RURAL HOMES
Maintenance Manual

Habitat for Humanity New Zealand

NEW ZEALAND FOREIGN AFFAIRS & TRADE

Habitat for Humanity Fiji

Message from the National Director

Communities across Fiji experience challenges to maintain and repair their homes. These challenges are increased due to unfamiliar construction techniques and inaccessibility to supply chains or skilled trades persons. As a result, many families may not make even the least technical repairs to their homes and therefore increasing their vulnerability to climate change.

A safe home is a most pivotal element in the lives of all humans. We are social creatures and being able to have a base that we can call our own to protect our lives and property is one of our most basic needs and galvanizes our identity. The lack of maintenance of this element in our lives gives rise to socio-economic issues which have bearing on many other areas of our lives including health, education, food security and employment to name a few.

The research and contents of this publication, the "Rural Homes Maintenance Manual," expresses the commitment by Habitat for Humanity Fiji to improve the knowledge and skills of homeowners to maintain their homes and communities and improve their resilience to disasters.

This research initiative involved comprehensive research in remote communities on the mainland and outer islands to better understand the types of homes constructed, the maintenance needs and capacity of homeowners to effectively remedy these needs. The resulting publication provides a **holistic approach** to remote Fijian home maintenance and will enhance the knowledge and skills of homeowners. It will act as a guide to using best practices that are accessible for Fijian homeowners, enabling them to retrofit and repair their homes.

Masi Latianara
National Director
Habitat for Humanity Fiji

Information about the
Rural Homes Maintenance Manual

Habitat for Humanity Fiji began the four-year 'Stand Strong' project in 2018 to improve the level of resilience of Fijian communities to disasters through improved shelter conditions. The Stand Strong project is funded through New Zealand government's Partnership for International Development Fund and supported by Habitat for Humanity New Zealand.

The research component of the project aims to outline the current best practices to support remote Fijian communities in their construction and reconstruction efforts. A major gap identified by the research is that homeowners are not aware and do not always have the means to maintain their homes properly. This is particularly true in some examples of contemporary homes (e.g. concrete blocks, corrugated iron structures). Additionally, existing maintenance manuals in Fiji are not accessible to remote communities (in terms of their language and housing typologies).

The purpose of this manual is to help homeowners of all types of houses to extend the life of their houses and improve community resilience in terms of shelter.

Who is this manual for?

The Rural Home Maintenance Manual was primarily designed for homeowners in the peri-urban, rural and remote communities of Fiji, and specifically for those homeowners that find themselves conducting their own repairs and maintenance. The guidance in the manual is not intended to replace the Fiji Building Code or any Fiji laws. Users must seek the advice of professional structural engineers should they need any structural advice to strengthen their homes

Acknowledgement

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This work was developed by Mereoni Matalomani, Salote Valentine and Adi Arieta Tupou Baleivale with the endless support from Habitat for Humanity family members from New Zealand: Jamila Homayun and Lou Maea and Fiji: National Director Masi Latianara, Managers Michael Hill, Sowane Puamau, Tasiana Lulu, Marlon Atalifo, Colin Alfred; Community Development Officers; Vasemaca Qiolevu, Alusio Beramai and Carpenter John Mary.

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Printed in 2020
Front Cover: Levuka – I – Daku, Matuku island, Lau
Back Cover: Losa village, Itu'ti'u District, Rotuma

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Acronyms

PVC	**Poly Vinyl Chloride**
TnK	**Turaga ni Koro (Village Headman)**
HFHF	**Habitat For Humanity Fiji**

Glossary

PVC	**Poly Vinyl Chloride is a widely produced synthetic polymer that is used in construction for pipes etc.**
TnK	**Itaukei name for Village Headman**
Loose oil	**Is any petroleum based or synthetic oil that has been used that are again reused in communities to prolong the life of untreated timber**
Structural members	**Refers to the support that is an important part of any structure or building**
House Typologies	**Refers to the study and documentation of a set of buildings which have similarities in their of function or form**
Primer	**A substance used as a preparatory coat on previously unpainted wood, metal, or canvas, especially to prevent the absorption of subsequent layers of paint or the development of rust.**
Undercoat	**A layer of paint appli mer and before the topcoat.**
Structural Resilience	**Refers to the ability of a building to continue to perform after many natural disaster impacts.**
Contemporary Homes	**Covers a range of styles developed in the latter half of the 20th century.**
Hawk Board	**A flat board with a handle used by plaster man to hold the plaster mix during the plastering process.**

Introduction

"Supporting Resilient (re)Construction in Remote Fijian Communities" (HFHF, 2019), identified a gap that homeowners often lacked the knowledge and finance to maintain, repair or extend their houses in coastal areas, the maritime zone and in the interior of the larger Islands.

The lack of maintenance and repair of remote housing, resulted in the gradual loss of structural resilience, which consequently reduced the life span of homes. Simple techniques like painting corrugated iron roofing, diagonal bracing and checking for rotten posts, needed to be explained to homeowners to ensure sustainability and improve resilience. This was common in all house typologies.

The purpose of this manual is to increase the resilience of homes to climate change in rural and remote communities. The guidance will highlight common problems and suggest remedial measures and maintenance tips in retrofitting. It will also make suggestions on repairing and strengthening methods commonly used in the house.

Maintenance Techniques

This manual provides maintenance suggestions for different parts of a house, from the foundation to the roof cover, identifying the most common problems encountered at the different parts of the house and highlighting some remedial measures and maintenance tips in solving the problems.

1.0 Foundations

"A safe house must be based on a strong foundation and therefore this must be given primary attention." (Willison, 2008). The foundation supports the weight of the entire house on its shoulders and offers a levelled base for the wall construction that separates the wood framing of the house from the termites on the ground.

"A building foundation performs many functions including:
- supporting the load of the building.
- holds the building in place in case of earthquakes
- holds a building down in the case of cyclones
- and to isolate it from ground moisture." (Layton, 2017)

Moisture and wind are a buildings' strongest enemies and should be prevented from entering the house. The following points highlight the common problems related to foundations and flooring that were identified from communities visited.

1.1 Concrete Posts

"The best foundation for a strong house is concrete, but if timber is preferable then you should make sure that it is treated well before it comes in contact with soil or moisture"

Savenaca Nakete the former TnK for Nananu Village in Dawasamu, Tailevu.

"Concrete piles/posts can be cheaper to install than timber posts if mixed correctly. Poured concrete provides the highest level of strength for foundations. A strong foundation goes a long way in building a stable house because concrete is a highly durable material for foundational purposes." (Tiodi, 1995)

Common problem;

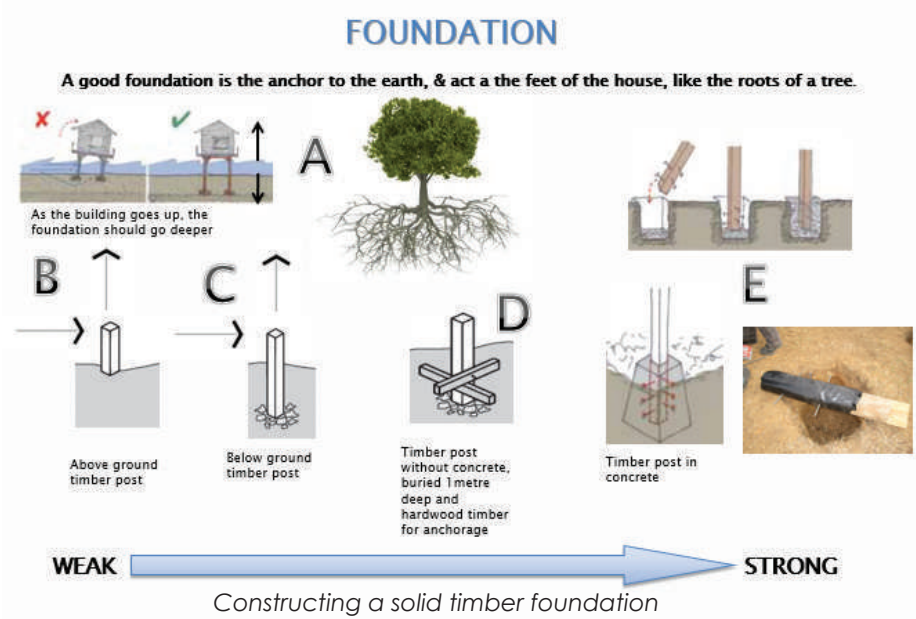
Cracked concrete posts

- Cracked concrete posts are caused by a weak concrete mix i.e. the wrong mix ratio of sand/ gravel and cement.
- Sand from the sea must be rinsed thoroughly or steel reinforcement will rust and expand thus cracking the concrete. This is called spalling.

