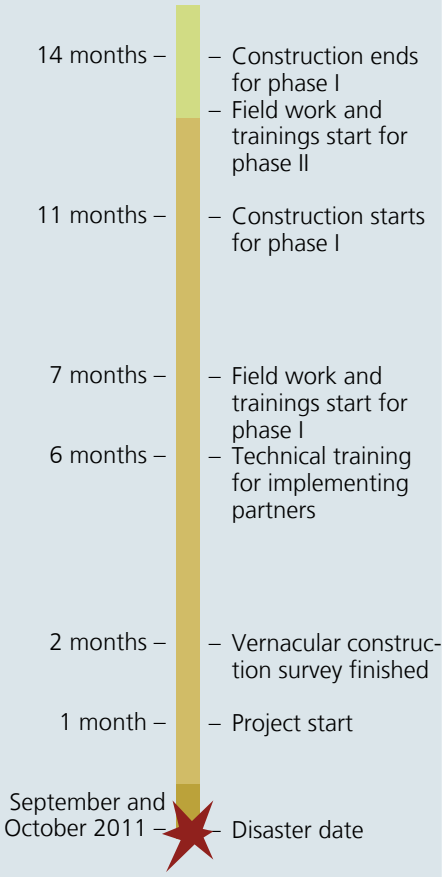
A.22 Pakistan – 2011 – Floods

Case Study: **Keywords:** Non-displaced / returns, Core housing construction, Cash, Training, Guidelines and training materials

Country:
Pakistan
Project location:
920 villages in south Sindh
Disaster:
2011 floods and intensive rains
Disaster date:
September and October 2011
Number of houses damaged / destroyed:
750,000–950,000
Project outputs:
4,624 shelters at end of 2012 - ongoing
55,914 villagers trained
Occupancy rate on handover:
100 per cent
Shelter size:
Recommended area 21m²
Materials cost per shelter:
US$ 300
Project cost per shelter:
US$ 514

Project timeline



Project description

The organisation worked with 27 implementing partners to deliver shelter at scale. The project provided cash to households to build their own shelters. It aimed to increase the resilience of communities by increasing the quality of technical input, incorporating more disaster risk reduction (DRR) components, monitoring to ensure compliance, and supporting the construction of safer shelters to catalyse self-recovery. This was achieved through knowledge and cash transfers to enable households to make choices based on their needs and priorities.

Strengths and weaknesses

✓ The project promoted self-reconstruction and strong beneficiary participation.
✓ Distributing cash to beneficiaries stimulated the local economies. Households managed the funds that they received in instalments.
✓ Technical trainings for partners, interested village members and beneficiaries focused on safer construction practices.
✓ Vernacular shelter typologies were recommended and promoted. These were affordable and maintainable by low income families.
✓ Created awareness of flood resistance principles using traditional or simple technologies such as lime.
× Households had to divide their time between daily tasks and construction. Implementation dependended on crop cycles, leading to delays for donor deadlines.
× Material quality was variable because it was dependent on local markets.
× The construction process output was directly proportional to the household input so the quality of reconstruction was not uniform across the project.
× Not all beneficiaries were interested in complying with the recommendations provided, leading to variations in shelter quality.
- Before the project the majority of flood affected households had a limited understanding of why their previous shelters failed.
- The vernacular construction typologies differed widely, even within a single village.
- Reintroduction of lime in the traditional construction process was perceived to be an innovation.
- Beneficiaries who witnessed the 2011 shelters with improved DRR techniques surviving the 2012 rains were very motivated to learn from the technical trainings, and to implement the recommendations.

Women plastering their one room shelters. The project provided cash to build shelters and training on safer construction with incremental improvements such as stronger plinths and footings to walls. Households chose their own shelter design.

Photos: IOM ORS

Before the floods

Many people in Pakistan could be classified as vulnerable before the floods. 27 per cent of Pakistan's population lived in severe poverty and 23 per cent lived on less than US$ 1.25 per day. The flooded region is one of the poorest areas in Pakistan.

In 2010 there had been major flooding and the organisation had supported households to build over 38,000 shelters (see A.24 Shelter Projects 2010). Evaluations of the response indicated that extra action on trainings would enhance the impact and longevity of disaster risk reduction interventions.

After the floods

Monsoon rain in 2011 led to the collapse of many houses due to the weight of waterlogged roofs, or failed due to foundations being compromised by rising water. An estimated 1.2 million people were displaced throughout Sindh and Balochistan provinces, without shelter, access to safe drinking water, health services or food.

