The Earthquake Risk Reduction Process at Ludlow Castle School

A Summary of Broader Risk Reduction and Earthquake Preparedness Measures

Delhi Earthquake Safety Initiative for Lifeline Buildings

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Introduction

This report documents the earthquake risk reduction process at Ludlow Castle School No. 1, a government school in Delhi, India. The process included not only seismic retrofit or replacement of vulnerable buildings, but also awareness-raising, falling hazards mitigation, and disaster preparedness planning. The efforts at the school were part of a larger project to build local capacity to reduce earthquake risk in Delhi and elsewhere in India.

The Project

In 2004, the United States Agency for International Development (USAID), the Ministry of Home Affairs, Government of India, , the Government of the National Capital Territory of Delhi, and GeoHazards International (GHI) developed a joint project to build India's capacity to reduce the earthquake risks posed by existing, seismically vulnerable buildings. The project built the capacity of the Delhi Public Works Department (PWD) by guiding its engineers through the seismic assessment and retrofit of five groups of important, or "lifeline," buildings in Delhi. The selected groups of buildings are:

- Ludlow Castle School No. 1 (also known as Rajakiya Pratibha Vikas Vidyalaya)
- Guru Tegh Bahadur Hospital
- Delhi Police Headquarters Building (Multi-storey Office Building)
- Divisional Commissioner's Office Complex
- Delhi Secretariat (Dilli Sachivalaya or Players Building)

GeoHazards International (GHI) formed a Peer Review panel, comprised of experts from India and the United States, to mentor the Delhi PWD engineers and to facilitate the exchange of experience-based seismic safety knowledge between the United States and India. The Peer Review Panel consisted of:

- Dr. A.S. Arya (Co-Chair), National Seismic Advisor, Ministry of Home Affairs
- Mr. Melvyn Green, Principal, Melvyn Green & Associates, Los Angeles
- Mr. William T. Holmes, Principal, Rutherford & Chekene Structural Engineers, San Francisco
- Mr. Kip Edwards, System Vice President for Facilities, Banner Health, Phoenix
- Prof. I. M. Idriss, Emeritus Professor, University of California, Davis
- Mr. Jose Kurien, Chief Engineer, Delhi Tourism and Transportation Development Corporation
- Prof. D. K. Paul, Professor, Department of Earthquake Engineering, Indian Institute of Technology, Roorkee
- Mr. Mahesh Tandon, Managing Director, Tandon Consultants Private Limited, Delhi
- Mr. Thomas Tobin (Co-Chair), Chief Operating Officer, GeoHazards International

The project provided an opportunity to take important steps towards earthquake safety in Delhi, not only in terms of building safety, but also in terms of a comprehensive process of earthquake risk reduction. GHI and the Delhi Government selected Ludlow Castle School to demonstrate a holistic approach to seismic risk reduction that included raising awareness, mitigating falling hazards, and developing disaster preparedness plans, in addition to retrofitting or replacing school buildings. GHI anticipates that Ludlow Castle School's experience will provide a model for many other schools throughout the country to follow, and as such it will make a major contribution towards reducing India's earthquake risk.

About Ludlow Castle School No. 1 (Rajakiya Pratibha Vikas Vidyalaya)

The Ludlow Castle School No. 1 is a government school located on Raj Niwas Marg in north Delhi, across the street from the Divisional Commissioner's Office complex. The school was recently designated a Rajakiya Pratibha Vikas Vidyalaya, in recognition of the excellent education that it provides to its students. The school, headed by Principal B. K. Sharma, has consistently been recognized for the academic and athletic honors that its students receive.

The school consists of a Classroom Block and a Multipurpose Hall. The Classroom Block building is a three-storey load bearing brick wall building. The building was constructed in two phases, with two blocks being constructed in 1965, and the third block being constructed in 1978. Unreinforced brick buildings similar to the Classroom Block have been badly damaged or have collapsed in numerous earthquakes worldwide. The Multipurpose Hall is a single-storey concrete and brick building that is likewise vulnerable to earthquake damage.

