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Ministry of Physical Planning and Works
Earthquake Risk Reduction and Recovery Preparedness
Programme for Nepal
(UNDP/ ERRRP-Project: NEP/07/010)



Training Report
on
Earthquake Resistant Construction of Buildings
for Masons
in
Hetauda Municipality

(Sept 25 – Sept 28, 2008)

Prepared By:
UNDP/ERRRP - Project

Acknowledgements

I would like to express my gratitude to all those, whose support enabled me to complete the training program on “earthquake resistant construction of buildings for masons” and preparing training report for the same.

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My colleagues especially the field Coordinator Mr. Randhir Kumar Singh from the UNDP/ERRRP project supported me for completion of the training program. Especially, I want to thank ERRRP team for all their help, support, interest and valuable hints.

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Executive Summary

Earthquakes are natural hazards, but the disasters are man-made. As has often been quoted, Earthquakes don't kill, unsafe buildings do. It is the high vulnerability of our building stock that turns these hazards into disasters. The collapse of engineered and non-engineered building during earthquakes is the main contributor to the loss of lives and injuries to the people. Building codes generally do not specify good practice, but simply a level of resistance to forces to be attained based on the best known data. Despite the tragic loss of life and property caused by the earthquake, it provided an opportunity to learn how to be better prepared for larger earthquakes and how to mitigate the damaging effects of future earthquakes.

Earthquake Risk Reduction and Recovery Preparedness (**ERRRP**) program initiated by UNDP/BCPR (Bureau of Crisis Prevention and Recovery) with the support of government of Japan is a regional project. This being a National Implementation (NIM) project of UNDP, the implementation responsibility of the project will be with the Government of Nepal. Therefore, UNDP/ERRRP project, has, therefore been continuously strengthening the Earthquake Risk Reduction Management capacity of its selected municipalities of 5 development regions of Nepal since June 2008. It includes capacity building through training, sensitize people and giving awareness as well as establishing linkages with partners at different levels to maximize efforts to be prepared for and respond to disasters more effectively. The main goal is to reduce the impact of potential earthquakes on seismically vulnerable communities in Nepal.

Accordingly, with the joint effort of ERRRP and Hetauda Municipality had organised the 4 days training on Earthquake Resistant Construction of Buildings for Masons in Hetauda from Sept 25 to Sept 28, 2008. The objective of the training program is to increase awareness and build the capacity at the local level on earthquake resistant construction through education, practical training, field visit, film show, group discussion, exam of trainees and construction of technological demonstration unit. As masons are the second line engineers in construction of houses, it is most important to provide them the basic technique of construction of earthquake resistant buildings along with various engineering methodology of building construction in the seismically active zones.

1.0 Training Outline

The Hetauda Municipality and United Nation Development Programme / Earthquake Risk Reduction and Recovery Preparedness Programme for Nepal jointly organized training on

earthquake resistant construction of buildings for masons at Vector Borne Disease and Research Centre in Hetauda on Sept 25, 2008 to Sept 28, 2008. 34 numbers of participants were attended in the programme out of which 7 numbers are female.

2.0 Objective and Purpose of the Training Program

The purpose of this training is to provide understanding to practicing masons who have been exposed to little or no previous training in earthquake resistant construction & safety.

The general purpose of the training program was as follows:

- To build capacity of masons working in municipality on earthquake resistant construction of buildings
- To involve municipal engineers for conduction of training.
- To aware local builders for the earthquake safe construction
- To build capacity of local Masons to instruct and advice the masons, house owners, suppliers for quality construction works.
- Ensure seismically safer habitats by training of practicing Masons.
- Putting in place a system of training and subsequently of certification for practicing masons.

The specific objective includes creating understanding on basic principles of strengthening the life of structural building and others.

3.0 Time Duration

The duration of the training period was 4 days which held completely from Sept 25, 2008 to Sept 28, 2008 in Hetauda Municipality.

