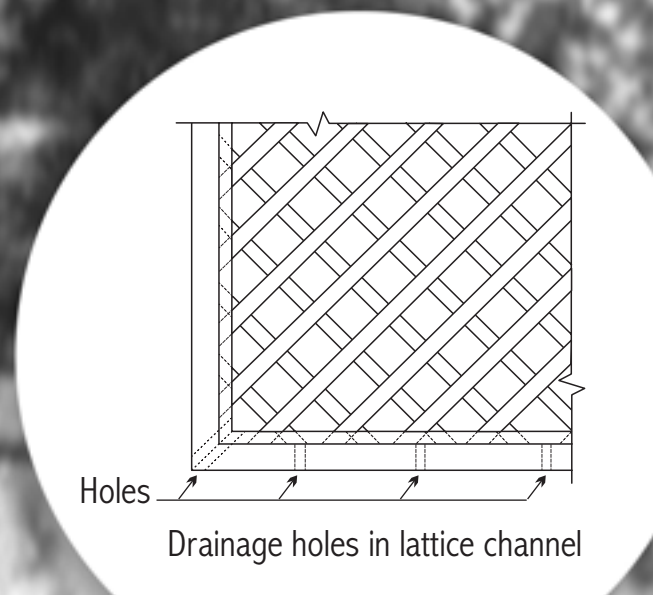
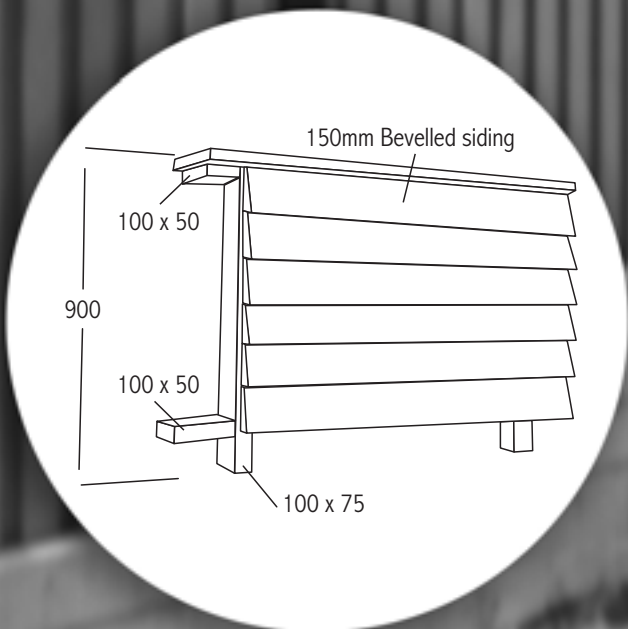
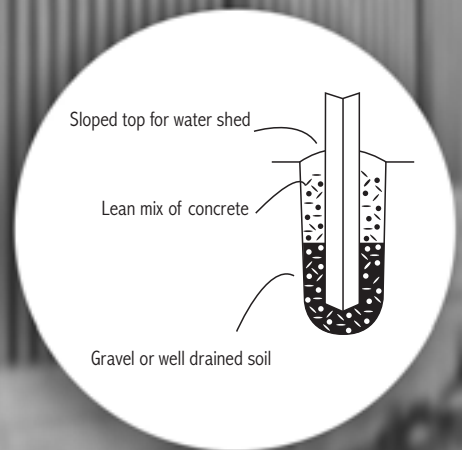
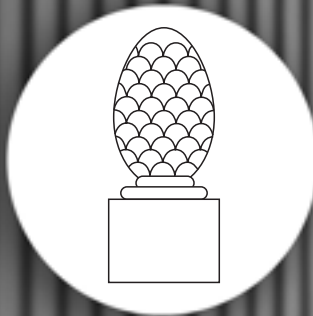
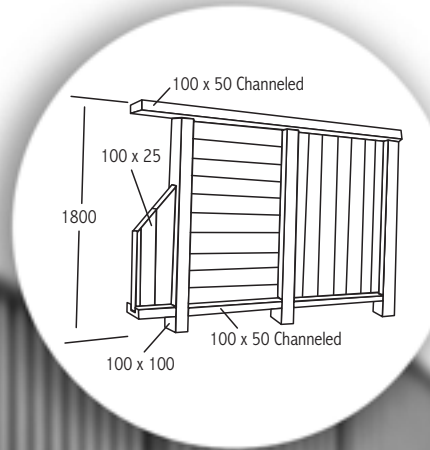
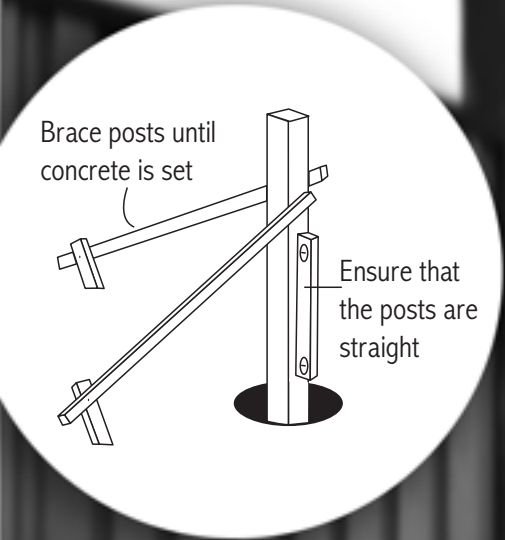




