

UN/DESA PROJECT-INT/98/X70 (UNCRD)

**CONSULTANT REPORT ON
FIELD SURVEY OF NATURAL DISASTERS**

Duty Station : Kathmandu (Nepal)

Based on One Week Visit to

Kathmandu (Nepal)

by

Dr. ANAND S. ARYA, F.N.A., F.N.A.E.
Professor Emeritus, Dept. of E.Q. Engg.
Indian Institute of Technology
(Formerly, University of Roorkee)

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PREFACE

United Nations DESA, in consultation with United Nations Centre for Regional Development, Disaster Management Office, Kobe, offered a consultant mission for Field Survey of Natural Disasters by undertaking one week visit to Kathmandu (Nepal). A mission report was to be submitted to UNCRD Kobe after completing the mission visit. The Consultant made the visit from Jan. 12 - 18, 2001 and started preparing the report. Before the report could be completed, the massive earthquake in Kachchh area of Gujarat, India occurred on Jan. 26, 2001, which engaged practically the whole time of the Consultant in providing post-earthquake rehabilitation advise to the State of Gujarat. Now, the Consultant has been able to complete the report and submit to the United Nations. The delay in the submission of this report is very much regretted.

The Consultant takes this opportunity of conveying his hearty thanks to the staff of National Society of Earthquake Technology (NSET), Nepal, who extended all the courtesies to the Consultant and provided the various types of information included in the report. Special thanks are due to Sri Shiv Bhadur Pradhanang and Sri Amod Mani Dixit for providing guidance and assistance in successful completion of the survey visits.

September, 2002

A.S. Arya
Consultant

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 - b) Secure the costly items like TV, Computer etc. against falling
 - c) Secure Almirahs and Cupboards to strong walls to prevent over turning
 - d) Get the house and self insured against earthquake disaster

CONSULTANCY REPORT ON FIELD SURVEY OF NATURAL DISASTERS *

1. INTRODUCTION

1.1 With reference to Consultancy under Project Symbol INT/98/X70, Index No. 616330 the Consultant was assigned to visit Kathmandu in Nepal with the following Terms of Reference :

- 1) To provide advisory services to communities vulnerable to disasters in cooperation with governmental agencies. NGOs and academic institutions.
- 2) To advise on the improvement of the safety of some of the core facilities like schools.
- 3) To suggest and promote community based disaster management schemes in the earthquake hit areas.
- 4) To suggest retrofit design of selected types of buildings using traditional technologies
- 5) To participate in Earthquake Safety Day Main Ceremony in Kathmandu and to attend a meeting with the King of Nepal.
- 6) To submit a mission report to UNCRD and UNDESA on completion of the assignment.

1.2 The visit to Kathmandu (Nepal) was undertaken from January 12 to 18, 2001. During the visit, the Consultant participated in the following activities:

- (i) Participation in completion Ceremony of Gadgade Primary School, Nagarkot on Jan. 12.
- (ii) Presentation of keynote paper on *Strategies for Earthquake Disaster Reduction* in Symposium on Experiences in Natural Disaster Risk Management and chairing Session II, on Jan. 13, and participated in the Symposium sessions as Panelist on Jan. 14.
- (iii) Participation in Earthquake Safety Day Rally, Exhibition, Main Ceremony, and High Level Meeting on Jan. 15.
- (iv) Meeting with the King of Nepal along with the NSET authorities on Jan. 16.
- (v) Discussions with the NSET authorities and staff regarding 'mason training' and 'kit for teachers'.
- (vi) Planning of a Guideline on Earthquake Resistant Reconstruction and Retrofitting of School Buildings - Discussions with UNESCO, Nepal & NSET authorities.
- (vii) Visit to a School under Reconstruction, inspection of block making.

The schedule of Earthquake Safety Day programs is given in Annexure to the Report.