4.0 Participants

Capacity building and training of masons of municipal members was called by issuing letter to different concerned departments through Hetauda Municipality. The training was attended by 34 participants out of whom 7 numbers are female from the municipality and made presence after selection from Hetauda Municipality.

5.0 Course Design Concept

According to the field visit and municipal level meeting of May 14, 2008 at Hetauda Municipality, the participants of meeting felt the necessary of various training and awareness programme on earthquake risk reduction and preparedness. From the discussion with municipal technicians and staffs, the focal person of UNDP/ERRRP Project filled up the training need assessment form and prioritize trainings accordingly. On the basis of that need assessment, follow up meeting in July 17, 2008 and further discussions with focal person, we analyzed the need of trainings for masons on earthquake resistant constructions of buildings.

In the past experiences several destructive earthquakes caused extensive damage to lives and property. Rapid urbanization and unplanned development has led to the situation that millions of people in various parts of the country are at risk from earthquake.

The training will be provided by resource persons and municipal engineers. The course has covered in such a way that will increase awareness and build the capacity at the local level on earthquake resistant construction through education, practical training, field visit, film show, group discussion, exam of trainees and construction of technological demonstration unit. As masons are the second line engineers in construction of houses, it is most important to provide them the basic technique of construction of earthquake resistant buildings along with various engineering methodology of building construction in the seismically active zones. Thus, masons training along with construction of earthquake resistant buildings are most important parameter of earthquake vulnerability reduction programme in the earthquake prone areas.

Trained masons will also play a vital role as catalyst in certain other components as mentioned below:

- Formation of self help group of masons and artisans as well as Masons Cooperative
- Construction of earthquake resistant Houses as part of Earthquake Vulnerability Reduction efforts.

Looking into the vulnerability of the city to earthquake the masons training will definitely be one of the key components in reducing vulnerability of the municipality to earthquakes. Hopefully this movement of masons training on earthquake vulnerability reduction will enable the city to meet the fury of nature as when situation arises.

5.1 Course Contents of Training Program

- Course overview, expectations by participants/ Pre Test
- Overview of Earthquake / Cause and Effects of Earthquake
- Dharan Darpan / Video Demonstration/ Shake Table Demonstration
- Ways of earthquake risk reduction and preparedness
- Site Selection, Building Configuration and Layout
- Types of Construction Materials & It's Characteristics
- Planning a Building and Layout (Exercise – 1)
- Construction of R.C.C Frame Structure building and Load Bearing Masonary Buildings
- Foundation Construction Technology/ Appropriate Technology / Alternative Building Materials / Nepal National Building Code
- Practical Exercise on Load Bearing and RCC frame structures in municipality ground
- Quality Control and Workmanship in Construction
- Repair and Maintenance of Existing Buildings
- Role of Masons in Earthquake Safe Constructions
- Field Visit of Under Construction Buildings in Groups
- Post Test
- Group discussion/ Evaluation/ Feed back
- Formal Closing Ceremony & Certificate distribution

6.0 Name of Resource Persons

- Mr. Amrit Man Tuladhar, Senior Divisional Engineer and National Project Manger of UNDP/ERRRP Project
- Ms. Chandra Laxmi Hada, Project Engineer and Training Coordinator of UNDP/ERRRP Project
- Mr. Satya Narayan Shaha, Civil Engineer – Hetauda Municipality
- Mr. Bishnu Gopal Maharjan, Civil Overseer, Hetauda municipality
- Mr. Ram Chandra Thapa, Civil Engineer – DUDBC – Kathmandu
- Mr. Bir Bahadur Katuwal, Civil Engineer – DUDBC – Makwanpur
- Mr. Sukha Chandra Lal Karna, Civil Overseer, DUDBC- Makwanpur

7.0 Training Methodology

7.1 Inauguration Session

Shankar Prasad Upadhaya, Acting Chief Executive Officer of Hetauda Municipality, National Project Manager of UNDP/ERRRP Project, Resource persons from DUDBC, Kathmandu and Hetauda attended the inaugural session and Municipal Engineers from Hetauda Municipality and Team Members of UNDP/ERRRP project etc were also there at first hour of the day. Speaking at the program Shankar Prasad Upadhaya pointed out the need for a well-knowledgeable force of masons could be resourceful at strengthening the building and will be the trainer to spread knowledge to same community of masons.

