Step-by-Step Guide to Shelter Construction

WEST BENGAL FLOOD-RESISTANT SHELTER PILOT PROGRAM








CRS
CATHOLIC RELIEF SERVICES

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Cover photo: Family constructing their shelter, David Snyder for CRS
Photos pages 1-18: Isaac Boyd/CRS

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Document Overview and Purpose

In 2008, CRS and partners in West Bengal and Orissa built 157 flood-resilient houses as part of a broader flood-preparedness program. The aim was to provide the most vulnerable families in four villages with housing capable of withstanding floods and strong winds; at the same time the process of construction was done in such a way as to develop understanding of disaster-resilient construction techniques, improved construction skills and increased demand for disaster-resilient housing.

First, CRS and its partners assessed normal, local construction practices and the impact of floods on the houses of poor families. The houses typically had a mud plinth, mud and bamboo walls, a thatch roof and little lateral reinforcement. Without a solidly grounded structural frame, the mud walls collapsed when they were saturated with water. To address this problem, CRS, in discussion with target families, developed a flood-resilient design adapted from normal, local construction practices.

The flood-resilient techniques were summarized into five memorable key points and shared with families, skilled labourers and the government:

1. Pillar fabrication: Prefabricated reinforced concrete pillars anchored on stone footing at least 2 feet below ground level.
2. Raised plinth: Compacted earth plinth raised above ground at the main occupied space of the shelter.
3. Cross-bracing in perpendicular directions at two opposite corner pillars for lateral resistance.
4. Roofs anchored into the main pillar structure with "J" hooks, nails and washers.
5. Hipped roof: A four-sided roof provides greater resistance.

Strategic involvement of the government, for example by building model houses in the compound of local government offices, meant that government officials were convinced of the value of the new design so they could recommend it to those who would be served by their shelter subsidy scheme. The cost of the house, at $730 per house, was within the limits of the government-housing structure.

A year after construction, cyclone Aila caused damage in coastal areas of West Bengal and Orissa. A partner staff reported that, *"The houses constructed in this program withstood the strong wind and rain. The plinth, walls, roof and pillars also remained intact in the monsoon rains. Only the mud daub was often washed away and needed to be replaced by the families."*

This construction guide was one of the tools used by CRS and partners to ensure quality construction of houses under this project.

Phase One: Site Preparation and Excavation

1.A Site selected and cleared

- Prior to preparation of the shelter construction site, the project team should confirm that the site is appropriate: as high as possible relative to the surrounding ground level, free of any major obstructions such as trees, will allow for drainage of surface water away from the site to an acceptable location, and is large enough to accommodate the shelter and drainage channels (approximately 22 feet by 26 feet). The project team should also double-check that the household has proper authorization to construct the shelter on the identified site.
- Once the appropriateness of the site has been confirmed, the household should clear the site of vegetation and debris.

1.B SITE LEVELLED

- The household should prepare a flat, levelled surface of dimensions 22 feet by 26 feet for shelter construction. The project team and/or project manager should assist households in measuring out this area, as necessary.
- Where households will need to fill any slight slopes with soil, the filled soil should be well-compacted, minimizing any air spaces within the soil through application of water to layers of 4 to 6 inches during filling and compacting. Refer to notes in phase three for plinth construction.

