

School building guideline on cyclone/earthquake safety in Fiji

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Introduction

The United Nations Centre for Regional Development (UNCRD) has implemented a research project on “Reducing Vulnerability of School Children to Earthquakes” in the Asia-Pacific Region during 2005 and 2009. The project aimed to ensure that school children living in disaster-prone regions have earthquake-safe and cyclone-safe schools.

The project included retrofitting of some school buildings in a participatory way with the involvement of local communities, local governments, and training for technicians on safer construction practices. These activities have been carried out in Fiji Islands, India, Indonesia, and Uzbekistan as pilot cases. In Fiji, the project includes measures against cyclone disasters as well as earthquake disaster risk management since Fiji Islands served as the only target country where cyclones frequently attack.

Objectives

As the primary goal of the project is safety of the most vulnerable group in society, children, the project contributes towards the objective of human security which is defined as removal or reduction of vulnerability to various risks including cyclone disasters. Expected outcomes of the project were retrofitted school buildings to demonstrate the appropriate technology, capacity enhancement of communities to adopt safer houses / buildings, educated and trained school teachers, students, and parents about safe practices. A strong partnership has been established in all participating project countries to implement the project activities.

Concept and Methodologies

Schools play a vital role in every community and region. Recognizing the importance role of schools in regional development, each region and community needs to strive to improve quality of education and facilities. Capacity building of human resources and securing financial basis to provide adequate education and facilities must be considered in the process of formulating education policy at regional level. Past experience has indicated that the basic problems related to disaster mitigation and preparedness in developing countries can be

attributed to lack of capacity, awareness, education, and self-reliance within the communities. An appropriately educated and self-trained community is much more capable of coping successfully with natural disasters, and of reducing their impacts. UNCRD initiated the School Earthquake Safety Initiative (SESI) since 1999 immediately after the establishment of the Hyogo Office.

The first programs of SESI in early 2000's include school retrofitting projects in India and Iran under the Hyogo Friendship Funds that were created to assist recovery of disaster affected area in Gujarat and Bam. The original concept of the project was also formulated in early 2000's through experiences of SESI. The current project aims to promote culture of mitigation through community participation and the empowerment process tailored to residents with specific needs will complement, enlarge, and sustain the ongoing efforts. As disaster risk reduction is also a key for sustainable regional development, concept of disaster risk reduction should be integrated into school curricula and school facility management.

Primarily, the project gets the fund from the UN Trust Fund for Human Security (UNTFHS) for all planned activities. The project received additional resources from partner institutions and also through additional allocation of resources to support complementary activities. In each project countries, preparatory works like formation of institutional set up and other basic survey works were carried out. The interagency coordination and partnership with concerned organizations is satisfactory in all countries. National and local governments have already taken steps to upscale the activities through their own efforts for a wide coverage.

Project Activities

Retrofitting of School Buildings

The project includes seismic vulnerability analysis of about 10 selected schools in the project city in each country and the retrofitting of some of them which incorporate prominent construction typologies of the region. This leads to the development of country-specific guidelines on earthquake and cyclone safe construction which incorporates solutions to the practical problems experienced during school retrofitting. Following stepwise approach is adopted for retrofitting of school buildings:

- (1) Criteria Development for School Selection
- (2) Guideline Development for Preliminary Assessment / Evaluation
- (3) School Selection
- (4) Preliminary Evaluation of School Buildings
- (5) Detail Seismic Analysis and Retrofit Design of Selected Schools
- (6) Retrofitting of School Buildings
- (7) Retrofitting Guideline Development

Capacity Building of Communities

Retrofitting of schools in local communities can act as a demonstration of proper technology to residents. Masons in these communities get on-the-job training during the retrofitting of schools. In addition, technicians in each project city get training on design and construction of houses. Consideration is given to local practices, material availability, indigenous knowledge, and affordability of technology during trainings.

Disaster Education and Awareness Raising

The project includes the development and wide distribution of educational booklets, posters and guidebooks on teachers' training and students' drills for earthquake disaster preparedness and response. The guidebooks gain verification and are updated through training and mock drills. In order to integrate disaster risk reduction (DRR) education into school curricula, current curriculum was assessed.

Knowledge and Experience Dissemination

Regional and international workshops on school safety will be held to disseminate lessons from the project cities to a wider audience. It is expected that distribution of guidelines on safe construction, training manuals for technicians, and education and awareness booklets will help to generate a sustainable demand for the safety of school buildings.

School Safety Guideline Development: Case of Fiji Islands

Building Retrofitting is the process of strengthening a building structure so that it can better withstand natural hazards such as cyclone, flood, earthquake and tsunami, etc. The four types hazards mentioned above are quite common in Fiji Islands and are discussed in the manual. The manual has been prepared under the UNCRD program on Reducing Vulnerability of School Children to Earthquakes. Although the manual focuses on retrofitting of school buildings, the same concept can also be applied to any other public or private building.

The Manual is aimed at assisting technicians, masons and carpenters to gain better understanding of the common hazards that usually occur in Fiji and more importantly to be able to undertake the retrofitting work required using the concept and procedures outlined in the manual. It is also aligned to the "Home Building Manual": which was prepared by the Fiji Building Standard Committee that produced the Fiji National Building Code in 1990. The Home Building Manual is a guide which home owners can use within its limitations to design and construct their own homes. Construction details in the training manual should be used as minimum standards of construction for retrofitting existing school buildings (one or two storey construction) as the construction of new ones.

Although the manual targets technicians, masons and carpenters, it is hoped that policy

makers, administrators, school managers and principals will also realize the great risks involved in the use of unsafe school public buildings and take appropriate steps to allocate more resources for the improvement of those buildings.