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2. BACKGROUND OF THE PROJECT

2.1 From the terms of reference, it is seen that the focus of this assignment is on *core communities like schools*. Schools form a critical component in the life of the communities for various reasons (Ref. 16, 5) such as the following:

- (i) The United Nations IDNDR (International Decade for Natural Disaster Reduction) has been able to make a significant progress in raising awareness among diverse communities regarding the risk and effects of natural disasters. A strong shift has been observed from post-disaster rehabilitation and reconstruction to pre-disaster mitigation and preparedness policy. As a part of the prevention and preparedness process, it has been emphasized that we need to strengthen the school buildings and make proper disaster education.
- (ii) Schools play a vital role in every community. Children take a very strong message back to their homes, and through them, it is possible to address a wide range of population.
- (iii) It is one of the moral obligations of society to provide a safe study and work environment for children and teachers.
- (iv) Earthquake-threatened communities need earthquake-resistant schools to protect their children and teachers.
- (v) When an earthquake occurs during daytime (school hours), the disaster will be significant. For example, in Bali (1976), more than 60 students died when the quake occurred in mid afternoon causing the collapse of one classroom.
- (vi) When schools are closed because of earthquake damage, the education is delayed and community life is disrupted.
- (vii) An earthquake-resistant school can be used as the relief and rehabilitation shelter immediately after an earthquake.
- (viii) Through a recent survey, it has been found that more than 40% of the population in the developing countries lie in the age group of 6 to 18. By addressing this important community (and the future citizens), *it is possible to establish the culture of prevention and mitigation.*

It has been observed from many earthquakes, especially the Hanshin Awaji Earthquake of Kobe 1995, that the schools can be used as a temporary shelter for many people immediately after the earthquake.

- (ix) Depending on the active role of the teacher, schools can play an important role in the community training, and building partnership among different sectors of the community.

Not only an earthquake resistant school, but a strong leadership of the teachers has proven very useful in dealing with the emergency situation. This is important not only during the emergency situation, but also before and after the events.

- (x) Repair and construction of school buildings are difficult after an earthquake, when government resources are strained.

2.2 In brief, school buildings should be made stronger for the following reasons:

- The collapse of school buildings may cause high toll of human lives.
- Most of the occupants are children, who are society's precious resources.

- Closure of school for a long time may result in community problems, and major school damage may pose long term economic problems,
- The additional cost for new buildings to be earthquake resistant is small, about 2. to 6 percent (depending on various types of construction and Intensity Zone) of the cost of construction.
- When designed and built properly, the school building pays off.

3. DISASTER SAFETY DAY JANUARY 15, 2001

National Society of Earthquake Technology Nepal (NSET Nepal) had taken the initiative in 1999 to observe the day of occurrence of Jan. 1934 Bihar Nepal Earthquake as Earthquake Disaster Safety Day in Kathmandu. The author had the opportunity of participating in such safety days organized in Jan. 1999 and Jan. 2000 also, on each one of these occasions three types of programs were organized as follows.

3.1 Awareness Rally

There is a memorial in Bhugol Park, Kathmandu, which commemorates the occurrence of the Jan. 1934 Earthquake which had caused large scale building collapses in the Kathmandu Really and had caused loss of lives of more than 7000 people. The monument lists the names of those who lost their lives in that earthquake in the valley, and reminds people of the devastating effects of the earthquake. Sadly, however, there is hardly any awareness in the people about preparedness!

The procession consisting of the concerned Scientists and Engineers, also students from the schools carrying placards calling attention to earthquake hazards in the valley, starts from the monument and moving through the main roads reaches the exhibition ground where the procession ends. The author was impressed by the numbers of people increasing every year who participated in the procession. In the first such disaster safety day the procession was very small in terms of numbers. However during the January 2001 procession, many government officials from the Scientific and Engineering Ministries also took part, the number placards increased substantially along with the number of School children participating in this activity. From all counts, there has been a great deal of awareness created about the earthquake hazard in the capital city of Kathmandu.