7.2 Class Lectures

Apart from participatory lecture, trainees were taken to a under construction site of different residential buildings and office buildings. There they saw the existing technique of constructing buildings and local materials later on described the need of adopting earthquake resistant technology. They have given education, practical training, field visit, film show, group discussion, exam of trainees and construction of technological demonstration unit.

Technological demonstration unit in Hetauda Municipality: Trainees had 'hand on exercise' of construction of earthquake resistance of load bearing and frame structure at the premises of Hetauda Municipality and sponsored by UNDP/ERRRP project. Trainees tied the bars of pillar and made the load bearing walls with bands, etc and understood the points of precaution for strengthening the building for earthquake and other incidence sometimes caused by soil.

In the practical session, the demonstration of load bearing and frame structure construction were completed by the participants with the guidance of municipal engineers, resource persons and project engineer of UNDP/ERRRP Project. People can see the constructed structures for permanent technological demonstration unit in Hetauda Municipality.

Exam was taken with 15 questions having Yes/No answers on earthquake discussion construction and group was held in presence of resource persons and project engineer of UNDP/ERRRP Project.

7.3 Exam results

Trainees received maximum 15 out of 15 questions. Out of 34 trainees, 25 received greater than equal to 9 marks and rest attempted some of the questions & some of them were illiterate.

7.4 Tools

The following tools have been used during the training program:

- Lectures
- Question /Answer
- Practice/Exercise
- Technological demonstration unit
- Site visit to under construction sites
- Exam
- Sharing of Experiences

7.5 Training material and training aids

The following training materials and aids have been used during the conduction of the course:

- Handouts
- Overhead projector with screen.
- White Board, Markers.
- File, Writing Pad, bag
- IEC material

Trainees were provided with building construction guidelines, resource material and IEC material in Nepali having pictorial presentation for easy understanding among the uneducated participants.

8.0 Execution Arrangements

Ministry of Home Affairs, Ministry of Physical Planning and Works, Ministry of Local development, UNDP/ERRRP project executed the programme in collaboration with Biratnagar Sub- Metropolitan City. Additionally the UNDP/ERRRP Project provide support to strengthen the institutional, administrative, technical system for earthquake vulnerability reduction. The Municipality provided support for the successful implementation of the programme.

9.0 Feedbacks from the Participants

- Received knowledge on earthquake and techniques on building construction. This they'll use in field.
- In this training, they got to know new ways and the right way of construction. They said: We got to know the earthquake resistant techniques of construction; the training provided us new knowledge
- All the construction shall be taken in consideration to earthquake. This training fulfilled objective and was knowledgeable.
- Got opportunity to know various new things on earthquake resistant construction works.
- These trainings should be organized at different places for awareness.
- Provided resource materials are very fruitful
- They felt the need of at least two such trainings per year and follow up training for the trainees after certain duration.

10.0 Valedictory session

The valedictory session attended by Shankar Prasad Upadhaya, Acting Chief Executive Officer – Hetauda Municipality, Ms. Chandra Laxmi Hada, Project Engineer and Training Coordinator of UNDP/ERRRP Project, Mr. Satya Narayan Shaha, Civil Engineer, Hetauda Municipality and Focal Person of UNDP/ERRRP Project, Municipal Overseer, Resource Persons and ERRRP project members and others.

The valedictory was carried including the experience sharing on dais by trainees, certificate distribution and Rs. 250/- per day to masons and gift pouch having bag, measuring tape, plumbob and required stationeries for the training period.