Concrete posts of a 60-year-old house at Nakasaleka, Kadavu.

Repairs

- Provide support to the part of the house that is supported by the damaged post before removing and replacing the damaged post.
- Use clean crushed gravel not bigger than 25mm.
- Ensure that reinforcing steel is scrubbed with a steel brush before use.



Constructing a solid timber foundation

Tips

- Foundations must sit on firm, solid ground.
- Only crushed gravel should be used in foundations solid fills
- Ensure that gravel and coarse river sand are washed and soaked in fresh water for 24-48 hours before use.
- Avoid building in flood-prone locations. If this cannot be avoided, then build on tall timber or concrete posts.
- DO NOT BUILD on coastlines or too close to the seashore.

1.2 Timber posts

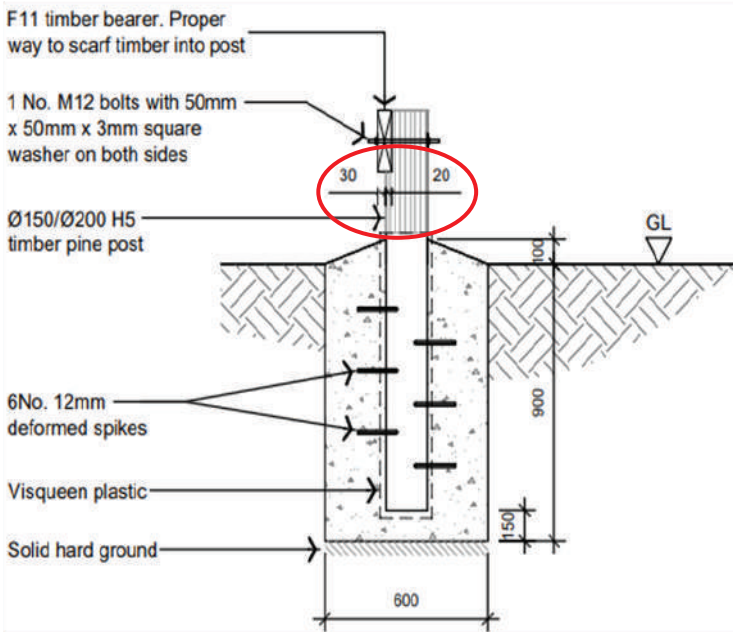
Common problem;

- Bearers can sag in the middle if the distance between posts is too great. [Refer to Table on page 14 for suggestions on post distance to bear size].
- Posts that are smaller in diameter will not hold the weight of the building.
- Untreated timber in contact with soil/moisture, can cause the timber to rot faster.

Houses with timber posts in need of repairs

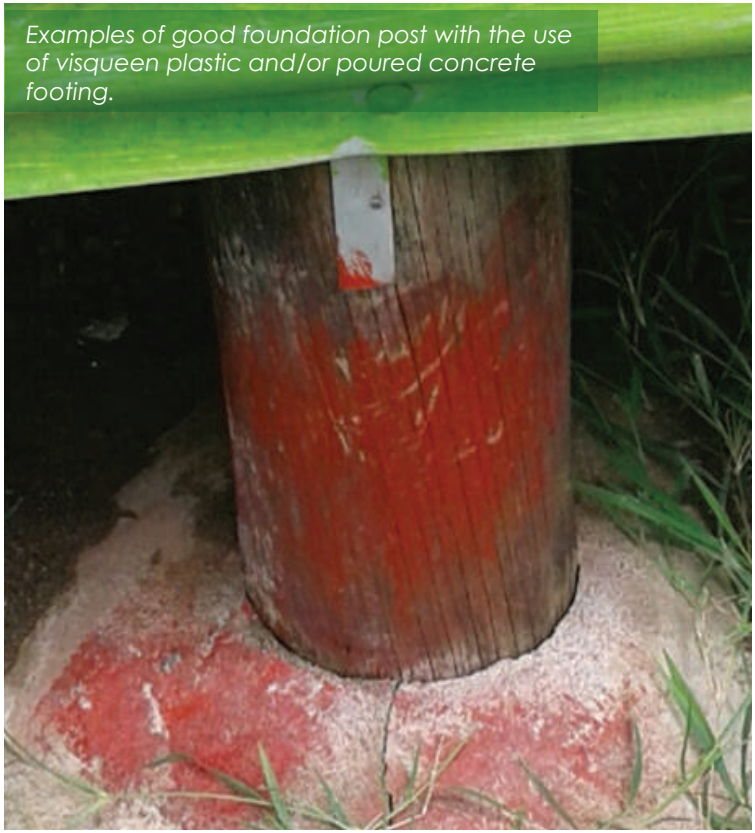
Repairs

- Provide support to bearers before removing rotten posts
- Replace rotten posts with new posts then secure bearer to post with galvanized bolts
- Timber posts are not to be far apart but spaced out evenly. [Refer to Table on page 14 for suggestions on post distance to bear size].
- If there is no plastic sheeting to wrap the bottom of timber posts before pouring concrete footing, the same part of the post should be charred or brushed with loose oil and the post to be placed in the hole before the concrete pour.



When Scarfing, we recommend that 20mm of the bearer be sitting on the post and 30mm of it be hanging out of the post.

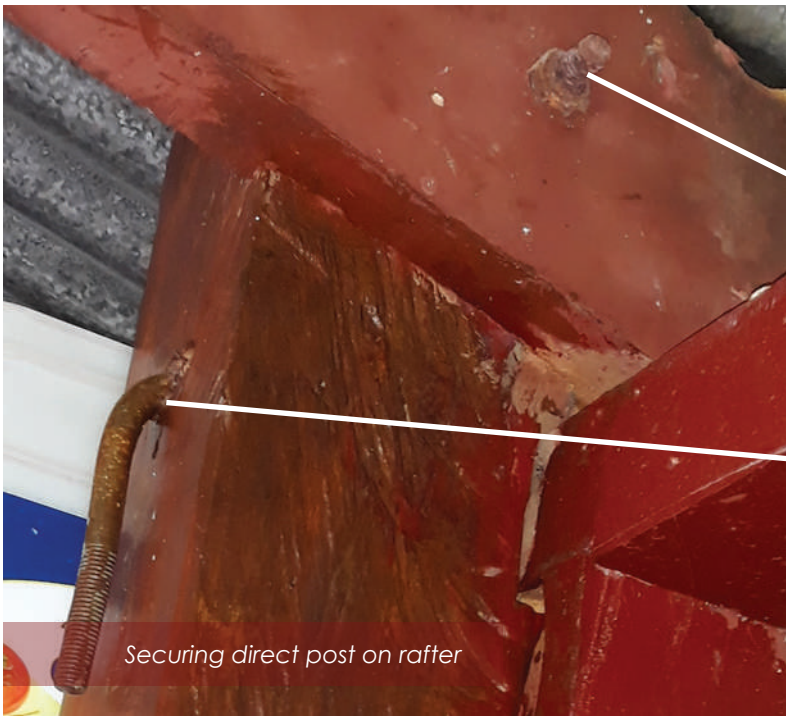
Examples of good foundation post with the use of visqueen plastic and/or poured concrete footing.



Tips

- Do not use timber with lots of knots.
- Always use treated timber
- Ensure timber posts are protected from moisture.
- Use 4' or 6' nails as spikes in bottom end of the post if reinforcing steel rods are not available, to secure posts to foundation.

Correct timber post construction



Securing direct post on rafter

For the use of direct post, be sure to use nuts and bolts to secure the top plate directly to the post if available (6 x 2 or 4 x 2 beam).

Nuts and bolts

Reinforcing rod may also be used if there aren't any nuts and bolts available

Recommended timber sizes

TIMBER SIZES	
FLOOR BEARER	150x50
FLOOR JOIST	150x50
RAFTERS	200x50
PURLINS	100x50

TIMBER SIZES	
TOP PLATE	100x50
BOTTOM PLATE	100x50
STUDS	100x50
NUGGINS	100x50

2.0 Floors

2.1 Solid concrete floors

Common Problem;

Cracks on the concrete flooring

Cracks in concrete flooring can be caused by:

- A weak concrete mix caused by the wrong mix ratio of sand, gravel and cement.
- Rusting reinforcing steel swelling (spalling) and cracking the concrete.

concrete floor cracks"

Repairs

Step 1
Clean the cracked area. Remove loose concrete chips.