# TIMBER FENCES



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# TIMBER FENCES

Timber fences have been widely used throughout Australia's history. There are literally hundreds of variations in fence styles and types of timber used due to the versatile nature of timber for this application.

Timber fences can be used to enhance the privacy, provide security, or to screen off unsightly areas. They can also provide colour and add style to landscaped areas, provide protection against noise, wind or the sun, without compromising the landscape.

Timber is a superb material for this application and when specified and detailed correctly, will provide many years of trouble free service

## Scope

This booklet's aim is to provide a general guide to the range of timber fence types available along with "best" practice in installation techniques and materials specification. It also aims to showcase different types and varieties of fences along with those more traditionally used.

Installation techniques and practices vary around Australia. There is no single fence type or practice that is necessarily better than another, each fence type and building practice has its own characteristics to suit a particular application.

## Terminology

*Capping* . . . . . Milled board which is fixed over the top of the palings. It is generally slotted to accept paling into the underside.

*Board* . . . . . Timber element that is larger in width than depth.

*Paling* . . . . . Timber board usually hardwood 100 x 12 mm, treated pine 100 x 15 used to span between top and bottom rails

*Pickets* . . . . . Short timber boards offering a range of top profiles.

*Post* . . . . . Vertical timber element buried into ground generally one third of its length and used to support rails.

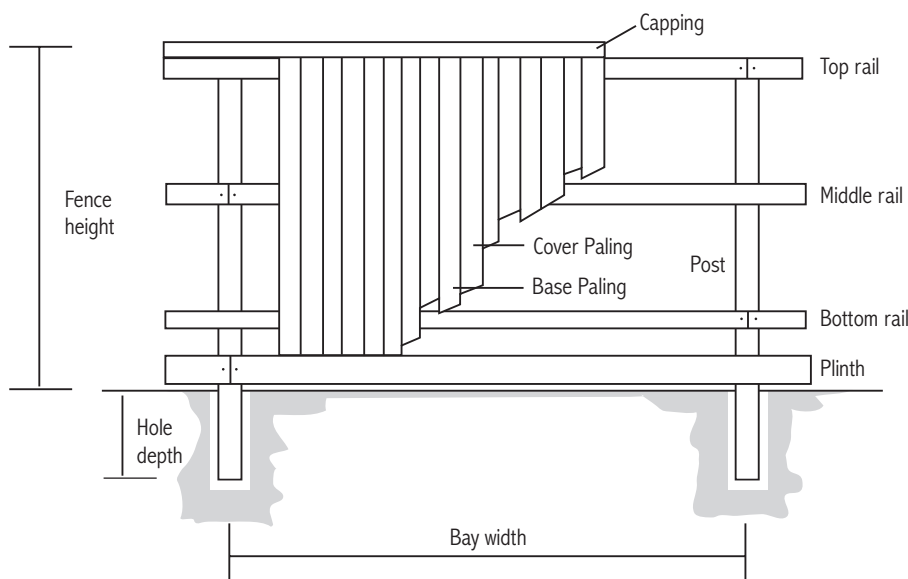
*Top rail* . . . . . Top most horizontal timber element spanning between posts.

