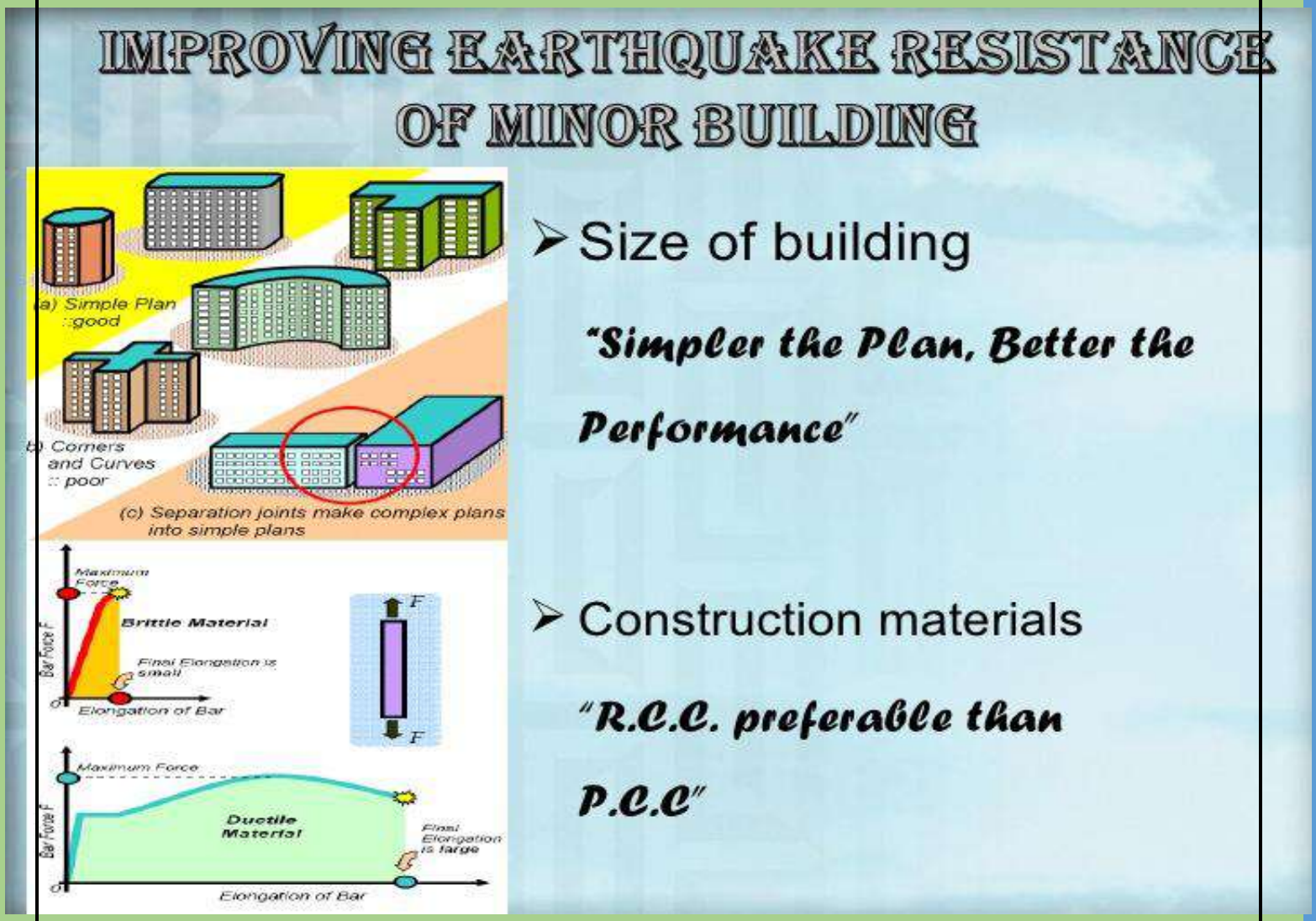
TRAINING OF MASONS ON HAZARD-RESISTANT CONSTRUCTION

AT

BASANTPUR BLOCK SHIMLA, HP



Organised by

District Disaster Management Authority, Solan, Himachal Pradesh

&

State Disaster Management Authority (SDMA), H.P. Secretariat, Shimla

In collaboration with

Himachal Pradesh Council for Science, Technology and Environment, Shimla

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EXECUTIVE SUMMARY

WORK SCHEDULE FOR THREE DAYS TRAINING ON "EARTHQUAKE RESISTANT CONSTRUCTION TECHNOLOGY FOR RURAL MASONS"

VENUE: **Basantpur Block, Distt Shimla, HP**

PROGRAMME: **05-07 February, 2020.**

Organised by: District Disaster Management Authority, District Shimla

State Disaster Management Authority, Shimla.

