

**DESIGN COMPETITION OF**

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# **RURAL HOUSING**

**Submitted by**

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# 1. Rural Housing

## Background

Nepal underwent a devastating earthquake on Baisakh 12, 2072 that took many lives, injured thousands and left many families homeless. A total of 14 districts were badly hit, including places such as Gorkha, Sindupalchowk, Dhading, Kavrepalanchok, Nuwakot, Rasuwa, Dolakha, Ramechhap, Okhaldhunga, Makwanpur, Sinshuli, Parsa, Lamjung, Palpa and Parbat districts. An estimated six Lakh houses were permanently damaged. Hence the main aim of this project is to 'Build Back Better' in these affected areas, and bring relief to the victims. By making site visit and getting the real understanding of the ground condition, and from there developing designs is part of the design competition. Using local materials, and appropriate technology making the building in cost effective manner so that the design is practical and buildable.

### 1.1. Site Selection and Visit

The site was selected at Marpak Village Development Committee Dhading District. It is located about 60 km from Barpak the epicentre of the April Earthquake. Marpak is accessed from Kathmandu to Dhadingbesi 94 kms, from Dhadingbesi to Marpak 36 Km, from Marpak to Trishuli 50 kms and from Trishuli to Kathmandu 75 Kms.



The site visit was conducted with the help of North Point Alumni fund (sincere thanks to making the site visit possible) which was collected to support the earthquake victims. As we travel from Kathmandu to Dhadingbesi the road is black topped from Dhadingbesi to Marpak the road is gravel road, also from Marpak to Trishuli about 80% of the road is gravel road,

and from Trishuli to Kathmandu the road is blacktopped. A four wheel drive vehicle was taken, because the off road track from Dhandingbesi to Marpak to Trishuli was quite rough.

As we landed at Marpak it was late at night, and we got to rest in a house that was temporarily built by using CGI sheets and remains of the broken house. The following morning we got to talk to a teacher at the local school Mr.Sundar Thapa. With the given time and to maintain a focus, we thought of considering only Ward No.1 of Marpak VDC.

As we walked every house to get a first hand understanding of the village, almost 90% of the houses were damaged in Ward no.1. There was a total of 91 houses. There were no RCC (Reinforced cement concrete) structures, all of them were stone and mud masonry houses. The earthquake had damaged all of the houses, and soon after the earthquake humanitarian organizations from Pokhara had distributed prefab toilets, CGI sheets, floor mats and water holders. As we observed the houses, now all of them were wrapped around with CGI sheets and roofed also with them. The wood from the broken houses were being reused. But all this was temporary settlement. There is a need for something more permanent.

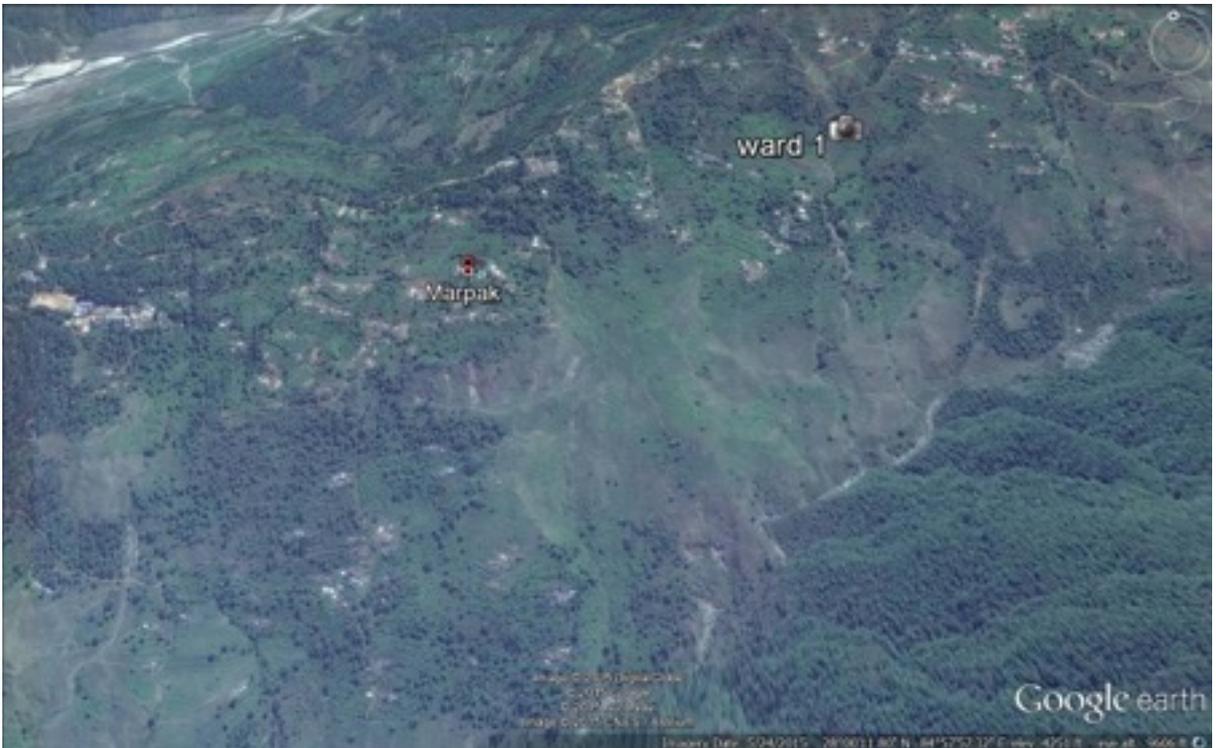
Although there is a need for something permanent the locals don't believe anything permanent is going to happen any time soon.

