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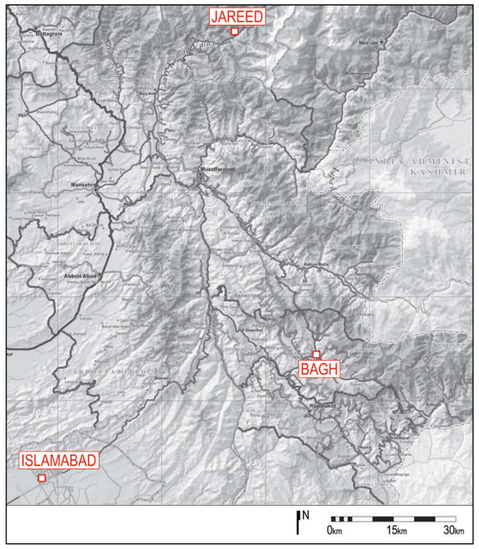

House Type 1

Family Size:	9/10 maximum
Gross Area:	721sqft / 67m2
Gross Internal Area:	502sqft / 46m2

House Type 2

Family Size:	7 maximum
Gross Area:	641sqft / 60m2
Gross Internal Area:	445sqft / 41m2

Project Type

- Housing reconstruction in earthquake affected areas
- Recipients are the most vulnerable in the community who cannot self-build
- Incorporating seismic resistance measures
- Delivering training workshops to local community members
- Budget of approximately Rs290 000 per house

Project Partner

- Muslim Aid UK / Muslim Aid Pakistan

Context

- Pakistan Earthquake, October 8th 2005: 7.6 on the Richter Scale
- Deaths estimated at between 70,000 and 80,000, similar number injured
- Upwards of 3 million people made homeless

Project Location

- Bagh, Azad Jammu & Kashmir and Jareed, North West Frontier Province
- Rural, mountainous terrain

No. Houses Constructed

- 60 - 80 by September 2008 when project is programmed to complete

Shelter Type

- Dhajji Da (patchwork of timber and stone) houses on stone plinth
- Mud, stone and straw infill with mud render finish
- Lightweight timber structure with corrugated metal sheet roof
- Dhajji Da is a construction type indigenous to the region
- Small bracing members spread seismic energy, reduce risk of damage
- a[25] design approved by regulatory authorities: NESPAK,ERRA