In Collaboration with: Himachal Pradesh Council of Science Technology and Environment

Day/Sessions	Topic	Resource Person
Day 1- 03.10.2019 (Thursday)		
09:00 – 10.00	**Registration**	
10:00 - 11.30	Inaugural Session	
	Welcomes Address	**Kaam Raj Thakur,** SEBPO, Block Basantpur
	Honoring of Chief Guest	**Kaam Raj Thakur**
	Introduction & Course Objectives	**Sh. Gopal Jain, Scientific Officer,** HIMCOSTE, Shimla
	Address by Chief Guest	**Sh. Sandeep Negi,** Additional District Magistrate, Distt Shimla
	Vote of Thanks	Principal/ Coordinator
11:30- 13:30	Good Construction Practices	**Ar. Prem Lal Thakur,**Asstt. Architect, HIMCOSTE
13:30- 14:00	Lunch break	
14:00- 15:00	Examining Quality of Materials and importance of Construction Tools for Good Quality of Construction.	**Er. Kanchan Rana, Jr. Research Fellow** HIMCOSTE, Shimla.
15:00- 17:00	Layout of site. Construction Sample Foundation and Plinth. Construction of Plinth band. Visit to Demonstration Centre.	**HIMCOSTE Team.**
Day 2- 04.10.2019 (Friday)		
09:00- 09:30	Recapitulating the previous Day's Learning.	**Sh. Gopal Jain, Scientific Officer,** HIMCOSTE, Shimla
09:30- 13:30	Constructing Hazard Resistant Foundations with corner vertical	**HIMCOSTE Team.**

	bars.	
13:30- 14:00	Lunch break	
14:00- 15:00	Principal of Hazard Resistant Construction. Hazard Resistant Features for House size and Configuration. Importance of Site and Soil Conditions.	**Er. Kanchan Rana, Jr. Research Fellow** HIMCOSTE, Shimla.
15:00 - 17:00	Hazard Resistant Feature construction: Foundation and Plinth.	**Ar. Prem Lal Thakur,**Asstt. Architect, HIMCOSTE
DAY 3 - 05.10.2019 (Saturday)		
9:00 – 09:30	Recapitulating the previous Day's Learning.	**Sh. Gopal Jain, Scientific Officer,** HIMCOSTE, Shimla
9:30- 12:00	Constructing Earthquake resistant feature Plinth Band.	**Ar. Prem Lal Thakur** and HIMCOSTE TEAM.
12:00 – 13:00	Estimation of Quantities and Costs	**Er. Kanchan Rana, Jr. Research Fellow** HIMCOSTE, Shimla.
13:00 – 14:00	Lunch break	
14:00- 15:00	Hazard Resistant Feature for other Construction Elements.	**Sh. Gopal Jain, Scientific Officer,** HIMCOSTE, Shimla
15:00- 16:00	Importance of Earthquake resistant feature Plinth Band.	**Er. Kanchan Rana, Jr. Research Fellow** HIMCOSTE, Shimla.
16:00- 17:00	Feedback from Participants. Valediction.	Distribution of TA/DA.

***Sessions were continued until the activities of the day are complete.**

****Tea was served at 11:30 and 15:30.**

DDMA SHIMLA, Team Members		
S. NO.	**Name**	**Designation**
1.	Sh. Hitender Sharma	BDO
2.	Kaam Raj Thakur SEBPO	SEBPO
3.	Neha	Project Director, DDMA Shimla

HIMCOSTE, Team Members		
S. NO.	**Name**	**Designation**
4.	Sh. Gopal Jain	Scientific Officer
5.	Ar. Prem Lal Thakur	Asstt. Architect
6.	Er. Kanchan Rana	Jr. Research Fellow

Introduction

This training made them aware not only of the critical principles of hazards resistant construction but also provide some practical skills in appropriate and relevant details of Rural Housing Technologies that people use in different regions of India. The objective of this training curriculum is to strengthen the practicing Masons on Hazard Resistant Construction Techniques and features through theoretical and practical sessions.

This training is meant to guide Masons on construction of engineered houses up to two stories and does not cover construction of engineered buildings with reinforced concrete frame for multi storey buildings.

Training methods

This training module is envisaged to be for 3 days. Each training day is designed such that there is ample time for hands-on training of Masons. The classroom sessions are plant using participatory methods with discussions, audio visual presentations models etc. Sessions provide enough time and scope for the trainees to discuss their concerns, questions and issues. The practical construction sessions were to get hands-on experience of hazard resistant features and details used in construction work.

A maximum of 3 dozen Masons were trained at one time with three resource persons training them.

Masons trained at Basantpur Block, Distt Shimla, HP from 05-07 February, 2020. The total number of masons were 35.

