



BASIC STRENGTHENING HANDBOOK FOR <u>MASONRY</u> HOUSES

ABOUT THIS HANDBOOK

This basic house strengthening handbook has been developed for community members affected by Typhoon Ompong, particularly those that live in single-family timber houses with a lightweight roof. It can help homeowners and construction workers identify, in a basic way, areas where the house may be especially vulnerable. It also provides examples of simple strengthening measures that may help houses become more resistant to earthquakes and typhoons.

DISCLAIMER

This handbook is not appropriate for developing a full seismic or typhoon strengthening (retrofit) plan and does not provide a complete list of retrofit options. Application of techniques described in this guide and compliance with the observation checklist included does not mean the building meets building code requirements. In some cases, the application of these techniques may not lead to a demonstrable improvement in seismic or typhoon resistance, especially in houses more complex in nature. Other strengthening techniques and construction materials are available and should be considered. The order of the techniques described in the guide does not necessarily correspond with the order of their application. Before applying any of these strengthening measures, or for a complete retrofitting home solution please consult with a qualified construction professional.

ACKNOWLEDGEMENTS

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INSTRUCTIONS

- 1. Using a pencil, answer **YES** or **NO** to every question below. The pictures underneath each question serve as guidance.
- 2. Whenever you mark an item **NO**, add the proposed strengthening measure to the TO-DO LIST on page x.
- 3. Use the TO-DO LIST as a guide to progressively strengthen the building.
- 4. When the TO-DO LIST has been done, verify the strengthening work has been completed properly by doing the assessment again.





LIGHTWEIGHT ROOF

1.	Are CGI sheets in good condition (undamaged and without severe rust)?		□ NO
lf tl	If the answer is NO : Change CGI sheets where needed		







3. Are there roofing nails every 7 cm along the perimeter and ridge of the roof AND every 15 cm along the purlins?	
If the answer is NO : Add extra roofing nails where needed	



If the answer is $\ensuremath{\text{NO}}$: Exchange bad timber for new timber where needed





5. Are all p	urlins 70 centimeters apart (or less)?	
If the answe	r is NO : Add extra purlins	

























If the answer is **NO**: Strengthen connection between A-frames and wall where needed.











If the answer is **NO**: Build a beam at the top of the wall. The beams also help keep the walls in place so the walls don't topple over in a disaster.







If the answer is **NO**: Add more blocks to the top of the wall so that it is at least 2.5 meters high. Your room will be tall enough for good light and air flow.



If the answer is **NO**: Demolish the top of the wall so that the top of the beam will be less than 3 meters above the ground. If the walls are too tall they more likely to topple over in a disaster.





17. Are all CHB walls plastered on both sides?		
ourse and a second seco		
If the answer is NO . Plaster all wall faces that do not have. Plastering makes	the walls	stronger

If the answer is **NO**: Plaster all wall faces that do not have. Plastering makes the walls stronger, so they are less likely to crack in a disaster.

18. Are all walls that face each other (i.e.: walls that are parallel) less than 4 meters apart?	O YES	□ NO
Bis		
If the answer is NO : Ruild a new partition wall between the two walls that for	no oach ot	bor

If the answer is **NO**: Build a new partition wall between the two walls that face each other. The partition wall helps to brace the walls that face each other, otherwise they maybe too weak to absorb strong winds or shaking







If the answer is **NO**: **Option** A: Demolish the CHB and replace with light materials such as plywood

Option B: Build a ring beam along the top two sides of the triangle.

A CHB gable can topple over in a disaster, and since CHB are heavy it can really injure someone. Better to replace it with something light or build a beam to keep it in place.







If the answer is **NO**: Build a reinforcement on both sides of the window/door. The reinforcing bars help to hold the windows/doors in place during shaking, otherwise the walls besides them can crack. Inspiration





21. Do the windows and doors that are wider than 60 centimeters have reinforcement along the top and bottom?	S	

If the answer is **NO**: Build a reinforcement along the top of the window/door. The reinforcing bars help to hold windows/doors in place during shaking, otherwise the walls besides them can crack.







If the answer is **NO**: Fill in the window or doors to get 1.5 meters of solid area on the walls which are lacking. A minimum of 1.5 meter of the wall is needed to absorb the shaking from earthquakes and typhoons, less than that and walls can crack.





HOUSE STRENGTHENING TO-DO LIST

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#	TO-DO ITEM	NOTES
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