3.2 Main Ceremony

The main ceremony of the Disaster Safety Day consists of a formal gathering of Scientist and Engineers, foreign guests, invitees from the embassies, invitees from the professional bodies and consulting organizations, as well as from the business communities. Every year since 1999 the numbers and quality of persons attending this public meeting has been increasing. The meeting is organized in a hall connected with exhibition grounds so that after the close of the meeting, the people could visit the exhibition along with the general public. The meeting was addressed every year by the foreign Scientists invited to the Disaster Safety Day for participating in the various activities as well as scientific seminars organized along with. The meeting was addressed also by the President of NSET and Secretaries to the Govt. The highest point of the main Ceremony was the address by the Prime Minister, Koirala Ji who, while paying tributes to those who had lost their lives in the great 1934 earthquake, complimented NSET for these programs and exhorted the people to work jointly so as to reduce the earthquake disaster by appropriate concerted action.

At the meeting of January 2001, which the author attended on behalf of UNCRD, had also a chance to speak. He made his remarks regarding the importance of safety of school buildings by taking precautions in there construction while building new schools and emphasized

the need of carrying out retrofitting work of the unsafe existing school buildings. He complemented NSET for starting the retrofitting program but showed his concern that the program was picking up but very slowly. He made a suggestion that an appeal should be made to the business houses in Kathmandu to adopt atleast one school each for achieving earthquake safety through their donations and also suggested to the government that tax concessions may be given to those who will come forward to give such donations. The suggestions were well appreciated by the audience.

3.3 Exhibition

NSET Nepal has also been organizing an exhibition of building technologies which are appropriate for Nepal for achieving earthquake safety. The author had been playing an advisory role in this regard since the very first safety day. The exhibits show the critical importance of providing seismic bands at plinth and lintel levels and the vertical bars at the corners of room and jams of openings in all type of masonry buildings. The exhibits also include physical models showing the installation of such elements in masonry wall enclosures.

The highlight of exhibits was the inclusion of very small scale 'one room building' models representing a school room. One model was made without any earthquake safety measures and an other with such safety measures. Both were shaken simultaneously on a shake table which could be given an impulse through a pulling and clutch arrangement, the kind of which was developed on a very large scale at the Department of Earthquake Engineering, University of Roorkee (now Indian Institute of Technology, Roorkee) in the seventies. This was a live showing the behaviour of the unreinforced and reinforced masonry rooms which people could see and appreciate the difference in their seismic performance and learn the lessons for achieving safety against earthquakes. During the show, the author had the opportunity of explaining the behaviours of the models to the audience in reply to the questions asked by them.

4. MEETING WITH THE KING OF NEPAL

A meeting of the NSET officials viz. Mr. Shiv Bahadur Pradhanang, President NSET, Mr. Amod Mani Dixit, Secretary General NSET, Mr. Mahesh Nakarmi, Administrative Officer NSET, Dr. Brian Tucker of GHI and the author was held with His Majesty the King of Nepal in the evening. His Majesty was appraised of the activities of NSET and the Disaster Safety Day in connection with the earthquake protection measures to be taken in the Kathmandu Valley in particular, and whole of Nepal in general. The author made a suggestion for using His personal influence on the various concerned ministries of the Kingdom for including the earthquake disaster mitigation programs in the various development plans of the country, so that earthquake safety measures are taken right in the first instance, which are most cost effective. Doing rehabilitation works after the damage occurrence is prohibitively costly. His Majesty listened to the various suggestions and suggested to the NSET to formulate their important points and submit to Him for his consideration and action.

5. PLANNING OF GUIDELINES ON EARTHQUAKE SCHOOL BUILDINGS

In a meeting with the UNSECO representative in Kathmandu, the officials of NSET and the author, it was discussed that on the lines of digest No.13 of UNSECO Bangkok titled Protection of Educational Buildings Against Earthquakes (Ref.2), a Guideline may be prepared with focus on School Buildings in Nepal, wherein the earthquake occurrences in Nepal, the Seismic Zoning of Nepal, and topology of School Buildings in Nepal should be considered as the basis, for developing the Guidelines for new construction and as well as for carrying out retrofitting of such buildings. A one year program was checked out and the author was requested to Advisor to this project for providing guidance in preparing the conceptual frame work, developing the Guidelines and reviewing the same before printing.