It was estimated that 35 per cent of the communities affected in 2011 were also affected by the 2010 floods. This indicates that more than a million people affected by the 2011 floods had barely recovered, or were still trying to recover from the 2010 flooding.

Beneficiary selection

Working through implementing partners and focusing on the most severely affected districts, assessments were made to identify villages where more than 20 per cent of the houses were destroyed and the social coping mechanisms were stretched to the limit.

Villages to intervene in were selected in phases:

- Phase I was based on the list of most affected union councils (administrative districts).
- Phase II was based on the list of union councils with the most unmet needs.

Village committees were set up to identify the most vulnerable households among those whose shelters had been completely destroyed. Vulnerable households included:

- Female-headed households
- Households with no adult male
- Households with an elderly member (over 60 years old)
- Households with a disabled or chronically ill member
- Households with extremely low income and no livestock
- Households with a dependency rate above 60 per cent.

Implementation

The organisation worked with 27 implementing partners. Each implementing partner agreed to build 500 one-room shelters or support 23 villages. Each one had an average of four field staff members, two social mobilisers and two technical assistants. The organisation also provided its own project staff to support the implementing partners, assisting them in the project and on solving all questions and challenges that arose.

Village committees, in coordination with the beneficiaries, appointed a village focal person who was responsible for receiving and distributing cash to a group of up to 25 households. The organisation transferred the first tranche of funds as an advance for the beneficiaries to construct the base of the house. Once all the members of group had finished their plinths the organisation transferred the second tranche for the construction of the walls.

This process of advance and milestone construction was completed with the third tranche payment once the roofs were finished. Joint construction provided positive peer pressure and encouraged collaboration.

During the entire construction process, implementing partners and project staff provided practical technical trainings in the villages. This aimed to ensure that safe practices and cost-effective disaster risk reduction techniques were incorporated at all stages of the construction.

Monitoring

To monitor the distributed funds and construction progress the project team scrutinised a minimum five per cent of the total shelters committed. Households were chosen to be monitored at random from the project beneficiary database.

The aim was to ensure that the monitoring process was evenly distributed amongst all groups. Monitoring plans were devised in such a way that they guaranteed a visit to each village. The process continued throughout the project, starting from verification of beneficiary

A homeowner using lime to prepare stabilised adobe bricks for the walls of his house. Photo: IOM ORS

Some homeowners decorated their houses. This was encouraged as a way of building pride in traditional architecture. Photo: IOM ORS

selection, to construction oversight and cash distribution.

Coordination

The project activities and implementation locations were coordinated with the national interagency coordinating body (see the case study on coordination in Pakistan, A.21). This reduced duplications and maximised coverage in line with agreed priorities. The coordination team also supported organisations to liaise with the authorities and donors, creating a platform for information collection and sharing amongst all shelter actors.

Regular progress reports were publicly shared. Close coordination was maintained with the disaster management authorities at the district, provincial and national levels to ensure a coherent approach towards shelter recovery.

Accountability

A complaints telephone hotline was established to encourage transparency and to provide beneficiaries with a direct link to a complaints and feedback process. It also provided beneficiaries, implementing partners and project staff a channel to report irregularities and challenges. Trained staff, fluent in local languages, responded to queries and recorded complaints in a database. At the end of every week, the complaints were forwarded to the project manager and followed-up by the field teams.

Shelter staff in the field informed all beneficiaries and their implementing partners about the complaints referral mechanism. A free telephone hotline was set up to record any complaints. Colour posters and business cards with key messages and phone numbers were distributed. Awareness raising sessions were provided to all beneficiaries, implementing partner representatives and focal points before the first payment.

Training

In order to identify the most cost-effective local construction methods, a build-back-better survey on vernacular construction was conducted in the six priority districts with support from a local technical implementing partner (see case study A.23).

The survey was designed to record existing conditions in the flood-affected districts with a focus on local self-built techniques. It assessed the strengths and weaknesses of existent vernacular construction practices. The main aim was to record the different types of structures that survived, the techniques and practices that largely withstood the flood waters and the ones that led to house collapse.

Once the best construction methods were identified and improved they were compiled into a construction manual used for practical and theoretical capacity building trainings for affected households. The programme also provided a Training of Trainers course which had theoretical and practical sessions. It was based on the construction manual and educated all technical and field staff working with the communities.

