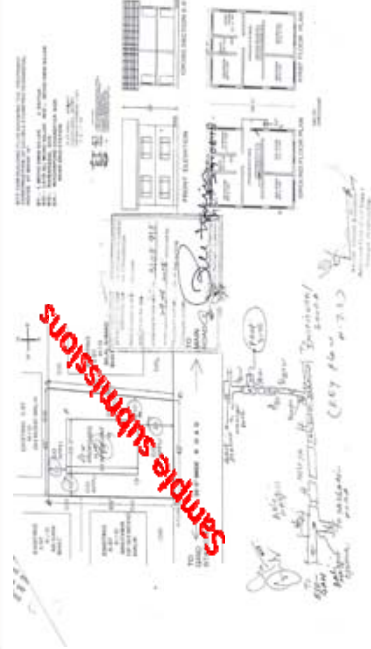


### Existing Building Permit System – Initial Queries

- **What are parameters by which NOC by town planner is issued?**
  - How does TP ensure the plot is not on filled up lake?
  - What is procedure for avoiding construction on slope with high landslide hazard?
  - **What is procedure to determine plinth height? Is it based on Flood level?**
  - Map showing areas of landslide, flooding vulnerability not available.
    - Is it dovetailed into the permit process.
- **Where and how does Fire Officer Permission come in?**
  - How is permission given to new construction where there is no access to fire tender?
- **Are the architects and engineers registered by Municipal Corporation?**
  - What is method of licensing?
- Is it required to hire services of Engineer and Architect for Building Permit?
- **How are slums handled by MC?**
- **How are unauthorised buildings regularised?**

TARU

### Srinagar Municipal Corporation





**Thank You**

TARUJANG





# Annexure III - Detailed Presentation for the Jammu Municipal Corporation and Line Department

**Upgrading Design Guidelines and Building Codes for Multiple Disasters in J&K**  
 Discussion with JMC and Line Departments...

**TARU VMS**  
 JERULIM & JAWI  
 FLOOD RECOVERY PROJECT

3<sup>rd</sup> to 6<sup>th</sup> February 2019

### State At a Glance

- 2 Municipal Corporations (Jammu and Srinagar)
- 6 Municipal Bodies (Kathua, Poonch, Udhampur, Anantnag, Baramulla, Sopore (Baramulla))
- 70 Municipal Committees/Councils (33 in Jammu, 35 in Kashmir, 2 in Ladakh)

### Exposure to Hazards

Seismic & Hazard

Flooding

Fire Hazard

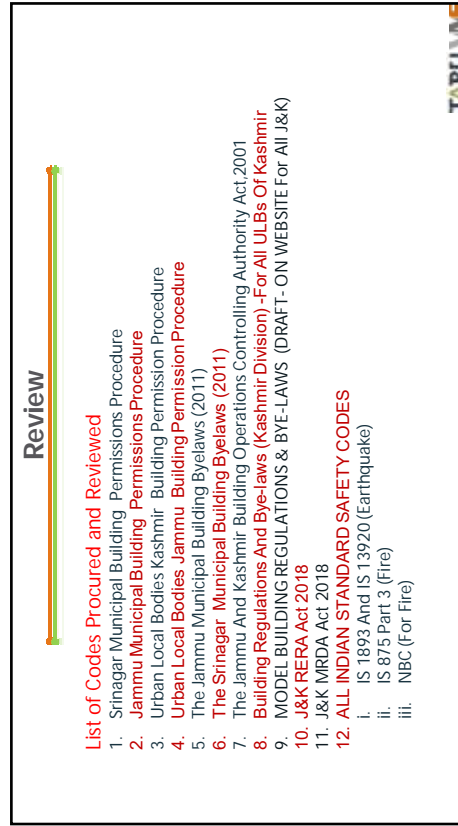
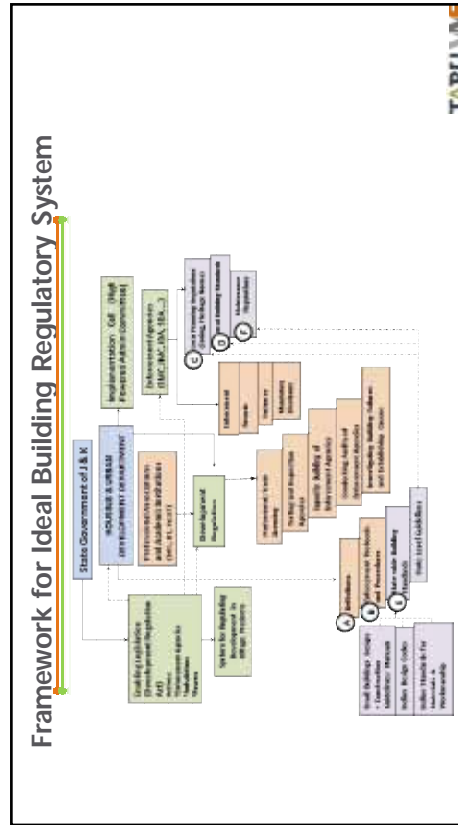
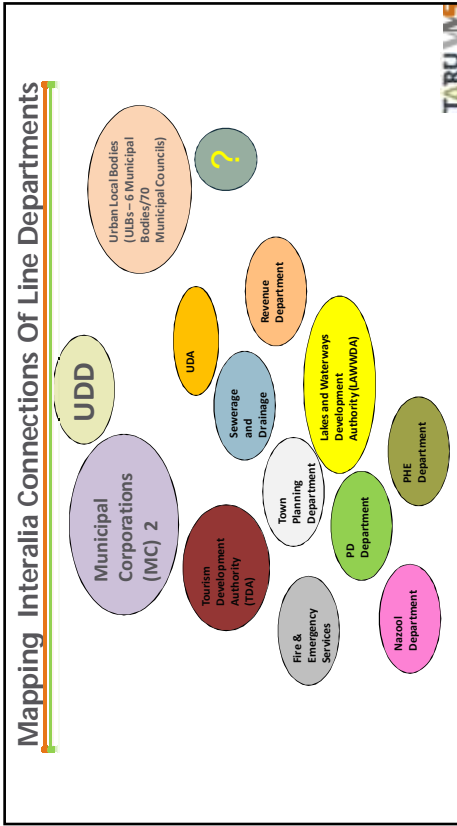
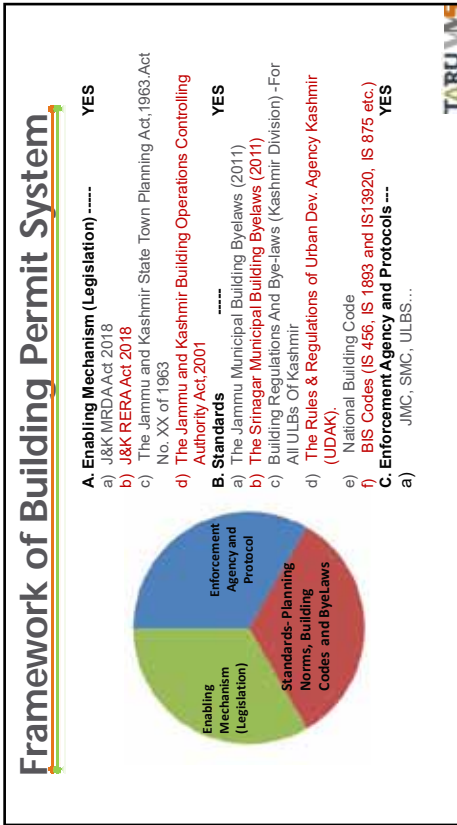
Landslide Hazard Map

Wind Speed Map

### Building Byelaws

REVIEW, PROBLEM IDENTIFICATION OF EXISTING BUILDING BYELAWS

Components of a Development Regulation System	Enabling Mechanism	Status
1. A primary legislative framework	Standards	Exists
2. A system for framing development regulations, reference to national/international standards	Enforcement Agency	Exists but multi-hazard resistance?
3. An agency for enforcing development regulations	Enforcement Protocol	Exists, but capacity? Only for Planning, not for structural safety
4. A mechanism for verifying and approving designs for compliance to development regulations	Accreditation System	Non-existent/Not Transparent
5. A mechanism for granting variances		Almost Non-existent
6. A mechanism for testing and monitoring construction for compliance to approved designs		Exists
7. A mechanism for granting permission to use		Non-existent/Not Transparent
8. A system for dealing with unauthorized construction		Non-existent/Not Transparent
9. A system for licensing professionals		Non-existent/Not Transparent
10. A system for attributing responsibility for misconduct and building failures		Non-existent/Not Transparent





### Jammu Municipal Corporation Building Plan Approval & Inspection Procedure

**Step 1.** Citizens can fill online form ,attach their photograph, land documents etc in a PDF format. A confirmation SMS & e-mail will be send to the applicant on the spot. Application Form A for building permission will be automatically generated and send to the concerned Officer/Officials online.

The following documents are required for building plan approval :-

- i. Site plan
- ii. Building plan
- iii. Service Plan
- iv. Parking & Circulation plan
- v. Landscape plan
- vi. General Specifications Plan
- vii. Ownership Title plan
- viii. Other documents if any.

### Jammu Municipal Corporation Building Plan Approval & Inspection Procedure

- Step 3.** Inspection of Site by the Concerned Field Staff.
- Step 4.** Submission of Inspection Report by Concerned Field Staff.
- Step 5.** Once the NOCs are received online from the line departments the case is placed before Building permission authority for final approval and ink signed authorization. There after the applicants were informed via registered e-mail regarding acceptance & rejection of their cases.
- Step 6.** The cases which are approved by the Building permission authority, online generated building permission fee details were sent to the applicant via registered e-mail for depositing the fee either through online mode (RTGS,NEFT,Online Banking) or through offline mode at single window of JMC.
- Step 7.** Once the requisite fee was received then building plan approval was communicated via e-mail and also handed over in hard copy to the applicant.

### Challenges in Jammu Town Planning Development...

From Website of JMC...

- This section which is instrumental in ensuring planned development of city is suffering with following weaknesses :
  - 1) We have one Senior town planner from town planning organization. Proposal for transfer of post of STP and a Divisional architect has been sent to the Administrative Deptt.
  - 2) **Deficient staff**- we have 2 building officers, 4 surveyors for handling such vast area of 288 sq.kms. We receive 5-10 building permission cases everyday. For handling these cases, we have 11 contractual employees to handle this. Their proposal for regularization of these employees has been sent to the govt for approval.

### Challenges in Jammu Town Planning Development...

- 3) Building permission is online in JMC, but partly. The cases are submitted offline. The cases are further processed online. ??
- 4) **Building permissions are still being given under BOCA, when a new chapter has been inserted in the Municipal Corporation Act.**
- 5) The policy for urban poor i.e. for EWS/LIG has been specified in the amendments of JK Municipal Corporation Act 2000 & JK Dev. Act 1970. There are certain clarifications required as it becomes difficult to adhere these guidelines...
- 6) **To ensure that all traffic generating building permission cases i.e commercial & institutional with total floor area more than 20,000 sft. shall be referred to UTEIC** (Urban Transport Environment Improvement Committee) **for scrutiny** before according the building permission.
- 7) PHE deptt. and PDD deptt. do not ask for completion certificate from JMC before issuing the water and electric connection in favour of any group housing project or Commercial project.





### Existing Building Permit System – Initial Queries

- No differentiation between Engineer, Architect and Draftsmen as “technical person”?
- **No requirement for soil investigation?**
- No requirement of design by qualified and registered civil engineer?
- **No collection of structural drawings. Only architectural drawings submitted and approved. ?**
- No requirement for submitting Structural stability certificate by engineer for conforming to design standards for multi-hazards. Earthquake, wind or for protection against floods?
- **No separate requirements for self-use home and commercial project?**
- Capacity availability in Municipal Bodies for review of Applications?
- **No accountability for safety on any stakeholder?**
- No procedure for penalising for failures or misconduct?

TARUVA

### Existing Building Permit System – Initial Queries

- **What are parameters by which NOC by town planner is issued?**
  - **How does TP ensure the plot is not on filled up lake?**
  - What is procedure for avoiding construction on slope with high landslide hazard?
  - **What is procedure to determine plinth height? Is it based on Flood level?**
  - Map showing areas of landslide, flooding vulnerability not available.
    - **Is it dovetailed into the permit process.**
- **Where and how does Fire Officer Permission come in?**
  - **How is permission given to new construction where there is no access to fire tender?**
- **Are the architects and engineers registered by Municipal Corporation?**
  - **What is method of licensing?**
  - Is it required to hire services of Engineer and Architect for Building Permit?
- **How are slums handled by MC?**
- **How are unauthorised buildings regularised?**

TARUVA

# Thank You

TARUVA





## Annexure IV - Presentation on Natural Hazard Exposure of J&K and Sensitization to Earthquake Design Concepts by Ms. Alpa Sheth at Institute of Engineers

### Scope of Presentation

- Natural Hazards Exposure of J&K
- Possible Approach to Landslide Hazard
- Seismic Hazard in J&K
  - Earthquake Tectonics
  - Earthquake Effects
  - Basic Earthquake Principles

### Natural Hazard Exposure of J&K and Sensitisation to Earthquake Design Concepts

**IEI, Jammu**

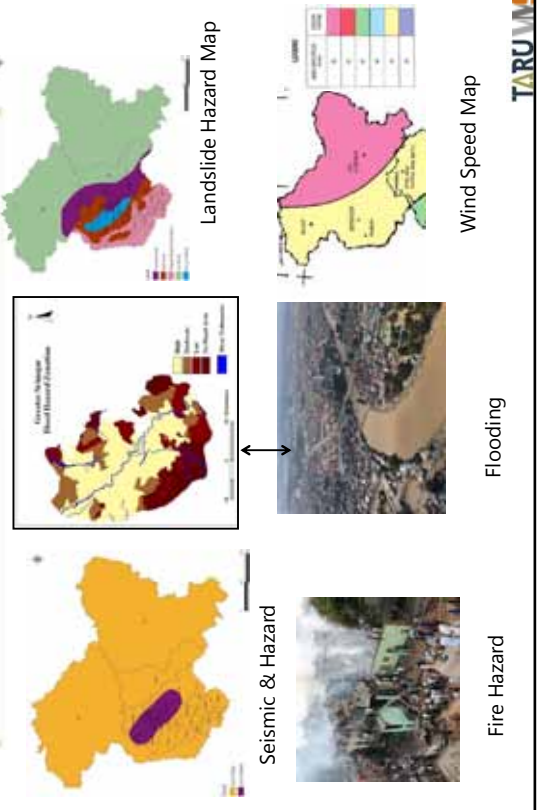
Feb 4 2019

Alpa Sheth

VMS Consultants Pvt. Ltd.

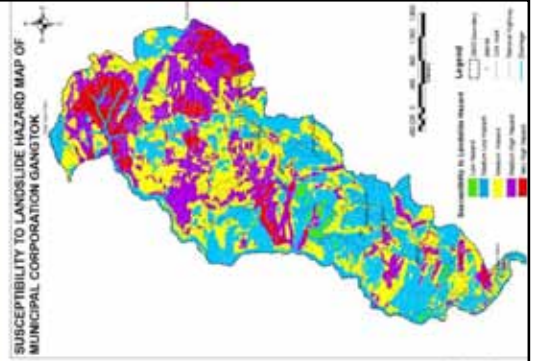


### Exposure to Hazards



### Sikkim's approach to landslide vulnerability

Hazard Category	% of Area	% of Buildings	Risk Type
Very High Hazard	3.3	3.3	Very High
High Hazard	24.6	18.6	High
Medium Hazard	11.8	20.2	Medium
Low to Medium Hazard	22.8	18.7	Low
Low Hazard	11.1	14.4	Low

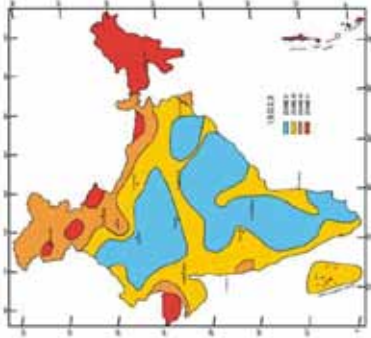


Areas in Red Zones are not given building permit.