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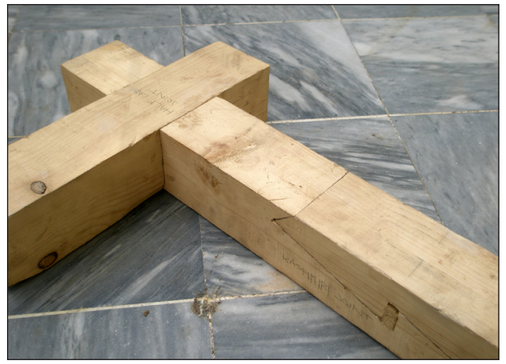
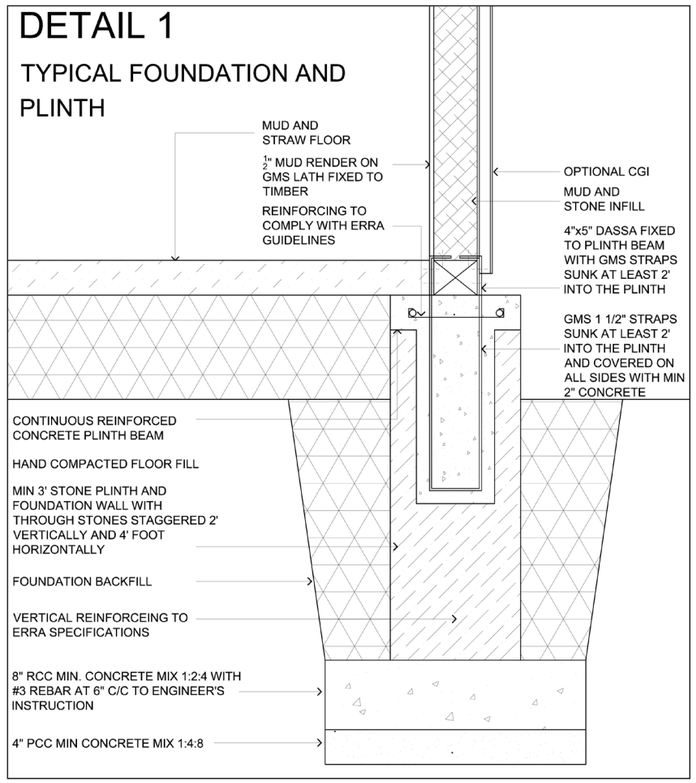
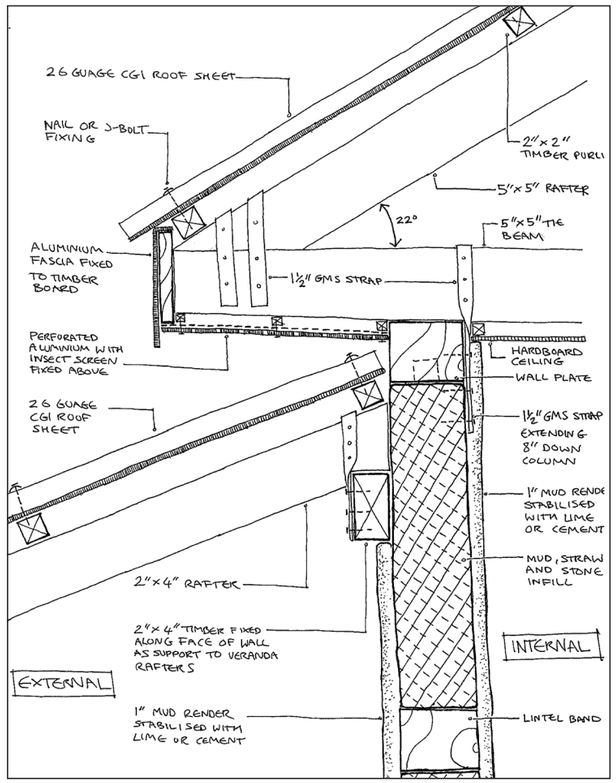






Detail Design

- a[25] consultancy service includes comprehensive detail design
- Robust detailing ensures high quality construction
- Appropriate detailing ensures value for money
- Details developed by a[25]'s experienced built environment specialists
- Local and international consultants provide input where required
- Various methods used to explain detail design e.g. models, sketches
- Details refined for maximum buildability and cost efficiency