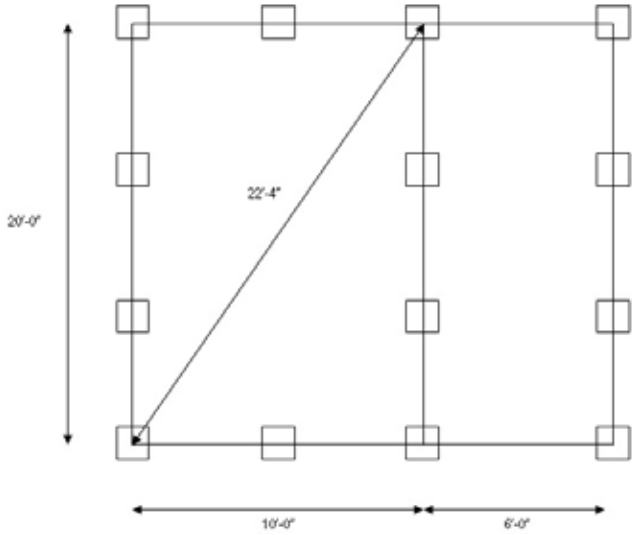


Diagram A: shelter layout and pit locations

1.C SHELTER SITE AND PILLAR PITS DEMARCATED

- Once the household site has been cleared and levelled, the project team and/or project manager should use string and stakes to mark out the dimensions of the shelter and the 14 pillar pits on the shelter site.
- The overall dimensions of the shelter are 16 feet by 20 feet from the center points of the corner pillars. The spacing between pillars along the long edge of the shelter should be 6 feet 8 inches; the spacing between pillars along the short edge of the main living space should be 5 feet. The distance between the pillars of the main living space and the veranda pillars should be 6 feet. Refer to Diagram A.
- The pits should be 2 feet by 2 feet (length x width).
- While marking out the locations of the pillar pits, the project team and/or project manager should instruct the households to dig each of the 14 pits to 2 feet 6 inches below ground level. It may be useful to mark this depth on a piece of bamboo or a stick so households can check the depth of the pits as they dig.

1.D SURFACE WATER DRAINAGE CHANNELS LOCATED

- In addition to demarcating the shelter dimensions and pillar pit locations, the project team and/or project manager should work with households to determine an acceptable location for drainage channels that will drain surface and rainwater away from the shelters. The destination to which the channels drain the surface and rainwater should be confirmed to ensure that drainage does not adversely affect neighbouring households, circulation paths, or public areas. It would be best to discuss drainage channel locations with the Village Design Committee and make sure that some community planning exercise is carried out so that drainage locations are the result of conscious, community-wide decision-making.
- Drainage channel excavation should be performed after completion of the plinth during Phase Three.

Step 1.E: pillar pit excavated

Step 1.F: pillar pit depth confirmed

1.E PILLAR PITS EXCAVATED

- Once pit locations and dimensions have been demarcated, the households should dig all 14 pits to 2 feet 6 inches below ground level, with a length and width of 2 feet by 2 feet.
- The bottom of the pits should be as close to flat as possible to make backfilling with hard-core (maram) and mortar easier and uniformed.
- Once the pits have been dug to 2 feet 6 inches, the households should compact the soil at the bottom of the pit as firmly as possible.
- It is advisable that the project team and/or project manager provide roving support to the households to ensure that the pillar pits are dug to the proper dimensions and in the correct locations during excavation.

1.F PILLAR PIT LOCATIONS AND DEPTH CONFIRMED

- Once households have completed digging and compacting the pillar pits, the project team and/or project manager should confirm that the pits are dug to the proper dimensions and located in the correct locations.
- If any modifications need to be made, the project team and/or project manager should provide clear instruction to the households.
- Once pillar pit locations and dimensions have been confirmed, the household should ensure that the required amount of hard-core has been brought to the shelter construction site.

Step 1.G: maram compacted

Step 1.G: mortar applied

1.G PLACEMENT OF HARD-CORE AND MORTAR AT BOTTOM OF PILLAR PITS

- The hard-core (maram) and mortar should be applied in three approximately 2-inch layers up to a level of 2 feet below ground level (the resulting maram/mortar layer should be approximately 6 inches thick).
- Maram used for the bottom of the pillar pits should be between roughly 2 to 4 inches in diameter.
- The project manager and Community Construction Crew (CCC) should fill each pillar pit with the first 2-inch layer of maram; this layer should be compressed with a compactor.
- A thin layer of cement mortar (at a ratio of 1:3:0.5–cement:sand:water) should be sprinkled on top of the first layer of maram. Maram should be sprinkled lightly with water prior to application of the cement mortar.
- This process should be repeated until the top of the third layer of maram is at a level of 2 feet below ground level, compressing each layer with a compactor.

1.H UNIFORM DEPTH OF MARAM LAYER IN PILLAR PITS CONFIRMED

- The height of the top layer of maram should be confirmed with a water-pipe level. An easy way to achieve this is to establish a constant reference point next to the construction site on a notched piece of bamboo staked vertically into the ground.

- The top layer of cement mortar should fill in the gaps between the compacted maram and be smoothed into a flat surface with a trowel; the final surface should remain at 2 feet below ground level.
- After the top layer of mortar has been applied and the depth confirmed, the mortar at the top of each pillar pit should be allowed to dry for at least 2 hours.