A core component of the project was to train flood affected households on how to build back safer using disaster risk reduction techniques. The objective of the trainings was to build the resilience of affected populations enabling them to cope with future disasters on their own.

Each implementing partner conducted four trainings per village during the construction process. Affected people could also request additional trainings. By December 2012 the programme had delivered 2,071 trainings that where attended by over 55,900 villagers.

In September 2012, there were two weeks of intense rain. At the time, all beneficiaries and implementing partners where very worried that all the constructions were going to be washed away. However, plinths and platforms were minimally damaged and people could repair them, and continue construction within a short time.

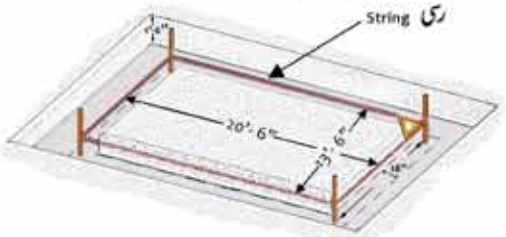
Although not yet quantified, there are anecdotal examples of villages where families who did not receive the cash grants copied the construction techniques because they had free access to the village trainings.

TYPE B-4 with KARAVAN CHAURA ROOF

REED/LOH-KHAT MODULE

CONSTRUCTION GUIDELINES

ORIENTATION سورج کا رخ

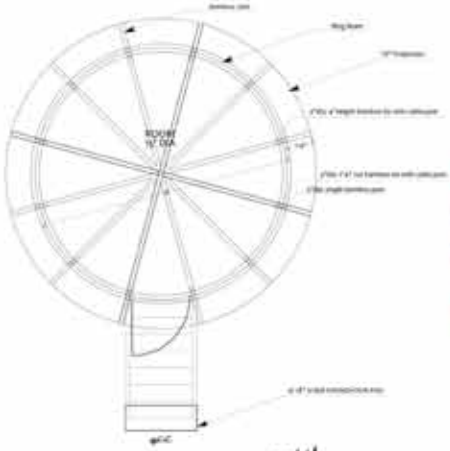


SHELTER LAYOUT ناپنے کا طریقہ

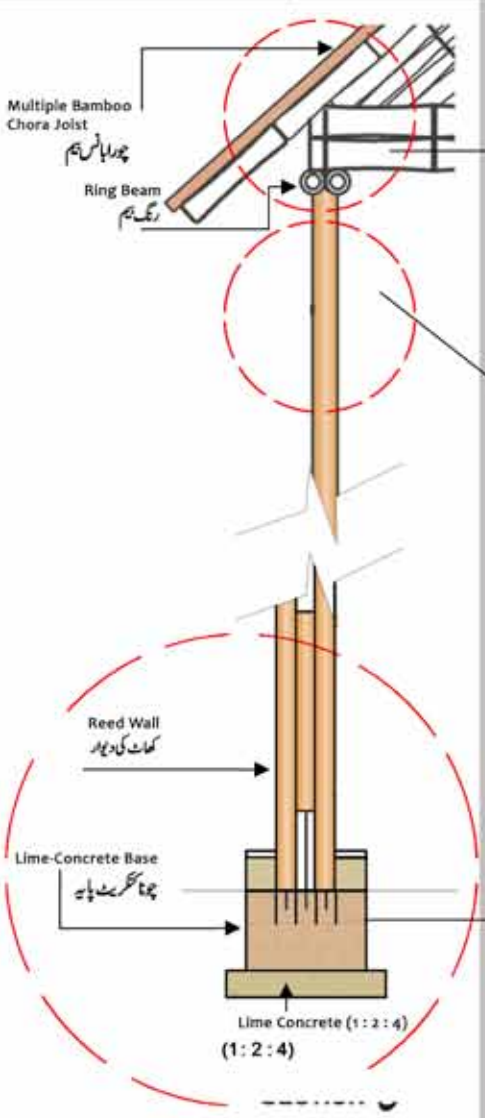
LIME PIT چونا تیار کرنے کا گڑھا

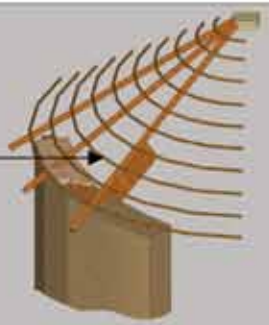
LIME CURING (one week) پلاسٹر کی ترائی (ایک ہفتہ)