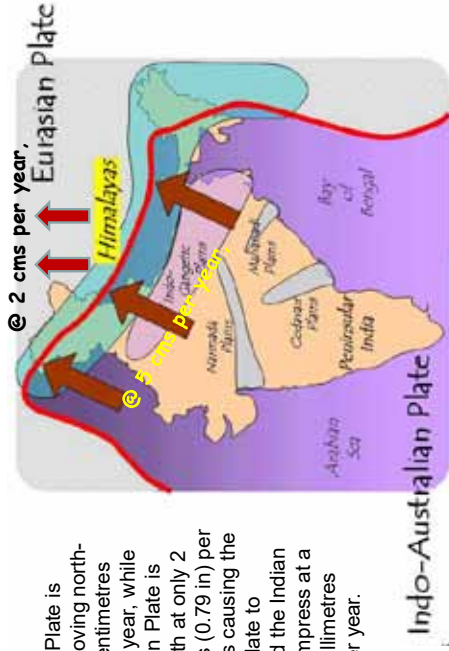


## Seismic Hazard in J&K...

Jammu and Kashmir lie in Severe and High Earthquake Zones (Zone V and Zone IV)



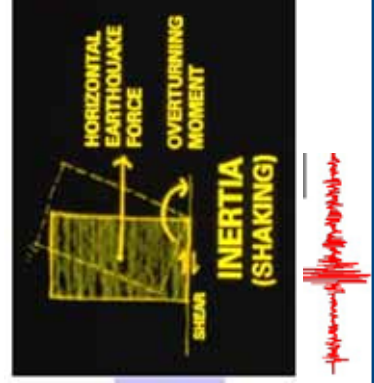
## Tectonic Plate Boundaries



The Indian Plate is currently moving north-east at 5 centimetres (2.0 in) per year, while the Eurasian Plate is moving north at only 2 centimetres (0.79 in) per year. This is causing the Eurasian Plate to deform, and the Indian Plate to compress at a rate of 4 millimetres (0.16 in) per year.

## No Real Earthquake “Force” ..

- Earthquake Shaking generates Inertia Forces ( $F=ma$ )  $m$ =mass of floors,  $a$ =ground acceleration



## Earthquake Effects

Unreinforced Masonry



6.3.04.04 Christchurch, New Zealand, in 2011.



## Earthquake Effects

Reinforced Concrete Flat Slabs

1985 Mexico Earthquake

## Earthquake Effects

Reinforced Concrete

Ecuador

Turkey

## Earthquake Effects

Buildings on Stilts

Bhuj Eq 2001

1971 S Fernando Eq

## Earthquake Effects

Pounding

(a)

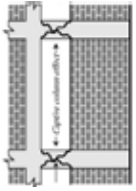


(b)

( a ) Collapse of intermediate storey due to pounding of adjacent building, and ( b ) collapse due to extension of the upper storey plan beyond the column ...



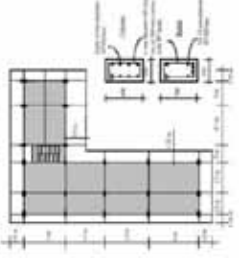
## Earthquake Effects -Short Column Effect

Infill Buildings..







## Earthquake Effects


Alphabet shaped buildings




• L-shaped


Ahmedabad 2001



## Earthquake Effects Steel Buildings Damage



1985 Mexico Earthquake




1994 Northridge Earthquakes

## Earthquake Effects Infrastructure Damage



1989 Loma Pieta Eq. USA







# Earthquake Effects Precast Construction..



# Earthquake Effects Precast Construction..

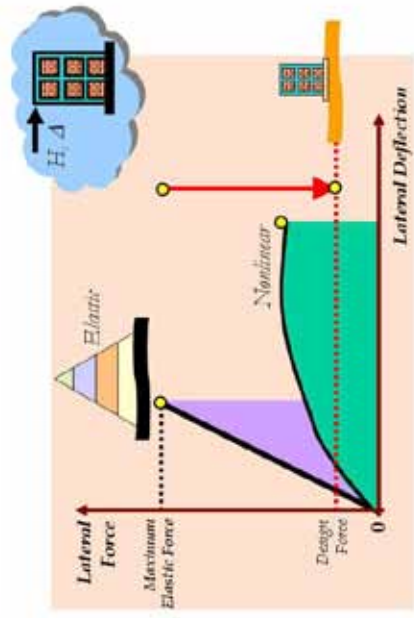


# Earthquake Effects Liquefaction...



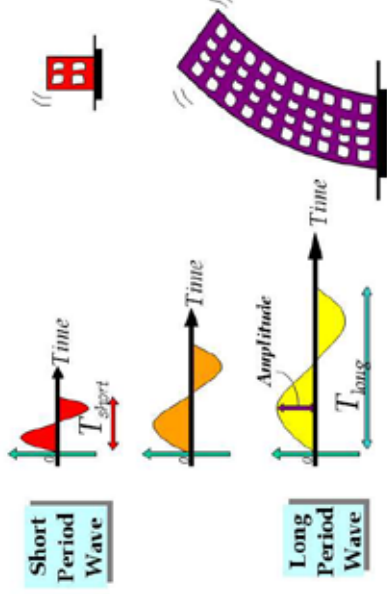
1964 Niigata Earthquake Japan

# Earthquake Design Philosophy



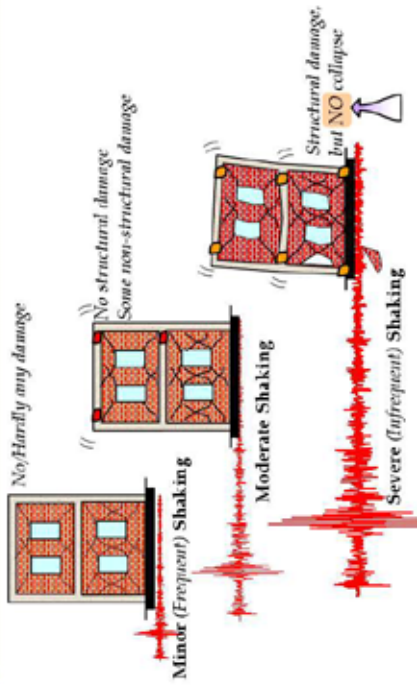


## Frequency of Earthquake Waves and Frequency of Building

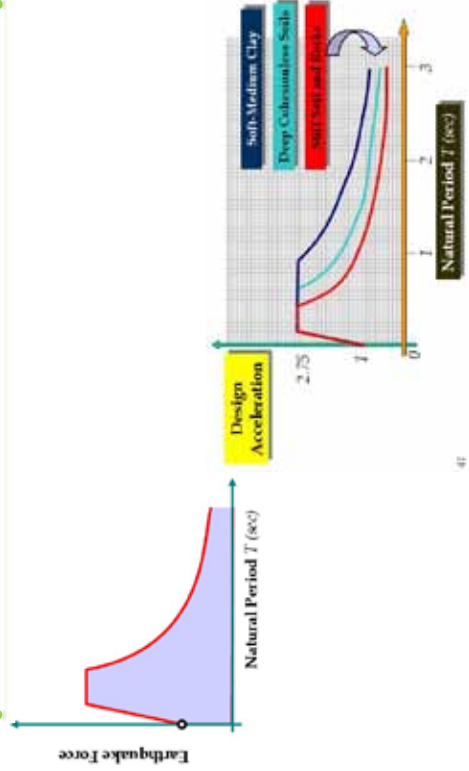


35

## Objectives of Earthquake Codes

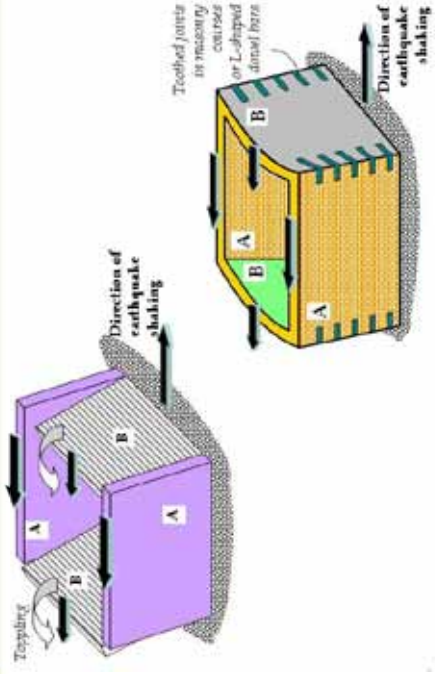


## Code Earthquake Design Forces



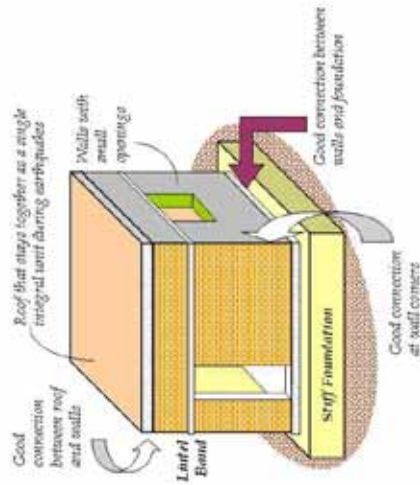
41

## Principle of Robustness..









## Box Effect gives Earthquake Resistance to Masonry Buildings



## Important Issues for Consideration in Earthquake Design

- Building Occupancy
- Geometry
- Structural System
- Detailing
- Quality of Construction

## Four Requirements for Safe, Good Behaviour of Buildings....

- Strength 
- Stiffness 
- Ductility 
- Configuration 





# Annexure V - Presentation on Seismic Setting, Construction and Design in the State of J&K by Prof. Rupen Goswami at Institute of Engineers

Seismic Setting, Construction and Design in the State of Jammu & Kashmir ::  
**Role of Seismic Design Codes**

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**Rupen Goswami**  
Department of Civil Engineering  
Indian Institute of Technology Madras

**Natural Hazard Exposure of J&K and Sensitisation to Earthquake Design Concepts**

IEI, Jammu  
Feb 4, 2019

**Rupen Goswami**  
Indian Institute of Technology Madras





**Hazard**

- **Man-made**
  - Involve human intent, negligence, or error  
Or failure of man-made system
  - Pollution (environmental, noise, light, ...)
  - Industrial
  - Nuclear
  - Chemical
  - Biological
  - Mining
  - Arson
  - Fire
  - Structural...



**Hazard**


- **2 types**
  - Natural
  - Man-made!!






## Hazard


- **Natural**
  - Drought
  - Windstorm & Cyclone
  - Tsunami
  - Natural Fire
  - Volcanic eruption
  - Snow
  - Landslide and Avalanche
  - Flood
  - Earthquake...



## Setting




Gondwanaland: 200 Ma



## Our Journey

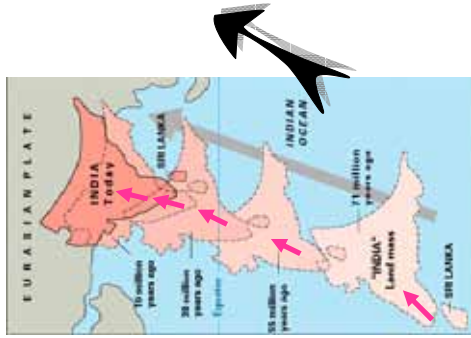
- **Continental drift theory**
  - PANGAEA
    - The Super-continent





## Our Journey

- Continental drift theory
  - 6400 km journey
    - ~2900 km wide collision
    - ~300 km compression in the making of Himalayas