Step 2
Use a cold chisel/steel brush to widen and clear the mouth of the crack

Step 3
Mix the plaster with ratio 1: 3 (1 part of cement: 3 parts of sand) and pour the mixture into the crack.

Step 4
Use trowel to apply a thin layer of plaster to the area

Step 5
Press the mixture into the cracks until it is level with the surface

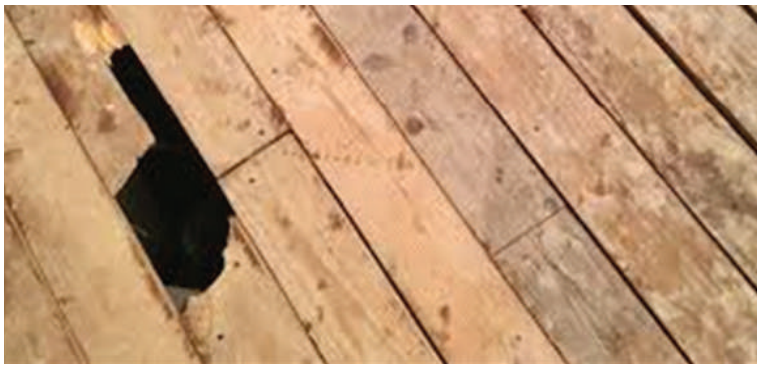
Tips

- Good clean ingredients with minimal water makes strong concrete.
- Do not use salty water. Salt reduces concrete strength.
- 4:2:1 aggregate: (4 parts of coarse aggregate - gravel, 2 parts of sand and 1-part of cement.)

2.2 Timber Floors

Common problem;

- Rotten, uneven and loose floorboards
- Gaps between floorboards.
- Use of timber with too many knots



images of rotten and loose floorboards and floorboards with many knots

Repairs

- Remove and replace the rotten floorboards with the same size floor boards.
- Nail securely into place the floor boards.
- Apply with the same finish on the new floor boards so it will look the same with the old boards.

Tips for replacing damaged timber flooring

Cut out rotten floor | *Remove rotten floor* | *Replace rotten part with new floor board and nail it to floor joist*

method of replacing damaged timber flooring

Tips

- Paint or varnish floors regularly to protect the timber from moisture.
- Replace rotten floorboards and joists immediately. Delaying repairs will cost more.
- Use timber with fewer knots for flooring.
- Do not use wet floorboards because they will shrink when dried and leave gaps.
- For floorboards of different sizes, it is good practice to clamp the floorboards to each other to close the gaps between the boards
- Ensure that the joists are close to each other at least a minimum of 600mm apart.
- Floorboards should start and finish above the joists for support.

3.0 Wall Structure

Three common wall types are

- Concrete block
- Timber frame with timber wall lining
- Timber frame with corrugated iron wall lining

3.1 Concrete Structure

Common problem;

Concrete wall cracks:

Concrete walls can crack for a number of reasons.

- Hairline cracks: Caused by incorrect plaster mix or plaster drying too fast.
- Major or structural cracks: Caused by the house settling unevenly or reinforcing steel swelling from rust.

Hairline cracks

Major/Structural cracks

Repairs

Hairline Cracks:

- Clean the surface of the wall (cracks) you intend to work on.
- Dust off the cracks so it is free from dust and loose debris. This is important if you are plastering an older existing wall.
- Cover any holes and cracks you may find on the wall you are working on. You can use screen tape for this purpose.
- Follow the instructions and prepare the plaster. Always mix the plaster into the water and not the other way around. There should be no lumps in the mixture.
- First place some plaster on the hawk board using the trowel and use the floater to push the plaster from the hawk board onto the walls. Spread the plaster firmly upwards thus filling in the cracks on the walls.

- Flatten the plaster using the floater at the end of each sweep. Use small amounts of plaster each time in combination with lots of pressure on the floater, as this is the best way to ensure the crack gap is filled. Repeat the procedure until the crack on the wall is fully covered and a smooth look on the wall surface.
- After the first coat of plaster has been applied, wait for 20 minutes in order to let the plaster dry slightly. Using the trowel to get rid of the lumps and bumps by smoothing over with the trowel or floater.
- Proper curing of plaster should be observed.
- Repaint the walls periodically following normal painting procedures.

The process of cleaning, filling the cracks with plaster and painting the walls.

Structural/Major cracks:

- Structural and Major cracks can compromise the safety of your home as it would require major reconstruction works. It is recommended to seek advice from a civil engineer or an expert to investigate the reason for the cracks and take appropriate action.

Note

- Make sure to soak gravel and sand from the seashore with fresh water before mixing with cement.
- Remove debris or sediment from the gravel and sand before use.

(Source: https://www.google.com/search?q=Smoothing+the+surface+of+the+wall+using+a+cement+block&tbm=isch&ved=2ahUKEwjZn_XyvcHqAhUGSCsKHeypCj4Q2-cCegQIABAA)

3.2 Timber Walls and Structure

Exposed and untreated timber walls rot fast over time due to direct exposure to sunlight, rain, and pests such as wood borers or termites. This results in surface rot, peeled paint, and rough wall surface.

Common Problem;

Rotten wall surface [See page 42 for rotten timber repairs and maintenance method]

Timber wall surface decay due to exposure to sun and rain

3.3 Sheet metal walls

Sheet metal walls can be of flat or corrugated metal sheets. Since all metals corrode, the primary problem in dealing with sheet metals is to slow down the rate of corrosion. Timber wall frames supporting sheet metal wall lining will also rot if exposed to continuous wet conditions.

Common Problem;

Rusted corrugated iron sheets

State of sheet metal walls over time

Repairs

- Remove rust with wire brush and sandpaper or cut away the rusted part.
- Add a primer coat on the wall surface.
- Apply zinc paint or rust guard to protect the wall surface.
- For the decayed wall frames, remove and replace them with new timber frames to hold up the sheet metal walls.

4.0 Roof Cover and Structure

4.1 Corrugated roofing iron

Common Problem;

- Rusted roofing iron sheets

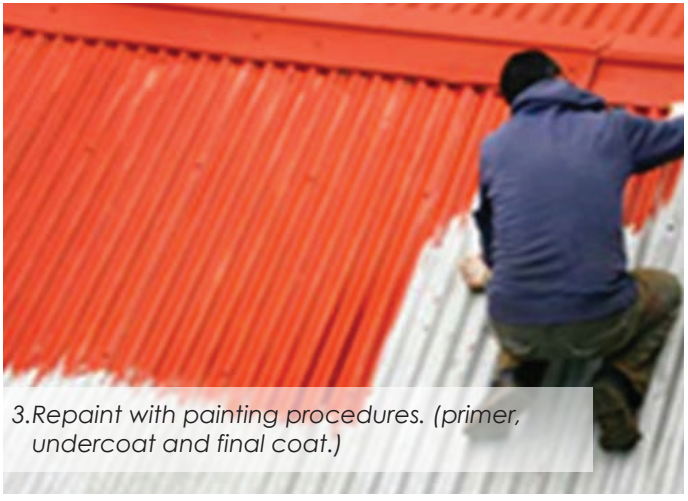
Corroded corrugated roofing iron

Repairs

- Cut off the corroded part and replace with the same material.
- Small holes in the galvanized iron sheets can be plugged with silicone, or covered with a bitumen flashing tape (Flash band), bitumen glue.
- Replace corroded cyclone straps with the same material as the roof sheets.

1.Remove corrosion and peeling paint with steel brush or sand paper.

2.Apply zinc paint or rust guard on the corroded parts of the iron sheets.



3.Repaint with painting procedures. (primer, undercoat and final coat.)

Method of replacing corroded corrugated roofing iron

(Source: https://homeguides.sfgate.com/repairing-rust-holes-corrugated-roof-29467.html)

Maintenance

- Use zinc paint for maintenance of minor corrosion.
- Avoid walking on the roof, unless necessary
- Avoid putting heavy weights on the corrugated galvanized iron sheets, especially objects with sharp edges (e.g. concrete blocks) that risk scratching and damaging the sheets.
- Choose the right kind of paint for your roofing material.
- Select a day when the weather is dry, for roof repairs. It is not safe to undertake repairs during wet or windy weather conditions.