Detail Drawings

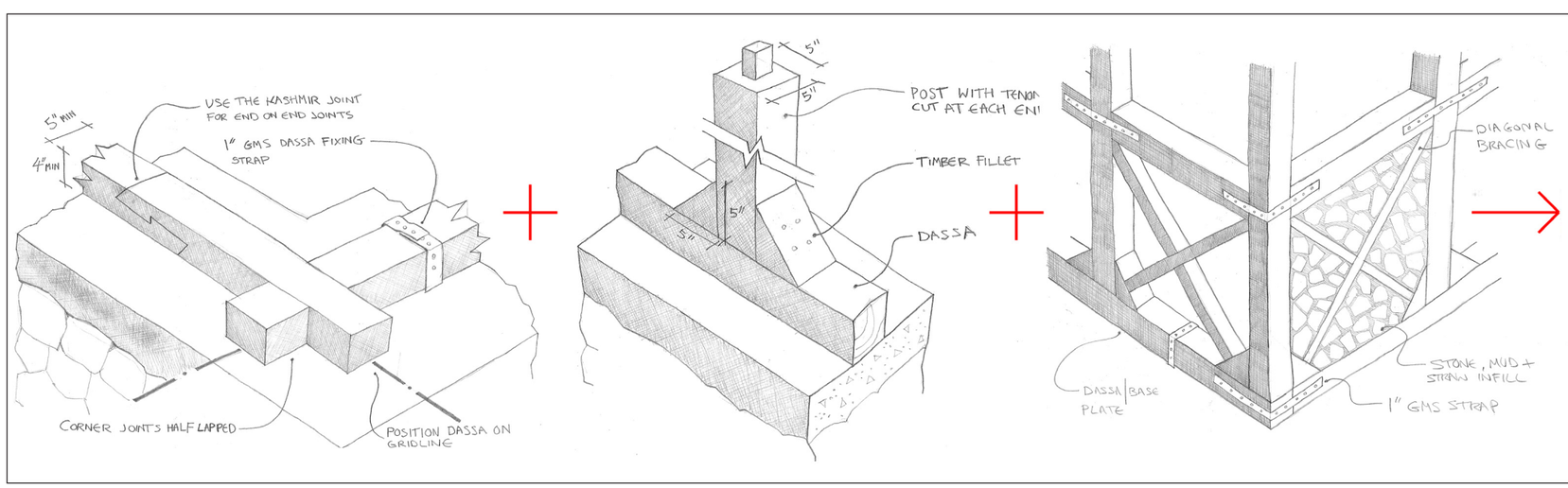
- Developed as part of a coordinated package of production information
- a[25] produced additional drawings during the works to help explain key structural details to construction workers

Timber Joint Samples

- Constructed by local carpenters in cooperation with UN-HABITAT
- Samples demonstrated key structural details
- a[25] used samples onsite as training aids for carpenters
- Effective communication of required workmanship to labour
- Enabled rapid improvement of the skills in the community

Visual Construction Guidelines

- Hand-drawn diagrams explaining construction process
- Complex construction methods described step by step in simple format
- Used as a training aid for non-technically skilled community members