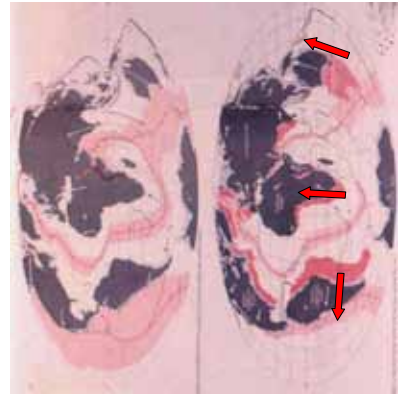
## Our Journey

- Continental drift theory
  - Current status



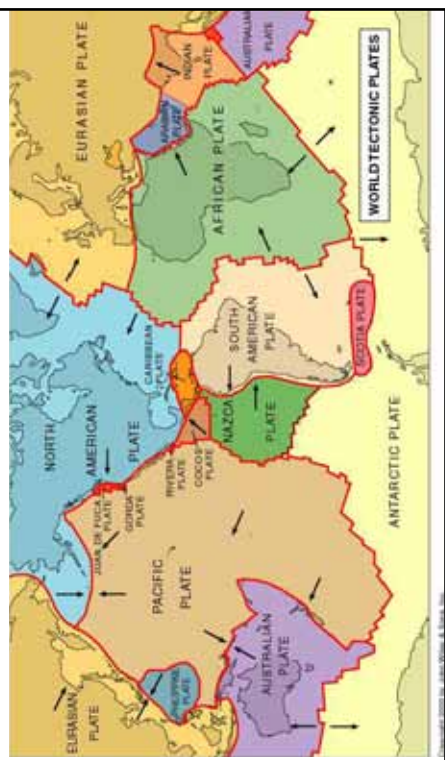
## Our Journey

- Continental drift theory
  - Future projections



## Plate Tectonics

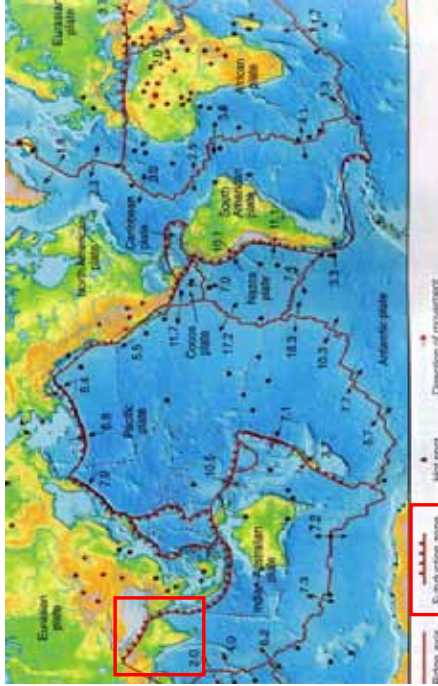
- Major Tectonic Plates





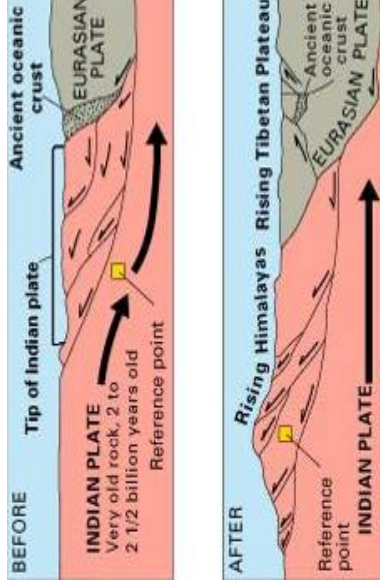
## Plate Tectonics

- Movements of tectonic plates



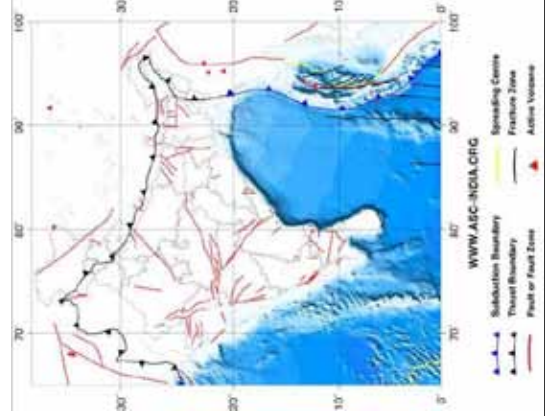
## Plate Tectonics

- Movements of tectonic plates
  - Collision of Indian and Eurasian Plates

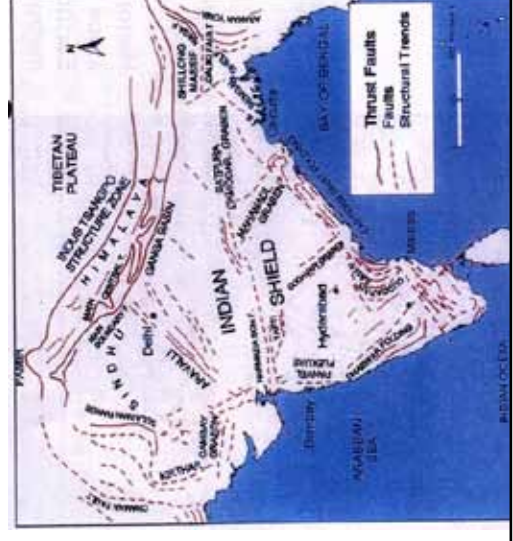


## Tectonic Setting

- Major features
  - Inter-plate boundary
  - Intra-plate faults



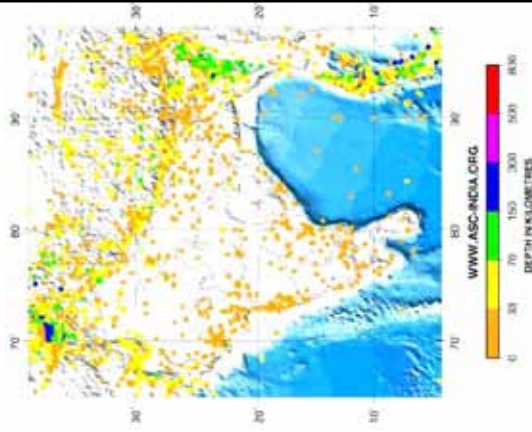
## Tectonic Setting





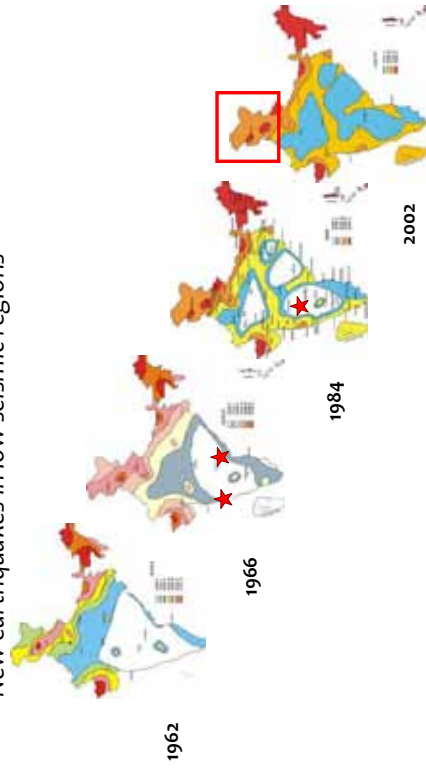
## Earthquakes

- Largely at inter-plate boundaries
  - Many significant at intra-plate faults too



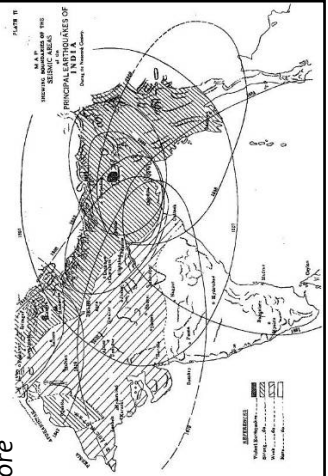
## Seismic Zoning

- Macro-zones
  - New earthquakes in low seismic regions



## Seismic Zoning

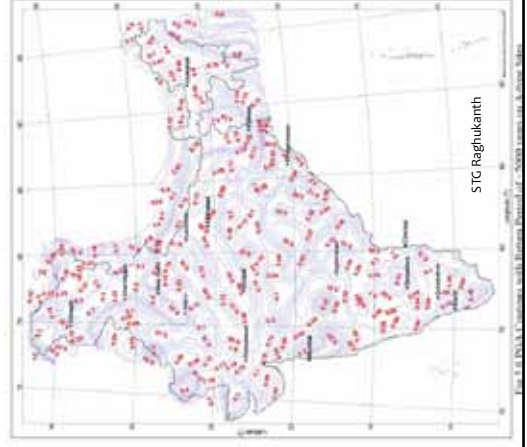
- Based on past occurrence of events
  - Zone II : MSK VI or less
  - Zone III : MSK VII or less
  - Zone IV : MSK VIII or less
  - Zone V : MSK XI or more



## PSHA

- Comprehensive consideration of
  - Potential events
  - Faults
  - Rock properties
  - Local soil properties

- $Y_R = 5,000$  years



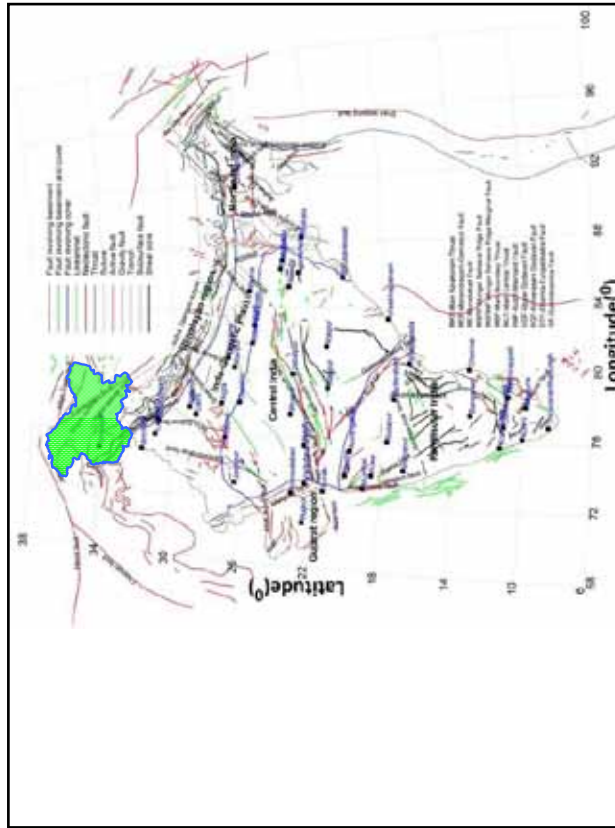
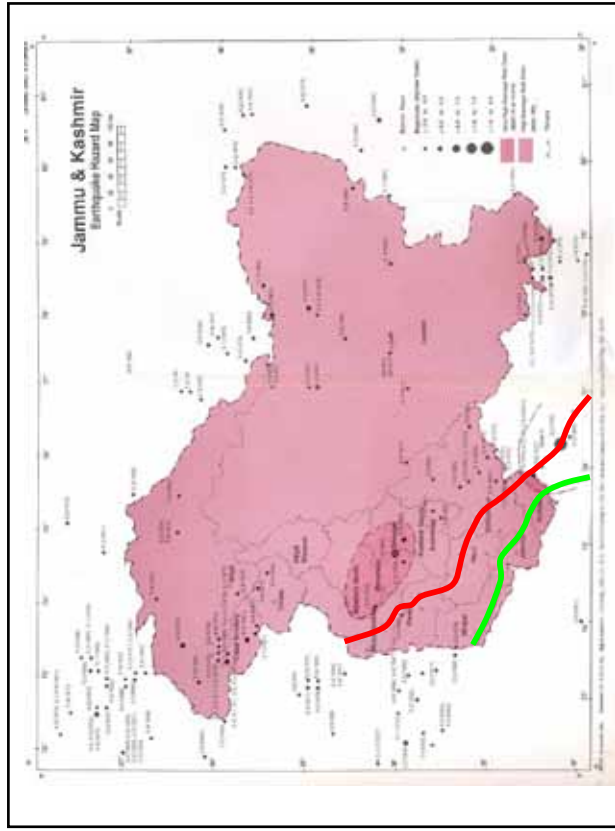


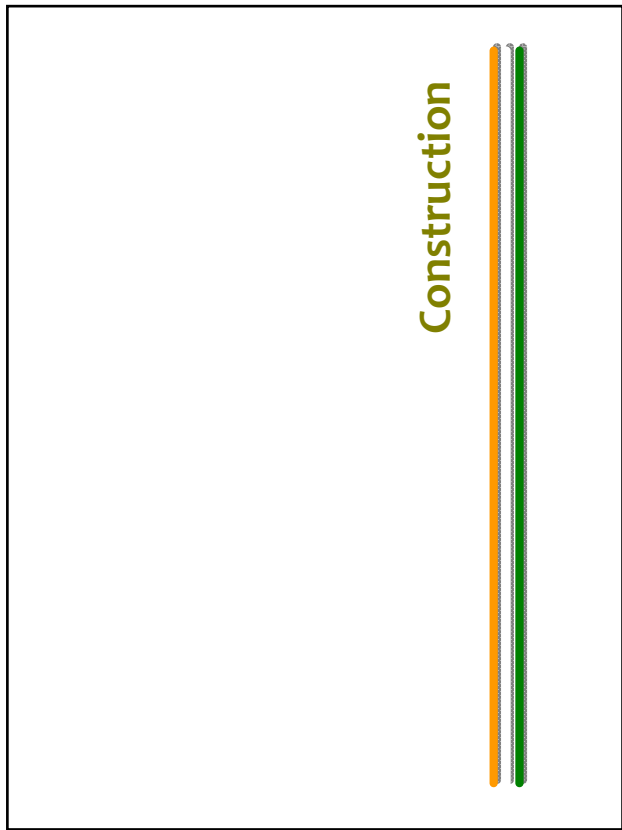
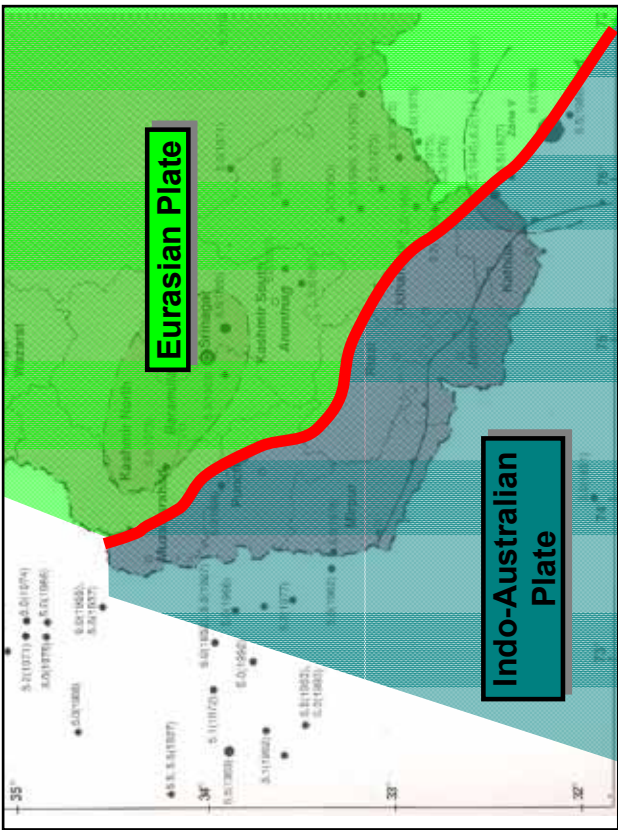
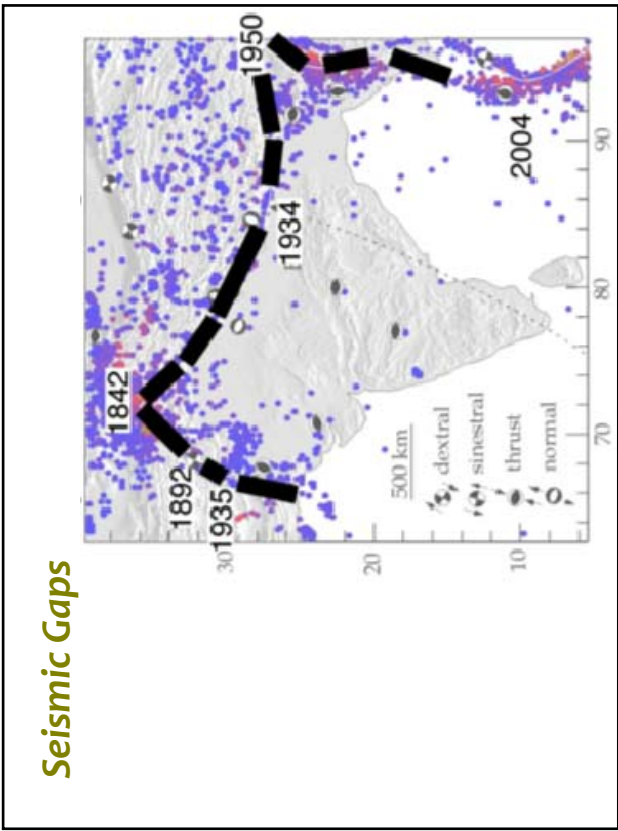


**PSHA**

- **Comprehensive consideration of**
  - Potential events
  - Faults
  - Rock properties
  - Local soil properties
- $Y_R = 10,000$  years