*Middle Rail* . . . Middle horizontal timber element spanning between posts.

*Bottom Rail* . . . Bottom most horizontal timber element spanning between posts.

*Plinth* . . . . . Timber board placed at the base of the fence to fill gap between end of palings and the finished ground.

*Bay width* . . . . The width between supporting posts.



◀ Fig 1: Fence Terminology

# FENCE TYPES

There is a wide range of fence types, designs and options which can be specified. Ultimately, the type or design of fence will depend upon its intended application, ie. security, privacy, boundary division, animal enclosures, etc. The following designs and styles are those most typically specified. Some variations of each style are also included.

## Paling Fence

The paling fence is a familiar sight in most suburbs – providing boundary separation and privacy. The height of these fences varies with typical heights being 1200, 1500, 1800 and 2100 mm. Paling fences provide an extremely economical fence for many applications. Typically a post and rail frame is constructed with the palings being simply nailed onto the rail vertically, butting the palings against each other. (Unseasoned product will tend to shrink marginally leaving small gaps between the palings.)

Standard palings are sometimes substituted with tongue and grooved palings. These paling are machined in a similar manner as interior linings but are generally thicker. They typically have a smooth surface. This type of paling fence offers improved privacy screening as no gaps are open between palings. Generally these are fully painted and offer a very solid and impressive appearance.

### Variations to Traditional Paling Fence

Paling fences can be varied by simply using different width boards, leaving uniform or patterned gaps between palings, scalloping paling heights, alternating which side palings are attached to rails, either alternative palings or bays. The addition of feature type posts also adds to aesthetic appeal.



▲ Traditional Paling Fence



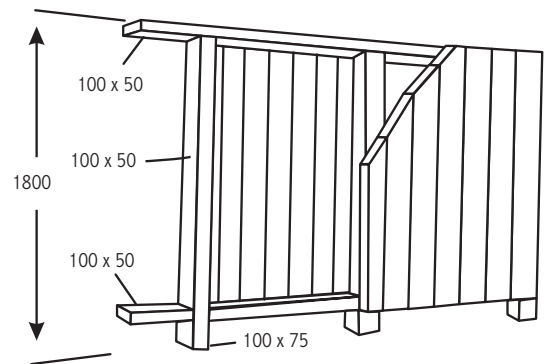
▲ Variable height palings



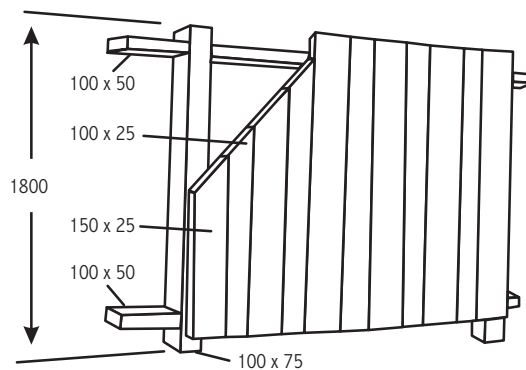
▲ Alternating paling fence



▲ Scalloped palings



▲ Fig 2: Alternating double sided paling



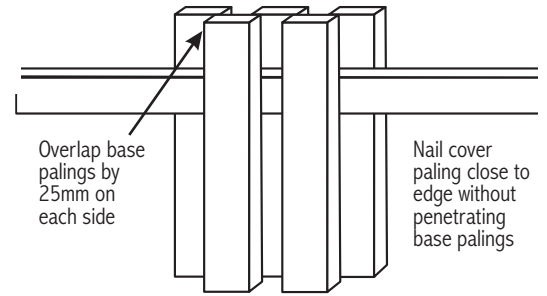
▲ Fig 3: Variable paling width

## Lapped and Capped Paling Fence

The lapped or boxed paling fence provides a more attractive appearance and also increased visual privacy. The palings are installed onto the frame leaving a gap of 50mm between palings (this gap will vary depending on the paling width – ensure a lap of 25mm minimum).

The lapped palings are then installed centrally over these gaps, overlapping the first run of palings. This design ensures visual privacy is maintained even where the palings shrink marginally.