Sr no	Name	Village/Panchayat Name	Mobile no
1.	Mohan singh	Ghaini	8580567639
2.	Balak ram	Reog	
3.	Om Prakash	Khatnal	9817755142
4.	Rajesh sharma	Khatnal	7018106729
5.	Nek chand	Shakrari	8988112917
6.	Mohal lal	Shakrari	8580721635
7.	Nand lal	Basantpur	8261060586
8.	Prem lal	Neen	9805047531
9.	Jagat singh	Neen	8894017788
10.	Madan lal	Shakrari	8580456046
11.	Chunni lal	Shakrari	9817644123
12.	luxminand	Basantpur	9817293797
13.	Narender kumar	Basantpur	9418589487
14.	Ramesh kumar	Basantpur	9817725598
15.	Chirju lal	Reog	9817520721
16.	Krishan kumar	Reog	8988230501
17.	Bhagal ram	Reog	8988366051
18.	Pawan kumar	Deola	9459355280
19.	Tek chand	Maghiwar	8629070713
20.	Om prakash	Maghiwar	9805383250
21.	Nek ram	Ghaini	8219139899
22.	Chunni lal	Basantpur	7807800797
23.	Dalip kumar	Basantpur	9817790055

24.	yashpal	Maghiwar	9817043350
25.	Basonda lal	Maghiwar	9817425349
26.	Tirath ram	Dewla	8278755278
27.	Hem raj sharma	Khatnal	9817826746
28.	Sant ram	Dewla	8894067274
29.	Girdhari lal	Khatnal	9816695316
30.	Chunni lal	Reog	9817190080
31.	Sita ram	Reog	9418498136
32.	Kundan lal	Khatnal	8628899737
33.	Hari ram	Neen	7876275571
34.	Chandar Prakash	Neen	8091730766
35.	Narender sharma	Maghiwar	8261042619

Training Sessions

Inaugural Session

The opening speech is given by **Kaam Raj Thakur,** SEBPO, Block Basantpur Distt Shimla. The esteemed dignitaries present were, **Sh. Gopal Jain** Scientific Officer HIMCOSTE, Ar. Prem Lal Thakur

Asstt. Architect HIMCOSTE, **Er. Kanchan Rana,** Jr. Research Fellow HIMCOSTE and the audience. While inaugurating the training lauded that such trainings may help in adoption of suitable Earthquake Resistant Technologies and serve the larger interest of the Himalayan State, which falls in Zone IV & V by the norms of the earthquake definitions.

Welcome Address

At the outset of the Programme, **Kaam Raj Thakur, SEBPO** of esteemed dignitaries and the entire audience. Setting the Programme's premise he highlighted the growing concern around hazard resistant techniques. The chief guest appreciated the effort of HIMCOSTE for taking up an interesting societal programme. She advised the trainee participants to learn appropriate techniques with full dedication and a commitment in order to take and transfer them further for field implementations in all future construction activities. The Chief Guest also suggested

for inclusion of a discussion on suitable retrofitting techniques in the training curriculum so as to help and get them implemented in the improvement of the existing houses and making them earthquake resistant.

The training comprises of 13 sessions, consisting of 10 theory classroom and 3 practical sessions. These sessions were conducted in 48 hours over 3 days. The sessions are named in sequence of 1 to 13 and the prefix letter indicates the nature of session i.e. “C’ for classroom session and “P” for practical exercises.

Session C1 was introductory classroom session where **Sh. Gopal Jain, Scientific Officer,** HIMCOSTE, Shimla discussed about the coarse objective. The participants interacted with each other and with the trainers. Their expectations from this training program were defined in this session.

The participants were encouraged to discuss the role the artisan play in influencing the choices of the house owners and promoting hazard resistant specifically in context of self build of self build houses.

Session C2 In this session, **Ar. Prem Lal Thakur,** Asstt. Architect, HIMCOSTE introduced the participants to good construction practices in the country. He focused on regional context of the trainees. This establish linkages

between the building typologies and materials available as well as construction skills in the region. This session led discussion on important role artisans have played in evolving these typologies.

Session C3 In this session, **Er. Kanchan Rana, Jr. Research Fellow** HIMCOSTE, Shimla discussed about how to examine quality of materials and importance of construction tools for good quality of construction. He also discussed different natural hazards and focused on the locally experienced hazards, their severity, frequency and their impact on buildings. The natural hazards covered under different topics are earthquake, flood, cyclone, tsunami and landslides. There is flexibility to include other local hazards that may affect the particular region. The session gives conceptual understanding of different hazard zones that the country is divided into and the impact a particular region would have certain hazards. A specific discussion was initiated in the session on multiple hazards striking a particular region. Further impact of the above hazards on buildings is discussed.