STC Raghukanth







## Types

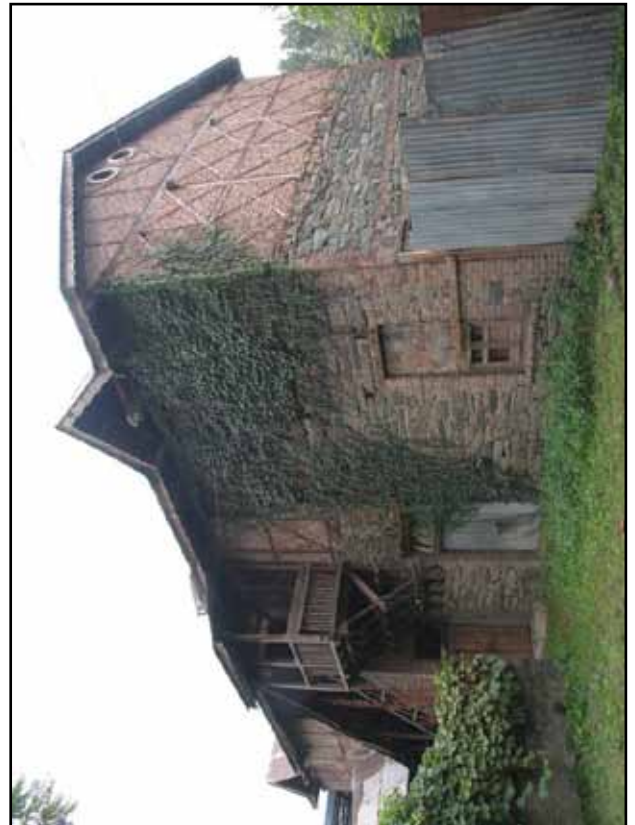
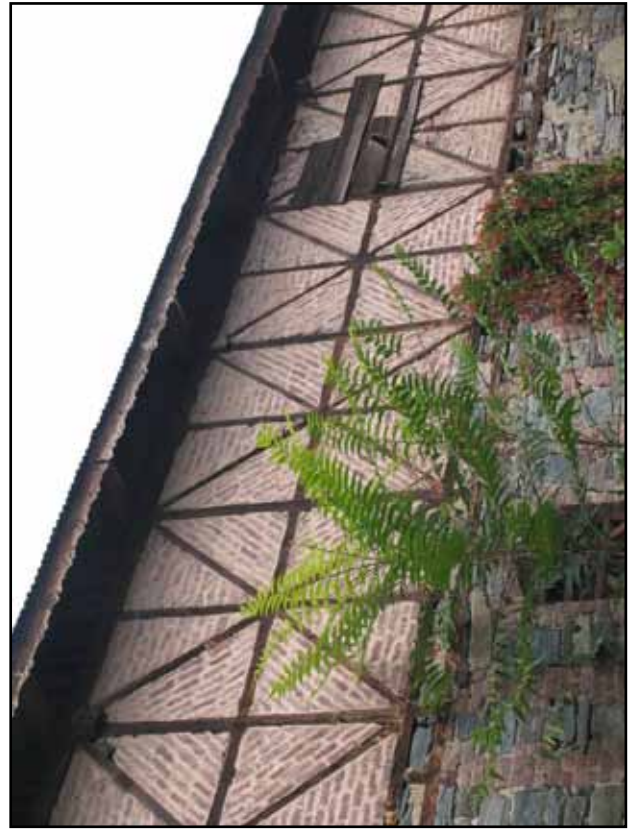
- **Traditional**
  - Dhajji Dewari, Taaq
  - Thathara, Koti Banal, Ekra...
- **Masonry**
  - Stone Masonry
  - Brick Masonry
- **Concrete**
  - Infilled masonry
  - Confined masonry

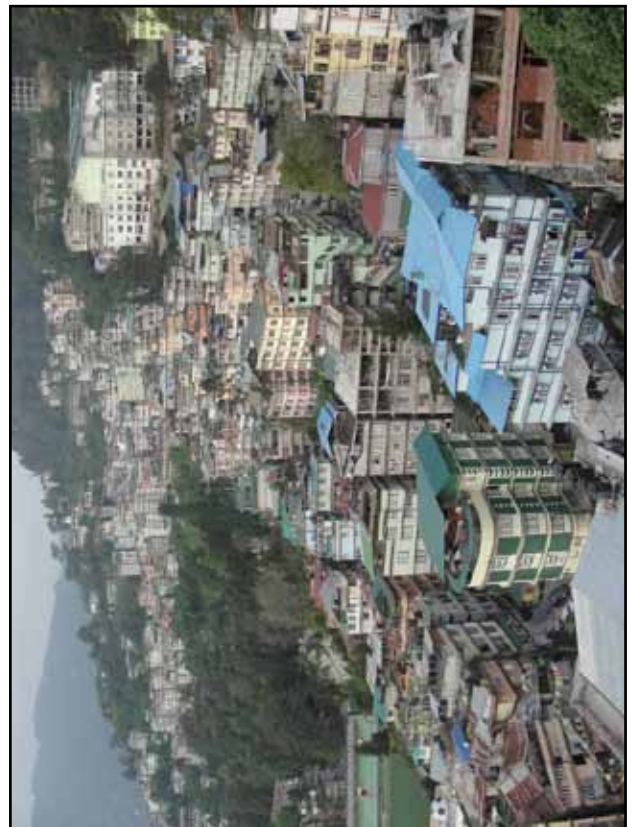




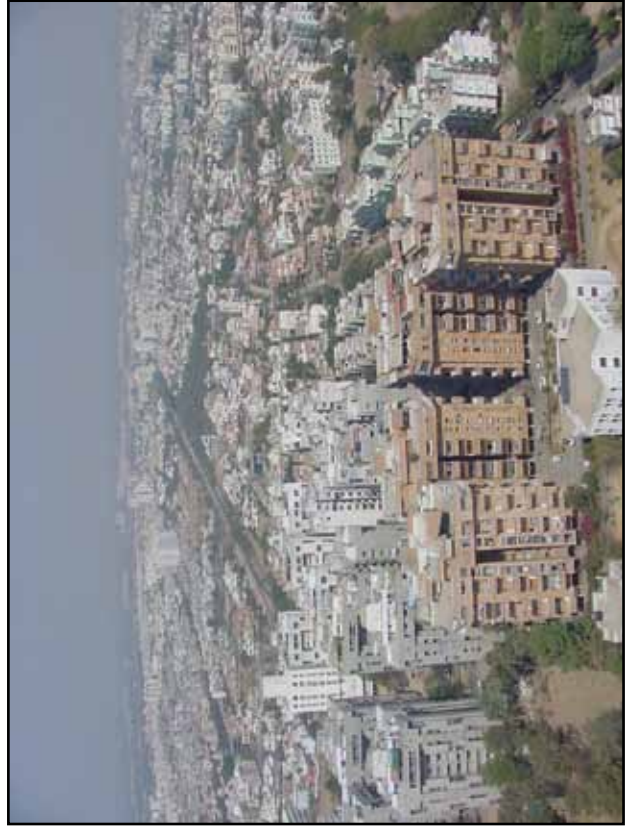




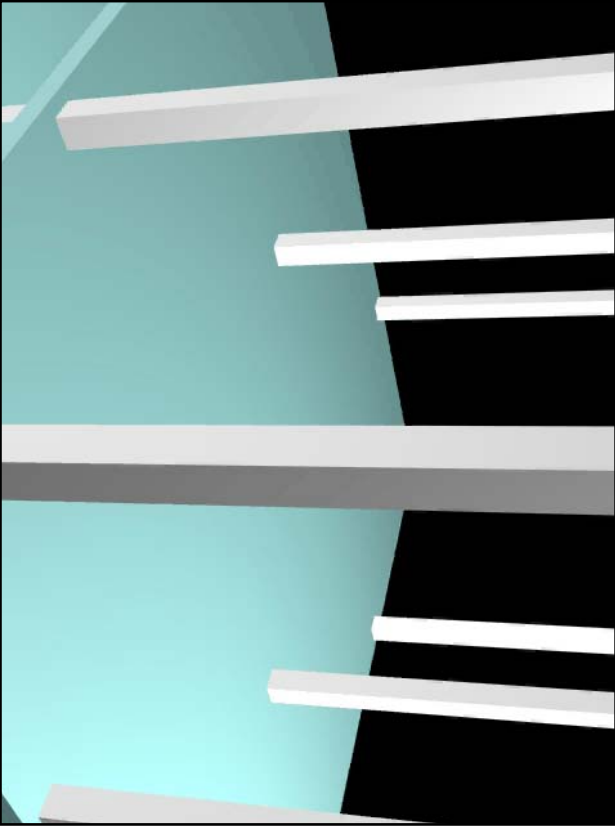












## Design Codes of Practice

## Indian Seismic Codes:: Timeline!

Code	Year
IS 1893	1962
IS 1893	1966
IS 1893	1970
IS 1893	1975
IS 1893	1984
IS 1893 (1-5)	2002
IS 13920	1993
IS 4326	1993
IS 4326	1967
IS 4326	1976
IS 1893 (1)	2016
IS 13920	2016



## Indian Seismic Code IS:1893

- **Since 1984:**
  - More information
  - More experience
  - Practical difficulties

### Detailed Provisions

- **IS 1893: From 2002 onwards...**

Part 1	:: General Provisions and Buildings
Part 2	:: Liquid Retaining Tanks – Elevated/Ground Supported
Part 3	:: Bridges and Retaining Walls
Part 4	:: Industrial and Stack-like Structures
Part 5	:: Dams and Embankments

## Other BIS Documents

- **CODES**

4326 -1993 :: Earthquake Resistant Construction  
13920 – 1993 :: Ductile Detailing of RC Structures

- **Guidelines**

– 13827 - 1993 :: Low Strength Masonry  
– 13828 - 1993 :: Earthen Constructions  
– 13835 - 1993 :: Repair & Strengthening

## Indian Seismic Codes:: 2016 onwards...

- **IS 1893**

Part 1	:: General Provisions and Buildings
Part 2	:: Liquid Retaining Tanks – Elevated/Ground Supported
Part 3	:: Bridges and Retaining Walls
Part 4	:: Industrial and Stack-like Structures
Part 5	:: Dams and Embankments

## Other BIS Documents...

- **CODES**

4326 – 2013 :: Earthquake Resistant Construction  
13920 – 2016 :: Ductile Design and Detailing of RC Structures

- **Guidelines**

– 13827 - ---- :: Low Strength Masonry  
– 13828 - ---- :: Earthen Constructions  
– 13835 - ---- :: Repair & Strengthening  
– 15988 – 2013:: Evaluation & Strengthening of RC Buildings





IS 1893 (1): 2016

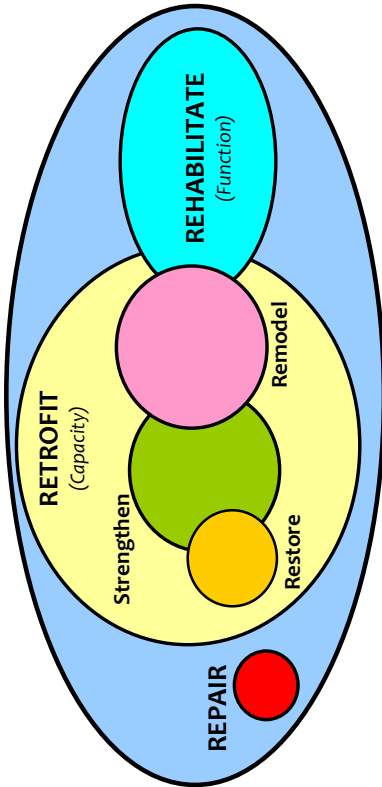


IS 4326: 2013



Restoration of Buildings

Restoration



IS 13920: 2016



## IS 15988: 2013

भारतीय मानक  
संज्ञा संकेत IS 15988: 2013  
भारतीय मानक संस्थान द्वारा  
प्रकाशित — दिल्ली

Indian Standard  
SEISMIC EVALUATION AND STRENGTHENING OF  
EXISTING REINFORCED CONCRETE  
BUILDINGS — GUIDELINES

भारतीय मानक संस्थान  
BUREAU OF INDIAN STANDARDS  
NEW DELHI 110 068, INDIA

First Edition 2013

IS 15988

## National Building Code : 2016



## National Building Code : 2016

- **2 Volumes**
  - 12 Parts (1-6 In Volume 1 and 7-12 in Volume 2)
  - 33 Chapters
- **Highlights**
  - Detailed provision for **streamlining the approval process** in respect of different agencies in the form of an **integrated approval process through single window approach** thereby avoiding separate clearances from various authorities, with a view to ensuring ease of doing business in built environment sector.

## National Building Code : 2016

- **Highlights...**
  - Progressive **computerization of approval process**
  - Certification of structural safety of buildings by **competent professional and peer review of design**
  - **Fire and life safety** in modern complex buildings
  - Updated provisions on engineered **use of bamboo** in housing and other building construction
  - Norms for **solar energy utilization**
  - Updated provisions on **rainwater harvesting**
  - **Updated structural design provisions for wind and seismic** loads, imposed load due to helipad, and blast loads



## Indian Standards

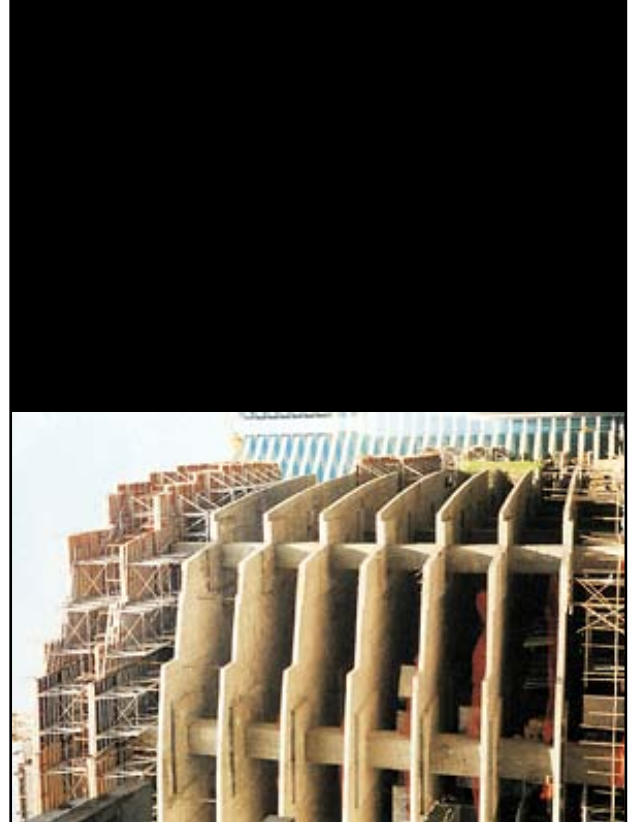
- For ALL



## The 2016 Revisions of 1893(1) & 13920

- 3 key aspects

- More forthright
- Instead of being 'silent'
  - Precise guidelines to some old issues
  - New items
- Provide revisions
  - Business as usual
- In tandem
  - Complement each other





## New System

- IS 1893(1)
  - FLAT SLAB Construction ALLOWED subject to conditions...

S.No. **Lateral Load Resisting System** R

Flat Slab – Structural Wall Systems 3.0

RC Building with the three features given below:  
 (i) Ductile RC Structural Walls (which are designed to resist 100% of  $V_{ps}$ ),  
 (ii) Perimeter RC SMRFs (which are designed to independently resist 25% of  $V_{ps}$ ), or  
 (iii) An outrigger and belt truss system connecting the core Ductile RC Structural Walls and the perimeter RC SMRFs

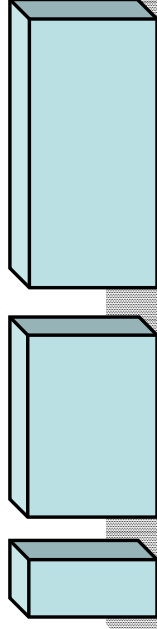
**Note:**

In these buildings:  
 (a) punching shear failure shall be avoided, and  
 (b) lateral drift at the roof under design lateral force shall not exceed **0.4%** of the building height.

## New System...

- IS 1893(1)
  - FLAT SLAB Construction ALLOWED subject to conditions...

• IS 13920  
 – New design and detail of Ductile RC Structural Wall  
 – Improvements in analysis and design of Special Moment Resisting Frames







## Clear Standing

- IS 13920
  - Energy dissipation through ductile flexural hinge in MEMBERS

IS 13920 : 2016



## Precast Structures

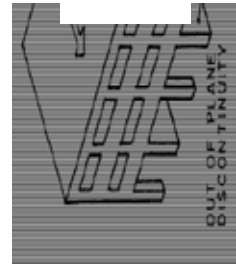
- Failure in connections
  - Need to develop standards, test protocols, etc.