The total cost of the training program is around NRs. 272,443.04 (two lakh seventy two thousand four hundred and forty three plus four paisa) as indicated by the Field Coordinator and Admin Finance Associate of UNDP/ERRRP project.

11.0 Output of the Training

- 34 Masons from the municipality were trained in cause and effect of earthquake, earthquake preparedness and earthquake resistant constructions of buildings.
- The municipal engineer and overseer also gained the capacity building on earthquake resistant technology and taken lecture class for the participants with the help of UNDP/ERRRP Project Engineers
- Masons being directly responsible for the quality of construction work, the targeted goal of earthquake safer cities can be achieved by training such group of people.
- They got the opportunity to know various new things on earthquake resistant construction works.

12.0 Conclusion

In concluding session, Mr Shankar Prasad Upadhaya, Acting Chief Executive Officer of Hetauda Municipality emphasized importance of the subject not only for better preparedness to natural disasters but also to the common faults made in the construction fraternity facing accidents in day today practice. It is also said that the trainees of this program will be used as resource/ trainer in development of the Hetauda city. Mr. Ram Chandra Thapa highlighted the need for adopting earthquake resistant technology in disaster prone countries like Nepal. Mr Satya Narayan Shaha stated that the project was successful in achieving its training objectives; there still exists a need for additional assistance in terms of capacity buildings for contractors, municipal engineers, community members and awareness programme. Ms. Chandra Laxmi Hada believed that all trainees were aware and provided with the opportunity to explore their existing knowledge and skills. She thanked to CEO, focal person, resource

persons, municipal members, participants and UNDP/ERRRP project team for their support and coordination

At the end Mr. Upadhaya delivered vote of thanks and concluded the programme.

Appendices

Appendix A: List of Participants in Training Program

Date and Venue: Sept 25 – Sept 28, 2008, Vector Borne Disease and Research
Centre, Hetauda Municipality

S. No	Name of Participants	Organization	Address
1.	Devendra Danuwar		
2.	Mahendra Rai		
3.	Laxman Lama		
4.	Aaryan Khawas Chaudhary		
5.	Sushila Giri		
6.	Makhmali Humagain		
7.	Bechen Prasad Chaudhary		
8.	Ratna Kumari Rai		
9.	Bhupal Prasad Pokharel		
10.	Bishnu Maya Nepali		
11.	Samita Pukurti		
12.	Brij Mahato		
13.	Bhagwati Gautam		
14.	Raju Acharya		
15.	Indra Bahadur Tamang		
16.	Krishna Bahadur Lama		
17.	Anil Raut Kurmi		
18.	Intiyaz Khan		
19.	Raj Kishore Shah		
20.	Saroj Raut Kurmi		
21.	Babu Ram Tamang		
22.	Manoj Rijal		
23.	Badri Shah		
24.	Nawaraj Khanal		
25.	Laldhar Yadav		
26.	Buddha Lama		
27.	Gyanendra Adhikari		
28.	Subarna Dhalan		
29.	Tikaram Rai		
30.	Prem Bahadur Moktan		

31. Saroj Rai
32. Som Bahadur Moktan
33. Mahendra Bahadur
Cheetri
34. Rostam Aalam

Appendix B: Photographs

Appendix B-I: Inaugural and orientation to the objectives of the training



Appendix B-II: Orientation to the Planning Exercise, Participant's Presentation and Class Lectures



Appendix B-III: Practical Session on Load Bearing Wall and RCC Frame





Appendix B-IV: Under Construction Site Visit



Appendix B-V: Valedictory address and certificate distribution



Appendix C: Training Schedule from Sept 25-Sept 28, 2008

Appendix D: Exam Result of Pre and Post Examination

Appendix E: Sample Questions

Appendix F: Name of Participants and their Attendance

Appendix G: Name of Resource Persons and their Attendance

Appendix H: Copy of Certificate