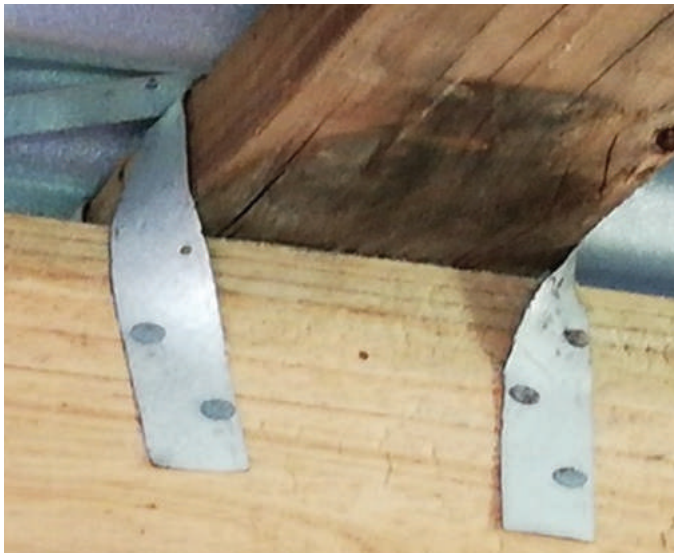
Note

- Use galvanized coated roof sheets with galvanized fixings such as roofing nails, roof screws and straps. The same applies for Zincalume coated roofing. Mixing the two will cause corrosion.
- Always paint the edge of the new corrugated iron sheets with rust guard, before installing, to prevent corrosion.
- Do not place heavy objects, such as blocks, sandbags tree trunks, or tyres on your roof as they can damage roofing iron sheets and will not secure your roof in a storm.

4.2 Roof structural members [purlins, rafters, ceiling joists, web brace]

Common Problems;

Incomplete strapping techniques



Not enough nails in straps

Damaged, rotten or termite infested timber

Missing or damaged fastening materials

Repairs [See page 42 for replacing rotten timbers]

- Remove old and install new straps and use proper nails on strappings. Make sure there are at least five nails per leg of strapping.

- Replace damaged or rotten/termite infested timber with new structural timber.
- Use holding down bolt to fix rafter to top plate.

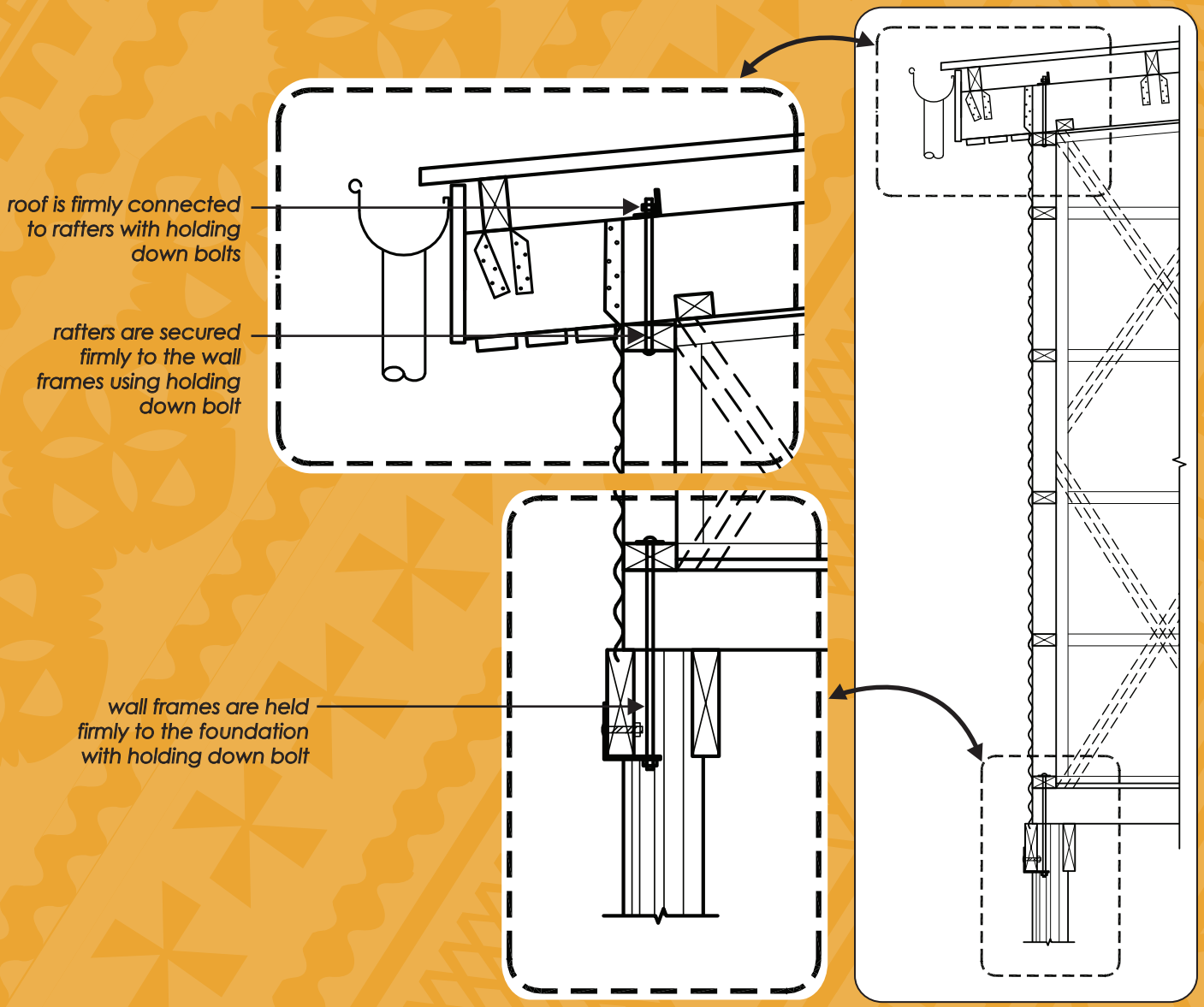
Common strapping techniques

Note

- Do Not overlap strapping when nailing

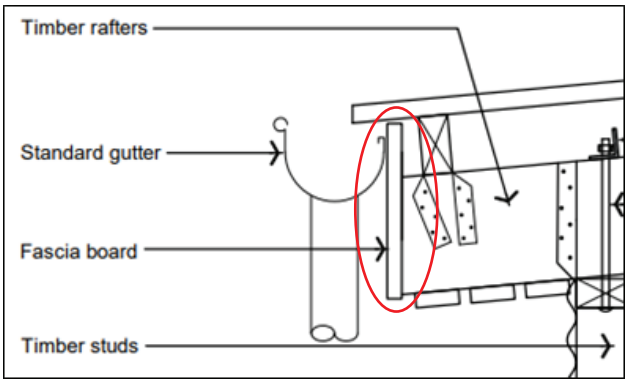
Maintenance

- Make sure there are at least five nails per leg of strapping for purlin to rafter connections, use only galvanized clout nails.
- Make sure the strapping is fixed together with no room for movement.
- Make sure the roof is firmly connected to the rafters, the rafters are secured to the wall frames, and the wall frames are held firmly to the foundation.



4.3 Fascia Boards

A fascia board is the horizontal board covering the ends of rafters at the eaves. Guttering is usually fixed to the fascia board.



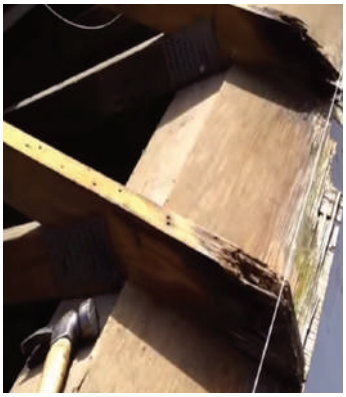
Common Problems;

Rotten fascia boards

Missing fascia boards leads to rapid deterioration of rafters

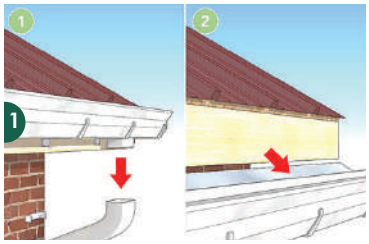
Peeling paint from the fascia board leads to rapid rot of the timber

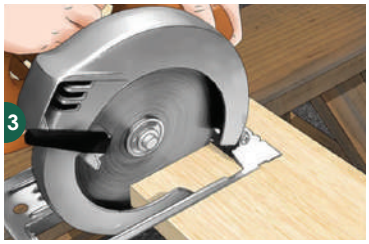
Examples of what the rafters end will looks like when fasia boards are missing.



