A.10 Haiti - 2010 - Earthquake

Case study:

See "Haiti - 2010 - Earthquake - Overview", p.12 for background.

Country:
Haiti
Disaster:
Earthquake
Disaster Date:
January 12th 2010
No. of houses damaged or destroyed:
180,000
Project target population:
Families with disabled persons
Shelter size:
12m², 18m² or 24m² with a 6m² porch dependent upon family size and land.

Project timeline

Project description
The project targeted displaced disabled people in rural locations in the south of Haiti. The project used a participatory approach to build durable shelters. The project re-engineered a well known traditional technique known as *clissade* making it more durable, suitable for mass assembly and later upgrade by beneficiaries.

Strengths and weaknesses

✓ The construction technique of *clissade* is well known by the local population as it has been traditionally used in rural Haiti. As a result it is easy and affordable to maintain and upgrade.

✓ The shelter was designed in panels. Each panel has the same width as a door, allowing beneficiaries to create new openings in their shelter.

✓ The project paid particular attention to beneficiaries with disabilities. Each individual shelter and its sanitation facility was adapted to the type of disability. It was accompanied by a rehabilitation program for people with disabilities, to increase their mobility and build capacities in the use and access to the latrine and the shelter.

✓ The project worked with students from a youth vocational training centre. It aimed to increase their capacity to join the labour market.

× Beneficiary selection depended on a referral system from other organisations. It proved very time and resource consuming to receive beneficiaries referred in this way. This increased the logistical challenges as beneficiaries were identified as the project progressed and were not identified from the start.

× If the beneficiaries do not upgrade their shelter by covering their panels, water could enter and it could be cold.

× Logistics were demanding and slow as rural locations meant that some families could not always be reached by vehicles.

× The project and the design was very labour intensive.

- The shelter was prefabricated in pieces in the central workshop and sent to the field for assembly by beneficiaries themselves. The concept was that shelters could later be moved if required.

Before the earthquake

See "Haiti - 2010 - Earthquake - Overview", p.12.

Before the earthquake, the majority of Haitian families who lived in rural areas lived in self-built houses. Many were built using *clissade*, a Haitian technique of weaving bars of palm wood to make walls. These walls were later covered by mud and cement. The roof was covered with corrugated zinc.

After the earthquake

In general, the *clissade* houses resisted the earthquake much better than the concrete houses. Where they were damaged in the earthquake, the injuries to the occupants were not as severe as those caused by collapsing concrete houses.

Pilot shelter

The project began with a participatory process that lasted 10 days. During this time, community groups were organised in a remote village. The focus was on understanding the daily activities of each member of the family, including working, cooking and sleeping. This process lead to a shelter design being developed that could be used for a pilot shelter.

A location for building the pilot shelter had to be negotiated with the local authority. It was intended that the pilot shelter would be useful for the community. In the end it became a treatment centre for disabled people.

Once a site was identified, it took another 10 days to organise teams and materials to build. The pilot shelter allowed different technical solutions to be tested. Different technical and design corrections were made to the pilot in order to improve it and to fit it in the budget. The shelter was assessed by structural engineers offered by another organisation. Specific changes including additional bracing and hurricane straps were required to ensure that it could withstand 100 mph (161 Km/h) peak wind speed.

The shelter was later adopted by the local authority and by several other non-governmental organisations. Once designed, the next three months were spent negotiating with donors, tendering, organising logistics and preparing workshops. The workshop was designed and organised with a chain of production producing around 30 shelters per week with almost 45 persons working inside.

The programme included a sanitation component providing with access to latrines or an adapted sanitation solution. Both the shelters and the sanitation component were adapted to the disability of the beneficiaries of the shelter.

To build the shelters, 60 USD was given to the beneficiaries to pay local workers. The organisation provided skilled workers to lead the construction.