The seismic vulnerability of these buildings is a cause for concern, because Delhi is located in the second highest seismic hazard zone in India, Zone IV, according to the Seismic Zoning Map in the Bureau of Indian Standards code for earthquake resistant design of buildings, *IS 1893:2002*. Delhi is approximately 250 kilometers from the Himalayas, the world's tallest, youngest and fastest-rising mountain range and one of the most seismically active regions on earth. Shaking from a large Himalayan earthquake, which can be greater than Magnitude 8, can cause damage in Delhi. The local Delhi-Haridwar and Delhi-Moradabad faults are additional sources of earthquake hazard. Recognizing these hazards, the project participants set out to reduce the earthquake risks faced by students and staff at Ludlow Castle School.

The Process of Improving Earthquake Safety

In 2005, GHI and its project partners began the process of mitigating the substantial earthquake risks faced by Ludlow Castle School. The process took more than three years, and follow-up activities will continue for the foreseeable future, as the school sustains earthquake safety efforts on its own. The following sections describe the major components of the process.

Laying the Groundwork

The project began in April, 2005 with a Roll-Out Workshop held in the Delhi Secretariat. This workshop recognized key members of participating Indian government agencies and other stakeholders, and raised awareness of Delhi's earthquake risk. Chief Minister Ms. Sheila Dikshit inaugurated the workshop, which all the stakeholders of the project attended. The peer review panel was introduced in this workshop. Principal Sharma attended the workshop, where he was briefed along with other participants on the importance of the project and on the role that they were expected to play, in order to make the project a success.

GHI and SEEDS held initial meetings with the school in the spring of 2005. The program began with an orientation session for Principal Sharma on disaster management and the importance of school safety. In April 2005, SEEDS and GHI held a workshop for teachers and distributed of awareness generation (i.e. Information, Education, and Communication – IEC) material. Teachers were asked to comment on the awareness generation materials so that the necessary changes could be made to make it more understandable. GHI and SEEDS held a presentation for students in September 2005. A

shaking table with a model of the interior of a school was used during the presentation to explain falling hazards.

Assessing the Risks

Delhi PWD assessed the risks posed by the school's buildings, using the provisions of *Indian Standard 13935: Seismic Evaluation, Repair, and Strengthening of Masonry Buildings –Guidelines*, the Tier 1 Checklist in the American Society of Civil Engineers *Standard 31-03: Seismic Evaluation of Existing Buildings*, and structural analysis. They found that the school's unreinforced brick Classroom Block building and concrete and brick Multipurpose Hall would both be heavily damaged in the earthquakes that engineers expect to strike Delhi, and that both buildings could possibly collapse.

SEEDS and GHI assessed the risks posed by furnishings, equipment, architectural elements, lights, fans, and other objects that might fall, topple, or slide. The results of their room-by-room assessment are documented in the report "Non-Structural Mitigation Inventory Report: Government School, Ludlow Castle" completed in December, 2005. This report includes information about each hazard and provides cost estimates and parts lists for mitigating the hazards in each room. The report also categorizes items as high, medium, or low priority hazards to mitigate. During the assessment, the team also noted other safety hazards, such as blocked exits.

Mitigating Risks through Seismic Retrofit

Delhi PWD and the project peer review panel determined that the Classroom Block would be seismically retrofitted so that the building would suffer repairable damage in a major earthquake, called the Design Basis Earthquake (DBE), that engineers use for design, and would not collapse in the largest earthquake, called the Maximum Considered Earthquake (MCE), that scientists believe could shake the area. Delhi PWD designed a retrofit solution that includes providing "seismic belts," corner reinforcement, and other prescriptive measures outlined in *IS 13935*. These measures are designed to tie the building's walls together, so that they will act like a box and will resist earthquake forces.

Because of the advanced state of deterioration found in the Multipurpose Hall's reinforced concrete beams and columns, Delhi PWD recommended that the Delhi government replace the Multipurpose Hall with a new building rather than try to retrofit and rehabilitate it. At the time when this report was written, the Delhi government had not reached a final decision but was likely to follow Delhi PWD's recommendation.

