



Government of Nepal
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 Design of Buildings /
Nepal National Building Code and its
Implementation Strategy for
Municipal Engineers**
in
Birendranagar Municipality

(Nov 19 – Nov 23, 2008)

Prepared By:
UNDP/ERRRP Project

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Executive Summary

Nepal is prone to various types of natural disasters. Most part of the country is seismically active. Hence, the geomorphology is very fragile. High mountains and the Himalayan range of Nepal are quite young. They stretch almost 2500 kms from east to west and they fall under the seismically active zone, which is considered to be the result of subduction of the Indian plate under the Tibetan plate. Urban areas are highly vulnerable to earthquake disaster and it is one of the biggest obstacles for sustainable development. Nepal has suffered huge losses of lives and properties due to ten major earthquakes since 12th century.

The National Building Code (NBC) is the first such document prepared for Nepal in 1994 but it has not been implemented except three municipalities. The NBC provides both regulations and guidelines for the construction of buildings in all areas of Nepal. Lastly, Earthquakes, as such, do not kill people. It is the falling buildings that do. The collapse of engineered and non-engineered building during earthquakes is the main contributor to the loss of lives and injuries to the people. Therefore, good house construction practice sticking with the existing building code will help to minimize the loss of lives and properties. Preparedness is the most important way to minimize the impact of an earthquake. So, implementation of National Building Code is very significant for disaster mitigation in Nepal.

For that UNDP/ ERRRP Project for Nepal is giving the training for engineers to strengthen capacity building for designing the buildings and implementing NBC guidelines in proper way. Accordingly, with the joint effort of ERRRP and Birendranagar Municipality had conducted the five days training program on “Earthquake Resistant Design of Buildings / Nepal National Building Code and its Implementation strategy” for Municipal Engineers from November 19, 2008 to November 23, 2008. The main objective of this training program is to build the capacity of the municipal engineers for the effective implementation of National Building Code focusing on the structural analysis and earthquake resistant design of buildings to promote economic, safe house building aimed at reducing human losses from natural disasters like earthquakes.

Training Outline:

The Birendranagar Municipality and United Nation Development Programme / Earthquake Risk Reduction and Recovery Preparedness Programme for Nepal jointly organized training program on “Earthquake Resistant Design of Buildings / Nepal National Building Code and its Implementation strategy” for Municipal Engineers at hotel Manakamana in Birendranagar

on November 19, 2008 to November 23, 2008. 24 numbers of participants were attended in the programme.

Objective and Purpose of the Training Program:

The main objective of the program is to introduce and orient civil engineers, architects and designers with Earthquake Resistant Design of Buildings / Nepal National Building Code and its implementation strategy.

The Specific objectives of this training program are:-

- To enhance the participants know-how on earthquake and their effects on building structures.
- To build the capacity of the municipal engineers for the effective implementation of National Building Code focusing on the structural analysis and Earthquake Resistant Design of Buildings.
- To increase awareness and build the capacity at the local level on earthquake resistant construction through education, design exercise, film show, group discussion and checklist / forms fill up for technical information.
- Enable them to check the submitted design for the compliance with the Nepal National Building Code

The specific objective includes creating understanding on basic principles of strengthening the life of structural building and others. The overall goal of the programme is sustainable earthquake risk reduction in the country.

Time Duration:

The duration of the Training period was 5 days which held completely from Nov 19 to Nov 23, 2008 in Birendranagar Municipality.

Participants

The training was attended by 24 from the municipality and made presence after selection from Birendranagar Municipality. All the participants of the training program were technical persons of varying level. Capacity building and training of engineers of municipal members was called by issuing letter to different concerned departments through Birendranagar Municipality. Participants who are engaged in design and construction of buildings,

consulting civil engineers from private sector and engineers from government sector are selected for the training.

Course Design Concept

According to the field visit and municipal level meeting of April 30, 2008 at Birendranagar 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 and further discussions with focal person, we analyzed the need of training on “Earthquake Resistant Design of Buildings / Nepal National Building Code and its Implementation strategy” for Municipal Engineers for municipal engineers to build the capacity at the local level and to familiarize the participant with the concept of earthquake resistant design of buildings using Nepal National Building Code. Municipal engineers will be trained for the effective implementation of National Building Code focusing on the structural analysis and earthquake resistant design of buildings to promote economic, safe house building aimed at reducing human losses from natural disasters like earthquakes.

Apart from assisting in issuing building permits, municipal engineers are mostly engaged in the administrative works. Thus, the training program was designed to impart the concept of seismic design of building structures and also to enable them to check the designs submitted to their office for approval. One of the constraints in designing the course was that the municipal engineers have different educational qualification and work experience. Thus, designing the course for participants with varying educational qualification was quite challenging job.