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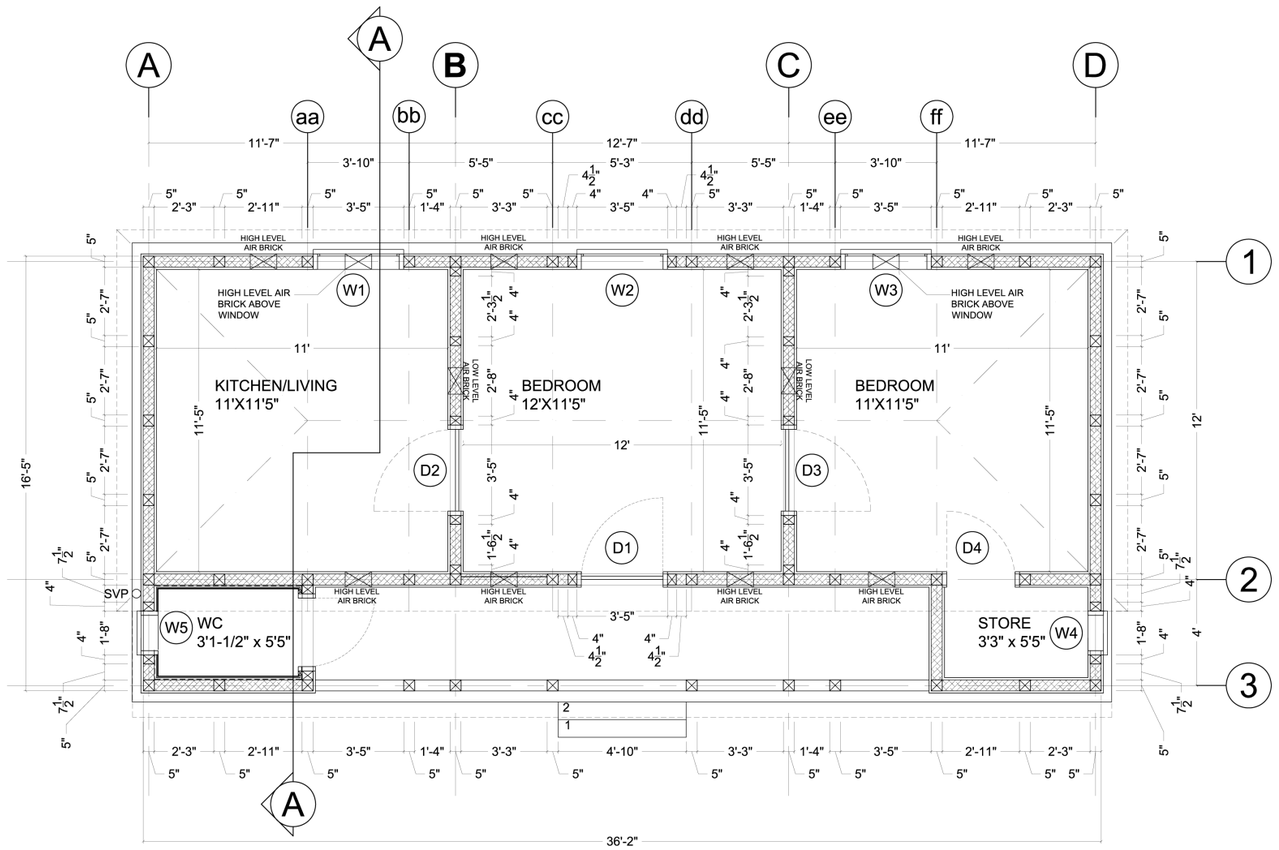
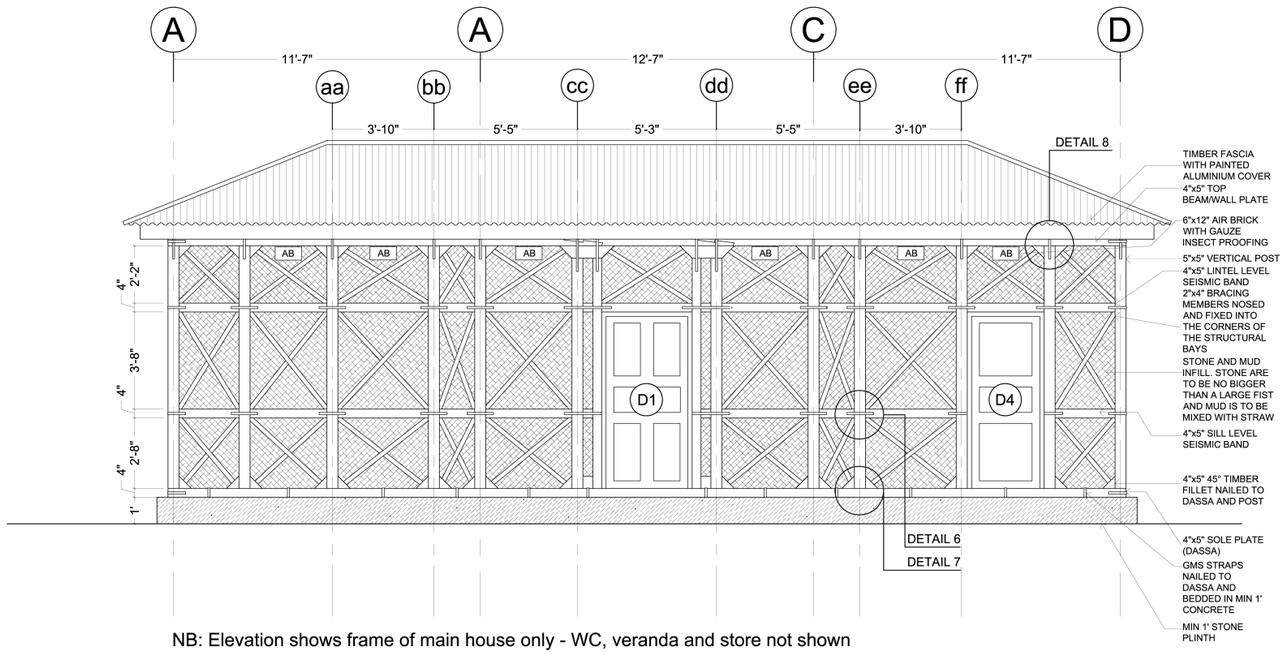