The author is happy to report at this time of writing this report that the Guidelines has since been prepared through the untiring effort of Mr. J.K. Bothara and other Engineers of NSET under the guidance of the author, and also printed.

6. SCHOOL RETROFITTING PROGRAM

As reported by the author in the report (Ref. 1) submitted to UNCRD, NSET Nepal has been consistently working on School Earthquake Safety Program in Kathmandu Valley using retrofitting techniques of masonry buildings developed by the author in North Yemen in 1983, in Latur earthquake area in India in 1994 and through various guidelines prepared after Chamoli Earthquake in India. The first pilot project of one school building was completed by NSET in 1999 under the immediate guidance of the author. Since then NSET is working with the communities as well as the government to take up more and more school buildings. Upto January 2001 four school building had already been retrofitted under the school earthquake safety program undertaken by NSET as follows:

- 1) Bhuwaneshwory Lower Secondary School, Nangkhel, Bhaktapur District
- 2) Bal Bikash Secondary School, Alapot, Kathmandu District
- 3) Upayogi Primary School, Sirutar, Bhaktapur District and
- 4) Gadgade Primary School, Nagarkot, Bhaktapur District

The important outcomes of this program can be summarized in Tables 1, 2 and 3 given herebelow. Table 1 lists major structural problems of Kathmandu Valley Public School Buildings; Table 2 gives the comparison of cost between retrofit and reconstruction options; and Table 3 gives a comparison of the costs involved in the two options for achieving earthquake safe school buildings.

Another highlight of this retrofitting program is that a number of masons have become trained by working in the retrofitting work and have become capable of training other masons for doing similar jobs. A mason training curriculum has also been evolved as outlined in the following para.

7. MASON TRAINING CURRICULUM

The mason training curriculum evolved through the retrofitting of school buildings as well as construction of two new School Buildings after demolishing the old ones was discussed and finalised as given in Table 4.

8. KIT FOR TEACHERS

Through the retrofitting program, NSET has been able to establish very good rapport with the teaching community of the various schools, particularly their Headmasters. An exercise has been started by NSET to prepare a kit for the teachers for imparting education and training to the school children. The issue was at the initial stage and only preliminary discussions were held.

8.1 Earthquake Preparedness

NSET had evolved a small illustrated handbook on Earthquake Preparedness (Ref.5) for distribution to the public in general but schools in particular. Plate Nos. 9 to 14 show the illustrations used in the handbook which cover the following topics.

Plate 9 Earthquake Preparedness-

- 17) Awareness to family members
- 18) Identifying unsafe and safe places
- 19) Shutting of gas, electricity, water supply
- 20) Dangerous to run through narrow lanes

Plate 10 During Earthquake

- 21) Just outside a weak building, dangerous
- 22) Falling of flower pots, dangerous
- 23) Care in saving trapped persons
- 24) Use of cell phone and evacuation

Plate 11 Earthquake preparedness actions

- 25) To think of weak building portions
- 26) Eatables like salt, biscuits, *chewda*, etc.
- 27) List of tools and first aid items to keep in the house

Plate 12 Post earthquake actions

- 28) Evacuation, immediate aid, transportation to Hospital using Ambulance

Plate 13 Awareness for self safety

- 29) Getting under bed or table
- 30) Standing in a door way
- 31) Standing in internal corner of the room
- 32) Don't run down the stairs during earthquake

Plate 14 Preventive actions before earthquake

- a) Think of safety in new construction *or* retrofitting of existing house
- b) Secure the costly items like TV, Computer etc. against falling
- c) Secure Almirahs and Cupboards to strong walls to prevent over turning
- d) Get the house and self insured against earthquake disaster

8.2 Calendar for Vikrami Year 2057

Another initiative taken by NSET for creating awareness about earthquake safety of various types of buildings is the preparation of a Calendar showing different activities on earthquake resistant construction and retrofitting of buildings. It covers the months of the period Dec. 2000 to Jan. 2002 in 8 glossy sheets as shown on plates 1 to 8. The following details have been shown in the Calendar.