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From the site visit we managed to note the names of all the residents of whose houses have been damaged in ward no.1 and their family members:

Chandra Bahadur Adhikari (4); Rabindra Adhikari (3); Bishal Adhikari (3); Sanu Bhai Adhikari (5); Sanu Kancha (1); Bir B. Adhikari (4); Kumar Adhikari (6); Jip B Adhikari (8); Murali Adhikari (6); Kuber Adhikari (4); Buddhi Adhikari (2); Chet B. Adhikari (11); Gopi Krishna Adhikari (5); Dhurba Adhikari (7); Kaji Ram (4); Maili Adhikari (13); Sita Adhikari (3); Khem B. Adhikari (9) ; Ram C. Adhikari (5); Chini Adhikari (5); Bal Kumari Adhikari (3); Shambhu Adhikari (4); Shiva Adhikari (4); Raju Adhikari (3); Bir B. Adhikari (8); Rajendra Adhikari (4); Shyam B. Adhikari (6); Janak Adhikari (4); Vishnu Adhikari (4); Bal Kumar Adhikari (1); Bhairab B. Adhikari (5); Badri Adhikari (4); Krishna B. Adhikari (7); Savitri Adhikari (5); Raju

Adhikari (4); Bachhu Adhikari (4); Arjun Adhikari (6); Sudarshan Adhikari (3); Krishna B.Adhikari (5); Gopal Adhikari (5); Aita Ram B.K.(7); Sarki B.K.(1); Kaila B.K. (1); Ganesh B.k.(5); Hari B.K.(4); Indra Kumari (2); Raju Nepali (2); Dil B.B.K. (5); Aitay B.K. (8); Meena Kumari B.K.(2); Mithu B.K.(3); Seti B.K. (3); Keshab B.K.(4); Rajendra Thapa Magar (4); Gyanendra Thapa Magar (4); Birendra Thapa Magar (8); Khil Bahadur Adhikari (5); Resham B.Adhikari (5); Min B. B.K. (7); Khil B.K.(6); Rana B.K.(6); Binod B.K.(4); Ram Chandra B.K. (4); Ramu B.K.(3); Kumar B.K.(4); Thakur Prasad Rijal (5); Rajan Adhikari (4); Bohar Singh Adhikari (6); Vishnu Adhikari (5); Jamuna Devi Adhikari (9); Tek B. B.K.(7); Ral Kumari Adhikari (5); Jayaram Adhikari (5); Rajan Adhikari (5); Ganesh Kumari Pant (5); Sher Bahadur Gharti(6); Rajesh Gharti (4); Maiya Gharti (1); Ghamka B.Thapa Magar (5); Thak B.Gharti(8); Dipesh Gharti (3); Lila B.Adhikari (5); Janak Raj Adhikari (7); Madan Adhikari (4); Sundar Thapa(3); Madhu K.Thapa(4); Nirmala Thapa(8); Gopal Adhikari (6); Vishnu B.Adhikari (9); Mister Adhikari (6); Ram B.Adhikari(12)

This more or less covers the whole of ward no.1. The population is mixed with Adhikari's majority. For the case study Mr.Chandra Adhikari's house was studied. From the background of the residents they are mainly farmers, with huge plots of farming land.