The capping will enhance the life expectancy of the fence by protecting the end grain of the palings. The capping profile should be of such a profile as to shed water and cover rails and the exposed ends of the palings. The capping should be fixed with nails penetrating not less than 35 mm into the top rail.



▲ Fig 4: Lapped palings



▲ Lapped palings



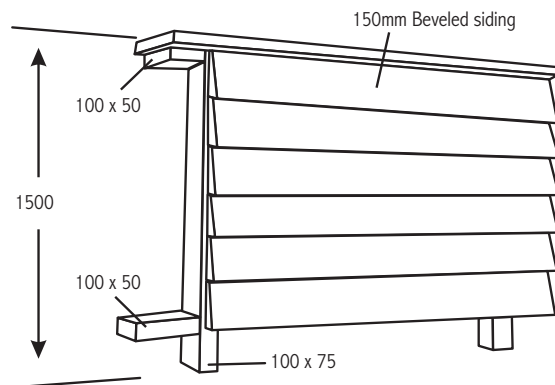
▲ Examples of lapped and capped palings

## Board or Corral Fence

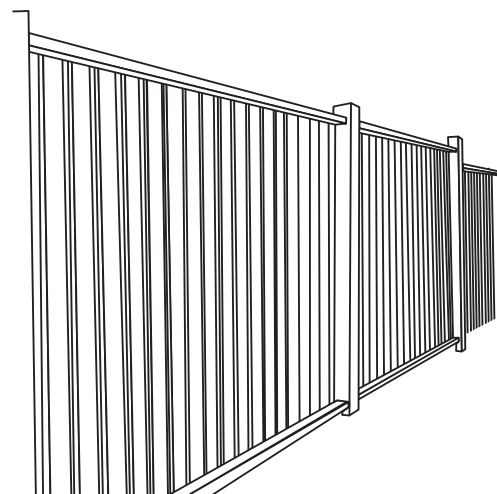
There are many variations to this fence style but the style of fence follows that of paling fences except palings are usually thicker and wider, typically 150 x 25 mm. The following briefly describes each type.

### Vertical Board Fence

Boards are installed vertically with a gap generally of 25 mm between each board. They provide screening rather than a solid appearance, blending well with the landscape.



▲ Fig 5: Bevelled siding board fence



▲ Fig 6: Vertical board fence



▲ *Traditional Board Fence*



▲ *Basket Weave Fence*

## Horizontal Board Fences

Otherwise known as corral fences, horizontal board fences typically comprise wide boards gapped some 25mm apart. The fence does not require rails as per vertical clad fences relying on the strength of the boards to span between the posts. The boards may be run on a single side or both sides of the posts to give a stepped appearance.

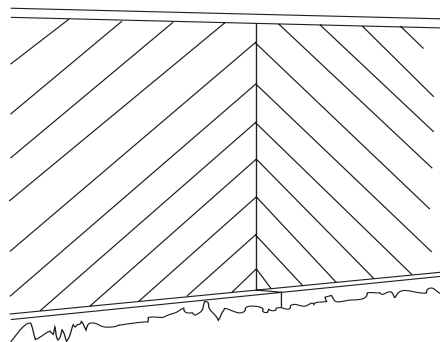
An alternative design is to weave the boards from the front of one post to the back of the next with the next adjacent board going from the back of the post to the front. These fences may be finished with a capping piece if required.

## Angled and Herringbone Board Fences

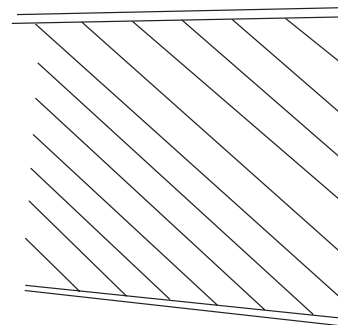
The general board specifications are as per the horizontal board fence (Corral) with the boards being set at an angle of 45 degrees to the horizontal. Alternative panels may be reversed in direction to achieve a herringbone pattern.