Rotten rafters due to the absence of fascia boards

Repairs





Replace all rotten fascia boards with new boards. Make sure the thickness of the new boards is the same as the old boards so that your gutters remain straight.

Replacing rotten fascia boards

(Source: https://thehonestcarpenter.com/blog/how-to-replace-rotted-fascia-boards/)

Tips

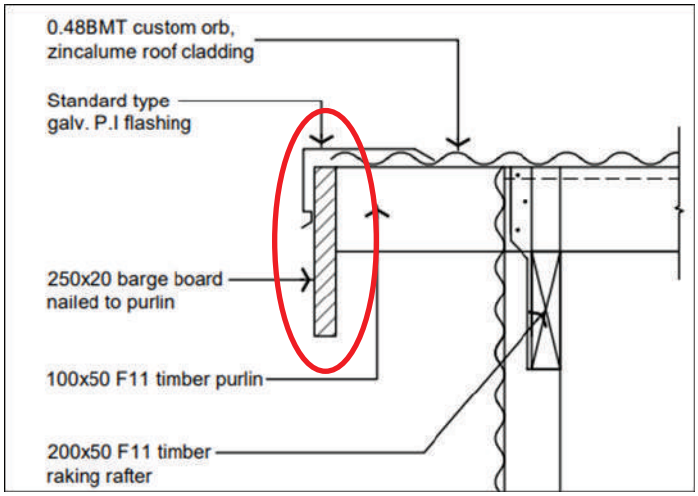
Follow proper painting procedure to protect the board (See Page 44 for proper painting procedure)

Maintenance

- Periodically check fascia boards for rot or damage.
- Clean and repaint fascia boards every 4 years or less.

4.4 Barge board

A barge board is a board fixed to the gable edge of a roof to give it strength, protection, and to conceal the exposed end of purlins of the roof.



Common Problems;

Missing barge boards

Missing barge boards exposes the purlins to harsh weather conditions.

Rotten barge boards

Rotten barge boards

Repairs

For missing barge boards, there are 2 main things that we should look at;

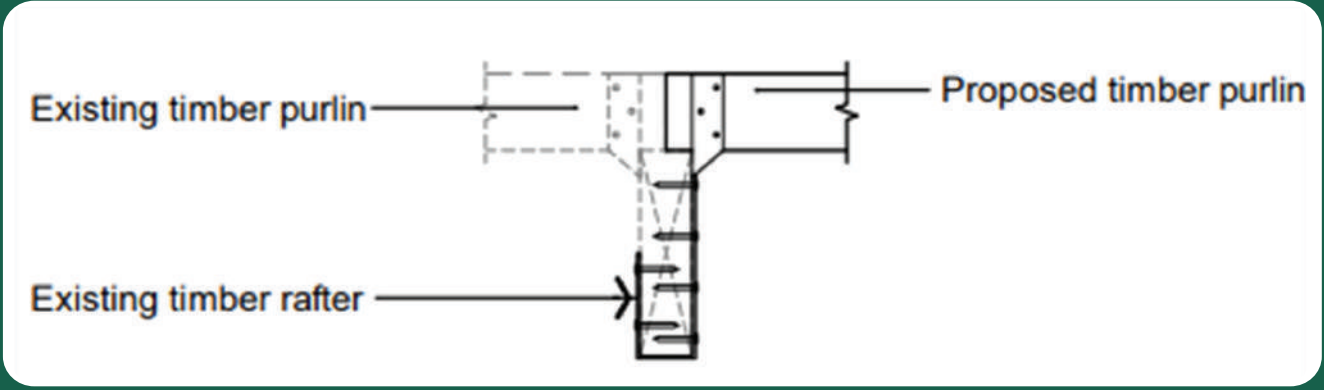
a. If the barge board was not nailed properly to the purlin the first time.
b. Whether the purlin itself is rotten.

If the barge board was not nailed properly then we can again nail the barge board to the roof structure provided we do not hammer the nail at exact same location. For purlins that have rotted, we should;

1) Cut the rotten portion of the purlin.
2) Replace the purlin.

Note

- The new purlin has to be of the exact size of the width, thickness and length of the removed rotten purlin, nail the new purlin into place on the exact position.



New purlin timber attached on the next nailed portion of the previous purlin and not at the place where it was cut.

Tips

For rotten barge boards, it is recommended to replace with new board as soon as possible and painted following the usual painting procedure **[see Page 44 for proper painting procedure]**

Select a fine day to conduct roof repairs. It is unsafe to undertake repairs during wet or windy conditions

4.5 Eaves

Eaves are part of the roof that is overhanging on all four sides of the building, which can be enclosed or exposed. The roofing eave has an important purpose in keeping water away from the walls and windows.

(**Source:** https://study.com/academy/lesson/what-are-eaves-in-architecture-definition-design.html)

Common Problems;

- Uncovered eaves – This is common for houses that is not fully completed and it is more exposed to different weather conditions which causes the timber to rot rapidly.

Uncovered eaves

- Short and no eaves - Having short/no eaves does not protect the side of the house.

Short/no eaves

Repairs

- To have clear access to the eaves, first detach the gutter system and fascia board.
- Remove the eaves battons or the roofing iron to properly inspect the rotten timbers.
- Remove and replace the rotten timber with the new timbers

Note

- if your eaves are upheld by multiple rafters, you will need to remove and replace them one at a time to avoid compromising your roofs stability.
- Measure and cut timbers for the new rafters to match the old ones.
- since the rafters are a critical part of the eaves support structure, it is necessary to ensure they are in good condition before you begin fitting the new components of your eaves.

- When the new members in the eaves are fitted into position, fit the fascia boards to the ends of the rafters and attach the gutter system into position. Seal all gaps to reduce the risk of water seepage into the eaves.

Tips

LADDER SAFETY: Always keep three points of contact on the ladder: Either both hands and one foot or both feet and one hand.

Maintenance

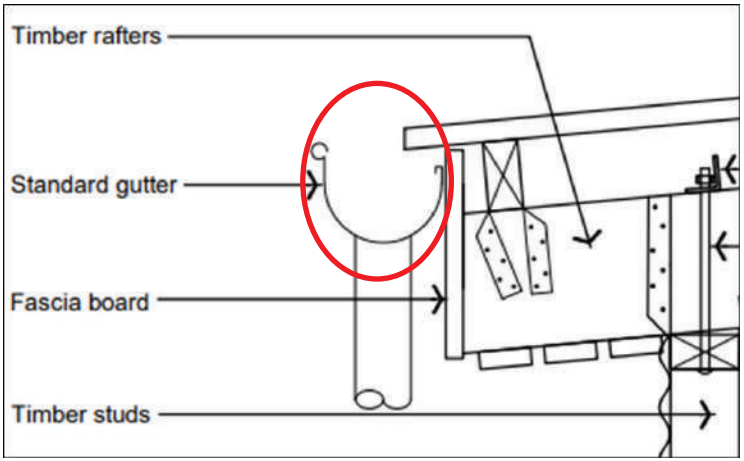
- Eave should be periodically inspected for rot or peeling paint.

Note

For bamboo wall claddings, make the eaves longer to cover and protect the bamboo from continuous rain thus increase the life expectancy of the house. Longer eaves will warrant a stronger anchor to hold the overhang to the roof and wall frames.

4.6 Gutters and Down pipes

Gutter is a shallow trough fixed on the fascia board of the roof for carrying off water.