Delhi PWD selected BBR (India) Pvt. Ltd. as the retrofit construction contractor. Delhi PWD provided supervision and construction quality control. The contractor reached an agreement with the school administration to work only in the afternoons and at night, to avoid disrupting classes. The only other option would have been to vacate the building or portions of it and to shift the students elsewhere; this proved to be impossible. Constructing the retrofit with the building's occupants in place called for significant effort and patience on the contractor's part, because the retrofit required wet, messy construction in nearly every room of the Classroom Block. First, the plaster had to be removed from locations where the seismic belts would be added, which were at the windowsill and door lintel level all around each room. Once the bricks were exposed, the contractor had to drill holes through the wall and clean them out using a blower, then to paint on a compound to help the band material bond with the brick. The workers inserted strands of galvanized steel wires in each

hole and tied them to the galvanized steel mesh used to reinforce the seismic band. Holes were drilled in the floor slabs in each corner of the room, and reinforcement bars were run from the foundation to the roof of the building. Finally, the contractor applied micro-concrete (a concrete made with cement and sand instead of rocks) to the belts and vertical bars. Once the bands were completed, everything had to be plastered and painted. One can see why such construction could not take place while students were trying to learn.

Figure 1. A seismic belt under construction (left); the exterior of the school (right)

Mitigating Falling Hazards

Preventing major damage or collapse of the classroom block removed a significant source of risk but did not make the school entirely safe. During an earthquake, the objects in a building, like cabinets, light fixtures and ceiling fans, as well as such large items as decorative architectural elements and water tanks could fall and injure or even kill students. Prior to retrofit construction, GHI and SEEDS began to address these hazards by demonstrating how to fix common items in one room of the school. SEEDS and GHI initially suggested that either the computer laboratory or the library be used to demonstrate falling hazards mitigation measures. Principal Sharma requested that his office be used for demonstration purposes instead, because it contained several falling hazards which visitors, teachers and students could relate to objects found in their own homes and offices. He also thought it would give him more opportunities to discuss earthquake safety with visitors without disturbing school activities.

GHI and SEEDS staff members fixed these falling hazards using GHI guidelines and with project funding provided by USAID. Figure 2 shows some of this work. Principal Sharma played a major role throughout this process. He took the initiative to find some special hooks in the market that could be anchored in the concrete. To simplify the mitigation process, SEEDS surveyed the markets to identify hardware products available locally. GHI and SEEDS used this locally available hardware to fix the falling hazards in the principal's office. GHI and SEEDS also removed items from exit pathways, so that students could exit quickly following an earthquake or in the event of a fire.

To help other schools to reduce their risks from falling objects, GHI and SEEDS wrote *Falling Hazards (Non-Structural) Risk Reduction Handbook for Schools*. This handbook includes information on how to identify and fix falling hazards, how to estimate costs, and how to set priorities. The handbook also includes useful resources, such as which shops carry the items needed to fix falling hazards. At

the time when this report was written, the retrofit construction had just been completed and the school was about to begin anchoring the remaining falling hazards.