USE OF LIME چونے کا استعمال



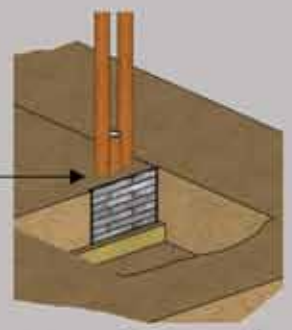
FLOOR PLAN پلان





ROOF چھت

WALL دیوار



BASE AND TOE پایہ

LIME

- Use Lime with lumps.
- Soak pit with water for 1 day.
- Fill pit with water and pour lime.
- Lime should be slaked for min. 1 week before use.
- Lime finish to be cured for 1 week.

چونا

- چقری چونے کا استعمال کریں۔
- گڑھے کو ایک دن تک پانی سے بھگو کر رکھیں۔
- دوسرے دن گڑھے کو دوبارہ پانی سے بھر کر چونا ڈالیں۔
- چونے کو ایک ہفتہ بھگو کر رکھیں۔
- چھت اور دیوار پر چونے کی تہہ کو ایک ہفتے تک ترائی کریں۔

ADOBE / MUD - BAMBOO

- Use soil with 20% - 40% clay using bottle test.
- Soak soil for 1 week and mix thoroughly.
- Begin constructing from the corners. Thickness of the wall should not be less than 18".
- Use mature, well cured bamboo (2 yrs +).
- Do not use bamboo poles with vertical cracks.
- Make sure bamboo ends are protected by lime cream bio-degradable special masala.

مٹی/ بانس

- مٹی کی پکی 20% - 40% مٹی کا استعمال کریں۔
- مٹی کو ایک ہفتے تک بھگوئیں اور پوری طرح ملائیں۔
- دیوار کی تعمیر کونے سے شروع کریں۔ دیوار کی موٹائی 18" سے کم نہ ہو۔
- خشک بانس کا استعمال کریں جس کی موٹائی زیادہ ہو (2 سال +)۔
- ایسے بانس کا استعمال نہ کریں جس میں دراڑ ہوں۔
- بانس کے سروں کو انٹی فنگس چونا مسالے سے محفوظ کریں۔

MIXES

Plain Lime Concrete	1 : 2 : 4 (Lime : Sand : Aggregate)	چونا کنکریٹ
Plaster	1 : 2 : 3 (Lime : Sand : Soil)	پلاسٹر
Karavan Roof Finish	1 : 2 : 4 (Lime : Sand : Brickdust)	کاروان چھت لپائی
Non-accessible Roof Finish	1 : 2 : 3 (Lime : Sand : Soil)	دوسری چھتوں کی لپائی
Mud Mortar	1 : 6 (Lime-Mud mixed with straw)	گارہ

HERITAGE FOUNDATION'S DRR-COMPLIANT SUSTAINABLE CONSTRUCTION

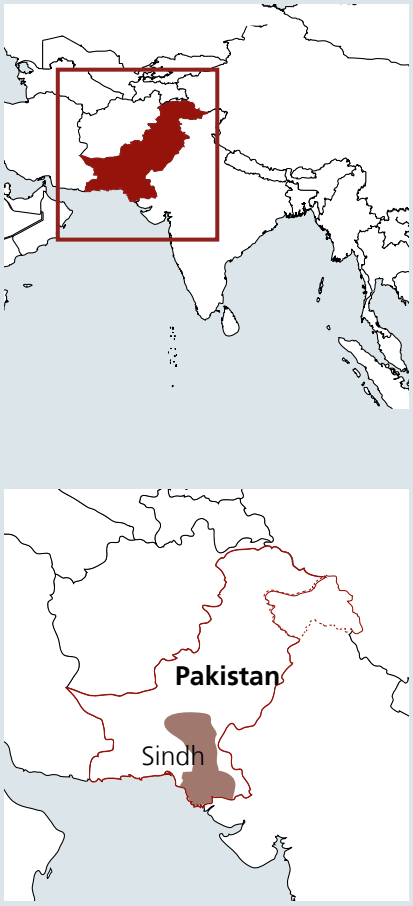
BUILD BACK SAFER WITH VERNACULAR METHODOLOGIES - TECHNICAL SUPPORT PROGRAMME

UKaid USAID SDI Heritage IOM • OIM

A.23 Pakistan – 2011 – Floods

Case Study: **Keywords:** Non-displaced, Core housing construction, Housing repair and retrofitting, Training, Guidelines and training materials, Advocacy.