- Plate 1 Earthquake safety day 2001 (Calendar issued on Earthquake Resistant Construction and Retrofitting of Buildings) for the Vikrami year 2057.
- Plate 2 Calendar for December 2000 - January 2001, showing building damage during past earthquakes.
- Plate 3 Calendar for February - March 2001, showing *do's and don'ts* in construction of buildings.
- Plate 4 Calendar for April - May 2001, showing further *do's and don'ts*.
- Plate 5 Calendar for June - July 2001, showing good construction points of reinforcement in RC buildings.
- Plate 6 Calendar for August - September 2001, showing earthquake resistant construction elements in masonry buildings.

- Plate 7 Calendar for October - November 2001, showing earthquake resistant features in burnt brick construction.
- Plate 8 Calendar for December 2001 - January 2002, showing non structural damage and preventive techniques.

8.3 Kit for Teachers

Both the above items namely the Handbook and the Calendar are very fit to be included in the kit for the teachers. Other ideas are still under development and were not finalized as yet. In addition to such awareness material, it will be necessary to review the educational curricula being followed in the schools and to insert small small items in regard to earthquake occurrences, their how and why, the earthquake effects on man made buildings and structures, and the safety measures that could be taken by the people. When the such items will be appropriately fitted in the school curricula they will be covered by the teachers in the form of lessons in a routine manner. The kit for the teachers should cover appropriately designed lessons to cover such items.

9. CONCLUSIONS

9.1 Main Issues in Earthquake Safety of Schools

From the studies presented in Paras 3 to 8, the various issues which arise in the earthquake safety of the schools and their users, can be listed as follows.

- 1) Earthquake Hazard assessment of the area in.
- 2) Typology of the buildings (class rooms, laboratories, gymnasias, hostel buildings).
- 3) Vulnerability of these buildings to the probable maximum Intensity of the earthquake (development of vulnerability functions of each building type to various hazard intensities will be essential).
- 4) Assessment of risk at various Intensity levels including the population density of the schools and the knowledge base of the pupils to protect themselves during occurrence of an earthquake.
- 5) To have appropriate legislative measures in place regarding siting of the schools.
- 6) Seismically safe construction of new school buildings using local materials and skills.
- 7) Guidelines for extension of the building horizontally or vertically.
- 8) Guideline to achieve good quality of construction. *Training of Masons and Supervisors*
- 9) To create awareness about safety in earthquakes through Do's and Don'ts and training of teachers and pupils in observing the same in various phases of the earthquake occurrence; *changes in curricula and kit for teachers.*
- 10) To involve communities in safety aspects through awareness, training and technology transfer.
- 11) To study the evacuation of the occupants of the school buildings after a major earthquake event.

It was heartening to note that National Society of Earthquake Technology, Nepal was alive to the various safety needs and mitigative actions, and striving hard to spread the culture of prevention using various awareness means and community involvement.

10. LIST OF REFERENCES

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6. *Have you ever been in an earthquake?*, Booklet for children, from Japan.
7. *Reconnaissance Report - Chamoli Earthquake of March 1999, India*, NSET, Nepal & DEQ, University of Roorkee, Kathmandu, Sept. 1999.
8. *Repair and Retrofitting of Damaged Buildings in Chamoli Earthquake Affected Area of Chamoli and Rudraprayag Regions*, HUDCO, Govt. of India, Sept. 28, 1999.