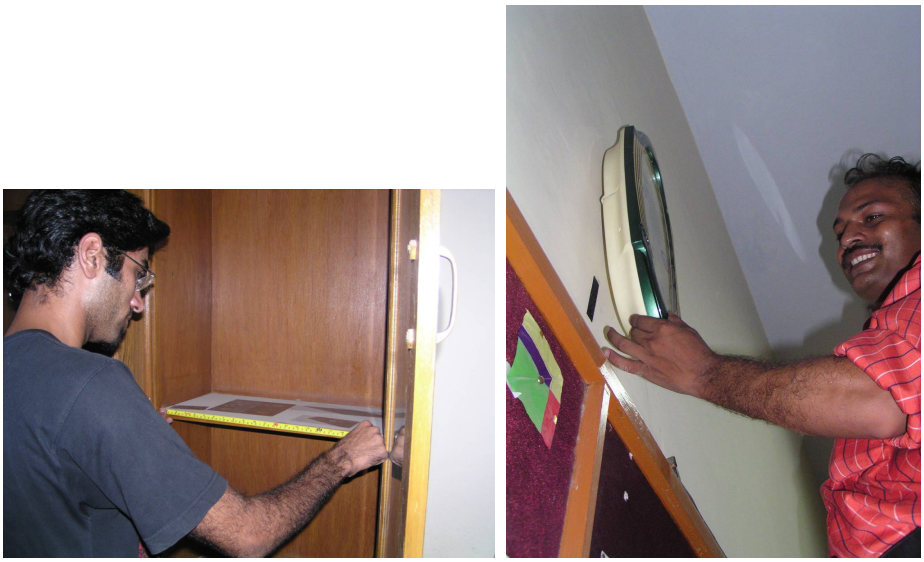

Figure 2. Fixing falling hazards in Principal Sharma's office

Raising Awareness

To make students, teachers and parents aware of earthquake risk and of ways to reduce their risk, GHI and SEEDS conducted an awareness generation program in the school in 2005. The team used a simple PowerPoint presentation to introduce the hazards posed by buildings and falling objects during an earthquake, as Figure 3 shows. The team presented awareness information to the teachers first, then to the students. After realising that parents came to the school in large numbers during the parent-teacher meetings, the team scheduled a sensitization program for parents on that day. The program for parents continued for most of the day and was an immediate success. The parents expressed their pride to the team that now their children would be in a safe school. GHI and the school periodically held follow-up awareness generation activities and have set plans in place to continue these activities with new students and their parents.

Figure 3. Awareness raising presentations for students

Preparing and Planning

SEEDS and GHI helped the school to develop a preparedness plan. The process began with a meeting of all the stakeholders: the education department, fire department, a representative from Parent-Teacher Association, held in Principal Sharma's office. During the process, several teams were formed, including a search and rescue team and a First Aid team. Experts from civil defense trained these teams of students to assist the school authorities in an emergency. Firefighters trained students in the proper use of fire extinguishers and fire safety. Parents and teachers formed a disaster management committee. After local safety experts trained the teams and SEEDS and GHI briefed the committee about their responsibilities, participants planned a drill. Teachers in every classroom explained the exit routes to students and displayed the evacuation plan. On a predetermined date, the school conducted a mock drill, with the teachers taking the lead. The fire department and civil defense helped with the drill. Figure 4 shows activities during the drill. The drill tested the training of rescue and First Aid teams. The drill was successful, and all of the hard work carried out by the planners paid off. The school continues to conduct periodic drills to test its readiness.

Figure 4. Students and teachers participate in the initial mock drill in 2005

Impact and Sustainability

Experiences of Key Participants

Mr. Sanjay. K. Jha, Additional District Magistrate, Government of Delhi

Mr. Jha was the Additional District Magistrate (Headquarters) for the Government of Delhi during the first few years of this project. He initiated this project, because it was very important for managing disasters. He played a major role in selecting the five lifeline buildings. Throughout his tenure, Mr. Jha was a staunch supporter of the project, and he remains an advocate for earthquake safety. According to him, Ludlow Castle School No. 1 was the most obvious choice of the five lifeline buildings, because it was a critical structure that has been playing a major post-disaster role for many years, due to its proximity to the Divisional Commissioner's office. He explained that it is very easy to coordinate relief efforts from the school, because of its location, size and available space, and that his office has always used the school for this reason. Following the 2001 Bhuj earthquake, the school was used to coordinate relief material, and it will continue to play a major role at times of

disasters. The school was selected both to improve children's safety and with the vision that the school will function as a relief and rehabilitation center following an earthquake in Delhi.

