

1. Summary

1.1 Overview



We are pleased to present the final report on the work completed at Shree Pema Chholing Lower Secondary School, Nakote, Helambu in Sindupalchowk district. Pema Chholing is one of the three schools for which we received funding from Eagle in November as part of our reconstruction work and is one of the fifteen schools we received permission for school reconstruction from the Department of Education.

Before starting the rebuild, we organized masonry training in Kathmandu for over 50 local people from various villages to build earthquake resistant buildings. We then began by fixing the damaged playground and building retaining walls. We then rebuilt the toilet building and finally moved on to the retrofitting of the classroom building. We started work in mid December 2015, involving 25 to 30 local people. Overall, it took this substantial labour force four and half months of continuous and dedicated work to reach the completion stage. The villagers were driven by immense commitment to finish the school so that it could reopen in time exactly at the first anniversary of the earthquake.

The project was hampered by fuel shortages throughout Nepal created by the blockade in late 2015. This lasted many weeks and drove up costs of transporting materials. It also caused delays.

However, we are pleased to report that Shree Pema Chholing Lower Secondary School actually became the first school to have been fully rebuilt and back in operation in the whole of Sindupalchowk district. The opening was done at a function with villagers, students and teachers as well as representative from the Ministry of Education and our Nepal education advisory member, Dr. Bidyanath Koirala. This was reported by several national TV reporters and a leading Nepali educational newspaper. A story in one of the Nepali education newspaper is attached in the appendix.

1.2 Aim

We sought to retrofit the damaged classrooms, rebuild the collapsed toilet building and other facilities as necessity, while applying safe standards of construction so that the pupils could return to a safe environment to continue their education.

1.3 Summary of results to date

Our original plan was to retrofit seven classrooms; however, we ended up retrofitting **ten classrooms**. We rebuilt two separate toilet blocks with three cubicles each for boys and girls. A massive amount of work was carried out on rebuilding the playground using gabion wires and it was fenced off using poles and wire-mesh fencing. We also built emergency safe spaces in several locations around the school. Retaining walls were another important piece of the work we did which was aimed at providing additional support to the school building where necessary. We have installed new desks and benches to replace the broken/damaged ones. *The picture shows retrofitted building ready for classrooms use.*



The completion of this project means some 110 children and 10 teachers have now moved back from the Temporary Learning Centre (TLC) to the new school building at the end of a very difficult year. The school building stands as an example of community resilience and a revival of hope amongst local people to achieve their common goal. It has also spread a message that local people can build better buildings than before by applying renewed methods of construction in their own local context.

2. Implementation

One of the challenges we faced while starting the rebuilding work at Nakote was disrupted road access where part of the roadway was destroyed in the earthquake, so we had to wait until the local authority allocated a budget to repair this. In the meantime, we obtained the necessary permissions at government level and trained local manpower to equip them with skills required for earthquake-resistant buildings (see picture, right). Several engineers - both ours and government staff - visited the school to assess the building, providing input on what had to be done. Our team in Nepal prepared a thorough plan which was presented to the Department of Education for approval. A full time supervisor was recruited to be stationed at the construction site.



The villagers were happy to show MondoChallenge Foundation CEO, Anthony Lurch, the work in progress during his visit just a month ahead of completion.

2.1 Classroom Retrofitting

The school has three separate buildings built over the past 6 years. Two of them are two-storey buildings; one with 8 rooms and another with 6 rooms. The third one is one-storey building built for kitchen and dining hall purpose for hostel students. None of these buildings suffered irreparable damage. However, the rooms on the second floor of both the two storied buildings had intense wall cracks and the bricks had come off the walls at several points after the tremors.



Initially, it was suggested that retrofitting was needed for seven rooms that looked unsafe, and this formed the basis of our proposal. However at a closer inspection, later, the treatment was required for 10 rooms. It was also deemed necessary to fix the other building with six rooms in its entirety to fundamentally enhance its structural integrity, strength and ductility (deformation capacity). This required external buttressing with reinforced concrete at strategic locations, especially at the joints between the walls, which has significant importance in improving the integrity of the

whole building. Integrated with these external reinforced buttresses, we provided an additional tie beam at the plinth level all around the building perimeter. However, the other building had robust stone masonry walls on the ground floor, so only its upper floor with four rooms was treated. The pictures above left above and below right show buildings during and after the retrofitting work.

In retrofitting these rooms, we replaced the dislocated blocks/bricks, filled the cracks in the bands and replaced bond beams in entirety with the new ones in accordance with technical protocol. Similarly, we shifted the locations of some doors to ensure proper functioning of the load bearing walls.



The retrofitting per room cost Rs. 150,000. This is equivalent to £10,462 in total for ten rooms, ie each room cost £1,040 which was very close to our original budget.