Table 1: Major Structural Problems of Kathmandu Valley Public School Buildings

Building Types		Building Construction Details	Major Problems Identified	Remarks
A.	Traditional	Adobe with flexible/ rigid floor and roof.	<ul style="list-style-type: none"> Weak construction materials: low tensile, compressive and shearing strength Heavy structure (wall, floor or roof) Delamination of walls Lack of diaphragm (if flexible floor and roof) United gable wall. Old aged Maintenance problem Mixed construction 	Mechanism problem (loosening of individual stones due to irregularity in shape)
		Stone masonry in mud mortar with flexible/rigid floor and roof.		
		Brick masonry in mud mortar with flexible/rigid floor and roof		
B	Modern	Stone masonry in cement mortar with flexible/ rigid floor and roof	<ul style="list-style-type: none"> Weak wall junctions Quality of masonry: lack of curing, unfilled mortar joints Low wall density Large and more openings 	
		Brick masonry in cement mortar with flexible/rigid floor and roof		
C	Modern	RCC framed building	<ul style="list-style-type: none"> Strength deficiency Ductility deficiency Unanchored cladding and partition walls 	

Table 2: Comparison between Retrofit and Reconstruction Options

No.	Criteria	Demolition & Reconstruction	Retrofitting
1	Involved Costs	High	Low
2	Time for Building strengthening	More than a year	3-4 months
3	Disturbance to School Function	High	Low
4	Problem associated with Disposal of Scrapped Materials	Big Problem	No Problem
5	Technology (adaptability)	Usual (hence no excitement)	New (hence high excitement, but need to train)
6	Societal Impact (Replicability)	Low/Medium	High

Table 3: Comparison between Retrofit and Reconstruction Costs *(1)

Building Type	Demolition and Aseismic Reconstruction (to the same standard as present) (NC/m ²)	Seismic Retrofitting (Including Repair & Maintenance, R&M), (NC/m ²)			Benefit of Retrofitting over Reconstruction	
		Retrofit cost (NC/m ²)	Repair & Maintenance cost (NC/m ²)	Total (NC/m ²)	Retrofit without R&M	Retrofit with R&M
Stone Masonry in Mud Mortar	2,598	734	347	1086	72%	58%
Fired Brick in Mud Mortar	2,628	686	306	992	74%	62%
C.C. Block in Cement Mortar	3,118	710	180	890	77%	71%
Fired Brick in Cement Mortar	3296	710	180	890	78%	73%

*(1) NC = Nepalese currency, R&M = Repair and Maintenance

(2) Retrofitting features include P+L₁+F+L₂+E+G+V.+ Stitching at corners, floor bracing, roof bracings where P = plinth band, L₁ = Lintel band in G.F., F = Floor band, L₂ = Lintel band in F.F., E = Eave band, G = Gable band, V = Vertical bars at corners of rooms and jambs of openings.

(3) In case storey height is about 2.4 m, lintel band can be avoided. This will reduce the Seismic Features cost by about 5% of reconstruction cost.

TABLE 4 : CURRICULUM FOR MASON TRAINING ON CONSTRUCTION TECHNOLOGIES

Duration of Training : 3 to 6 days

S.No.	Content	Method
1.	Deficiencies in construction process and its implication on (RC and Masonry) building behavior (including failure mechanism)	Slide show/discussion
1.1	<i>Configuration problem</i> <ul style="list-style-type: none"> • Uniform/non-uniform plan • Square vs. elongated plan • Vertical Setback • Building at different levels • Effect of openings • Large cantilevers • Height/number of storeys 	Slide show/discussion
1.2	<i>Material quality Problem</i> <ul style="list-style-type: none"> • Weak vs. Strong materials, Misuse 	Slide show/discussion
1.3	<i>Workmanship problem</i> <ul style="list-style-type: none"> • Masonry Building 	