Prof. Anand S. Arya, National Seismic Advisor, Ministry of Home Affairs

As the Co-Chair of the peer review panel, Prof. Arya was involved in the project from the beginning. Regarding the school, he noted that it is the first major building to be retrofitted. He appreciated the project, because it covered all of the specified requirements in the guidelines given by MHA. The fact that retrofitting work can cost less than 15 percent of the reconstruction cost of the same building was efficiently proven with Ludlow Castle School. The construction technology adopted for the school was very satisfactory, and the building looks like a new building. Several small things were taken care of during the retrofit, such as adding a second door in every classroom. He emphasized that Ludlow Castle School stands as a 'good example' and should be replicated everywhere across India.

Mr. Jose Kurien, Chief Engineer, Delhi Tourism and Transportation Development Corporation

Mr. Kurien was a member of the peer review panel. He felt that retrofitting old buildings was a great idea. He was very happy that a school was selected as one of the five lifeline buildings and is now the first building to be completely retrofitted amongst the five. He remarked that every building is unique, but that the lessons learned in handling one building can be used in new projects. The presence of experts from the United States, with the experience that they brought, helped in much of the learning exchanged and was very useful. Each engineer in the organization was trained – from the top level (Engineer-in-Chief) to the field engineers – a difficult process, but one that has been successfully completed.

Mr. B. K. Sharma, Principal, Ludlow Castle School No. 1

Mr. Sharma has served as the school's principal for the duration of the project, and he has become a champion for earthquake safety. He said, "It gave me immense pleasure to realise that it will be the first school to be retrofitted in India. The whole experience was overwhelming." He appreciated that his request not to disturb the normal workings of the school was efficiently addressed. Several delegations from across the country and world visited the school with curiosity, and all went home with a promise to do the same in their country or state. He mentioned that everyone was inquisitive about the cost of the project and was surprised to learn that the real cost incurred was less than 15 percent of the reconstruction cost. Mock drill demonstrations, interaction with students, and walking tours of the school were all highly appreciated by the visitors.

Mr. Sharma said that teachers, students and parents feel privileged to be associated with Ludlow Castle School No. 1. He also mentioned that due to regular awareness programmes and training, the fire extinguishers in the school are no longer merely a showpiece, because every student knows how to operate them. He knows that an earthquake can lead to fire, and that problem is now also under control. Once every trimester, the school organizes parent-teacher meetings. During these meetings, Principal Sharma takes the opportunity to educate parents about earthquake safety by having local earthquake experts give a shaking table demonstration, explain retrofitting and earthquake hazards, and answer the many queries posed by the parents. The students are taught to take the message home and to their neighborhoods. They have been asked to locate an open space near their house and to prepare a family emergency kit, so they can be prepared even when not in school.

Mr. Sharma was appreciated the work commitment, quality and safety measures adopted by the contractor BBR Pvt. Ltd. He also mentioned that Department of Public Works engineer Mr. Anil Pandit's frequent visits and minute observations and suggestions helped in all aspects. He said that he himself has taken an interest in all of the work and has done his bit by making exits clutter free and by opening all exit gates that were normally kept locked. Frequent participation in the district programmes has given him the opportunity to talk to other school principals and to mention the earthquake safety efforts taking place at his school. He recommended that at least falling hazards mitigation should be carried out in all schools from their own funds, as he will himself be doing in the remainder of his school. He said that he used both multimedia and practical demonstration to take this message to as many people as possible.

"A beautiful and efficient school loses its beauty and efficiency if its not earthquake safe. Make the school safe for children." – Principal Sharma

Mr. Anil Pandit, Superintending Engineer, Delhi Public Works Department Retrofit Circle

Mr. Pandit, who holds an M.S. degree in structural engineering from NIT Bhopal, began his role in the project as the Engineering Team Leader for the Police Headquarters Building (also known as the Multi-storey Office Building, or MSO), the project's most technically challenging building. He now heads the Retrofit and Rehabilitation Circle established within Delhi PWD as part of the project. As a structural engineer, Mr. Pandit was primarily involved with structural retrofit efforts. He became involved with Ludlow Castle School when the Retrofit Circle took over responsibility for all project buildings.

