Maria showed us that the way we build houses needs to be stronger. These are 8 key messages on how to repair your house and build back safer.

**How Does a Hurricane Affect Your House?**

1. **Build on Strong Foundations**
2. **Tie-down from Bottom Up**
3. **Brace Against the Storm**
4. **Use Strong Joints**
5. **A Good House Needs a Good Roof**
6. **Site Your House Safely**
7. **A Simple Shape Will Keep You Safe**
8. **Be Prepared**

- **Evacuation**
- **Communication**
- **Grab Bag**
A simple shape will keep you safe

The shape of your house is important to reduce damage in strong winds. Always keep the design simple and strong.

HOW SHOULD WE PLAN A GROUP OF BUILDINGS?

Houses too close together trap the wind

Spacing houses to let the wind pass
Site you house safely

Identify the hazards in your location and build as well as you can to resist them.

A. Raise your house above the floods

B. Don’t build too close to edges or where rocks might fall

C. Reduce risks and build away from hazards where possible

D. Build away from large trees or remove trees near the house to reduce risk of damage

E. Use wind breaks to protect your house from strong winds
A good house needs a good roof.

The way you design and build your roof is critical to protect you against strong winds and rain. Build your roof the right shape and pitch, and well nail down to protect against a storm.

**WHAT CAN I USE TO SECURE MY ROOF?**

- Regular nail
- Umbrella head nail and washer (good for bamboo)
- German wire
- Twisted umbrella head nail and washer
- Roofing screw and washer

**WHAT ROOF SHAPE SHOULD I USE?**

- Single slope roof
- Two sided gable roof
- Multiple roof slopes reduce the risks of your roof being pulled apart
Use strong joints

Your house is only as strong as the weakest joint. Build every joint so it can’t be pushed or pulled apart. Horizontal nails are better as they can’t be pulled apart by the wind sucking your house up or pulling it down.

A. Extend timber past joints to stop nails splitting the timber
B. Don’t cut away too much of the main posts or beams
C. Offset nails to prevent timber splitting
D. Nailing at an angle will make the joint harder to pull apart
E. Fishplate/strap vertical and horizontal joints to increase strength
F. Use gusset plates to strengthen joints

What can I use to strengthen joints?

- Single nail: Too Weak
- Nails: Strong
- Screw: Stronger
- Interlock joint and nail: Strongest
- Fishplate or cleats
- Bolt

Global Shelter Cluster
Dominica Hurricane Maria
Brace each wall

**Brace against the storm**

Strong bracing stops your house being pushed over or pulled apart by the wind. Bracing needs to be strong against being crushed along its length or pulled apart. Brace between the strong points of your house.

Brace below the roof

Brace between roof trusses or rafters

When on stilts, brace between the posts

Full bracing both ways from strong point to strong point!

Brace at 45°. No less than 30° and more than 60°

**WHAT CAN I USE TO BRACE MY HOUSE?**

- Tie thick galvanized steel wire: Strong
- Tie old rebar
- Nail timber: Stronger
- Nail galvanized steel straps: Strongest
- Nail timber and galvanized steel straps
**Tie-down from bottom up**

In a typhoon your house can be sucked apart or blown away by the wind. Tie every part of your building right through to the ground. Start thinking about this from the bottom up.

**WHAT CAN I USE TO TIE-DOWN MY HOUSE?**

- **Rope or nylon fishing wire**
- **Thick galvanized wire** (multiple layers)
- **Timber cleats**
- **Galvanized metal strap**

**STRONG WINDS COMING?**

- **Tie-down when strong winds come**

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**Strong ✓**

**Strongest ✓ ✓**
**Build on strong foundations**

Foundations are very important as they anchor your house to the ground. Ensuring foundations are suitable to your building’s location and ground conditions protect your house from strong winds, earthquakes, and flooding.

**WHAT CAN I USE AS A FOUNDATION FOR MY HOUSE?**

<table>
<thead>
<tr>
<th>Above ground timber post</th>
<th>Below ground timber post</th>
<th>Anchors increase foundation strength</th>
<th>Treated hardwood post below ground protects from rotting</th>
<th>Hardwood post set into concrete foundation</th>
<th>Rebar set into concrete foundation</th>
<th>Steel strap bolted to post with gap to avoid rotting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Too Weak</td>
<td>Strong</td>
<td>Stronger</td>
<td>Strongest</td>
<td>Strongest</td>
<td>Strongest</td>
<td>Strongest</td>
</tr>
</tbody>
</table>

**Global Shelter Cluster**

Dominica Hurricane Maria
**CONSTRUCTION KEY POINTS**

- **Pitch Roofs:** 2-pitched roof: min. 30°-45°, 1-pitched roof: 12°-14°.
- **Recommended extension of eaves/overhang:** min: 150mm – max: 300mm
- **225mm overlap between sheets longitudinally.**
- **150mm overlap between sheets laterally.**
- **Timbers connecting the rafters:** Use Collar ties, Gussets and Metal Straps to secure the ridge
- **Rafter connecting the wall plates:** straps and timber connector
- **Wall plates:** should be securely held down (no just nail)
- **Roof Connections for Concrete Walls:** Use a plate + Bolt or Galvanized metal strap embedded at least 200mm into concrete belt beam
- **Purlins to rafters:** Purlins minimum 50mm width to prevent splitting when nailed
- **Spacing of Laths/Gauge sheeting:** #26 (2’ nails- 2’6” Screws) - #24 (2’ Nails-3’ Screws)
- **Porches shouldn’t be structurally attached**

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**Be prepared**

Preparedness is critical because it is the main way to reduce the impacts of a disaster. It is important to start taking actions and prepare now.

**OVER TIME WHAT CAN I DO TO PREPARE MY HOUSE?**

- Add bracing
- Add shutters to windows and openings
- Create wind breaks
- Prepare strong ‘safe room’
- Remove large trees close to house

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**WHEN A DISASTER IS COMING WHAT CAN I DO TO MY HOUSE?**

- Tie-down house
- Protect windows and openings
- Elevate valuable items during floods
- Secure loose items so they won’t be blown away
- Turn off or unplug all appliances

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**WHAT ARE THE HAZARDS IN MY LOCATION?**

- Hurricane?
- Earthquake?
- Landslide?
- Volcano?
- Floods?