Common Problems;

No gutters and downpipes

Clogged down pipes/water overflow from the gutter

Leaking gutters

Sagging gutters

Repairs

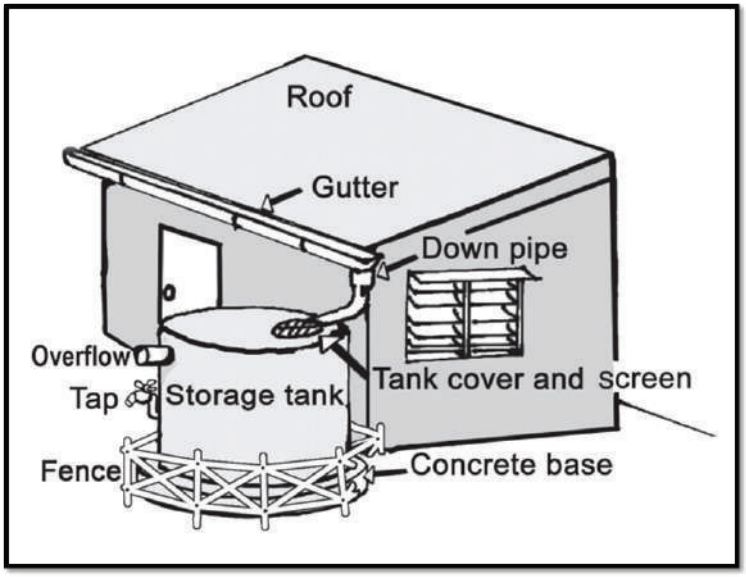
- Install gutter system as this protects the house from water splashing on the building walls, foundtion, and landscape.
- Damaged gutters and downpipes should be repaired immediately to avoid damage to other parts of the house.
- If rusted metal gutters and downpipes cannot be immediately replaced, remove as much rust as possible with a steZel brush and sandpaper and paint with rust guard. **This is a temporary solution only.**
- PVC gutters and down pipes require less maintenance than metal ones.

Maintenance

- Gutters, downpipes and spouts should be inspected and cleaned every 2 months.
- Sand and paint metal gutters every 2-3 years
- Replace all damaged gutter brackets.

Rain Water Harvesting

Rain Water Harvesting will enhance the use of guttering and down pipe. Save money by connecting your gutters to a water tank to flush toilets, water gardens or general household cleaning.



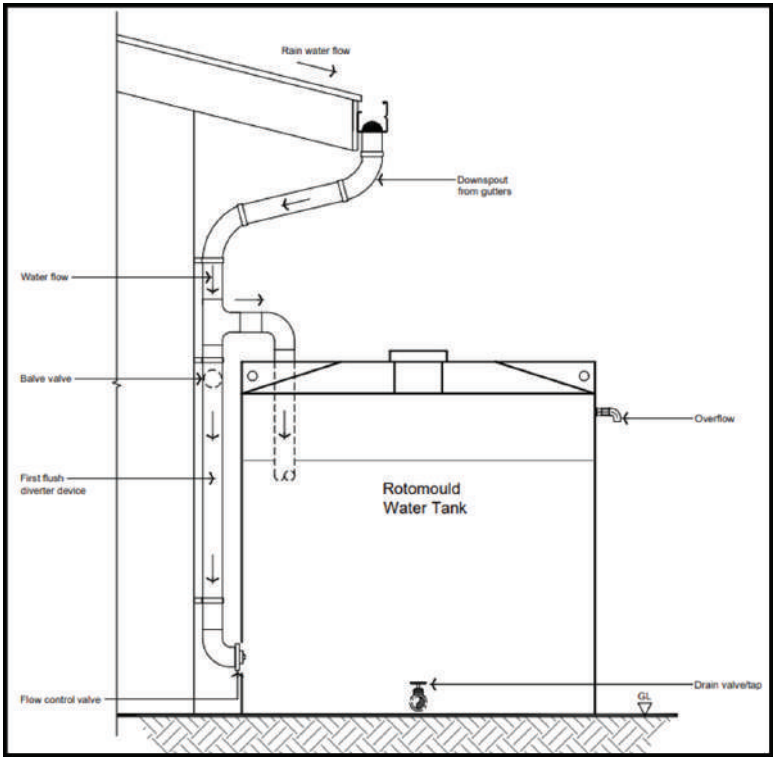
Parts of a rain water harvesting system

Rainwater Harvesting System

Typical rainwater harvesting system

First Flush Diverter

The "first flush" diverter or device, looks like a downpipe. The initial flush of the roof fills up the 'first flush diverter where debris and contaminants such as dust, leaves and bird droppings, will settle. When the first flush device is full, further rainfall is then diverted through a 'collection pipe' into the storage tank.



First-flush diverter

Maintenance of cracked Concrete Water Tanks

Steps in repairing concrete water tanks

- Repair tanks holding drinking water by first measuring the tank, noting both the circumference of the tank as well as the tank depth. Order a tank liner to the dimensions needed.

- Drain the tank completely and clean out the crack, removing any dirt or debris with a wire brush. Remove any loose concrete that may be located around the crack with the chisel. Take care not to chisel directly into the crack though, as this could spread the crack.

- Brush a layer of concrete bonding agent into and surrounding the crack, making sure to cover the entire inner surface of the crack. Wait about five minutes for the agent to dry to a point where it's no longer wet but remains tacky to the touch.

- Mix one-part hydraulic cement with three parts water in a bucket using the electric drill with mixer paddle attached. The cement should be a moist, dirt like consistency and stick together when rolled into a ball without leaving cement residue sticking to your hands. Use the trowel to press the cement into the crack, filling it completely. Scrape over the surface of the cement with the tilted edge of the trowel to make it even with the surrounding concrete. Remove any excess cement and allow the patch to dry for an hour. This is all that is necessary for tanks not used for holding water for consumption.

- Coat the entire interior of the concrete water tank with epoxy to serve as an adhesive for the liner. Roll the resin onto the concrete using a paint roller.

- Install the liner in the tank's interior starting at the center of the tank. Place the center of the liner in the tank's center, pressing firmly on the liner so it adheres to the concrete. Unfold the liner, spreading it across the bottom of the tank and then extending it up the sides of the vessel.

- Drill holes into the concrete where the steel reinforced holes on the liner's edges are located using the hammer drill. Inject epoxy into the concrete holes to help hold the anchors in place and then pass the anchors through the steel reinforced liner holes into the concrete holes to hold the liner in place. Allow the epoxy to dry completely for the length of time specified by the manufacturer before refilling the tank.

5.0 Doors and Windows

A home should have a minimum of 2 doors and 2 windows. Doors and windows provide privacy, ventilation and lighting for the home and generally with the exception of the need to repaint wooden frames, windows and doors made of wood will require similar maintenance.

i. Doors and windows should open and close easily.
ii. Routine checks for the hardware (hinges & door locks).
iii. The doors & windows framing joints should be repainted constantly to be in good condition.

5.1 Doors

Common Problems;

- Gaps - Gaps around the door can be an entryway for insects, vermin, termites, heat loss (during the cold season) and water (when it rains).

Gaps commonly found on doors in the community

- Rotten Doors [refer to rotten timber page for more information]

- Door rubbing on floor/sticking - Doors can be difficult to open for a number of reasons;
  a. Loose hinges
  b. Not hung properly
  c. House frame not square

Repairs

A. Loose Door Hinges

Open the door and slide a piece of wood underneath the door to keep it level

Remove the hinge screws that attach the hinge to the door jamb

Fill the entire hinge hole with a piece of timber that fits tightly.

Refit the hinge leaf to the door and the door jamb.

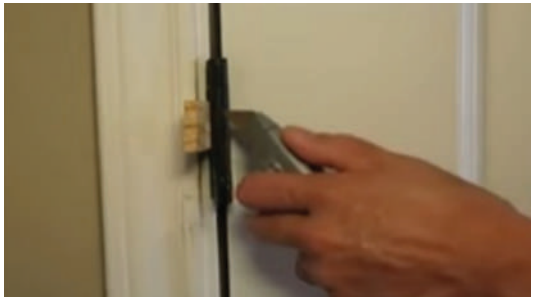
B. Door not hung properly

Gap at the top of the door should be equal to the gap at the bottom of the door

It is recommended for most hinge problems to use cardboards as it won't split when you drive screws through it.

The thin cardboard will push out the hinge (door) thus the gap at the top and also at the bottom of the door should be even.

Remove the screws using a screwdriver or drill with the correct bit. [Note: leave the middle hinge for last if you are removing all 3 hinges]

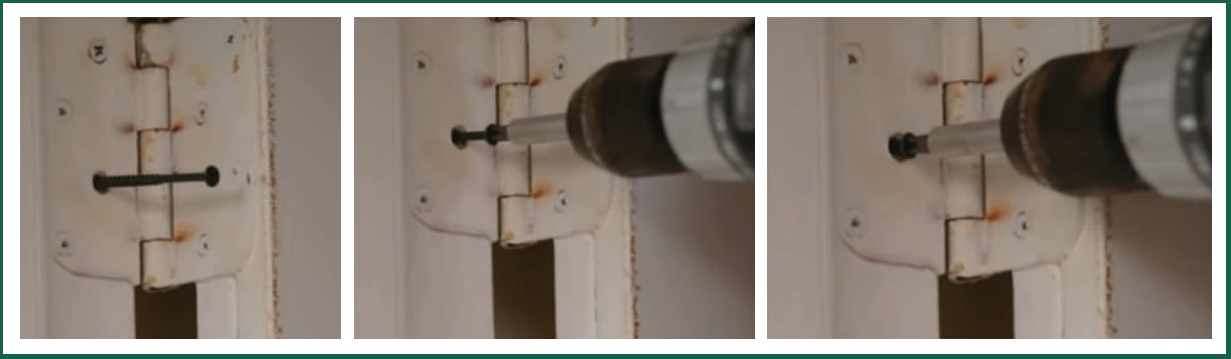


Slide the gap filler or shim behind the hinge that needs extra spacing.