He recalls that the Classroom Block building had several rehabilitation issues in addition to its seismic deficiencies, especially the deteriorated parapet and chajjas. A process called garneting was used to repair the building earlier. The structural condition of the Multipurpose Hall was so bad that it was not economical to retrofit, and as a result the Retrofit Circle recommended that it be replaced. Mr. Pandit's first tasks after taking charge of the building were to check the design and to prepare cost estimates for calling tenders. It was during this process that he came across BBR (India) Pvt. Ltd, which after initial persuasion, negotiation and realization of the importance of the project, was eventually awarded the retrofit construction contract for the Classroom Block.

The school provides an excellent example of successful disruption management. After an initial meeting with Principal Sharma, everyone agreed that shifting children from one room to another was not possible, so they decided that the contractor would work only after the school session was finished each day. The contractor would start work after 2:00pm and would work till late in the night. After completing the night's work, the contractor would clean the room, put the students' benches back in place, and make everything ready for classes to be conducted in the morning. The school is a good example of the seismic retrofit of a load-bearing masonry structure. The retrofitting strategy, materials used, and the disruption planning can all serve as examples and provide general guidelines for other buildings. The process used at the school can be modified, because all buildings are unique and need to be treated separately.

Mr. Pandit believes that the school retrofit was a great learning experience. Frequent visits to the site, and a good contractor like BBR resulted in this outcome. As a result of this experience, he thinks that average caliber contractors will not be able to handle retrofit projects and manage disruption successfully, because the process can be slow and more expensive. First-rate contractors are

required for retrofit projects. He also expressed the opinion that falling hazards mitigation should start with generating awareness amongst the people, followed by training, so that general mitigation can be carried out without need of engineers. However, when it comes to heavy things like air coolers, then a maintenance engineer needs to be involved.

Mr. Manu Gupta, Director, SEEDS India

Mr. Manu Gupta headed the efforts at Ludlow Castle School for SEEDS. He held the first meeting with Principal Sharma, and continued to be heavily involved in the project. Mr. Gupta related several lessons from the project. The school presented several interesting challenges. Because of the school's layout and architecture, the project participants had to make trade-offs between safety and discipline. For instance, the school did not want to keep all the exits open because as children might leave classes during normal days. Another difficulty was that the school was poorly maintained, and even simple repairs were left undone. The team also found that the students were receptive, but the teachers were not initially very interested, and took time to become a vital part of the program. Mr. also suggests that now instead of posting evacuation maps, it will be easier marked the evacuation paths from each room with signs, so they are easier for children to follow during evacuations.

Ms. Manpreet Kaur, Consultant, Ernst and Young

Ms. Kaur was the United Nations Development Programme (UNDP) district project officer for North District when this program was initiated. She participated from the beginning, meeting with Principal Sharma and assisting with the hazard hunt. She also helped with the school safety plan and mock drill. For her, it was a great experience overall, especially the sensitization programs for the parents. She relates that the PTA (Parents Teachers Association) greatly appreciated the whole program, and its members subsequently became actively involved in the school Disaster Management Committee.

Ms. Nupur Arora, Solution Exchange, United Nations Development Programme

Ms. Arora was working with SEEDS when the project began. She remembers that the support from school was excellent. The principal gave a free hand to the team and that made working easier. Many visitors came to Principal's Sharma's office, so it was an ideal location for the falling hazards mitigation demonstration.

Ms. Sujata Sathpathy, Assistant Professor, NIDM

Ms. Sathpathy has been associated with the project (indirectly) for more than two years. She coordinates all of the School Safety training programmes at NIDM and has used the Ludlow Castle School as a good practice example in field visits. Since NIDM is now the SAARC center for Disaster management, she has taken trainee delegations from Sri Lanka, Bhutan, etc. to visit the School. She feels that this project represents a big step taken by Delhi Government. The project's emphasis on training teachers and students has taken the message to laypeople. She suggested that videos be made of the school's mock drills and that the videos should be made readily available to other schools, to help them learn how to conduct such drills.