Phase Two: Precast Reinforce Concrete Pillar Placement, Attachment of Top Plates and Cross-bracing, and Assembly of Roof Structure

2.A PILLARS PLACED IN PITS IN CORRECT LOCATIONS

- Before pillars are placed in pits, their exact location should be marked out using the strings and stakes laid out prior to excavation. If these strings and stakes have been removed during excavation, they should be replaced; ideally the position of the pillars will be at the center of the 2 feet by 2 feet pits. Using a plumb-weight, the position of the bottom of the pillars should be marked out with chalk in each pit.
- Once the position of the pillars has been marked, the pillars should be placed into the pits so that the front of the pillars face the same direction along the long sides of the main space of the shelter.

Step 2.A: pillar placement measured

Step 2.A: pillars placed in pits

2.B CORRECT SPACING BETWEEN PILLARS, VERTICAL STRAIGHTNESS, AND SQUARE-NESS RELATIVE TO PLAN CONFIRMED

- After placing each pillar, the pits should be backfilled to the first 6 inches and compacted to hold the bottom of the pillar in place.
- The vertical straightness should be reconfirmed using the plumb-weight.
- The faces of the pillars should also align so that the pillars are square relative to the floor plan.
- Once the pillars are straight and square relative to the floor plan, the first 6 inches should be re-compacted, ensuring to dampen the soil with water.

2.C SOIL BACKFILLED IN 4-6" INTERVALS, DAMPENED, AND FIRMLY COMPACTED TO GROUND LEVEL

- The pits should be backfilled in 6-inch, dampened and thoroughly compacted layers until they are filled up to ground level.
- Additional water should be poured on the soil at the top of the pit; once the soil has dried, the pit should be compacted once more.

Step 2.C: pits filled and compacted

Step 2.C: pit compacted again once dried

Step 2.D: top plate bolt holes located

Step 2.D: top plates drilled and notched

2.D BAMBOO TOP PLATES AND CROSS-BRACING ATTACHED TO PILLARS WITH WASHERS AND BOLTS

- Once all pillars have been placed in pits, bamboo top plates should be prepared for attachment to the top of the pillars of the main space and veranda; bamboo to be used for the top plates should be very strong and as straight as possible. The top plates will form a rectangle around the main space; at the veranda, the top plates will stretch between the tops of the shorter veranda pillars along the long side of the veranda.
- Location of bolts should be marked with a string stretching along the top of the pillars to locate the position of each bolt extending from the top of the pillars.
- Using the string with marked bolt positions, holes for the bolts should be drilled into the piece of bamboo to

Step 2.D: top plates lapped and bolted at corners

Step 2.D: cross-braces bolted at corner pillars

be used for the top plate; ends of the top plates should be notched to allow lapping at corners where top plates will join.

- Once prepared, top plates should be connected to the bolts on top of the pillars with washers between the nuts and the bamboo to minimize splitting.
- Similarly, bamboo cross-braces should be prepared prior to attachment. Bamboo to be used for the cross-bracing should be very strong and as straight as possible.
- Cross-bracing will be attached from both faces of two diagonally opposite corners of the shelter to the two adjacent pillars on perpendicular walls. See Diagram B.
- Holes should be drilled in the cross-braces so that they can be bolted to the pillars easily (confirm the position of the holes prior to drilling).

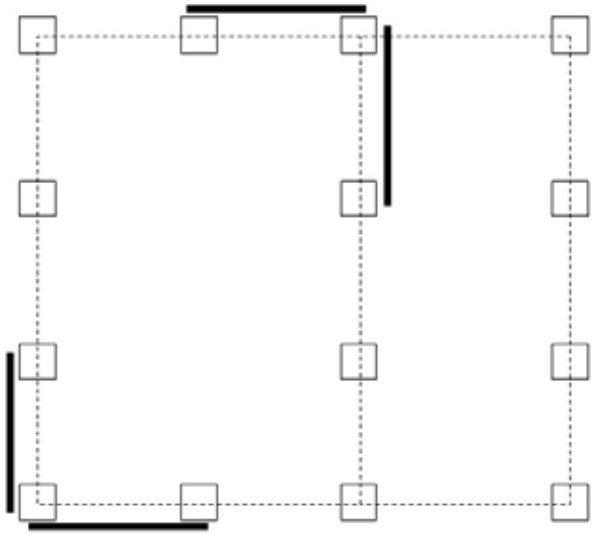


Diagram B: location of cross-bracing

- Small pieces of bamboo can be used as spacers as necessary; these spacers should be flat to avoid splitting.
- Washers should be used at both sides of the bolt, at the concrete faces of the pillars (or spacers) and at the bamboo cross-braces.