The National Building Code provides both regulations and guidelines for the construction of buildings in all areas of Nepal. The four different levels of sophistication of design and construction that are being addressed in the National Building Code are as follows and each of the four levels is introduced below.

- International state-of-the art
- Professionally engineered structures
- Buildings of restricted size designed to simple rules-of-thumb
- Remote rural buildings where control is impractical.

However, with the series of discussion with the resource persons and project co-ordinates, resource persons develop the course for five days such that the training covered the very basics in structural systems and analysis to advance topic such as finite element modeling.

5.1 Contents of training Program

Course mainly covered followings topics Contents in the training Program:

- Need & Concepts of Nepal National Building Code
- Earthquakes-origin and its manifestations, Earthquake Preparedness
- Importance of Building Configuration, Site Selection
- Earthquake Resistant Design Philosophy
- Fundamentals of Structural Analysis
- Loads & Load Calculation in RC Framed Structure -1
- Concept of Structural Dynamics
- Infilled RC Frame Structure & its Behavior
- Behavior of RC Buildings in Earthquakes
- Structural Analysis & Design of RC Buildings-1
- Ductile Detailing of RC Frame Building
- Behavior of Masonry Buildings in Earthquake
- Load Bearing Masonry Design Example-1
- Mandatory Rule of Thumb for RC Framed Building/ Masonry Structure
- Guidelines for Low Strength Masonry
- Building Act, Building Regulation & Apartment Act
- Architectural Requirement, Electrical Design requirement, sanitary design requirement as per NBC
- Retrofitting of RC Framed and Masonry Buildings
- Checklist for Building Code Compliance-1
- Evaluation / Feed Back
- Certificate Distribution and Closing Ceremony

6.0 Name of Resource Persons

- Mr. Dwarika Shrestha, Senior Divisional Engineer, DUDBC, Kathmandu
- Mr. Sagar Krishna Joshi, Civil Engineer, DUDBC, Kathmandu

- Mr. Binay Charan Shrestha, Civil Engineer, DUDBC, Kathmandu
- Mr. Himal K.C., Civil Engineer, DUDBC, Kathmandu
- Ms. Chandra Laxmi Hada, Project Engineer and Training Coordinator of UNDP/ERRRP Project
- Mr. Ravi Ratna Shakya, Divisional Chief, DUDBC-Surkhet
- Mr. Vishal Hada, Electrical and Electronics Engineer, K & S Enterprises, Kathmandu

7.0 Training Methodology

7.1 Inauguration Session

At Inauguration, Umesh Basnet, Chief Executive Officer of Birendranagar Municipality, Ravi Ratna Shakya, Divisional Chief of DUDBC, Surkhet, Resource persons from DUDBC, Kathmandu, Project Engineer / Training Coordinator of UNDP/ERRRP Project, Municipal Engineer (Focal Person) from Birendranagar Municipality were also there at first hour of the day. Speaking at the program Umesh Basnet pointed out the need for a well-knowledgeable force of engineers could be resourceful at strengthening the building.

The gift pouch having bag, NBC CD, required stationeries for the training period and resource materials were given to the participants before conducting the class.

7.2 Class Lectures

Apart from participatory lecture, trainees were given to fill up the check list of one full residential building. There they knew the minimum design requirement to be followed while constructing the buildings as per NBC.

- Check List / Forms for NBC Code 206:2003- Architectural Design Requirements.
- Check List / Forms for NBC 208: 2003. Sanitary and Plumbing Design Requirements
- Check List / Forms for NBC 207: 2003--Electrical Design Requirements
- Check List / Forms for NBC 000:1994 to NBC114:1994 Professionally Engineered Buildings

Trainees had successfully completed the way of filling up the checklist for design requirement of residential building. They knew how to check the drawings as per NBC while coming in front.

7.3 Tools

The following tools have been used during the training program:

- Lectures
- Question/Answer
- Practice/Exercise
- Check List / Forms
- Sharing of Experiences

7.4 Training material and training Aids:

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

- Handouts.
- Building Code CD
- Overhead Projector with Screen.
- White Board, Markers.
- File, Writing Pad.
- IEC material

Trainees were provided with resource material and IEC material for reference

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 Birendranagar Municipality. 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 / Evaluations

Evaluations sheets for all participants were distributed for the evaluation of whole training programs. After the overview of those evaluation sheets, the training program was found to be fruitful in many ways for the participants. Despite the wide range and diverse background of the participants, their active participation and keen interest and finally their satisfaction show that the training program was successful.

- Questions - Answers, sharing of experiences with the resource persons makes every session interesting to the participants.
- Logistic and technical support during training program was found satisfactory.
- They felt that other technical trainings like SAP are in need for capacity building for municipal engineers.