Mr. Amir Ali, Assistant Professor, NIDM

Mr. Ali, also from NIDM, has been an eyewitness from the beginning of the project. He has been so influenced by the whole programme that he mentions it wherever possible. He has been visiting the school regularly, along with various groups of trainees from NIDM. He appreciates the efforts made by Delhi Government, GHI and SEEDS. He feels it is a humble beginning and a trendsetter.

Dr. Chandan Ghosh, Professor, Director, National Institute for Disaster Management
Dr. Ghosh visited the school on the very first day of the programme. He feels that it is a bold first initiative, one of a kind, involving a great mix of experts from India and abroad. The Indian Institutes of Technology used sophisticated technologies and analysed seismic condition of the buildings. Delhi PWD conducted soil investigations and testing of existing building materials. The project was very special because participants took great care in determining the exact condition of the buildings involved in the project, from their plan geometry to the site conditions. He said that the involvement of non-engineering experts made this a unique project. He mentioned that the involvement of experts who developed the FEMA guidelines, and the formation of a PWD retrofit circle were two key outcomes of the program, and that these outcomes gave him confidence that the whole program could be sustained.

Impact

The earthquake risk reduction program at the school has had a large impact on India's disaster management and education communities. In partnership with GHI, Delhi PWD, and UNDP, DDMA has begun to replicate the program at one school in each of the nine revenue districts of Delhi. DDMA selected the nine schools, Delhi PWD conducted initial assessments, and GHI performed initial sensitizations at each of the nine schools. Each school will be seismically retrofitted, will have its falling hazards anchored, and will implement earthquake preparedness measures. As a result of this replication project, GHI and Delhi's Director of Education have initiated a separate effort to seismically retrofit a type of highly vulnerable semi-permanent building found at many school sites throughout Delhi and the surrounding region.

The National Disaster Management Authority is using the Ludlow Castle School experience as a model in the forthcoming National School Seismic Safety Programme. The programme will address the earthquake risks of schools in several states that have high seismic hazard (those in Zones IV and V of India's seismic zoning map). The school has also become a part of the National Institute for Disaster Management (NIDM) training programs. NIDM uses the school as an example and has brought in several groups of trainees from India and other countries to tour the school. Principal Sharma has been happy to demonstrate the work done, and every visitor has taken a lesson back home.

Principal Sharma has emerged as a champion of school safety. He has given lectures on the importance of school earthquake safety not only in Delhi but also in International workshops elsewhere. He feels school safety is of utmost importance. Because of his stature in the education community, many principals now want to implement similar safety measures in their schools.

Sustainability

Any earthquake safety program must be sustained, in order to be successful. The school has put in place several mechanisms to keep teachers, staff and students prepared. The school holds periodic awareness programs and conducts regular drills. The awareness programs are age-appropriate: small children are made aware of earthquake hazards through stories, whereas older children see demonstrations and pictures. Recently, a street play on what to do and what not to do during a disaster was performed at a school assembly. The children were so impressed that today Ludlow Castle has its own team of actors that puts on an original street play demonstrating hazards and

mitigation measures. A new Disaster Management Committee was formed with a new set of parents and teachers; the original committee was formed in 2005.

The school played a major role in developing *Falling Hazards (Non-Structural) Risk Reduction Handbook for Schools*. Most of the examples used in the handbook are from Ludlow Castle School. GHI and the Delhi Government have disseminated the handbook widely, both in Delhi and to interested organizations in areas of high earthquake hazard throughout India. GHI anticipates that the handbook will continue to be a major resource for school earthquake safety for years to come.

Because of the successful earthquake risk reduction efforts, the school has become a model for earthquake risk reduction and has hosted many visitors who come to tour the retrofitted building, witness earthquake drills, and examine how falling hazards have been anchored. Principal Sharma has been very accommodating of visitors and has opened the school to many people wanting to see school earthquake safety in action. The ongoing education that the school provides to visitors serves a secondary purpose of ensuring that earthquake safety efforts are sustained. Through its activities, the school is also producing students who are aware of earthquake risks and how they can reduce those risks. As these students enter society, they are more likely to become advocates for earthquake safety themselves. These students are perhaps the best sustainability mechanism.