## 1.2. Design approach

### *Design cost balance*

The design strategy is focused on bringing on a balance between design of the building and cost of one unit. While the main features are earthquake resilient structure, the green design principles are seen to have already been present, since the village has sufficient flow of water, and electricity. By making a framework design of the house, there are no partitions in the proposed design, keeping in mind people have different needs as per the number of habitants and allowing people's process to take place. Thus each individual family would change and build their interiors as per their need. This flexibility is one key feature of the design, which helps achieve the cost, while still being able to give a roof for the affected people.

### *Materials and Areas*

The design intends on using local stone, wood CGI sheets and stabilized soil and concrete beams for the flooring. The materials to be imported to the site are Steel, cement, sand and aggregate and CGI Sheets.

The square feet area covered by the proposed design is 450 sq.ft. without 'pidi' space and including 'pidi' or semi open space is about 600 sq.ft. The site plan was not possible to create due to site conditions, but according to interviews most people wanted to build right over the destroyed site, instead of being re-settled. So keeping that in mind a model fit for all has been created, but that with utmost flexibility for growth as per their needs.

### *Earthquake Resiliency*

To make it earthquake resilient, RCC has been used in the foundation, Damp proof course level, Sill level and Lintel level, in the four corners of the walls, and roof gable. These

materials will have to be transported from Dhadingbesi or Trishuli. The stone and mud masonry will still be used but the heights for their deployment are reduced thus making the building safe. For the flooring, stabilized soil and concrete with rebar beams will be used, this is a technology adopted from Mr.Bhubaneswor Lal Shrestha. Which is cost effective by using soil and cement mix and concrete mix with rebars while being durable.

### *Contemporary Vernacular*

The design has responded to the maintaining of 'sense of place and belonging' with its local traditional architecture and roof, staircase and pidi(semi-open space). The design is made to fit in the context, and enliven the memory. But does not take a strictly conservative role, it has tried to re-define the vernacular into a more contemporary vernacular. It has adopted traditional ideas, kept in mind the market forces and allowed appropriate technology developed through study and research, thus redefining vernacular into a Contemporary Vernacular Architecture.

With the given design the intention is be able to deliver to the affected people, with the right cost. There is also an execution plan, which is the most important for delivery of the the project. That is to have a local body supervision team so that can resolve the local issues as well as pursue with right mindset, and keep other executing agencies in check and balance.

Rough Cost Estimate

S n	Description of work	Unit	Quantity	Material Cost	Rate/unit	Amount	Remarks
1	Earthwork excavation	Cum	31.83		560.00	Rs17,823.68	
2	Backfilling earthwork	cum	15.83		420.00	Rs6,648.60	
3	Total Stone works	Cum	74.54		2980.00	Rs222,129.20	
4	R.C.C Works	Cum	5.71		15610	Rs89,148.71	
	Cement	Bags	38.00				
	Sand	Cum	3.12				
	Aggregate	Cum	4.07				
5	Wood Works		1.86		73191	Rs136,428.02	
6	Stabilized Soil Block		35.51				Soil used from excavation no cost added, but cement is added in RCC
7	Reinforcement 12mm Dia	kg	217.98		77.85	Rs16,969.74	
8	Reinforcement 7mm Dia	kg	319.85		82.05	Rs26,243.69	
9	Reinforcement 4.75mm Dia	kg	137.12		85	Rs11,655.20	
10	CGI Sheet	sqft	32.89		2487	Rs81,797.43	
						Rs608,844.28	
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Rs Six Lakhs Eight thousand, eight hundred and forty four twenty eight paisa.