2.E BAMBOO PRIMARY ROOF STRUCTURE ASSEMBLED

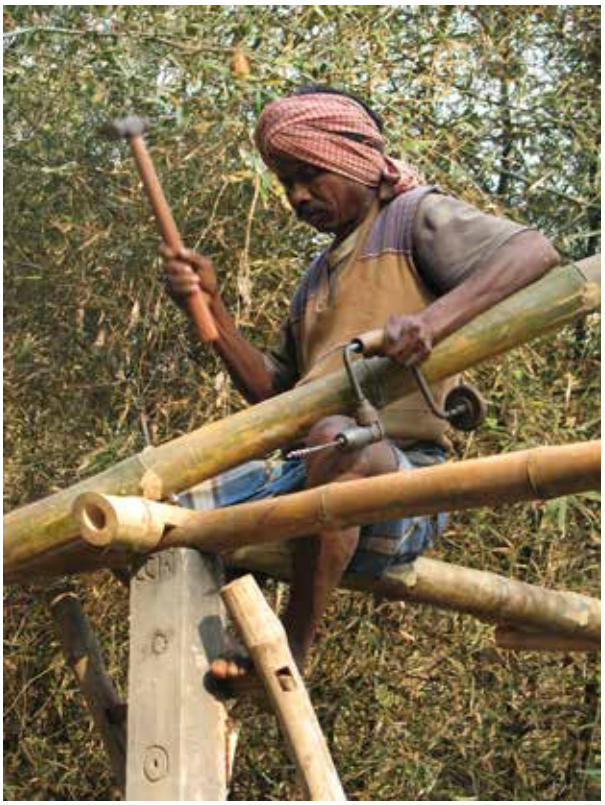
Main space

- Once top plates and cross-bracing have been attached to the pillars, prepare and attach three tie beams. Two of the tie beams should be placed 5 feet in from the corner pillars to ensure that the roof slope at the sides and the slope of the front and back of the roof over the main space are all the same angle. The third tie beam should be placed at the middle of the longer top plate.
- Tie beams should be notched at the ends to rest on top of the top plates, which should be pre-drilled prior to nailing through to the tie beams. After nailing, the ends of the 7-inch nails should be bent and hammered flat against the bottom of the tie beams.

Step 2.E: tie beams pre-drilled and nailed

Step 2.E: king post and ridge beam attached

- Three king posts 2 feet 9 inches to 3 feet long should be notched at the top and bottom for attachment to the middle of the tie beams, and the ends and middle of the ridge beam *(murdhun).* Notches at either ends of the king posts should be 90° relative to one another, since the tie beams and the ridge beams run perpendicularly to each other. The king posts should be pre-drilled and nailed to the tie beams, bending and hammering the ends of the 7-inch nails flat against the sides of the tie beam.
    - The ridge beam should be cut to a length of about 10 feet so that it stretches between the tops of the two furthermost king posts; the king posts should be pre-drilled at the tops and nailed to the opposite ends of the ridge beam, with the ends of the nails hammered flat against the side of the ridge beam.
    - Once the ridge beam has been attached, the diagonal primary supports *(konach)* that will stretch between the corners of the main space and the ends of the ridge beam should be prepared prior to attachment; the ends of the diagonals that will rest on top of the ends of the ridge beam should be notched so that they fit together. The diagonal should also stretch approximately 2 feet beyond the top plates to provide a roof overhang; the diagonals should be notched where they will rest on the top plates.
    - Once prepared, the diagonal primary supports should be pre-drilled and nailed to the ridge beam and the top plates, with the ends of the 7-inch nails bent and hammered flat.



Step 2.E: diagonal primary roof supports pre-drilled and nailed

Step 2.F: main-space secondary roof supports at diagonal

Veranda

- The bamboo horizontal element to support the top of the secondary veranda roof supports *(chauta)* should be pre-drilled and bolted through the holes 1 foot below the top of the 12-foot, main-space pillars facing the veranda. This bamboo support should be cut to be nailed to the top of the cross-bracing on the exterior of the main space where they intersect. Bolts and nuts at the pillar holes should have washers at either end of the bolt.

