



TRAINING OF MASONS ON HAZARD RESISTANT CONSTRUCTIONS

AT
MUNICIPAL CORPORATION SHIMLA, HP



Organised by
Municipal Corporation Shimla



In collaboration with
HP Council for Science, Technology and Environment (HIMCOSTE)



Sponsored by
United Nations Development Programme UNDP



Compiled by
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EXECUTIVE SUMMARY

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

VENUE: Community Hall, Kaithu-Shimla

PROGRAMME: 28-29 January, 2020.

Organised by : Municipal Corporation Shimla

In collaboration with HP Council for Science, Technology and Environment (HIMCOSTE).

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Day/Sessions	Topic	Resource Person
Day 1- 28 January, 2020 (Tuesday)		
09:00 – 10:00	Registration	
10:00 - 11:30	Inaugural Session	Inauguration by Chief Guest
	Welcomes Address	HarKanchan Singh , Project Coordinator, Municipal Corporation Shimla.
	Honoring of Chief Guest	Sh. Gopal Jain , Scientific Officer
	Introduction & Course Objectives	Sh. Gopal Jain , Scientific Officer
	Address by Chief Guest	SatyaKaundal , Mayor Shimla
	Vote of Thanks	HarKanchan Singh
11:30- 13:30	Good Construction Practices	Er. Kalit Bhardwaj , Sr. Tech Asstt.,
13:30- 14:00 Lunch break		
14:00- 15:00	Examining Quality of Materials and importance of Construction Tools for Good Quality of Construction.	Sh. Gopal Jain , Scientific Officer
15:00- 17:00	Layout of site. Construction Sample Foundation and Plinth. Construction of Plinth band. Visit to Demonstration Centre.	HIMCOSTE Team.
Day 2- 30 January, 2020 (Thursday)		
09:00- 09:30	Recapitulating the previous Day's Learning.	Er. Kalit Bhardwaj , ATC, Sundernagar.
09:30- 13:30	Constructing Hazard Resistant Foundations with corner vertical bars.	HIMCOSTE Team.
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. KanchanRana, Jr. Research Fellow HIMCOSTE, Shimla.
15:00 - 17:00	Hazard Resistant Feature construction: Foundation and Plinth.	HIMCOSTE Team.

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

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

HIMCOSTE, Team Members		
S. NO.	Name	Designation
1.	Sh. Gopal Jain	Scientific Officer
2.	Er. Kalit Bhardwaj	Sr. Tech Asstt.,
3.	Er. KanchanRana	Jr. Research Fellow/ Master Trainer

Introduction

Training Objective: -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 Municipal Corporation Shimla Community Hall, Kaithu-Shimla H.P. from 28-29 January, 2020. The total number of masons were 22 in number.

Sr no	Name	Name of Department Organisation	Mobile no
1.	Hem Raj	M.C. Shimla	9817168794
2.	Kanshi Ram	M.C. Shimla	9816242386
3.	Hem Chand	M.C. Shimla	981758196
4.	Sunderlal	M.C. Shimla	8219706010
5.	Om Prakash	M.C. Shimla	9857180946
6.	Jagdish Chand	M.C. Shimla	9857118027
7.	Jagdish Kumar	M.C. Shimla	9736114461
8.	Veer Singh	Private	6816096632
9.	Devinder	Private	8978761377
10.	Bhawan Singh	Private	8988734956
11.	GulamAwaz	Private	7807345105
12.	Virsoyi	Private	9470308502
13.	Kamal	Private	8628898543
14.	Khadak Singh	M.C. Shimla	9805129252
15.	Budhi Singh	M.C. Shimla	9817574730
16.	Naveen	Private	8219364671
17.	Meharchand	M.C. Shimla	9805562151
18.	Mahaveer	M.C. Shimla	8091726115
19.	Ram Lal	Labour	-----
20.	Leela	Labour	-----
21.	Bhagwan Singh	Private	9816103021
22.	Jai Chnad	M.C. Shimla	-----

Training Sessions

Inaugural Session

The opening speech is given by

HarKanchan

Singh, Project

Coordinator,

Municipal

Corporation Shimla.

The esteemed

dignitaries present

were, **Sh. Gopal**

Jain

Scientific Officer

HIMCOSTE



Er. Kalit Bhardwaj

Sr. Tech Asstt., ATC Sundernagar 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, **Har Kanchan Singh** welcomed the HIMCOSTE Team of esteemed dignitaries and the entire audience. Setting the Programme's premise. She 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 **Er. Kalit Bhardwaj, Sr. Tech Asstt.** discussed about the course 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, **Sh. Gopal Jain**, Scientific Officer 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.



In this session, discussion was 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 P3 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 C4 was a classroom session given by **Er. Kalit Bhardwaj**, ATC, Sundernagar.. 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 P5 was a practical session which was meant to construct the Hazard Resistant Foundations with corner vertical bars. This session was led by **HIMCOSTE Team**. The

plinth is constructed on site.

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



Session C6 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.

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.

This was a discussion session also in which **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.



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.

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



The final structure made is shown in the following picture.



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.