	<ul style="list-style-type: none"> - Weak wall junction - Long walls - Un-reinforced brick columns - Lack of integrity between load bearing elements - Delamination of walls - Gable wall - Lack of diaphragm • RC Buildings <ul style="list-style-type: none"> - Stirrups - Longitudinal bar anchorage - Lapping of bars - Joint confinement - Infill walls not tied with frame 	<p>Slide show/discussion</p> <p>Slide show/discussion</p>
2.	<i>Identification of weak point in building</i>	Slide show (Damages)
3.	<i>Construction Process</i>	
3.1	Curing of concrete/mortar strength (effect on strength)	Model tests
3.2	Effect of filling of mortar in brick masonry/wetting of clay bricks	Model tests
4.	Earthquake Resistant Building	
4.1	<i>Configuration</i>	Slide show
4.2	<i>Masonry building</i> <ul style="list-style-type: none"> • Openings (Total length, spacing, location) • Stitching of Stone Walls • Seismic Bands and Belts • Bond stones/Headers • Vertical Bars • Bond stones/Headers • Vertical Seismic Belts 	<p>Slide show</p> <p>Practical Practical Practical Practical Practical Practical</p>
4.3	<i>RC frame</i> <ul style="list-style-type: none"> • Stirrups shape and spacing • Joint confinement • Minimum number and diameter of bars in beam and column • Bar splicing • Bar anchorage in joint 	<p>Practical Practical Slides</p> <p>Practical Practical</p>
4.4	<i>Material</i> <ul style="list-style-type: none"> • Silt in sand • Mortar mixing, time lap • Concrete mixing, Water cement ratio, • Wetting of brick • Curing of concrete/brick work 	<p>Practical Practical Practical Practical Practical</p>
5.	Conclusion (Stress on Quality for Safety)	
6.	Certificate Distribution	

Notes:

- Illustrated booklet in Nepali would be given to each participant.
- The training would be focussed on problem solving, practice oriented rather than theoretical discussion.
- The training should directly hit on the problems and its implication, so it works as eye opener.
- The training shall not be limited to curricula or exactly follow it but it should be site and local problem specific.
- Emphasis will be on practical Hands-on training
- As far as possible, the training be done at a construction site, otherwise a visit be arranged to such a site.

Annexure

PROGRAM OF EARTHQUAKE SAFETY DAY 2001

Date	Day	Time	Activity	Venue
4-Jan	Thursday	11:00-13:00	School Building Reconstruction completion ceremony of Bhuwaneshwory Lower Secondary School, Nangkhel, Bhaktapur District	Nangkhel
5-Jan	Friday	11:00-16:00	On the spot School Children Art Competition (Chief Guest, Senior Artist Mr. Lain Singh Bangdel)	Hanuman Dhoka, Kathmandu
6-Jan	Sat		Retrofit completion ceremony of Upayogi Primary Schol, Sirutar, Bhaktapur District	Sirutar, Bhaktapur
8-Jan	Mon		Retrofit completion ceremony of Bal Bikash High School, Alapot, Kathmandu District	Alapot, Kathmandu District
10-Jan	Wed		Earthquake resistant reconstruction completion ceremony of Vaishnavi High School, Kirtipur, Kathmandu District	Kirtipur, Kathmandu District
12-Jan	Friday	14:30-16:00	Retrofit completion ceremony of Gadgade Primary School Nagarkot	Nagarkot
13-Jan	Sat	10:00-17:00	Symposium on Experiences in Natural Disaster Risk Management, with focus on Earthquake Risk Management	Institute of Eng, Pulchowk Campus, A-Block, Lalitpur
14-Jan	Sun	10:00-14:00	Symposium on Experiences in Natural Disaster Risk Management with focus on Earthquake Risk Management	-do-
15-Jan	Mon	9:00-14:00	Main Ceremony and Inauguration of Earthquake Safety Exhibition (For details, please see the detailed program for the MainDay Event)	Kathmandu
		16:00-21:00	High Level Meeting (For details please see the Detailed Program for High Level Meeting) and dinner	-do-
16-19 Jan	Tue		Exhibition with demonstration on shake table test of twin building models, with and without earthquake-resistance elements	-do-

Note: International Guests are expected to participate in the activities on 12-15 January as a minimum.

Program of Symposium on Experiences in Natural Disaster Risk Management with focus on Earthquake Risk Management

13-Jan.	Session I	Inauguration, Key note Papers
	Session II	Earthquake Disaster Risk Management in Nepal
14-Jan	Session III	Lessons Learned from Kathmandu Valley Earthquake Management Project
	Session IV	Panel Discussion: Sustainability of Natural Disaster Risk Management Efforts in Developing Countries

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