2.F BAMBOO SECONDARY ROOF STRUCTURE ASSEMBLED

Main space

- Secondary roof structural elements *(rola)* should stretch from the ridge beam or diagonal primary supports to the top plates, extending about 1 foot 6 inches beyond the top plates to provide a roof overhang. The secondary roof structural elements should be notched and pre-drilled where they will rest on the top plates.
- At the short sides of the roof over the main space, the secondary structural elements should be cut diagonally at the top so that they can be nailed to the sides of the diagonal primary supports. Prior to nailing, they should be pre-drilled; once nailed through to the diagonal primary supports and the top plates, the ends of the 7-inch nails should be bent and hammered

flat. (Follow the same procedure for secondary structural elements that intersect the diagonal primary supports along the long sides of the roof as well.)

- Along the long sides of the roof, the secondary structural elements should be pre-drilled at the tops, where they will rest on top of the ridge beam, and where they will rest on the top plates. Once nailed through to the ridge beam and top plates, the ends of the 7-inch nails should be bent and hammered flat.
- At all four roof slopes, middle supports *(bukpar)* spanning the distance between the diagonal primary supports should be nailed to the underneath of the secondary structural elements; the middle supports should be nailed halfway up the roof slope, with the ends of the 7-inch nails bent and hammered flat.
- Diagonal braces *(thela)* should be attached between the middle supports and the tie beams at all four roof slopes; these diagonal braces should be notched and pre-drilled as necessary to provide a firm, nailed attachment, with the ends of the 7-inch nails bent and hammered flat.

Veranda

- The secondary veranda roof supports *(chauta)* should stretch between the horizontal element bolted to the main-space pillars at the top and the veranda top plate at the bottom. The secondary veranda roof supports should extend 1 foot 6 inches beyond the veranda top plate to provide a roof overhang; they should be notched where they will rest on the veranda top plate.

Step 2.F: middle support *(bukpar)* attached

- Pre-drill the secondary veranda roof supports and nail them to the horizontal element and to the veranda top plate, bending and nailing flat the ends of the 7-inch nails.
- A middle support *(bukpar)* should be pre-drilled and nailed to the bottom of the secondary veranda roof supports, similar to the main space; the middle support should stretch the length of the veranda, and the ends of the 7-inch nails should be bent and hammered flat.

Step 2.G: diagonal braces from *bukpar* to tie-beams

Step 2.E: tertiary roof structure attached

2.G BAMBOO TERTIARY ROOF STRUCTURE ASSEMBLED

- On the main-space and veranda roofs, tertiary roof structural elements *(battam)* should be nailed to the top of the secondary roof structural elements.
- At the bottom of all roof slopes, a tertiary roof structural element should be nailed 1 foot 6 inches out from the top plate to provide support for the roof overhang.
- A tertiary roof structural element should be nailed approximately 9 inches from the ridge beam to provide sufficient attachment for the Corrugated Iron (CGI) ridge cover (confirm placement with size of ridge cover).
- Tertiary roof structural elements should be nailed at regular intervals (9 inches maximum) down the length of the roof to provide sufficient attachment for the J-hooks and CGI roof sheets. Confirm spacing of fasteners with project manager and revise this note as necessary.
- At all nailed connections, the 7-inch nails should be bent and hammered flat.