Country:
Pakistan
Project location:
Sindh Province
Disaster:
Floods
Disaster date:
2011 to 2012
Number of houses damaged / destroyed:
2011: 750,000–950,000
2012: 275,000
Project outputs:
887 shelters,
Training attended by 55,914 villagers, 60 artisans and 160 implementing staff
Changes to national reconstruction policy
Occupancy rate on handover:
100 per cent
Shelter size:
16.2m², 13.8m², 20.88m²
Project cost per shelter:
This was primarily a training, assessment and advocacy project



Project timeline

Project description

The organisation provided research, training, assessment, design, technical assistance and construction monitoring and mentoring support to 7,500 households (to an additional 17,500 later) following the 2011 floods. Based on the organisation's experience in disaster-affected areas since the 2005 earthquake, the project focused on developing improved vernacular construction through the use of low-cost sustainable building materials and training. The organisation provided technical guidance based on its programme "Build Back Safer with Vernacular Methodologies", leading to stronger and safer structures that have withstood hazards.

Strengths and weaknesses

✓ The organisation was able to shift national shelter policy by rapidly implementing pilot projects with viable project models.
✓ The focus was on improved low-cost construction using traditional construction materials and methods, fostering pride in familiar materials such as mud.
✓ Involvement of student volunteers in various stages of construction and monitoring developed a spirit of giving and of unity.
✓ Training in safe eco-building techniques was provided to NGO personnel, social mobilisers, architects, engineers, students and master artisans.
× Lack of testing of stuctural elements due to lack of specific funding for the purpose.
× Households were unable to enlarge constructions due to extreme poverty levels and lack of access to microcredits.
× Lack of funds to promote trained builders into building entrepreneurs or technical advisors for large-scale self-sustaining shelter programme.
× Failure to promote bamboo farming on a large scale.
× Challenges in convincing a large number of other organisations of the efficacy of the project methodology.
- Further work is required to improve quality and reach of low-cost technical support.
- Disaster Risk Reduction compliant community structures needed to be built in large numbers to provide safety of life, water, food, livestock, and livestock feed etc.

Disaster Risk Reduction components included the use of lime, reinforced plinths and strong accessible roofs. Photo: Sohail Z. Lari, Heritage Foundation

The project was supported by student volunteers. One of the project aims was to promote traditional construction. Photo: Mariyam Nizam, Heritage Foundation

Before the disaster

The rural communities in Lower Sindh province suffered from high levels of illiteracy, lack of access to primary healthcare, and were disadvantaged and marginalised. Most people worked in fields as tenants for low wages. There were limited other livelihood opportunities.

There are major variations in construction technology, materials, climate and hazards across Pakistan, and even between adjacent villages.

Following the 2010 floods, the organisation provided assistance to over 400 households. Following the 2011 floods, it built on these projects to extend their impact.

After the floods

Following the floods of 2010 and 2011, the affected communities were in a much worse state. After two successive years of floods, they had lost all their reserves, and there were some signs of aid dependency among affected households.

Selection of beneficiaries

Initially villages were chosen on the basis of damage and of existing relationships by the organisation with major landowners and authorities. Later in the project, choice of location was informed by a detailed housing damage survey.

Depending upon the project location, the organisation worked from lists provided by the Provincial Government, on its own assessment data or from lists of priority needs provided by its donor organisation.

Most people did not wish to move from their place of origin and/or did not have access to any other land. As a result, shelters were mainly rebuilt on old plots.

Implementation

The organisation began its 2011 response by conducting a survey of housing typologies and damage.

During the assessment phase, the organisation divided its teams into two groups, a survey group and a construction group, each with 12 student volunteers. The survey team was lead by an experienced architect, the construction team was led by the field coordinator. Teams worked in rotations of three weeks in the field after which the data was compiled and analysed in the head office by an experienced technical team.

During the project, more than 80 volunteer students were involved. Students were mainly from architectural colleges in their third or fourth year of study. Social sciences students were also involved in some parts of the project. The organisation also engaged professional architects, horticulturists, artists, textile designers and product developers for different project stages.

The organisation normally had up to four people on site, with support from its head office.

Survey

The organisation assessed vernacular architecture, surveying 170 homes in 35 *tehsils* (sub-districts) in eight priority districts.