## Clarity

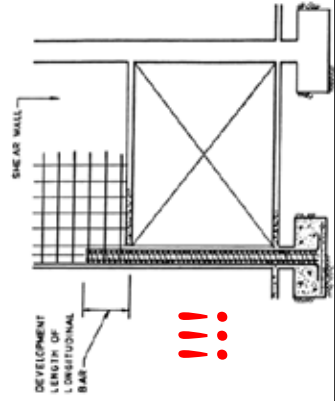
- Laying proper foundation for SAFE design!

10.1.10 Special shear walls shall be founded on properly designed foundations and shall not be discontinued to rest on beams, columns or inclined members.

IS 13920 : 2016



IS 1893(1) : 2002  
Fig.3; p.20



IS 1893(1) : 2002  
Fig.3; p.20

## Clarity

- Laying proper foundation for SAFE design!

10.1.10 Special shear walls shall be founded on properly designed foundations and shall not be discontinued to rest on beams, columns or inclined members.

IS 13920 : 2016



IS 1893(1) : 2002  
Fig.3; p.20



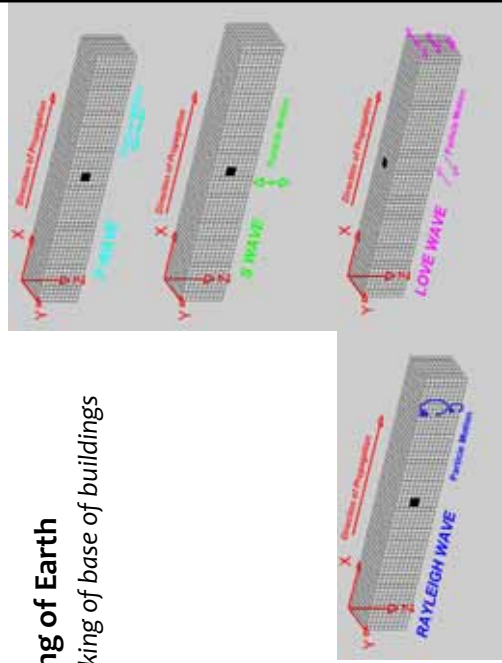


## Old Issues ... New Guidelines

- **1893(1) : 2002**
  - What is an irregularity?
    - Horizontal and Vertical
- **1893(1) : 2016**
  - What is an irregularity?
    - Horizontal and Vertical
  - What to do when an irregularity is present?
    - Guidance
      - Some are yet to be quantitatively addressed...

## Earthquakes

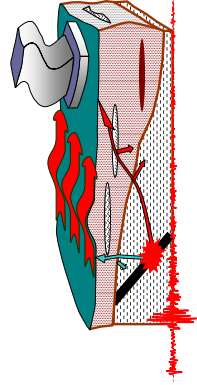
- **Shaking of Earth**
  - Shaking of base of buildings



<http://web.ec.purdue.edu/~bralle/cd/mod/waves/WaveDemo.htm>

## Earthquakes

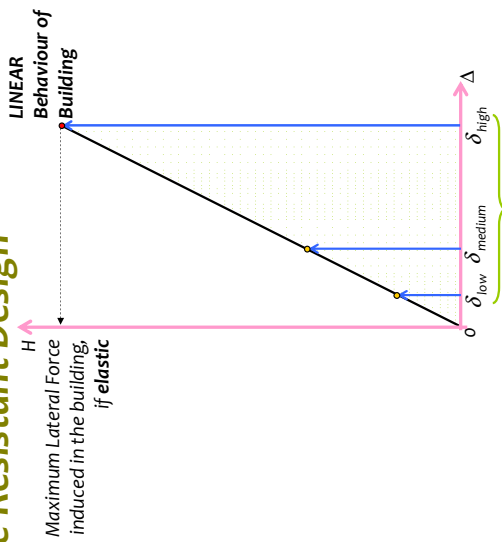
- **Shaking of Earth**
  - Causes displacement at base of buildings
  - Bigger the earthquake
    - Larger the displacement





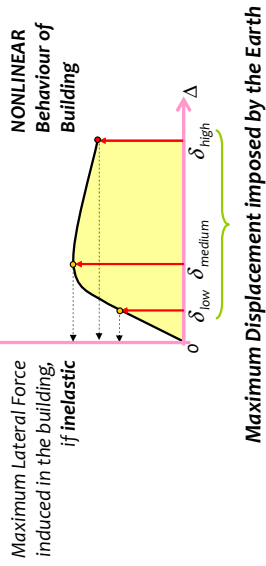
## Earthquake Resistant Design

- 1<sup>st</sup> choice



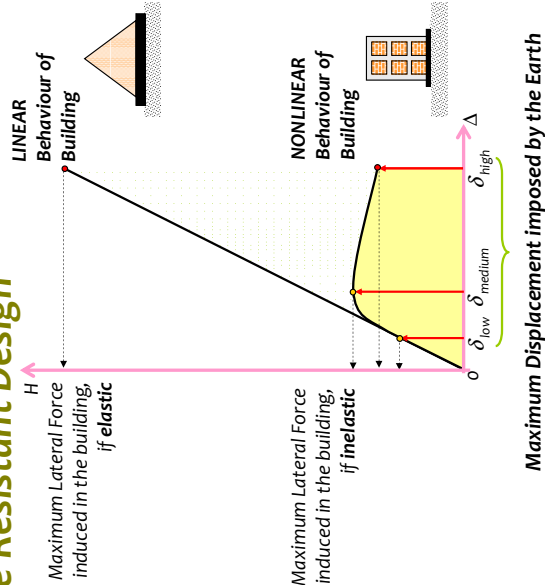
## Earthquake Resistant Design

- 2<sup>nd</sup> choice



## Earthquake Resistant Design

- 2 choices



## Earthquake Resistant Design

- Accept Damage!
  - Ensure that structures resist
    - Minor and frequent earthquakes
      - No damage to structural and non-structural elements
    - Moderate earthquakes
      - No or minor damage to structural elements and some damage to non-structural elements
    - Severe and infrequent earthquakes
      - Damage to structural elements but **WITHOUT COLLAPSE**

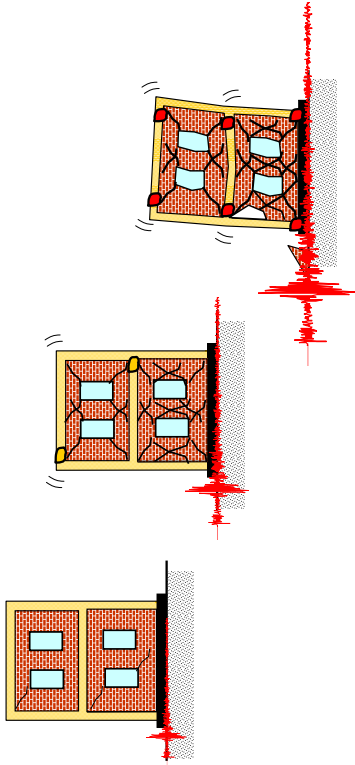




## Earthquake Resistant Design

- **Damage is acceptable**

- But NOT collapse
- Earthquake Design is Special



## Earthquake Resistant Design

- **Reliance on inelastic response**

- Damage is acceptable
- Good ductile type at desired locations



## Earthquake Resistant Design

- **RC Structures**

- Ductile
- Under-reinforced flexure
- Brittle
- Over-reinforced flexural
- Shear
- Axial
- Anchorage and Bond
- Buckling of rebars



## Earthquake Resistant Design

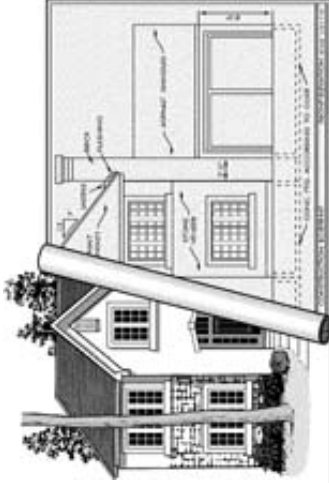
- **Location of Damage**

- Desirable
- Ductile flexural damage at beam ends
- Ductile damage in structural walls
- Undesirable
- Columns
- Joints
- Unacceptable
- Foundations
- Soil



## A more holistic approach

- Towards structural design



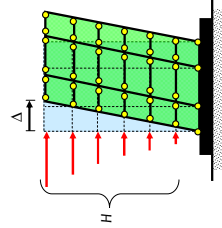
## New Items

- **Primary Objective**
  - Dissipate energy through DUCTILE action in members
  - Prevent brittle failures



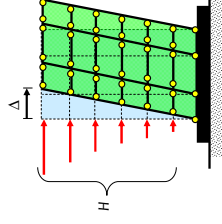
## New Items...

- **Structural configuration**
  - Specific steps based on type and severity of irregularity
    - Identify and eliminate soft and weak storey
    - Quantify contribution of URM infill walls
    - Minimum RC wall area requirement
- **Collapse mechanism**
  - Ensuring ductile action
    - Strong column weak beam design
    - Limiting factored axial load on columns
    - Ductile structural walls
  - Preventing brittle action
    - Shear design of beam-column joints
    - Mechanical couplers



## Highlights:: IS 1893(1)

- **Demand**
  - Design Criteria
    - 5% damping,  $S_d/g$ ,  $T_a$ ,  $\gamma_m$  and  $\gamma_L$ , Methods: Analysis/Design
  - R factors
  - Design Vertical Acceleration Coefficient  $A_v$
  - Minimum  $V_B$
  - Cracked Section Properties  $I_{eff}$
- **Capacity**
  - Irregularities 5+7; Diaphragm flexibility
  - URM Infill Walls
    - RC Walls in Buildings with Open Ground Storey

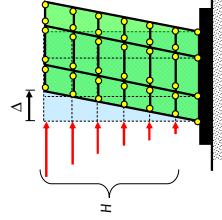




## Highlights:: IS 13920

- **Changes**
  - Scope
    - Ductile Design and Detailing of RC Structures
    - Design of Structural Walls
      - From first principle, not superposition!

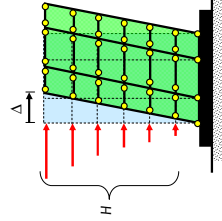
- **Additions**
  - Collapse Mechanism
    - Maximum Column Load
    - Column-Beam Strength Ratio
    - Shear Design of Beam-Column Joints
  - Mechanical Couplers



## Highlights:: IS 15988

- **Evaluation**
  - Preliminary
    - Past experience + simple calculations
  - Detailed
    - Engineering calculations

- **Strengthening**
  - Member level
    - Eliminate irregularities
  - Structure level
    - Supplemental damping & isolation



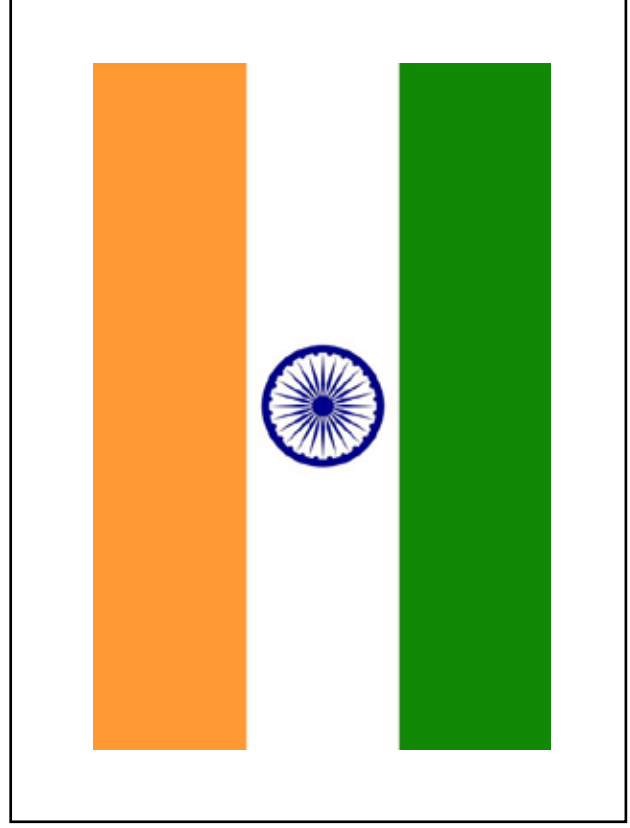
In Closure...











**Acknowledgements**

- **Government of Jammu & Kashmir**
  - Jammu / Srinagar Municipal Corporations
  - Municipal Councils / Committees / Local Bodies
  - Public Works Department
  - J&K Projects Construction Corporation Limited
  - ...
- **The Institution of Engineers (India)**
  - Jammu Local Centre
- **Professionals**
  - Colleagues
  - [www](http://www), for images





# Annexure VI - Presentation on Design and Detailing Issues of IS 1893(1) & IS 13920:2016 by Prof. Rupen Goswami at NIT, Srinagar

Seismic Setting, Construction and Design in the  
State of Jammu & Kashmir ::  
**Role of Seismic Design Codes**

---

**Rupen Goswami**  
Department of Civil Engineering  
Indian Institute of Technology Madras


**Natural Hazard Exposure of J&K  
and Sensitisation to  
Earthquake Design Concepts**

IEI, Srinagar  
March 29 2019  
**Rupen Goswami**  
Indian Institute of Technology Madras




**Hazard**

- **Man-made**
  - Involve human intent, negligence, or error  
Or failure of man-made system
  - Pollution (environmental, noise, light, ...)
  - Industrial
  - Nuclear
  - Chemical
  - Biological
  - Mining
  - Arson
  - Fire
  - Structural...



**Hazard**


- **2 types**
  - Natural
  - Man-made!!






## Hazard


- **Natural**
  - Draught
  - Windstorm & Cyclone
  - Tsunami
  - Natural Fire
  - Volcanic eruption
  - Snow
  - Landslide and Avalanche
  - Flood
  - Earthquake...