Step 3.A: plinth constructed and compacted to floor level

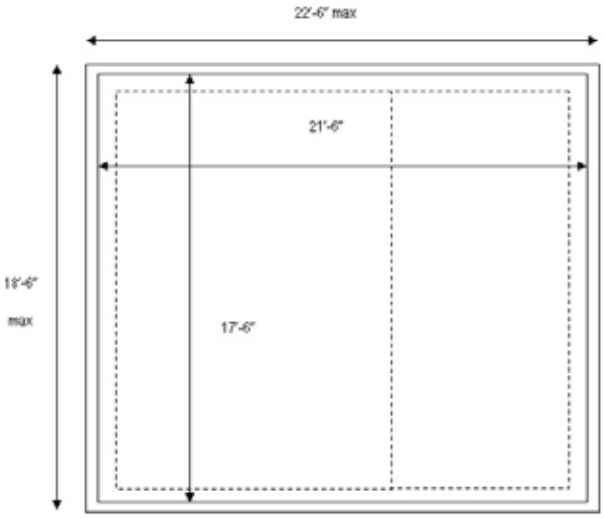


Diagram C: plinth dimensions

Phase Three: Plinth Construction

3.A PLINTH CONSTRUCTED AND COMPACTED TO FLOOR LEVEL

- Once the roof structure is complete, households should construct their plinths.
- Plinths should have a boundary around the main space and veranda that is 6 to 9 inches from the outer face of the pillars at the top of the plinth. See Diagram C for dimensions of the plinth (approximately 21 feet 6 inches by 17 feet 6 inches at the top of the exterior slope and no greater than 22 feet 6 inches by 18 feet 6 inches at the bottom of the exterior slope).
- The top of the plinth should be 2 feet above ground level at the main space and 1 foot above ground level at the veranda.
- Edges of the plinth should have a steep slope so that the bottom of the plinth is no more than 1 foot from the outer face of the pillars; this is important so that rainwater falling from the roof does not fall on the slope of the plinth and cause erosion of the slope.
- Households should construct their plinths with damp soil or mud in 6-inch layers. Once each layer of soil has been placed for the plinth, households should use paddles to thoroughly compact the plinth so as little air as possible remains in the soil. After the first compaction, households should again dampen the soil with water, allow the water to permeate the soil, and then compact the layer again.
- Subsequent 6-inch layers should be added following the same procedure until the full height is reached.
- The project team and/or project manager should periodically check progress of plinth construction to confirm that households are compacting their plinths sufficiently.

3.B INTERIOR FLOOR AND PLINTH PLASTERED WITH MUD PLASTER

- Once the plinth has been built and thoroughly compacted to the desired height, a final coat of clay-rich mud plaster with straw or cow dung should be applied to the floor of the plinth to achieve a smooth, final surface. The final floor plaster should also be dampened and compacted.

Step 3.C: erosion-prevention technique applied to exterior surfaces and slopes of plinth

3.C EROSION-PREVENTION TECHNIQUE APPLIED TO EXTERIOR SURFACES AND SLOPES OF PLINTH OR CEMENT WITH A WIRE MESH BACKING

- Once the plinth has been constructed, the erosion-prevention technique (turfing with Hessian cloth and grass, clay and dung mixture, or bamboo "fencing") should be applied.
- The project team and/or project manager should monitor the application of the erosion-prevention technique to ensure adequacy and completion.

3.D PLINTH COMPLETION CONFIRMED

Using cemented mesh wire for plinth reinforcement - Layer of 1.5" Thick cement sand (1:3) mortar with Chicken wire mesh used along the periphery of plinth for protection. This work should be done after the completion of the roof, walling and plinth

Note; This work should be done after completion of roof, inside flooring and walling.

- Compact and leveled the plinth in slop in a way that the edges of the plinth have a steep slope. ie so that the bottom of the plinth is no more than 1'-0" from the outer face of the pillars. This is important so that rainwater falling from the roof does not cause erosion to the plinth.

Step 3.D: plinth completion confirmed

Step 3.D: plinth completion confirmed

- Insert a medium sized stone with binding wire tied around with the wire projecting out from the plinth. This will act as an anchor.
- Apply sand and cement mortar under coat of 0.75" thick with ratio of 1 Cement: 4 sand to cover the surface of the plinth.
- Lay wire mesh on top the surface of the plinth once it has dried, tie into place by using the binding wire.
- Apply second layer of cement sand mortar; 0.75" thick cement sand mortar (1 Cement: 4 sand) across the entire plinth.
- Trim edges and smoothen surfaces with a trowel. After cement becomes hard start the curing process by keeping the surface wet for one week.
- Once households have finished constructing their plinth and applying the erosion-prevention technique, the project team and/or project manager should confirm completion; in the event that the plinth has not been properly constructed, the project team and/or project manager should clearly instruct households how to make the necessary modifications or improvements.

Step 3.E: drainage channels excavated

3.E DRAINAGE CHANNELS EXCAVATED

- Once completion of plinths has been confirmed, the project team and/or project manager should review the location and direction of drainage channels with the households in preparation for excavation; again, it must be confirmed that drainage channels will not adversely affect neighbouring plots or the community in general.
- Drainage channels should be dug deep enough and with sides sloped adequately to prevent the channels from being quickly eroded or filled with mud and debris, at least 2 feet deep and 2 feet 6 inches to 3 feet wide. Confirm that this is adequate with the

community, project manager or other decision-making personnel.