NB: Elevation shows frame of main house only - WC, veranda and store not shown

Production Information

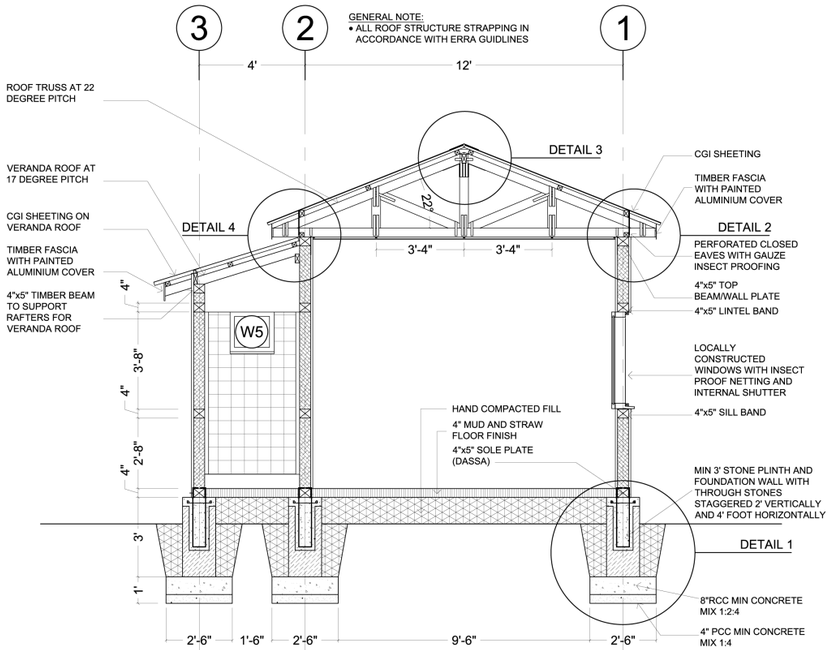
Two house designs developed following research into the following:

- Seismic mitigation measures
- Vernacular construction methods
- Family size and domestic requirements particular to the area
- Materials and skills available locally
- Logistical challenges e.g. transportation of materials to site
- Most cost effective construction technique

Drawing Package

- a[25] produced full package of drawings for each house type
- Information comprised plans, sections, elevations and details
- Drawings submitted to NESPAK (National Engineering Services Pakistan Ltd) and ERRA (Earthquake Reconstruction & Rehabilitation Authority) for approval
- Both house designs received official approval for construction in less than three months

Top Left - House Type 2 - Ground Floor Plan
Bottom Left - House Type 2 - Front Elevation / Timber Frame & Infill
Bottom Right - House Type 2 - Section A:A



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Construction Management

- a[25] project manager present to regularly monitor work on site
- Onsite supervision mitigates risk of costly construction errors
- a[25] project manager coordinates with local partner organisations
- Construction undertaken by local contractors and local labour
- The local economy benefits from the construction

Construction Process

Each house requires approximately 100 working days to complete

Plinth Construction: Primary construction phases

1. Site selection
2. Demarcation
3. Excavation
4. Pour reinforced concrete foundation
5. Masonry plinth wall
6. Pour reinforced concrete plinth band

Frame Construction: Primary construction phases

1. Construct frame
2. Fix metal roof sheet
3. Construct bracing
4. Stone,mud, infill / mud, straw floor
5. Electrics / plumbing work
6. Finishing work

Seismic resistance measures:

- Seismic bands tie the structure together
- Multiple small bracing members spread seismic energy
- Timber joints used approved by ERRA and NESPAK
- Galvanised steel straps add strength at joints between timber members
- Foundation and plinth bands reinforced to NESPAK approved standard




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