2.2 Toilet Construction



We rebuilt a new toilet building (picture left) with two separate blocks for girls and boys. Each block has three rooms with separate urinal section. The old toilet building had collapsed completely and we learnt that while it was built fairly well, the dimension of its length versus its width was unsuitable, inducing differential movements in different parts of the building. We therefore built the new toilets with two blocks separated by a seismic gap, ensuring that each has suitable length to width ratio. The new building has horizontal reinforced steel bands at different strategic levels as well as internal and external vertical reinforced ties. Reinforced

Cement Concrete Slab was used as roofing in order to accommodate a water tank that supplies water to the toilet.

The cost of rebuilding the toilet came to £5,160, which is £1,160 above our original budget of £4,000.

2.3 Playground and fencing

The playground measured 90 feet by 35 feet in length. It suffered large and deep cracks owing partly to the nature of the land but mainly due to the lack of a proper retaining wall. The remedy was to construct supporting walls from its base. The positioning of the school playground was such that supporting walls were required to be built with slope retention in order to protect the site from any potential landslide hazard and ground motion in the future. As the walls were built, we used gabion wires to box the stones. Soon after the playground was completed, we fenced the area using wire knitted fencing nets.



The total cost of fixing the playground and putting up the fence came to £3,723.

2.4 Engineering and supervision

Construction of the toilet block and retrofitting of classrooms were two major tasks that needed engineering input. The toilet block was designed by a senior Engineer, Gajendra Thapaliya, who now serves as the chief technical advisor to the Prime Minister of Nepal. The design was further improved by our Nepal technical team led by Architect Sameer Bajracharya. To assure the quality work, we recruited one technical supervisor, Shyam Gopal Shrestha, on a full time basis.

The cost of engineering and supervision was £1,132

Additional Works:

2.5 Retaining Walls:

There were several points within the school premises that needed external support to strengthen the main building structures. So, we applied reinforced gravity retaining walls (as shown in the picture right) at the back of the school building, near by the toilet area and at points where heavy rains could lead to landslides. The retaining walls constructed are durable and strong and we have spent a sum of Rs. 150,000 or £1,000 to do this.



2.8. Furniture and other facilities:

20 set of desks and benches were destroyed in the earthquake, so we replaced all of them. 10 sets were sent to the TLC in July and the other 10 were delivered in November. We spent £500 for installing desks and benches.

3. Budget

The total cost to undertake this project came to £23,377. This is a budget overspent of £7,977 as a result of the extra work we had to do and higher costs on several items caused by shortages and the fuel blockade. The largest share of expenditure was on labour costs which, spread across the various items below, amounted to £11,246. The table below shows the comparison of our original budget and actual spent on different headings.

Money Spent on	Original (£)	Spent (£)	Overspent
Retrofitting 10 classrooms (originally 7 rooms budgeted)	7,000	10,462	3,462
Toilet building	4,000	5,160	1,160
Playground, fencing and retaining wall	2,000	3,723	1,723
Additional retaining walls needed		1,000	1,000
Engineering and Supervision	1,000	1,132	132
Desks & benches	0	500	500
Admin (10%) Original retained	1,400	1,400	0
Total	£15,400	£23,377	£7,977

Conclusion:

Clearly, we underestimated the work that had to be done for reasons outlined above and the overall expenditure was 50% more than the original budget. We covered these costs by raising funds from other sources and taking some from our reserves.

The budget figures above show that we managed to keep the retrofitting cost to close to the £1000 per classroom we budgeted. For the toilet building, the budget was £4,000 to build four rooms but due to the application of latest earthquake resistant technique, in which we decided to use buttresses all around, the cost went up. The other major overspend was on the playground and the fencing because it consumed more gabion wall boxes than what were originally predicted.

Overall, however, we feel the project has been very well handled in exceptionally difficult circumstances. The techniques used and the experience gained have been of enormous help in our various other building projects currently underway. Fondation Eagle have been long term supporters of Nakote and we are hugely grateful to you for the confidence you showed in supporting this (and other) rebuilding work. We are delighted that it has been completed within the original timeframe and to the high standards you would have wished.

Jimmy Lama
Anthony Lunch

Appendix

1. Testimonials

1.1 Dr. Bidyanath Koirala, a well respected Nepali Educationist and a Professor at Tribuvan University: "I am glad to be a part of the inauguration of the school and I have not seen a school built with such efficient engagement of the community. This building looks very strong and I congratulate everyone who supported this project."

1.2 Mr. Krishna Dhungana, Joint Secretary at Ministry of Education: "This is an exemplary job and I will write a letter to the District Education Office with a request that this school receives one more teacher as it seems is required."

1.3 Mr. Santosh Mishra, Engineer at the District Education Office: "It is unbelievable to imagine a construction of this scale and so much thoroughness happening in such a remote village. I have inspected every single work done and it is hard to find anything that has not been done properly."

2. Newspaper article of the school reopening