## Board and Batten Fence

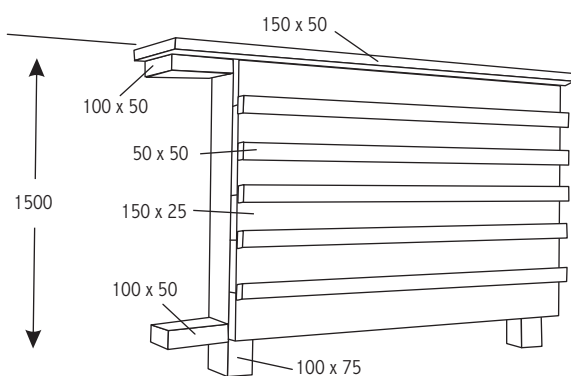
The design utilises wide boards typically 150 x 13/19mm butted against each other and installed vertically. A cover batten is then fixed over each butt joint (vertically). This fence style provides good visual privacy and a very solid appearance.



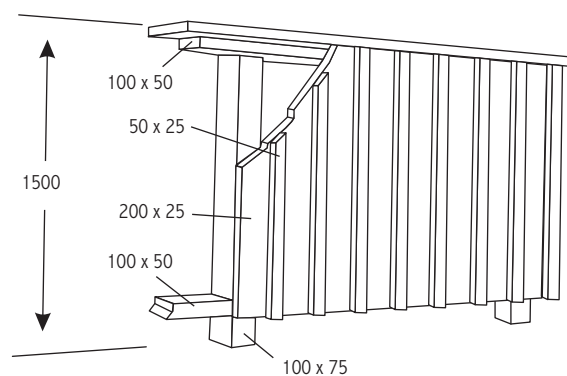
▲ *Fig 7: Herringbone Board Fence*



▲ *Fig 8: Angle Board Fence*



▲ *Fig 9: Horizontal Board and Batten Fence*



▲ *Fig 10: Vertical Board and Batten Fence*

## Picket Fences

There are a large variety of these types of fences used throughout Australia; the pickets, i.e. the small palings, may be square in section (slat style) or have the top of the boards and occasionally the bottom of the boards finished in a profile. They may also have a pattern cut (typically with a laser) into the middle of the boards. The posts within these fence types are often finished with a decorative capital – once again a wide variety of these exist on the market.

The set out of the pickets or slats may be finished level, rise and fall, scalloped or set square with the last few boards sloped up to the post height.



▲ *Traditional picket*



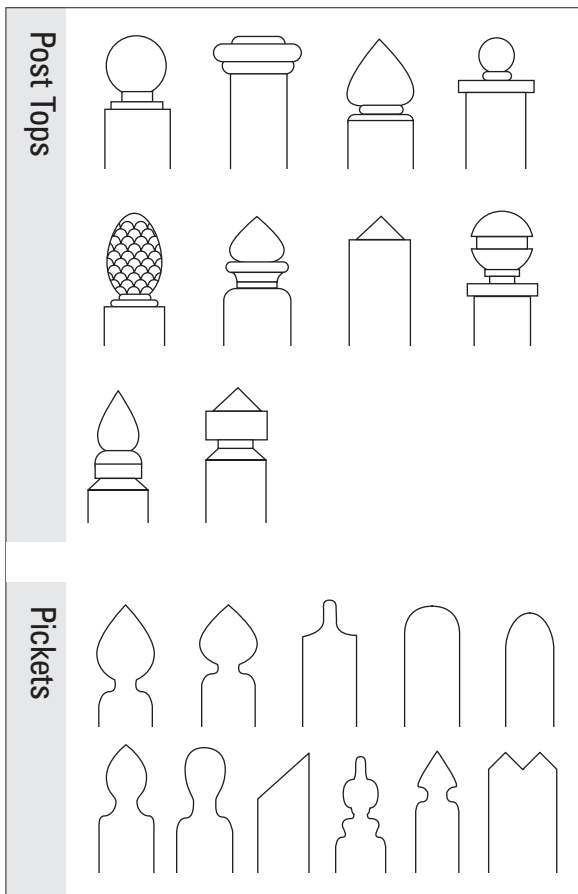
▲ *Square topped picket*



▲ *Scalloped picket*



▲ *Staggered picket*



◀ *Fig 11: Examples of Picket Fence Profiles*



▲ Log Post and Rail Fence



◀ Post and Rail Fence



▲ Post and Rail Fence with wire infill

## Post and Rail

Another variation is the post and rail fence. As the name suggests, the fence is basically a framework of the support posts and horizontal rails, with no paling or boards. This type of fence is used generally for defining boundaries or to fence livestock. This fence type does not offer security or privacy.