## Setting




Gondwanaland: 200 Ma



## Our Journey

- **Continental drift theory**
  - PANGAEA
  - The Super-continent





## Our Journey

- Continental drift theory
  - 6400 km journey
    - ~2900 km wide collision
    - ~300 km compression in the making of Himalayas



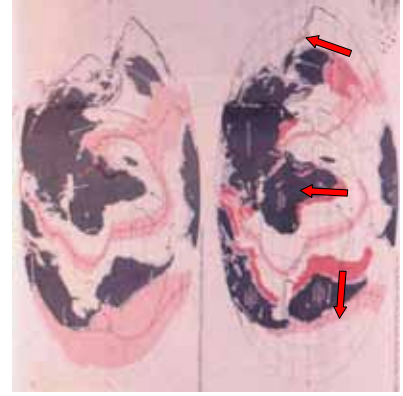
## Our Journey

- Continental drift theory
  - Current status



## Our Journey

- Continental drift theory
  - Future projections



## Plate Tectonics

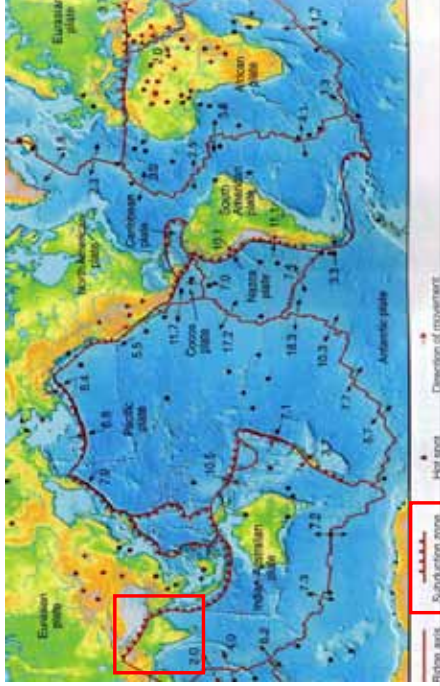
- Major Tectonic Plates





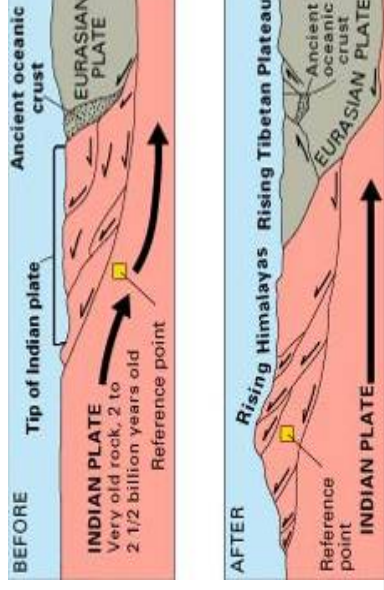
## Plate Tectonics

- Movements of tectonic plates



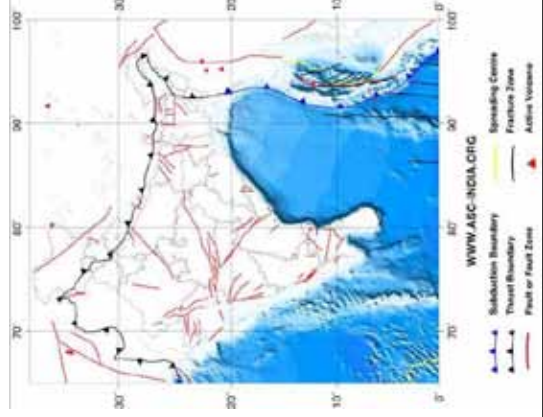
## Plate Tectonics

- Movements of tectonic plates
  - Collision of Indian and Eurasian Plates

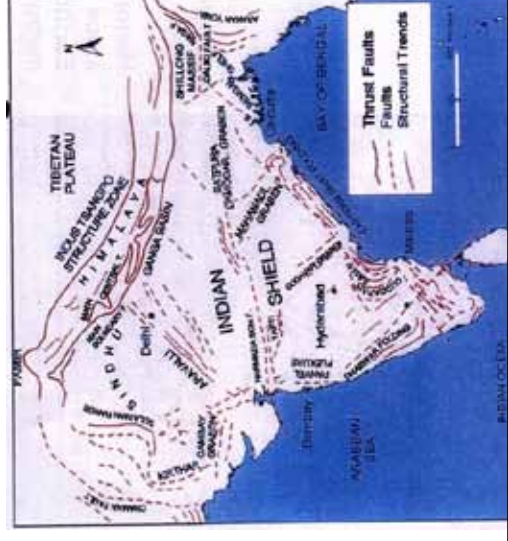


## Tectonic Setting

- Major features
  - Inter-plate boundary
  - Intra-plate faults



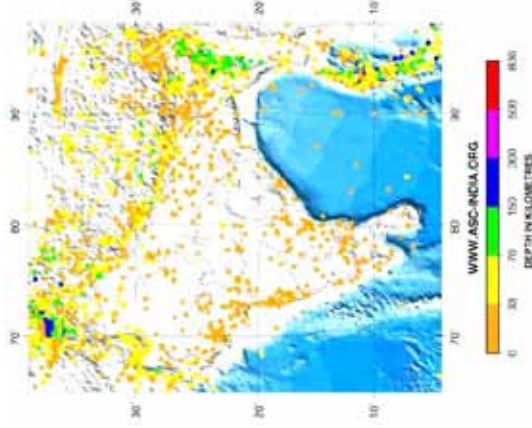
## Tectonic Setting





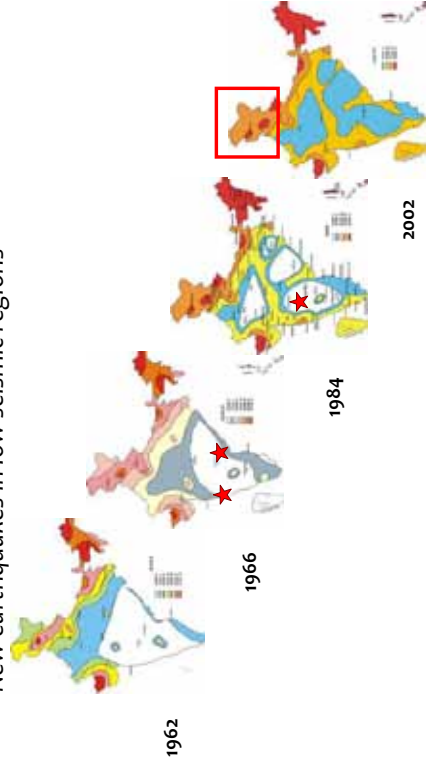
## Earthquakes

- Largely at inter-plate boundaries
  - Many significant at intra-plate faults too



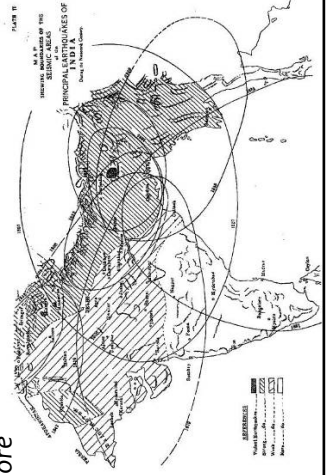
## Seismic Zoning

- Macro-zones
  - New earthquakes in low seismic regions



## Seismic Zoning

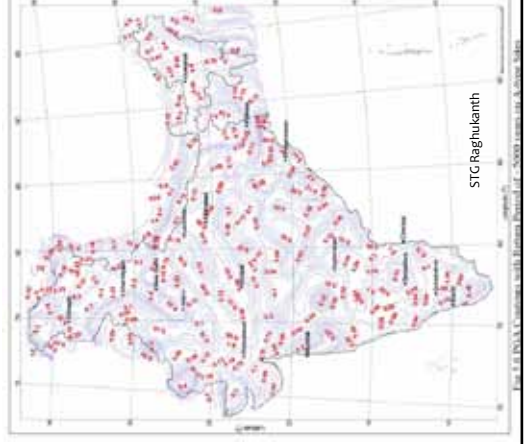
- Based on past occurrence of events
  - Zone II : MSK VI or less
  - Zone III : MSK VII or less
  - Zone IV : MSK VIII or less
  - Zone V : MSK XI or more



## PSHA

- Comprehensive consideration of
  - Potential events
  - Faults
  - Rock properties
  - Local soil properties

- $Y_R = 5,000$  years

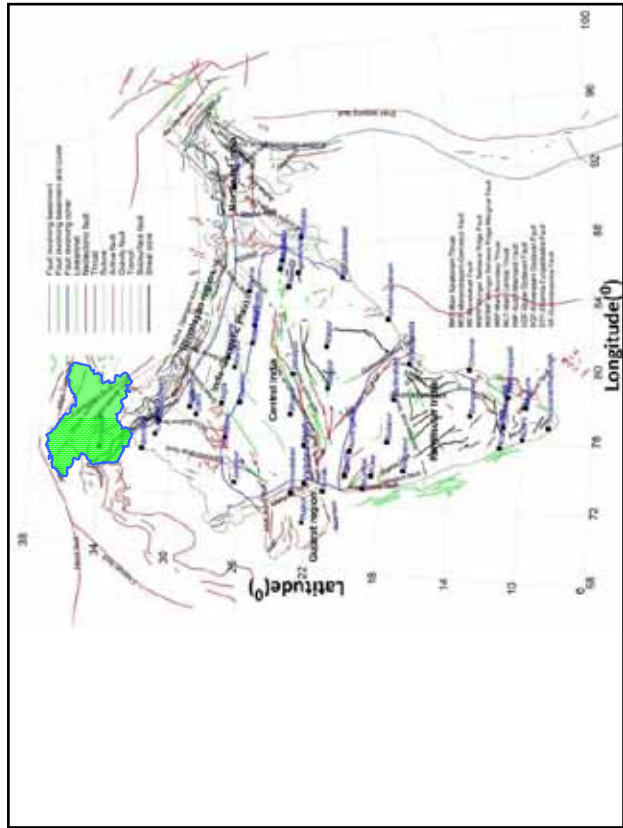
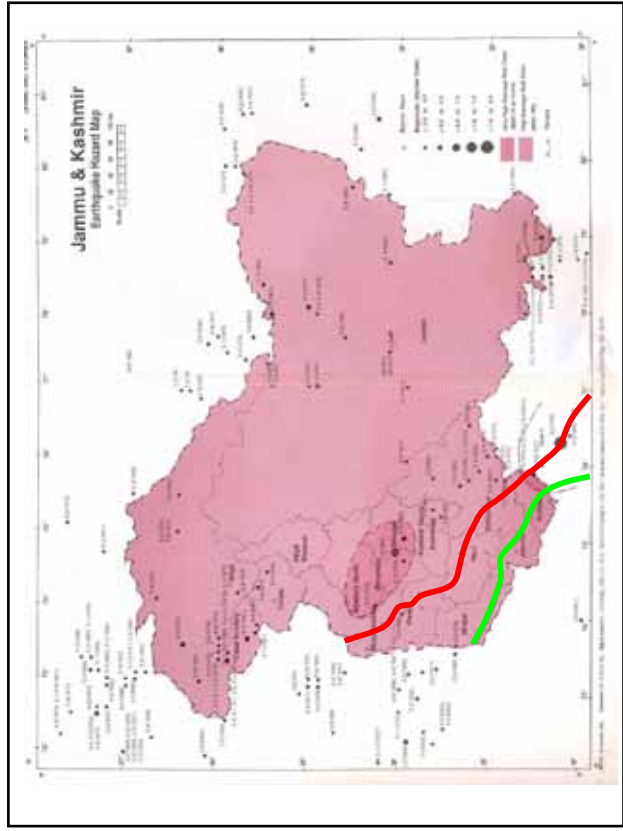


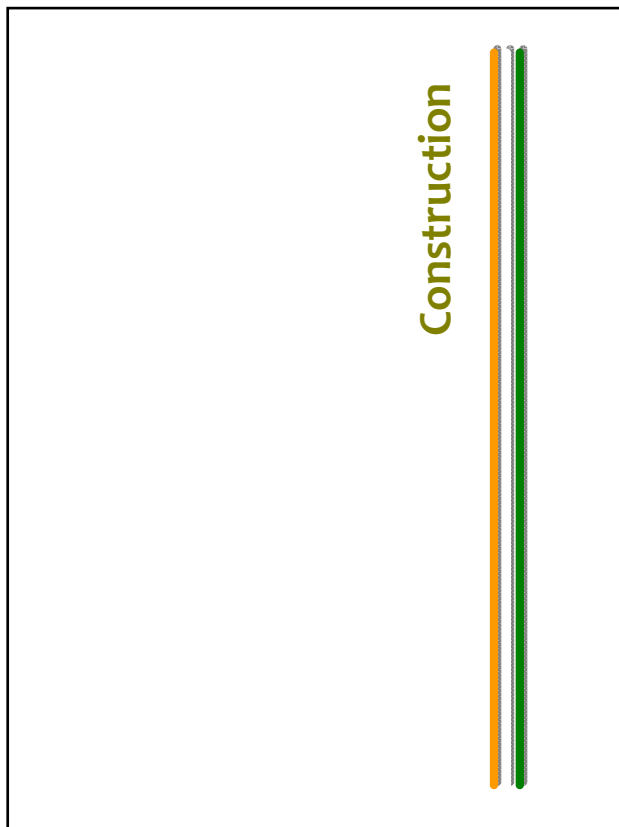
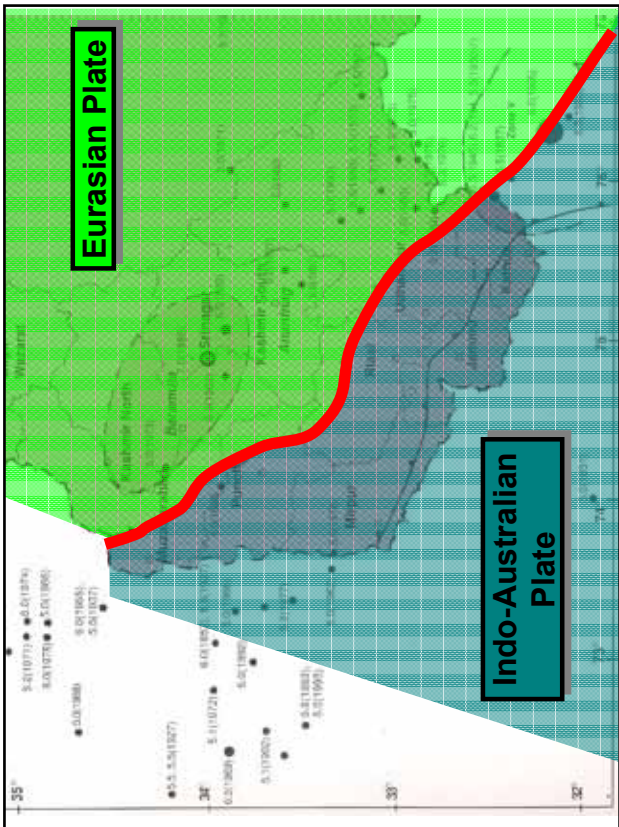
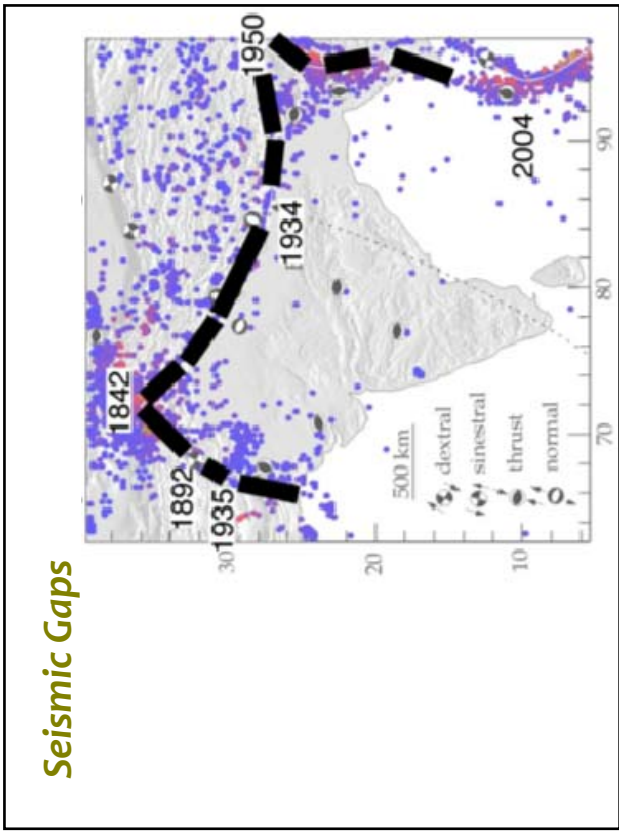


**PSHA**

- **Comprehensive consideration of**
  - Potential events
  - Faults
  - Rock properties
  - Local soil properties
- $Y_R = 10,000$  years

Fig. 3.7 PSHA Contours and Return Period of ... 10000 years on Average Sites  
 STG Raghukanth