Session P4 was a practical session which is meant to instil the importance of good quality materials and workmanship in construction. In this session, masons visited the Demonstration Centre with **HIMCOSTE Team.** Layout and Construction of Sample Foundation was done. Simple steps, rules and techniques were expected to be performed by participants to know

their understanding of basics of construction. The session helped the trainers to know the skill levels of the participants so as to customise future instructions.

Session C5 was a classroom session given by **Sh. Gopal Jain, Scientific Officer,** HIMCOSTE, Shimla. This session was focused on Recapitulation of previous Day's Learning on the principles of hazard resistant construction. While discussing various hazards that induced damage, this session identified the characteristics that help buildings survive earthquake forces. Basic structural principles were discussed in this session with simple and often day to day life examples.

Session P6was a practical session which was meant to construct the Hazard Resistant Foundations with corner vertical bars. These sessions was led by **HIMCOSTE Team**. The plinth is constructed on site.

The bars are provided at the corners of walls to make the building earthquake resistant.

Session C7 was a classroom session in which House size and shape and damage due to hazards was discussed. **Er. Kanchan Rana, Jr. Research Fellow** HIMCOSTE, Shimla made all masons aware about size, shape, scale and proportions of building and its elements that play important role in determining whether or not the building is prone to damage during hazards.

Session P8 was a practical session in which **Ar. Prem Lal Thakur,** Asstt. Architect, HIMCOSTE Team talked about Hazard Resistant Features and construction of Foundation and Plinth. The

masons are made familiar with the good construction practices, directions of windows, slab thickness, steps to be followed in stone masonry and brick masonry, techniques of shuttering, positions of windows and doors, construction of staircases.

Session C9 was a classroom session given by **Sh. Gopal Jain, Scientific Officer,** HIMCOSTE, Shimla. This session was focused on Recapitulation of previous Day's Learning, meant to apply the theoretical knowledge gained in earlier classroom sessions in

the construction exercises. Participants understand how to construct foundations incorporating hazard resistant features.

The foundations chosen in these exercises were selected from the locally practiced typologies. Also, participants were exposed to the basics of reinforced concrete footings and details of horizontal bands.

Session P10 was a practical session in which construction of earthquake resistant plinth band was done. **Ar. Prem Lal Thakur and HIMCOSTE TEAM also** discuss facts of building site, different soil types and hazard resistant features of the house.

Specific soil conditions like house on black cotton or Sandy soils as well as special incidents like liquefaction are discussed in this section.

Specifications of foundation for hilly Terrain and landslide prone regions are discussed in this session.

Session C11 was a classroom session given on Estimation of Quantities and Costs **by Er. Kanchan Rana, Jr. Research Fellow HIMCOSTE**, Shimla. She told participants about the importance and role of money, material and manpower. She told what the specifications of buildings is and how to find the item rates of materials. The participants understood how to calculate the rate of construction materials.

Session C12 was a classroom session given on Hazard Resistant Feature for other Construction Elements by **Sh. Gopal Jain, Scientific Officer,** HIMCOSTE, Shimla. He discussed about the parapets, balconies, chajjas, staircases, veranda and overhead tanks. He told that Parapets must be light weight, veranda should have columns that are properly braced up.

Session C13 was a classroom session discussed on Importance of Earthquake resistant feature using Plinth Band by **Er. Kanchan Rana, Jr. Research Fellow** HIMCOSTE, Shimla.She discussed importance of selecting right type of foundation and plinth for specific conditions which may help in hazard resistance. Specifications of foundation for hilly Terrain and landslide prone regions are discussed in this session. Damp Proofing course, installing vertical reinforcement are discussed. The details of bands and vertical reinforcement are discussed. The participants are made aware of the requirement of wire benders and carpenters they work with. Participants understand critical concepts of siting and details of construction of foundation and plinth.

The Major Things learned from this workshop:-

1. Construct CL stubs and mark CL and level. Protect stubs from damage. Protect stubs from damage.

2. Always check dimensions and corners by 3-4-5 method or equal diagonal method.

3. Check the level of construction at different levels.

4. Check that the courses are in level.

5. After checking the level plumb the bob.

6. Apply mortar to brick face before putting it in the course and fill all the mortar joints.

7. Consume mortar within 30-60 minutes of adding water.

8. Ensure perfect bond.

9. Provide RC band and corner steel as per design and detail

10. The Sill Band provided is shown as

The final structure made is shown in the following picture.

Distribution of certificates

Feedbacks

1. They like the Training programme because they learned new techniques for hazard resistant construction.

2. They don’t use the horizontal and vertical bands in the construction of buildings, now they said they will use.

3. They commit that they will use centre line method and will use stubs in construction.

4. They said that they will teach other masons these techniques.

5. In village they don’t use bands in load bearing structures, but now will use.

6. They said that they have learned 50% new techniques.