The results were used to develop a database of vernacular construction typologies in the province of Sindh. This database was later used to develop the eight shelter typologies which are being constructed in internationally-funded projects (see A.22)

The damage to the different types of houses was recorded and used to analyse the reasons for structural failures. These were used to help communities understand the technical failings of their homes and how to build back safer with designs developed by eminent architects and engineers associated with the organisation.

Many mud walls that had been partially damaged were rehabilitated after an engineering review. The rehabilitation included repairs on walls, bases and plasters, along with the use of accessible roofs using bamboo.

Demonstration shelters were constructed in some affected villages.

Construction

The initial projects responding to the 2011 floods focussed on households rehabilitating the walls of their shelters, and the organisation supporting in the retrofitting of new strong roofs. In the pilot project, complete shelters were built for people with disabilities and for female-headed households. In these initial projects, no money was directly given to the householders.

In two locations, the organisation established workshops to make bamboo joists. In other locations, where different construction methods were used, fabrication of bamboo roofs was done by local artisans trained by the organisation.

After a trial phase, the organisation signed an agreement with an international agency to provide technical support to other organisations who were collectively aiming to build 22,750 shelters.

Monitoring construction was challenging due to lack of internet and communication, on-site difficulties, harsh climate and long distances.

With the increase in scale it was difficult to check all stages of construction. Each area of work also had its own set of problems that had to be dealt with differently. To resolve these challenges, the organisation worked out a system of forms, and a strict set of rules for organisations to control construction and material quality. This was overseen by visits from its monitoring and mentoring field teams.

As it scaled up, the organisation had to increase the number of architects working on-site.

Training

The training programme consisted of eight shelter typology modules for Disaster Risk Reduced construction. The trainings were adapted to the different building methods in each location.

Training of trainers sessions for implementing partners were accompanied by mentoring during the construction phases by the organisation's technical teams.

Members from each household attended trainings, by the end of which they were able to construct shelters themselves.

The organisation trained 60 craftsmen in the following construction skills: layout, excavations, masonry, bamboo fabrication, mud-brick making, layered mud construction, plastering and finishing and the use of lime.

DRR components

The project had a very strong focus on improving resilience of communities. As there was repeated heavy rain and flooding in Sindh, shelter performance was monitored. All of the improved structures had withstood the flooding and rains.

The methodology became locally known as 'katcha kot' or "unfired clay fortress."

Technical solutions

The assessment made differing conclusions for different types of houses. These became key training messages:

- Shelters should be constructed in a hazard-free location wherever possible.
- Houses should be orientated north-south to reduce heat gain. Openings on opposite walls improves air circulation.
- Houses should have a strong base to protect the walls. Lime can stabilise mud walls, plasters and renders. Renders need to be well cured after application.
- Use salinity-free soil and clean water for stronger construction.
- Use bamboo reinforced lime concrete beams and bamboo lintels above openings.
- Encourage roof projections to improve drainage and to protect top of mud walls.
- Use lighter but stronger materials for roof construction, such as bamboo joists.
- Maintain a slope on floors and roofs to drain water.

Project impacts

The project had significant impacts on the overall national response. By rapidly mobilising skilled volunteers to conduct technical assessments, the organisation was able to produce accurate and usable information as well as proof of concept pilot projects.

The method was rapidly adopted as a key component of the national "Pakistan Initial Floods Response Plan" and in grant applications to donors. Thus, a relatively small but experienced technical organisation was able to have a significant impact beyond the scale of its own projects.

Many beneficiaries spent time to decorate and beautify their new homes, showing pride and giving each house an individual character.

Logistics

Most materials were procured locally reducing transportation costs and stimulating the local economy.

Materials

Below are the key materials for the different shelters types built.

Materials	Quantity
Flat roofs – accessible roofs 18'x10'	
Bamboo Lime (50 kg/bags) Mud bricks Layered mud/adobe	628ft. 350kg 14,580 1,170ft^3
Loh-khat walls + roof 18'x10'	
Bamboo Lime Mud bricks Loh-khat (reed filling for walls)	918ft 350kg 47ft^3 464ft^2
Conical Chaura roof Size 16' diameter	
Bamboo Lime Layered mud/adobe	224ft 350kg 1380ft^3

Rehabilitated house with accessible roof which can withstand the weight of fifteen people. Such roofs provide an escape location in case of floods. Photo: Heritage Foundation