Drive the screws back in

C. Rotten door jamb

If it is difficult to replace a rotten door jamb, then you may use a longer screw to hold the hinge in place with the rotten door jamb with a piece of timber behind the door jamb together at least temporarily.



Note

- Hanging heavy items on the doorknobs or at the top of the door can damage the hardware and hinges.
- Slamming doors can damage both the doors and the jamb and can even cause cracks in walls.
- Teach children not to hang onto door knobs and swing back and forth. This will loosen the hinges and cause the door to lean.

5.2 Windows

Common Problems;

Missing Louvre blades

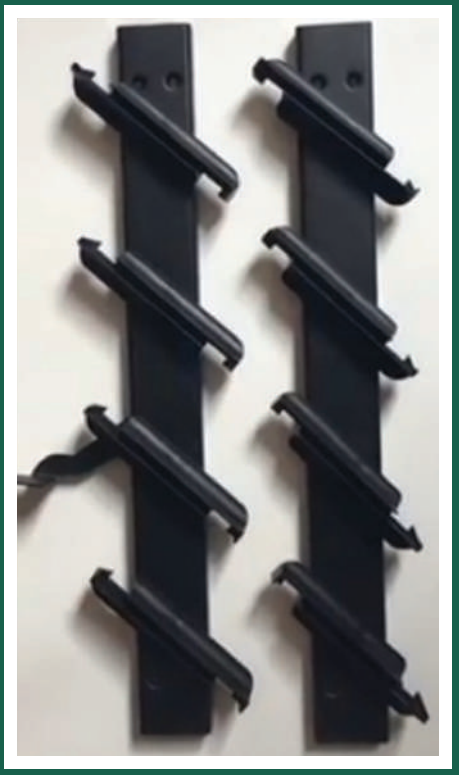
No window Covering

Rotten timber windows

Causes of missing louvre blades

- Rusted louvre frames – applying force to louvre frames will cause the louvre blades to break.
- Incorrect louvre measurements – Louvre blades can slip off the frame and break.
- Lack of maintenance – removal of rusted metal frames and louvre mechanism should be greased or use petroleum jelly for longer life expectancy.

Repairs and Maintenance



Missing louvre blades

- Correctly fit the louvre blades to the frame of the window
- Use plastic louvre frames especially for homes near coastal areas.
- Paint metal louvre frames with exterior water-based paint.

No window coverings

- Hinged timber shutters provide security and 100% ventilation.

Rotten Timber windows

- Remove rotten part of the window using proper tools
- Replace with a newly painted window.

Note

- Inspect window, repair and replace as necessary.
- You can remedy difficult windows by removing the hinge pin and applying petroleum jelly to it. Avoid using oil as it can gum up or attract dirt.
- Repaint as necessary following normal painting procedure.
- Repaint with exterior water-based paint.

Rotten Timbers Maintenance and Repair

Roof Structural Members

For rotten timber;

- Remove rotten structural timber with a pry bar.
- Measure the length of the timber piece needed using a measuring tape.
- Use a circular saw or hand saw to cut the timber to the required length.
- Paint the timber with a waterproof wood sealant to prevent further damage before fitting into position.

(Source: http://www.education.gov.fj/wp-content/uploads/Publications/Final-Maintenance-Manual.pdf.)

Wall structure

Remove and replace any rotten or damaged wall cladding

Remove the rotten part of the wall using proper tools.

Replace with season dried hardwood.

Repaint neatly with the same paint as the original paint.

Method of replacing rotten wall surface

Repair and repaint rotten parts of the wall surface

Remove old paint and clean the surface

Fill the rotten part with putty or gap filler

Smoothen the surface with sand paper

Repaint with the normal painting procedure

Method of replacing rotten wall surface with gap filler/putty

Maintenance

- Scrub the walls clean every year or use a pressure washer to remove any stains or fungus.
- Replace rotten or damaged timber wall lining as soon as possible.
- Make sure the timber is dry when painting.
- Paint walls with the same original paint type. It is recommended to never mix water-based paint with oil-based paint.
- Paint new walls with water-based exterior paint following normal painting procedures (undercoat/primers, first coat, second coat)

Painting Procedure

Peeled paint;

If the original paint peels off the surface;

1. Using a scraper or rough sandpaper, remove any loose, cracked, or peeling paint from the damaged area. Remove any dust or debris from the area with a water-dampened rag.

2. Using a putty knife, apply a thin layer of patching material to the damaged area. Allow it to dry.

3. Use fine sandpaper to smooth the patched area and make it even with the surface.

Tips

If shrinking takes place of the patching material, lightly sand and clean the area and apply additional layers of the patching material as required.

4. Remove the dust or debris from the finished surface.

5. Apply a primer coat on the dry surface and repaint with the same type of paint as the original following the painting procedures.

1

2

3

4

5

Peeled paint. Steps for reconditioning.

Painting Procedure

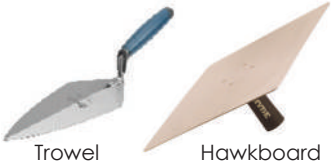
- Primer/Undercoat
- Second coat
- Final coat

(Source: https://www.wikihow.com/Repair-Peeling-Paint)

Appendix 1:

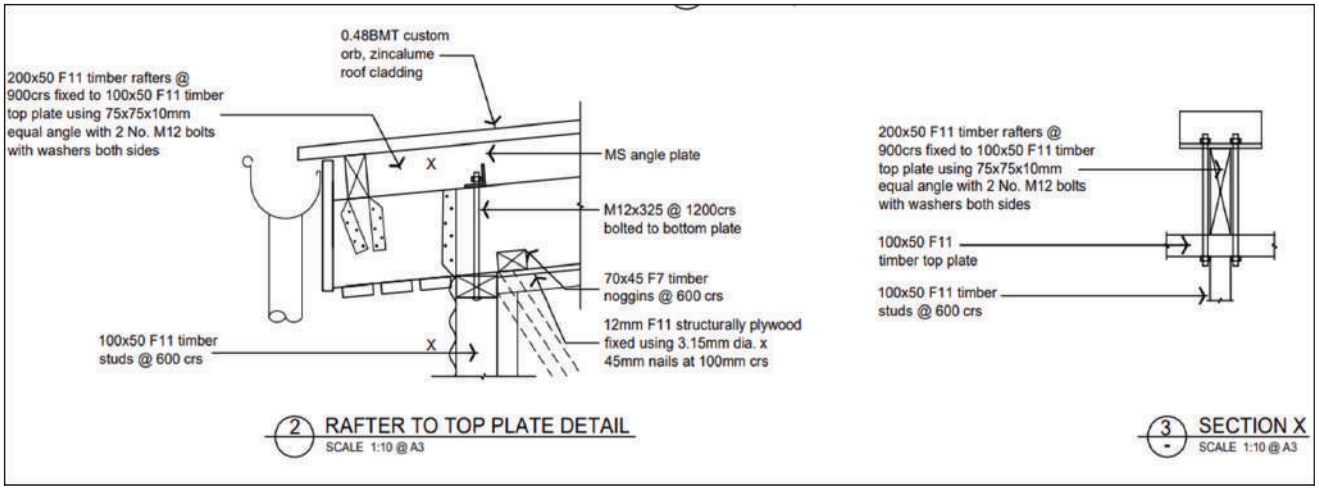
Structural Members of a house

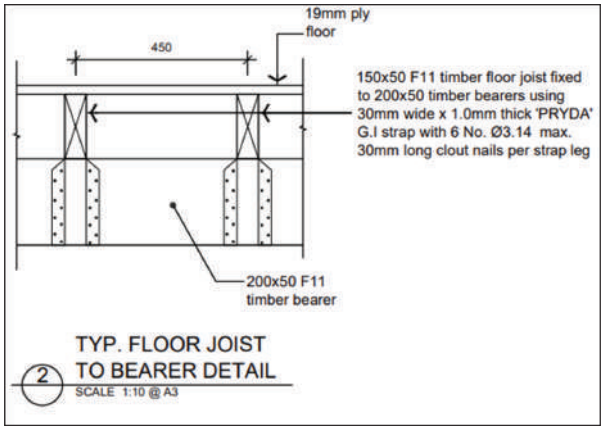
Appendix 2:
Maintenance Materials and Tools