## Channel Fence

This fence uses palings or boards that fit between profiled timber channels. The configuration may vary considerably with palings run either horizontally, vertically or in combinations of alternating panels.

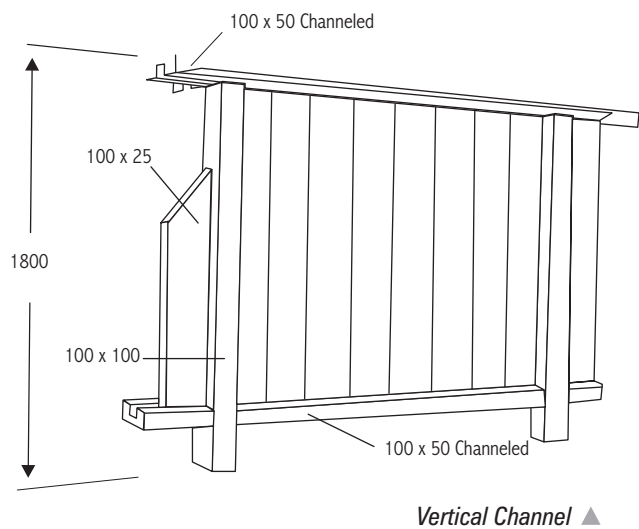
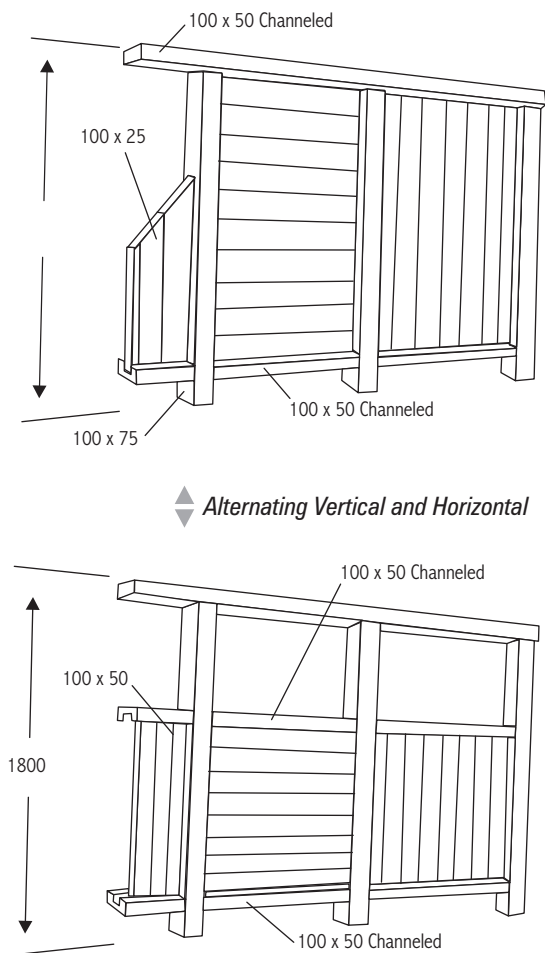


Fig 12: Channel fences

## Lattice Fence

Lattice fencing utilises panels of timber lattice, framed with channeled timber fixed to the main support posts. Alternately, the lattice panels may be directly fixed to a post and rail framework. The second option is more suited to a vertical/horizontal lattice rather than a diagonal product as the ends of the panel are square with the frame.

Typically, lattice type fences are not higher than 1.2metres given the reliance of the stiffness of the lattice panel. Taller fences may be constructed however care should be taken to ensure the lattice is securely fixed. Having closer post centres and a mid rail support may assist.



▲ Diagonal lattice



▲ Square lattice

## MATERIALS

Timber is available in a broad range of species all with their own specific natural durability or with enhanced durability achieved through preservative treatment. The selection of the timber will determine the fence service life.

The service life of timber (both treated and untreated) will be enhanced with the addition of appropriate specification and application of finishes, species / treatment level of timber and general maintenance.

The following will assist in detailing timber that will meet the intended expectation for a timber fence.

### Natural Durability

Natural durability levels or classifications are assigned to each species and reflect the expected in-ground service life. Table 1 details in-ground natural durability for common timber used for fence construction.