- The drainage channels should slope gradually down (roughly 2 feet) in the direction in which they will carry water to avoid as much as possible creating pools of stagnant water for mosquito breeding near shelters.
- (Whether drainage channel excavation should happen in Phase Three or Phase Four is something the Kolkata SO, SKC, the implementing partner, should discuss; the implication is whether or not drainage channel excavation is a prerequisite for attachment of CGI roof sheets).

3.F DRAINAGE COMPLETION CONFIRMED

- Once households have finished excavating drainage channels, the project team and/or project manager should confirm completion, testing adequate slope with buckets of water; in the event that the drainage channels have not been properly constructed, the project team and/or project manager should clearly instruct households on how to make the necessary modifications or improvements.

Phase Four: Attachment of CGI Roof Sheets

4.A CGI SHEETS CUT TO FORM FOUR-SLOPED (HIPPED) ROOF

- Once plinth construction and drainage channel excavation have been confirmed, the project manager and CCC should prepare the CGI roof sheets for installation.
- Eight-foot-long sheets will be used at the roof over the main space, except for the slope leading to the veranda, where a 7-foot-long sheet should be used.

Step 4.A: CGI sheets cut to form four-sloped (hipped) roof

- Prior to cutting or attaching any roof sheets, their placement should be planned on each slope to avoid any waste, according to the following requirements:
  - The CGI sheets should overlap at least 1.5 ridges when installed.
  - The CGI sheets should be cut diagonally to fit where the different roof slopes will meet.
  - The CGI sheets should be attached with the correct side facing upward.
  - The ends of the CGI sheets should form an even roof overhang.

4.B CGI SHEETS ATTACHED TO TERTIARY ROOF STRUCTURE WITH U-HOOKS, RUBBER AND DIAMOND WASHERS

- CGI roof sheets should be fastened to the bamboo tertiary roof supports at the tops of ridges (at intervals of four ridges maximum) with U-hooks, rubber washers, and diamond washers (confirm ridge interval with project manager).
- U-hooks should be firmly fitted around the bamboo tertiary roof supports beneath the roof.

Step 4B: CGI sheets attached to tertiary roof structure with U-hooks, rubber and diamond washers

Step 4.C: ridge covers attached to CGI sheetsroof structure at ridge and diagonals

4.C RIDGE COVERS ATTACHED TO CGI SHEETS/ROOF STRUCTURE AT RIDGE AND DIAGONALS

- Once CGI roof sheets have been attached, the ridge sheets should be prepared for installation, according to the following requirements:
  - Ridge covers should overlap the top of the CGI roof sheets by 9 inches minimum (confirm dimension with project manager) at the main ridge and along all diagonal roof-slope intersections.
  - Where ridge covers overlap each other (such as at intersections between the ridge and diagonal roof-slope intersections), the ridge covers should be installed with lower pieces underneath upper pieces to prevent rainfall from leaking through the overlaps.
  - Ridge covers should be trimmed at the roof overhang to not extend past the CGI roof sheets.
- Once ridge sheets have been cut to fit for installation, they should be attached through the CGI sheet and bamboo tertiary members underneath with the fasteners provided; fasteners should be attached at every third ridge of the CGI sheet underneath. (Confirm maximum ridge interval with project manager).

4.D ATTACHMENT OF CGI ROOF SHEETS CONFIRMED

- Once CGI roof sheets and ridge covers have been attached, the project team should confirm that they have been attached according to the requirements outlined above.

Phase Five: Bamboo Wall Sheathing Attachment

5.A EXTERIOR WALLS CONSTRUCTED

- Households should construct exterior walls for their shelters with materials they choose and contribute. Ideally, they will use bamboo fencing with mud daub, which can be easily repaired in the event of damage due to flooding.
- The project team and project manager can assist households in placing wall openings and instructing how to use bamboo to frame door and window openings, as necessary.

Step 5.A: exterior walls constructed

5.B INTERIOR WALLS CONSTRUCTED

- Households should use materials they wish to construct interior partitions; any bamboo used to frame the partitions can be sunk into the plinth at the bottom and attached to the roof structure above.
- The tie beams can also be used to support an overhead storage space to elevate grain and other valuables during the rainy season or in anticipation of floods.

Step 5.A: exterior walls constructed

Step 5.B: interior walls constructed

Completed Structure

Completed shelter Isaac Boyd/CRS

Completed shelter Isaac Boyd/CRS

Completed shelter Isaac Boyd/CRS

Occupied shelter Kirtimayi Mishra/CRS

Occupied shelter Kirtimayi Mishra/CRS

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