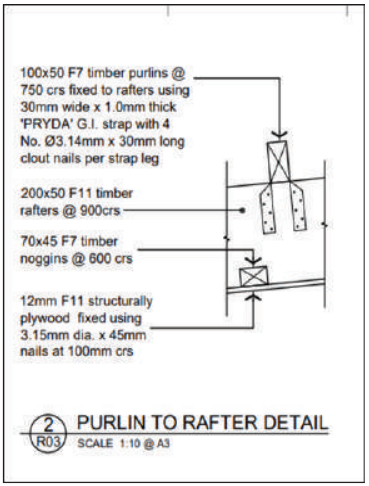
 Water base paint	 Bitumen tape	 Bitumen Glue
 Gap filler	 Primer paint	 Rust guard paint
 Silicone	 Vinyl paints	 Wood sealants
 Zinc paint	 Bitumen paint	 Cemestic
 Chisel	 Hammer	 Hand saw
 Nuts and Bolts	 Wheel barrow	 Trowel Hawkboard
 Loose oil	 Circular Saw	 Spades and shovel
 Hydraulic Cement	 Concrete Bonding Agent	 Tank Liner

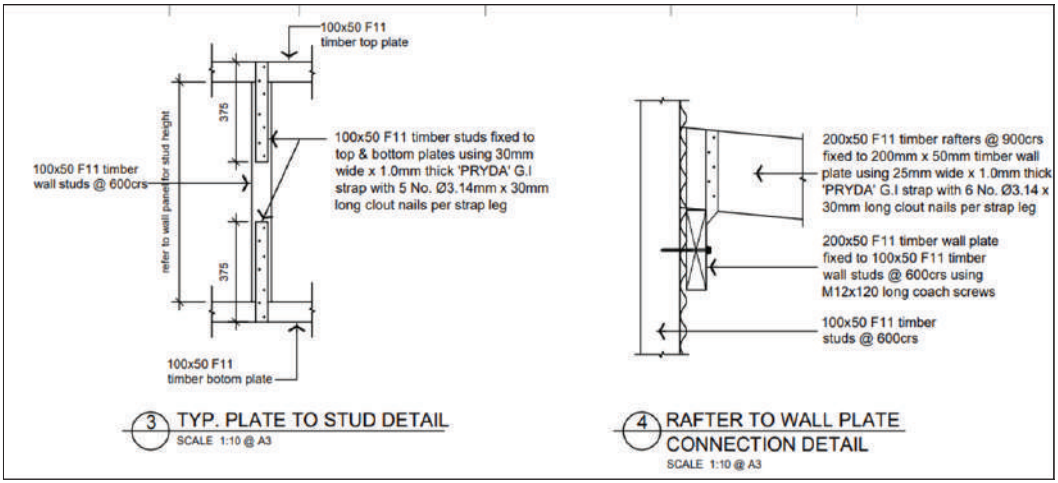
Appendix 3:

Recommended Connection Details for shelter construction







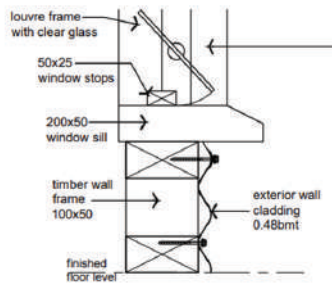


Window W01	
2 Bays, 8 blade window frame 2 Bays, 4 blade window frame	
Frame	8 Blade louvre frame 4 Blade louvre frame
Louvre	610x150x5mm clear glass
Cyclone Shutter	19mm exterior ply

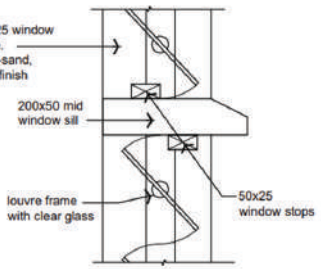
Window W02	
1 Bays, 8 blade window frame 1 Bays, 4 blade window frame	
Frame	8 Blade louvre frame 4 Blade louvre frame
Louvre	610x150x5mm clear glass
Cyclone Shutter	19mm exterior ply

Window W03	
1 Bays, 4 blade window frame	
Frame	4 Blade louvre frame
Louvre	610x150x5mm clear glass
Cyclone Shutter	19mm exterior ply

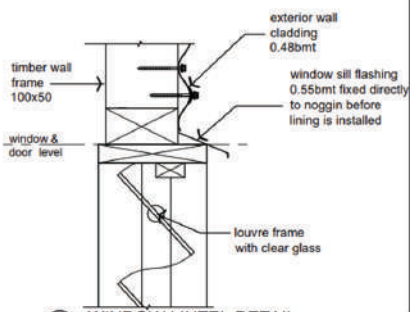
Window W04	
2 Bays, 6 blade window frame	
Frame	6 Blade louvre frame
Louvre	610x150x5mm clear glass
Cyclone Shutter	19mm exterior ply



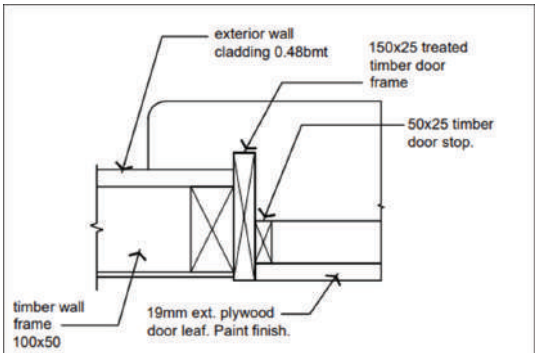
2 WINDOW SILL DETAIL
SCALE 1:5



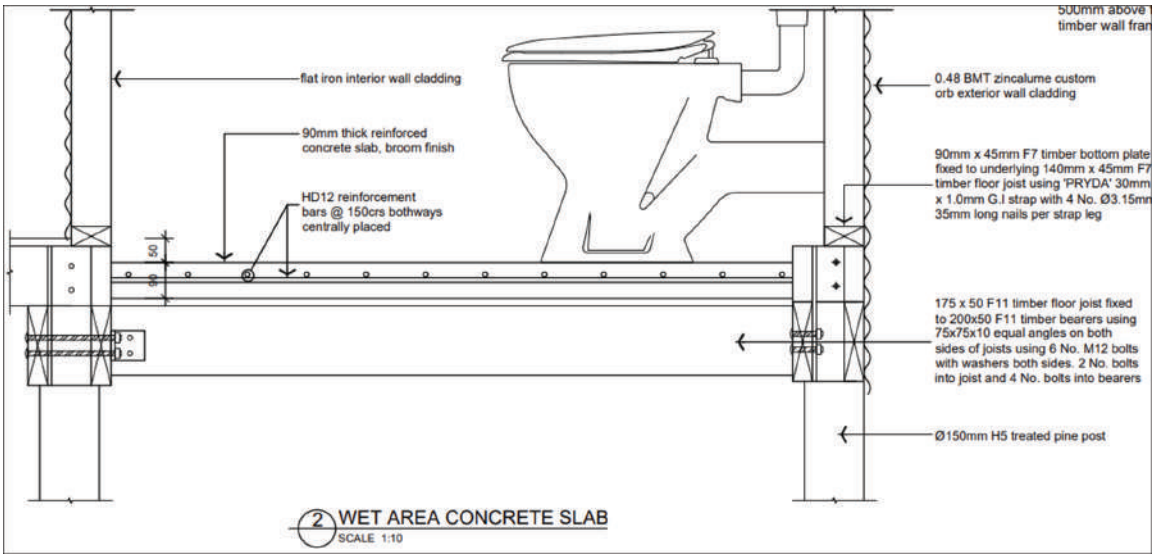
3 MID WINDOW SILL DETAIL
SCALE 1:5



4 WINDOW LINTEL DETAIL
SCALE 1:5



1 TYP. DOOR JAMB DETAIL
SCALE 1:5



2 WET AREA CONCRETE SLAB
SCALE 1:10

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