Less than 40% of the families owned their land. For these families, a multi-party document was signed to keep the beneficiary on the land for free for at least for 3 years. This was signed by the beneficiary, the landowner, the community leader, the mayor and the organisation. After 3 years, the beneficiary will remain the owner of the shelter and the owner will keep the latrine.

At its peak, the project had a staff of over 150 people working in the workshop, on site, in logistics and as social mobilisers.

Day	Stage	Worker days
1	Ground preparation	2 x technical advisor, 6 x beneficiaries
2	Digging foundatrions	6 x beneficiaries
3	Bolting and fixing columns	1 x chief carpenter 1 x chief mason 6 x beneficiaries 6 x labourers
4	Embankments	6x workers
5	Installation of panels and carpentry	1 x chief carpenter 6 x beneficiaries 3 x workers
6	Paving and drainage	1 x chief mason 6 x beneficiaries 3 x workers
7	Fixing roof windows and doors	1 x chief carpenter 6 x beneficiaries 3 x workers

Selection of beneficiaries

The project targeted vulnerable families affected by the earthquake, including people with disabilities. A survey form was prepared to select the most vulnerable people amongst those who were referred to the organisation. A social officer worked in close collaboration with the organisations field office, with other non-governmental organisations referring families with disability cases and with local organisations and associations.

The shelters were built using a traditional technology known as clissade. Photo: David Sacca

A traditional shelter that survived the earthquake.
Photo: Joseph Ashmore

A completed shelter, based on vernacular styles.
Photo: David Sacca

Technical solutions

The T-shelter was made from pressure treated pine wood. Panels were prefabricated in the workshop and were then transported to the field. Once on site, the pieces were bolted together. All the nails and screws (the panels were fixed with nuts and bolts, not nails) were double hot dip galvanized.

For roofing, corrugated bituminous sheets were selected. They were selected due to their 15 year guarantee, their thermal properties and their strength.

The site for each shelter was prepared by a team who were tasked with taking into consideration possible risks, such as landslides, of each plot. The field teams were expected to conduct work to mitigate the risks.

Each shelter is raised by between 30 and 50 cm from the level of the ground preventing water entry in case of floods.

The shelter was designed and tested by structural engineers to be resistant to hurricane, earthquake and floods. It was also designed to ventilate naturally.

Logistics and materials

Once the shelters had been prefabricated in the workshop, it proved challenging to get the components to remote locations in the mountains of southern Haiti.

Many of the raw materials had to be imported to Haiti. For example the timber used was pressure treated pine that was not available in Haiti. Most were shipped in and then trucked into the workshop in Petit Goave. In the workshop, the whole shelter was pre-fabricated in panels and trusses. The pre-assembled components were then transported to the site, by truck or by hand in difficult to access areas.

Materials list

Materials	Quantity
Timber 2"x2"x14' (50x50mmx4.3m)	4 pieces
Pine 2"x4"x14 (50x100mmx4.3m)	89 pieces
Pine 1"x4"x14 (25x100mmx4.3m)	23 pieces
Pine 1"x6"x14 (25x150mmx4.3m)	3 pieces
Plywood 1/2" (13mm)	3 pieces
Plastic mosquito net 48" (1.2m)	20' (6m)
Wood Glue	0.5l
Corrugated fastener 1"x5"	unit
Corrugated roof sheets (Onduline)	19 pieces
Ridge (Onduline)	9 pieces
Twisted roofing nails for wood 2 1/2"x9" (60x230mm)	
Threaded rod 3/8" 80" (10mm)	23' (7m)
Nails: 1 ½"-5" (30mm-125mm)	
Coiled strap (Hurricane strap)	15 m
Hinge 4"x4" (100mmx100mm)	1
Hinge 3"x3" (75mmx75mm)	2
Bolt 4", 3"(100mm, 75mm)	2
Wood screw 3½"x10	
Cement	18 bags
Sand	6 m^3
Gravel 5/25	4 m^3
Cement blocks	70 pieces

Some areas were difficult to access and materials needed to be transported by hand.
Photo: Olivier Dorighel