## Types

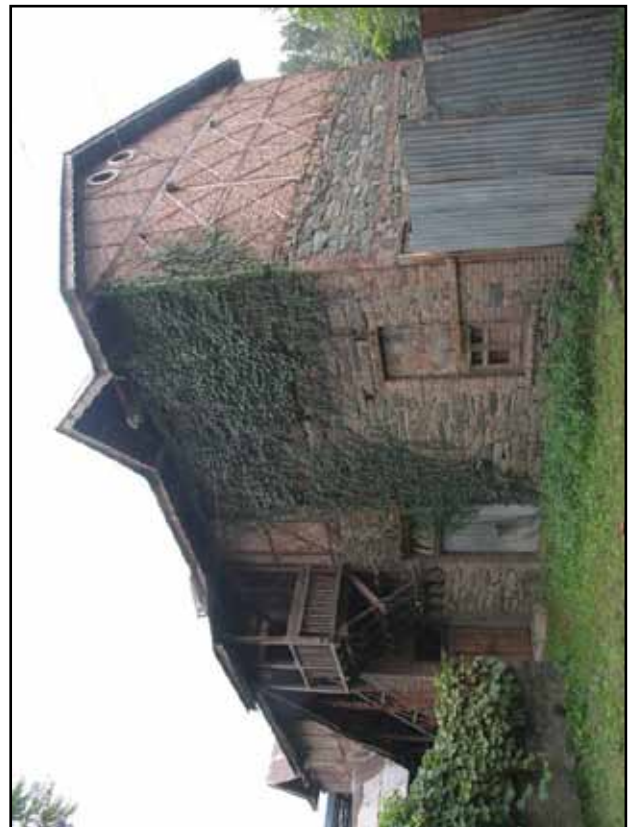
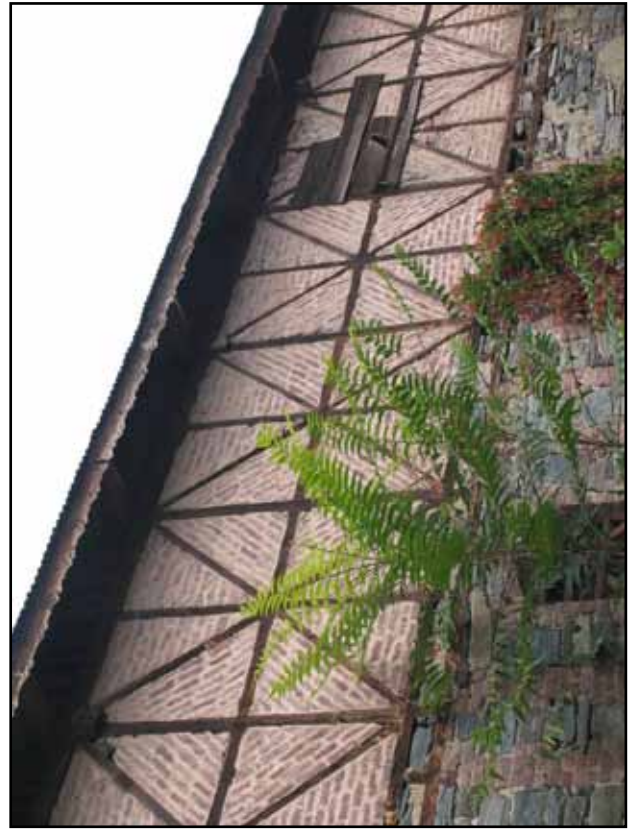
- **Traditional**
  - Dhajji Dewari, Taaq
  - Thathara, Koti Bandal, Ekra...
- **Masonry**
  - Stone Masonry
  - Brick Masonry
- **Concrete**
  - Infilled masonry
  - Confined masonry

















Building 1 intact; Building 2 loses three storeys



Building 1 intact; Building 2 pushes Building 3



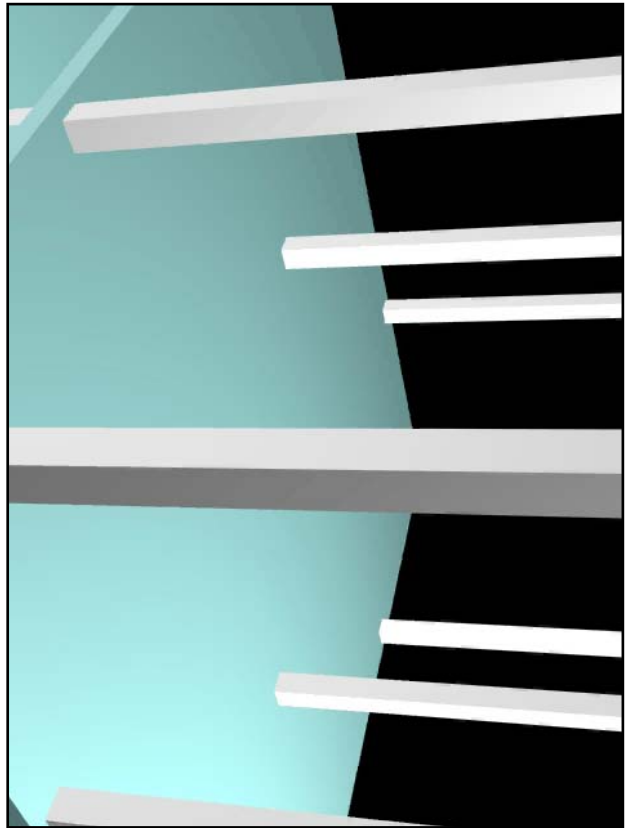
Building 2 loses three storeys



Building 2 loses three storeys


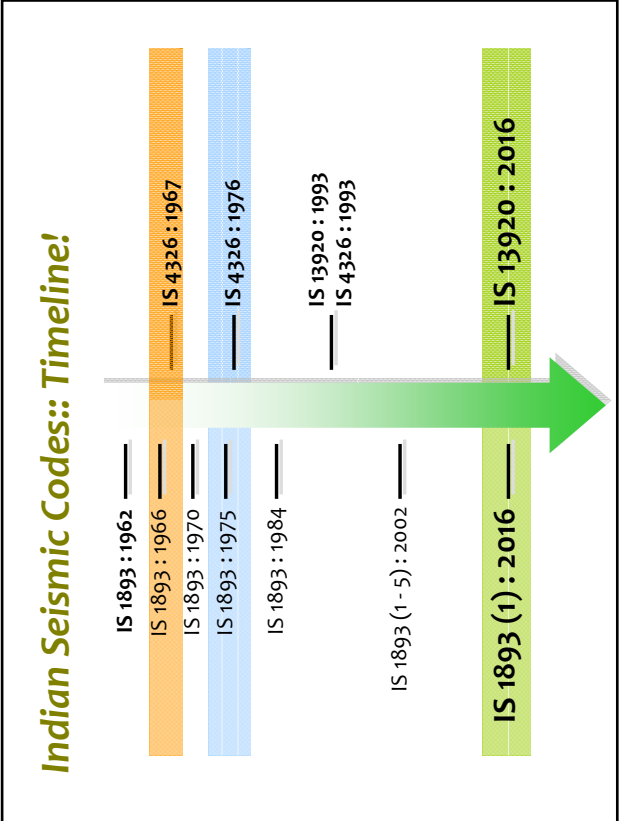








## Design Codes of Practice

- ### Indian Seismic Code IS:1893
- **Since 1984:**
    - More information
    - More experience
    - Practical difficulties
  - **IS 1893: From 2002 onwards...**
    - Part 1 :: General Provisions and Buildings
    - Part 2 :: Liquid Retaining Tanks
      - Elevated/Ground Supported
    - Part 3 :: Bridges and Retaining Walls
    - Part 4 :: Industrial and Stack-like Structures
    - Part 5 :: Dams and Embankments

- ### Other BIS Documents
- **CODES**
    - 4326 -1993 :: Earthquake Resistant Construction
    - 13920 – 1993 :: Ductile Detailing of RC Structures
  - **Guidelines**
    - 13827 -1993 :: Low Strength Masonry
    - 13828 - 1993 :: Earthen Constructions
    - 13835 - 1993 :: Repair & Strengthening

## Indian Seismic Codes: 2016 onwards...

- IS 1893

Part 1	:: General Provisions and Buildings
Part 2	:: Liquid Retaining Tanks – Elevated/Ground Supported
Part 3	:: Bridges and Retaining Walls
Part 4	:: Industrial and Stack-like Structures
Part 5	:: Dams and Embankments

## Other BIS Documents...

- CODES

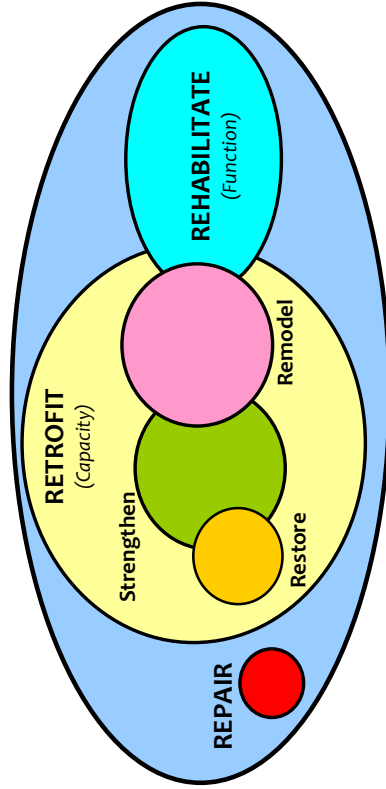
4326 – 2013	:: Earthquake Resistant Construction
13920 – 2016	:: Ductile Design and Detailing of RC Structures

- Guidelines

– 13827 - ----	:: Low Strength Masonry
– 13828 - ----	:: Earthen Constructions
– 13835 - ----	:: Repair & Strengthening
– 15988 – 2013	:: Evaluation & Strengthening of RC Buildings

## Restoration of Buildings

### Restoration



## IS 1893 (1): 2016





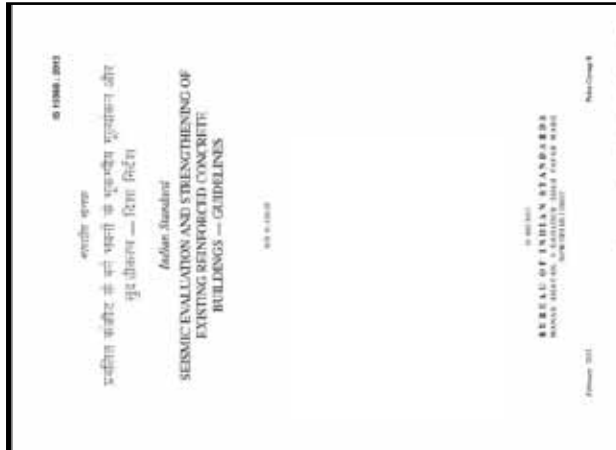
# IS 4326: 2013



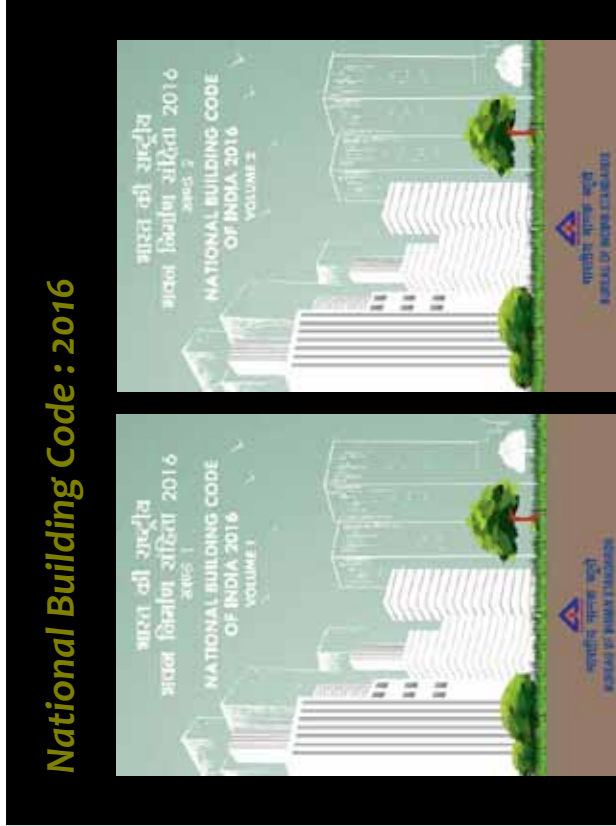
# IS 13920: 2016



# IS 15988: 2013



# National Building Code : 2016





## National Building Code : 2016

- **2 Volumes**
  - 12 Parts (1-6 In Volume 1 and 7-12 in Volume 2)
  - 33 Chapters
- **Highlights**
  - Detailed provision for **streamlining the approval process** in respect of different agencies in the form of an **integrated approval process through single window approach** thereby avoiding separate clearances from various authorities, with a view to ensuring ease of doing business in built environment sector.

## National Building Code : 2016

- **Highlights...**
  - Progressive **computerization of approval process**
  - Certification of structural safety of buildings by **competent professional and peer review of design**
  - **Fire and life safety** in modern complex buildings
  - Updated provisions on engineered **use of bamboo** in housing and other building construction
  - Norms for **solar energy utilization**
  - Updated provisions on **rainwater harvesting**
  - **Updated structural design provisions for wind and seismic** loads, imposed load due to helipad, and blast loads

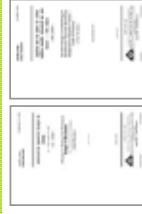
## Indian Standards

- **For ALL**



## The 2016 Revisions of 1893(1) & 13920

- **3 key aspects**
  - More forthright
    - **Instead of being 'silent'**
      - Precise guidelines to some old issues
      - New items
  - Provide revisions
    - **Business as usual**
    - **In tandem**
      - **Compliment each other**





## New System

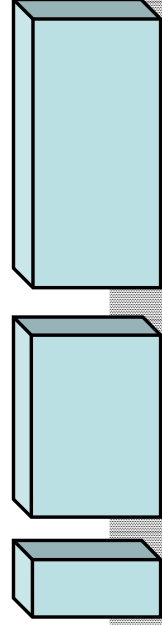
- IS 1893(1)
  - FLAT SLAB Construction ALLOWED subject to conditions...

S.No.	Lateral Load Resisting System	R
15	Flat Slab – Structural Wall Systems RC Building with the three features given below: (i) Ductile RC Structural Walls (which are designed to resist 100% of $V_{pb}$ ), (ii) Perimeter RC SMRFFs (which are designed to independently resist 25% of $V_{pb}$ ), or (iii) An outrigger and belt truss system connecting the core Ductile RC Structural Walls and the perimeter RC SMRFFs	3.0
<b>Note:</b> In these buildings: (a) punching shear failure shall be avoided, and (b) lateral drift at the roof under design lateral force shall not exceed <u>0.1%</u> of the building height.		

## New System...

- IS 1893(1)
  - FLAT SLAB Construction ALLOWED subject to conditions...

• IS 13920	– New design and detail of Ductile RC Structural Wall
	– Improvements in analysis and design of Special Moment Resisting Frames





## Clear Standing

- IS 13920

- Energy dissipation through ductile flexural hinge in MEMBERS

1.1.2 The provisions for RC structures given herein apply specifically to monolithic RC construction, and not for precast RC structures.

IS 13920 : 2016

- Precast Structures

- Failure in connections
  - Need to develop standards, test protocols, etc.