Lessons learned

It is observed that interagency collaboration and partnership is very effective in every project country. The approach taken to get the concerned government agencies informed and consulted has resulted in good collaboration with all stakeholders. Further, country-based UN agencies have been supporting the activities.

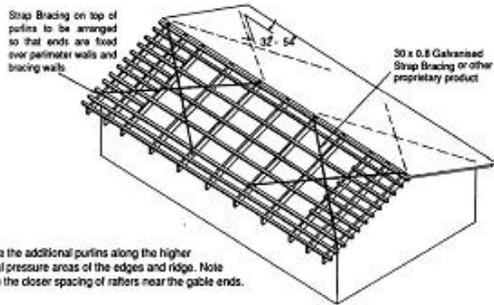
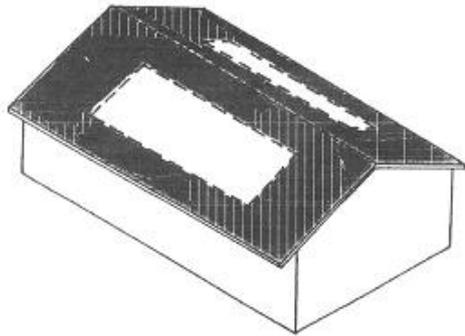
In Fiji, the National Disaster Management Office (NDMO), the government's focal point for disaster management, is playing a very effective role to bring all agencies together to work in a related field to the project advisory team. The project is being carried out with the support and active involvement from international organizations like the South Pacific Islands Applied Geo-science Commission (SOPAC) and Centre for Appropriate Technology and Development (CATD), civil society organizations like Fiji Institute of Engineers (FIE), Fiji Social Service Council (FSSC), and other technical public institutions like Public Works Department (PWD), Fiji Institute of Technology (FIT). In Uzbekistan, UNESCO country office is supporting the project with their expertise and experience in this field. The local UNDP office and Ministry of Home Affairs are collaborating for this project in India. There is strong support from Institute of Technology Bandung (ITB) for technical expertise and administrative support from the National Department of Education in Indonesia. Local UNDP office and UNESCO office are extending support and collaborating in the project.

At international level, a good collaborating partnership has been developed with UN and other agencies working the field of school safety and disaster management. The United Nations secretariat for International Strategy for Disaster Reduction (UNISDR), National graduate institute for policy studies (GRIPS), National Society for Earthquake Technology (NSET) Nepal have been collaborating in school earthquake safety cause in organizing international events and campaigns.

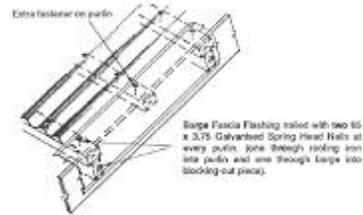
Conclusions

The Disaster Management Planning Hyogo Office of UNCRD is, currently, promoting the School Earthquake Safety Initiative through a project "Reducing Vulnerability of School Children to Earthquakes". The project includes retrofitting school buildings in a participatory way with the involvement of local communities, local governments and resource institutions, capacity building, training on safer construction practices to technicians, disaster education in schools and awareness raising in the local communities. These activities are being carried out in Fiji, India, Indonesia, and Uzbekistan.

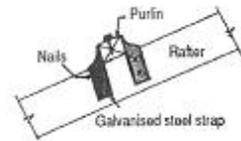
RAFTER ROOF FRAMING DETAILS



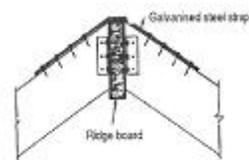
FIXING OF BARGE FLASHING AT GABLE END



CONNECTION OF PURLINS



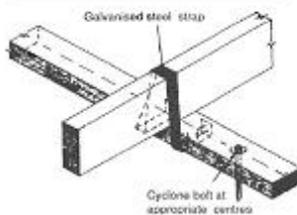
CONNECTION AT THE RIDGE JOINT



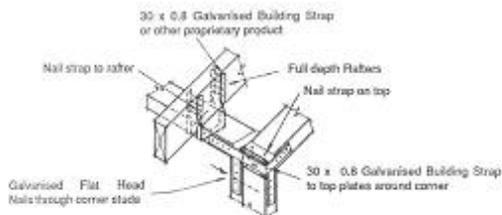
CONNECTION USED TO SECURE RAFTERS TO TOP PLATES



FIXING OF RAFTER TO TOP PLATE

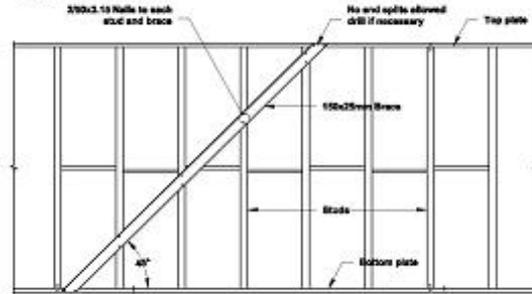


FIXING OF GABLE END WALLS TO SIDE WALLS AT TOP PLATE LEVEL



BRACING TYPES

1. TIMBER BRACE



2. Metal braces

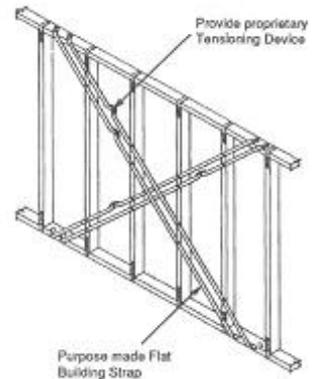


Figure: Detailed construction manual on wooden structure in Fiji Islands

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