**Table 1 – Natural Durability Classification of Heartwood of Some Common Timbers**

Class 1	Class 2	Class 3	Class 4
Cypress	New England blackbutt	Brush box	Brownbarrel
Ironbark	Blackbutt	Rose/Flooded gum	Caribbean pine
Tallowwood	Kwila (Merbau)	Sydney blue gum	Douglas fir (Oregon)
Turpentine	Spotted gum	Silvertop stringybark	Hoop pine
Grey gum	Western red cedar	Kapur	Radiata pine
Yellow cedar	River red gum	Taun	Slash pine
Berlian	Stringy bark, yellow and white		Tasmanian oak
	Balau (Selangau batu)		Victoria ash
			Keruing
			Baltic pine

A vast proportion of a fence is above the ground with the posts being the only portion of the fence which is effectively “in-ground”. Timber durability for the posts will be based on the “in-ground” service life specified. The remainder of the fence, not in-ground contact, can be based on above ground service life.

**Table 2 – Expected Service Life For Timber Durability Class**

Natural Durability Class	Heartwood Service Life		
	Fully Protected	Above Ground	In-Ground Contact
Class 1	50+	50+	25+
Class 2	50+	30	15 to 25
Class 3	50+	15	8 to 15
Class 4	50+	5	< 8

## Preservative Treated Timber

Preservative treated timber is also commonly used in the construction of fences. Chemical treatment of timber effectively treats only the sapwood. The heartwood is not effectively treated. Many softwood species such as Radiata pine have wide sapwood bands and hence are readily treated with preservatives. The level of chemical treatment is reflected in Hazard Levels – with a range of 1 up to 6 with the level of treatment increasing up the scale – ie timber treated to H2 level is of lower durability than timber of H3 level of treatment.

Once again, as with the naturally durable species, the key area for decay is in the ground where the timber will remain fairly wet and potentially open to both fungal and termite attack. Timber treated to an H4 level should be specified for the posts with an H3 level of treatment being adequate for rails and palings.

**Table 3 – Hazard Level and Application**

Hazard Class Exposure		Service Condition	Biological Hazard
H1	Inside above ground	Fully protected and well ventilated	Borers only
H2	Inside above ground	Protected from wetting and leaching	Borers and termites
H3	Outside above ground	Moderate wetting and leaching	Decay, borers and termites
H4	Outside in-ground	Sever wetting a leaching	Severe decay, borers and termites
H5	Ground contact	Extreme wetting, leaching and/or critical use	Very sever decay, bores and termites
H6	Marine waters north and south	Prolong immersion in sea water	Marine wood borers and decay
H6SW	Marine waters south only	Prolong immersion in sea water	Marine wood borers and decay

## Detailing For Durability

Timber will tend to perform better for longer periods when some care is taken in the detailing and maintenance of the fence.

Exposed timber will always take up and release moisture in relationship with the environmental conditions. Where timber has prolonged periods of time with its moisture