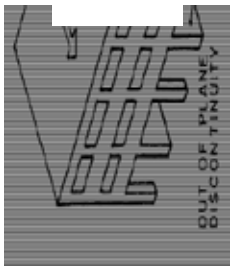


## Clarity

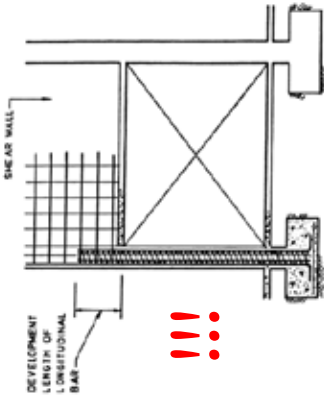
- Laying proper foundation for SAFE design!

10.1.10 Special shear walls shall be founded on properly designed foundations and shall not be discontinued to rest on beams, columns or inclined members.

IS 13920 : 2016



IS 1893(1) : 2002  
Fig 3; p 20

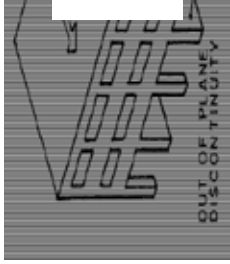


## Clarity

- Laying proper foundation for SAFE design!

10.1.10 Special shear walls shall be founded on properly designed foundations and shall not be discontinued to rest on beams, columns or inclined members.

IS 13920 : 2016



IS 1893(1) : 2002  
Fig 3; p 20



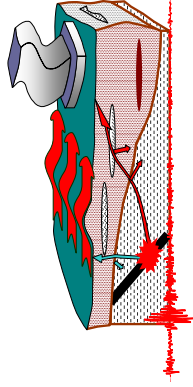
## Old Issues ... New Guidelines

- 1893(1) : 2002
  - What is an irregularity?
    - Horizontal and Vertical
- 1893(1) : 2016
  - What is an irregularity?
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  - What to do when an irregularity is present?
    - Guidance
      - Some are yet to be quantitatively addressed...



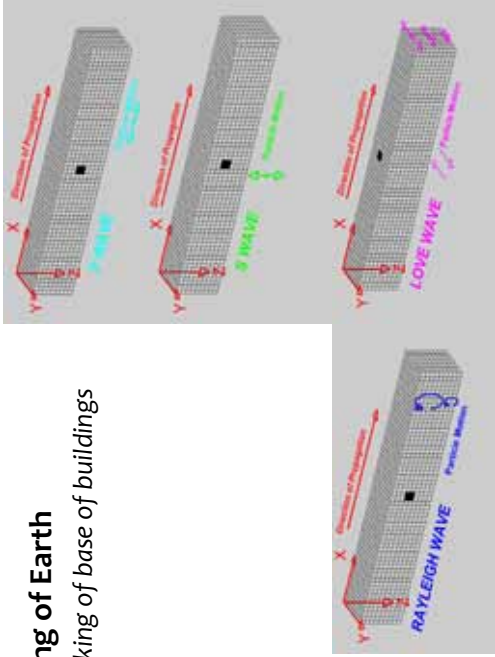
## Earthquakes

- Shaking of Earth
  - Causes displacement at base of buildings
  - Bigger the earthquake
    - Larger the displacement



## Earthquakes

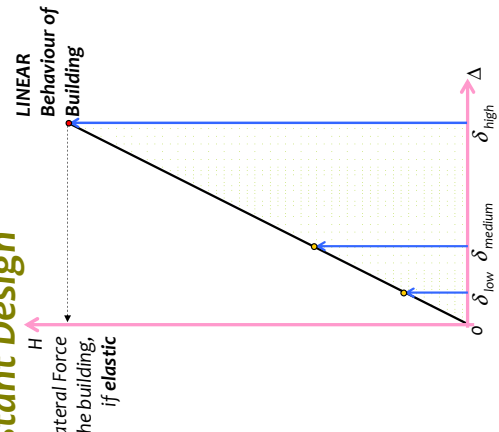
- Shaking of Earth
  - Shaking of base of buildings



<http://web.lcs.purdue.edu/~braile/edumod/waves/WaveDemo.htm>

## Earthquake Resistant Design

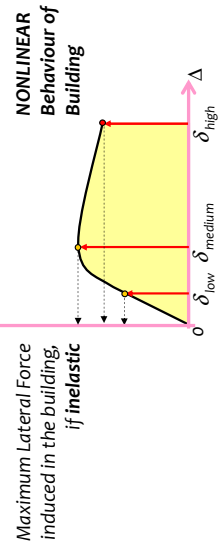
- 1st choice
  - Maximum Lateral Force induced in the building, if elastic



Maximum Displacement imposed by the Earth

## Earthquake Resistant Design

- 2nd choice
  - Maximum Lateral Force induced in the building, if inelastic



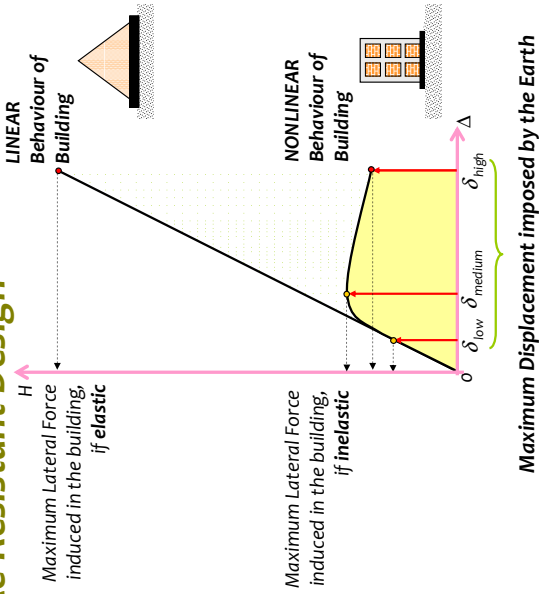
Maximum Displacement imposed by the Earth





## Earthquake Resistant Design

- 2 choices



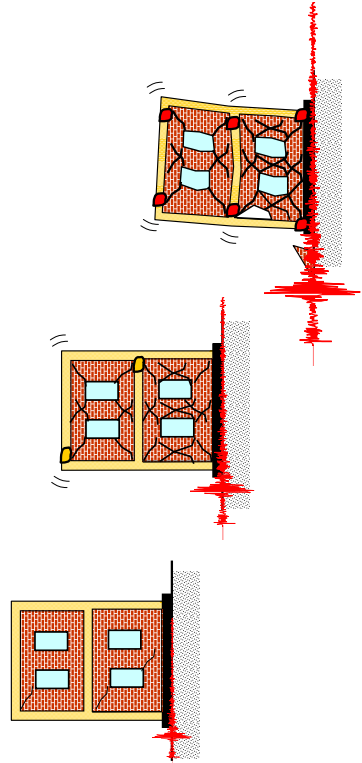
## Earthquake Resistant Design

- Accept Damage!
  - Ensure that structures resist
- Minor and frequent earthquakes
  - No damage to structural and non-structural elements
- Moderate earthquakes
  - No or minor damage to structural elements and some damage to non-structural elements
- Severe and infrequent earthquakes
  - Damage to structural elements but **WITHOUT COLLAPSE**



## Earthquake Resistant Design

- Damage is acceptable
  - But NOT collapse
  - Earthquake Design is Special



## Earthquake Resistant Design

- Reliance on inelastic response
  - Damage is acceptable
  - Good ductile type at desired locations





## Earthquake Resistant Design

- **RC Structures**
  - Ductile
    - Under-reinforced flexure
  - Brittle
    - Over-reinforced flexural
    - Shear
    - Axial
    - Anchorage and Bond
    - Buckling of rebars



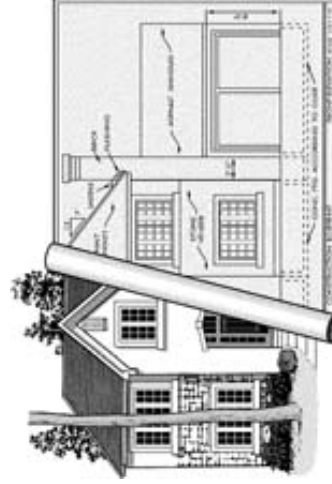
## Earthquake Resistant Design

- **Location of Damage**
  - Desirable
    - Ductile flexural damage at beam ends
    - Ductile damage in structural walls
  - Undesirable
    - Columns
    - Joints
  - Unacceptable
    - Foundations
    - Soil



## A more holistic approach

- Towards structural design



## New Items

- **Primary Objective**
  - Dissipate energy through DUCTILE action in members
    - Prevent brittle failures



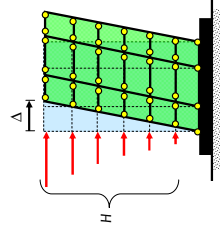


## New Items...

- **Structural configuration**
  - Specific steps based on type and severity of irregularity
  - Identify and eliminate soft and weak storey
    - Quantify contribution of URM infill walls
    - Minimum RC wall area requirement

- **Collapse mechanism**

- Ensuring ductile action
  - Strong column weak beam design
  - Limiting factored axial load on columns
  - Ductile structural walls
- Preventing brittle action
  - Shear design of beam-column joints
  - Mechanical couplers

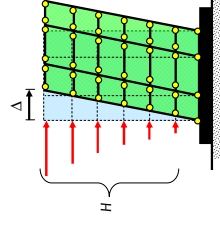


## Highlights:: IS 1893(1)

- **Demand**
  - Design Criteria
    - 5% damping,  $S_d/g$ ,  $T_a$ ,  $\gamma_m$  and  $\gamma_L$ , Methods: Analysis/Design
  - R factors
  - Design Vertical Acceleration Coefficient  $A_v$
  - Minimum  $V_B$
  - Cracked Section Properties  $I_{eff}$

- **Capacity**

- Irregularities 5+7; Diaphragm flexibility
- URM Infill Walls
  - RC Walls in Buildings with Open Ground Storey

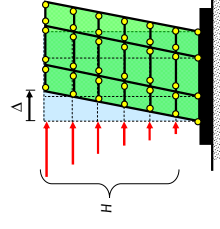


## Highlights:: IS 13920

- **Changes**
  - Scope
    - Ductile Design and Detailing of RC Structures
    - Design of Structural Walls
      - From first principle, not superposition!

- **Additions**

- Collapse Mechanism
  - Maximum Column Load
  - Column-Beam Strength Ratio
  - Shear Design of Beam-Column Joints
- Mechanical Couplers

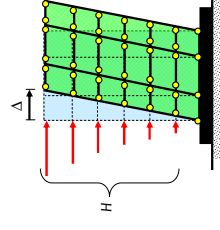


## Highlights:: IS 15988

- **Evaluation**
  - Preliminary
    - Past experience + simple calculations
  - Detailed
    - Engineering calculations

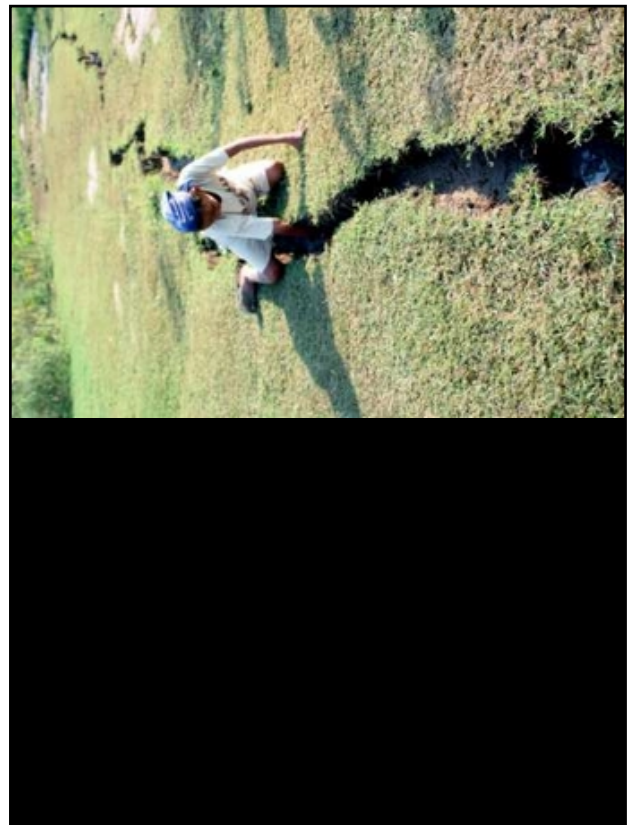
- **Strengthening**

- Member level
  - Structure level
    - Eliminate irregularities
    - Supplemental damping & isolation
  - Alternate options





In Closure...

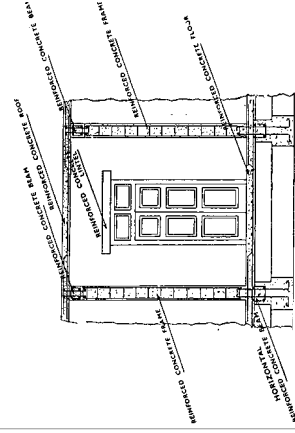




Old knowledge...

The  
Indian Concrete Journal  
1934

### Important points about Earthquake Proof Construction.



When rebuilding or repairing insist on having the above features incorporated in your new building, as an insurance against further earthquake shocks.

For details of recent construction, apply to—

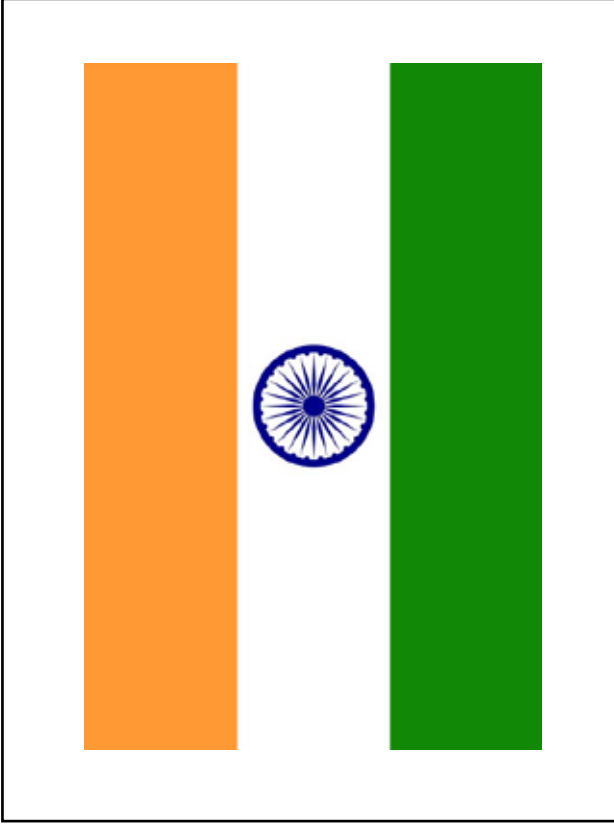
THE CONCRETE ASSOCIATION OF INDIA  
Fishes Building, Bansa Street,  
P.O. Box, BOMBAY.

WITH A. S. WANI AT THE HEAD OF THE STAFF OF THE INDIAN CONCRETE ASSOCIATION, BOMBAY. THE ASSOCIATION WAS FORMED IN 1934. THE ASSOCIATION IS NOW UNDER THE MANAGEMENT OF THE INDIAN CONCRETE ASSOCIATION, BOMBAY.









**Acknowledgements**

- **Government of Jammu & Kashmir**
  - Jammu / Srinagar Municipal Corporations
  - Municipal Councils / Committees / Local Bodies
  - Public Works Department
  - J&K Projects Construction Corporation Limited
  - ...
- **The Institution of Engineers (India)**
  - Srinagar Local Centre
- **Professionals**
  - Colleagues
  - [www](http://www), for images