10.0 Valedictory session

The valedictory session attended by Mr. Umesh Basnet, Chief Executive Officer – Birendranagar Municipality, Mr. Ravi Ratna Shakya, Divisional Chief of DUDBC, Surkhet, Ms. Chandra Laxmi Hada, Project Engineer and Training Coordinator of UNDP/ERRRP Project, Mr. Janak Bahadur Shahi, Civil Engineer, Birendranagar Municipality and Focal Person of UNDP/ERRRP Project, Municipal Overseer, 4 Resource Persons, ERRRP project members and others.

The valedictory was carried including the experience sharing on dais by participants, remark given by resource person, municipal engineer, divisional chief, training coordinator and finally the closing remark by CEO of Birendranagar municipality. The certificate distribution was carried out by CEO and training coordinator.

The total cost of the training program is NRs. 424,744.00 (Four Lakh twenty four thousand and seven hundred and forty four only) as indicated by the Admin Finance Associate of UNDP/ERRRP project.

11.0 Output of the Training

- 24 municipal engineers from the municipality were trained in cause and effect of earthquake, earthquake preparedness and earthquake resistant design of buildings.

- They got the opportunity to know various new things on earthquake resistant construction works.
- The participants got basic knowledge on earthquake resistant design of buildings and earthquake safety features to be incorporated in building construction.
- They also got the detail information on Nepal National Building Code (NBC) and its application in building permit process.
- They came to know checking design and drawings as per NBC checklist and whether buildings are comply with NBC or not.

12.0 Conclusion

In concluding session, Mr Umesh Basnet, Chief Executive Officer of Birendranagar 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 programme will be used as resource/ trainer in development of the Birendranagar city. The focal person of ERRRP project emphasized that the engineers are the pillar of the nation taking examples of world's great construction works. If we try we can achieve to make our city earthquake safe and motivate the participants to involve on it from today. He really felt the need of others such training which can build up the capacity of engineers to achieve our target.

As part of UNDP monitoring role, Mr Ghulam Sherani rated the programme well participated. He expressed that the lectures delivered will be trained for easy understanding due to cause of earthquake and for the effective implementation of National Building Code focusing on the earthquake resistant design of buildings to promote economic, safe house building aimed at reducing human losses from natural disasters like earthquakes.

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

Appendices

Appendix A: List of Participants in Training Program

Date and Venue: Nov 19 – Nov 23, 2008, Manakamana Hotel, Birendranagar Municipality

S. No	Name	Organisation	Address
1.	Ananto Kumar Deo	DUDBC, Surkhet	
2.	Anga Bahadur Shahi	DDC	
3.	Bhakti Keshar Khanal	W/S	
4.	Bharat Keshar Khanal	W/S Regional Office	
5.	Chudamani Gautam	DUDBC, Surkhet	
6.	Deepak Khadka	DTO, Surkhet	
7.	Durga Datta Kharel	RM & Supervision Office	
8.	Dor Prasad Upadhyaya	Regional Irrigation Directorate	
9.	Gopal Prasad Upadhyaya	RM & Supervision Office	
10.	Janak Bahadur Shahi	Birendranagar Municipality	
11.	Kishore Kandel	Birendranagar Municipality	
12.	Krishna Gopal Bhandari	Dhangadhi Municipality	
13.	Mahendra Singh Tharu	DUDBC, Surkhet	
14.	Mahesh Bahadur Singh	DUDBC, Kailali	
15.	Mahesh Paudel	DTO, Surkhet	
16.	Manoj Subedi	DEC	
17.	Moti Lal Pd. Gupta	DDC, Surkhet	
18.	Nirakh Bahadur Kharel	DUDBC, Surkhet	
19.	Ramji Prasad Koirala	DTO, Surkhet	
20.	Shyam Dass Shrestha	DTO, Surkhet	
21.	Surya Narayan Jha	DTO, Surkhet	
22.	Tej Bahadur Shahi	Birendranagar Municipality	
23.	Tika Ram Sharma	DTO, Surkhet	

Appendix B: Photographs

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



Appendix B-II: Class Lectures





Appendix B-III: Orientation to the Check List / Forms for NBC 207: 2003--Electrical Design, NBC 208: 2003, Sanitary and Plumbing Design Requirements, NBC Code 206:2003 - Architectural Design Requirements, NBC 000:1994 to NBC114:1994 Professionally Engineered Buildings



Appendix B-IV: Valedictory address and certificate distribution





Appendix C: Training Schedule from Nov 19-Nov 23, 2008

Appendix D: Name of Participants and their Attendance

Appendix E: Name of Resource Persons and their Attendance

Appendix F: Registration List in Inauguration Ceremony

Appendix G: Copy of Certificate