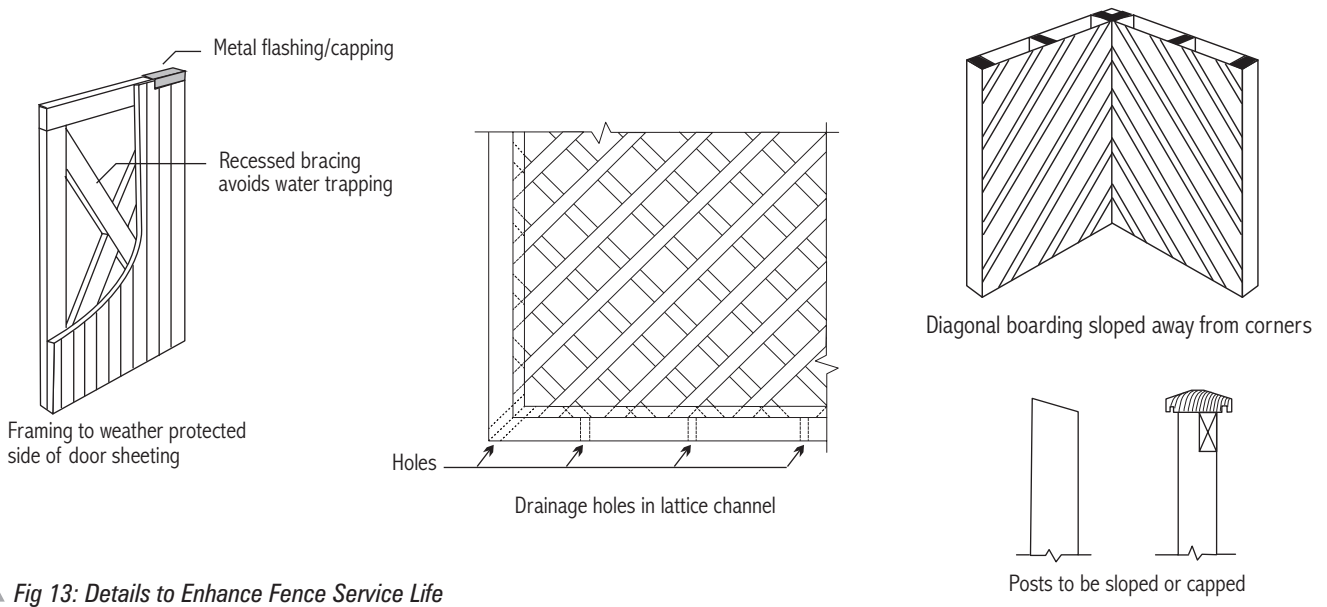
content above 20 %, the timber becomes susceptible to fungal attack and decay is likely to occur.

In addition some construction details will tend to hold moisture so that without adequate precaution timber decay may result. Areas where this is prone to occur are where cuts or joins are made into the timber. These cuts may expose timber not sealed or expose untreated heartwood in preservative treated wood.

To enhance the durability of these details it is recommended that the cut or joint i.e. at post/rail junction, bolt holes etc are suitably treated. Preservative treated timber should have an appropriate preservative applied before the joint is made.

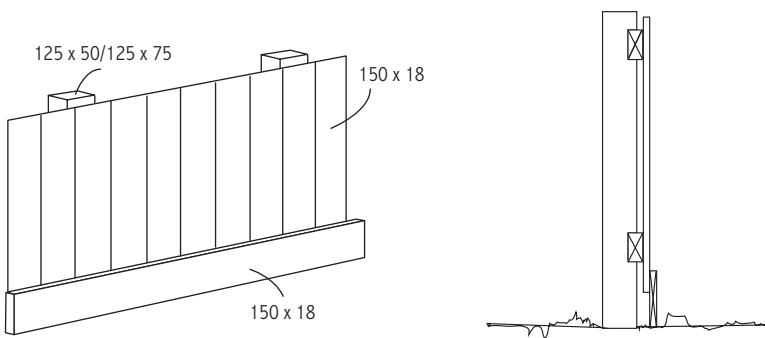
The mortised or halved joint as well as the post base at the ground line are the two key areas for decay in timber fencing. The appropriate treatment will enhance the life expectancy.

Capping on the top of the fence also increases the service life of the material. Timber will readily absorb moisture in its end grain. The capping tends to limit the exposure of the end grain of both posts and palings along with shielding some of the face of the palings. This reduces the amount of moisture intake and hence the materials stay more stable in service.



▲ Fig 13: Details to Enhance Fence Service Life

To reduce termite damage, Australian Standard AS3660 recommends that the palings not be in contact with the ground. Palings or boards should be kept clear of the ground. If the gap between the palings and the ground is unacceptable, then a plinth board can be installed. This board is placed on edge into the ground and runs along the fence line. Replacing or repairing the plinth board is cheaper and easier than replacing or repairing all the palings in a fence.



▲ Palings damaged by contact with the ground

◀ Fig 14: Plinth Board

## **Timber Quality**

Timber is generally graded for either structural and/or visual properties. Fencing materials are also selected in this same manner with timber of suitable quality and appearance being appropriate for application. The quality of these materials may vary and in many cases a cost verses appearance relationship exists. There are currently no specific grading rules for fence palings to limit materials although an implied "suitable for purpose" requirement generally restricts materials unsuitable for this application.

It should be noted that quite commonly timber in an unseasoned state is utilised in fence construction. Some shrinkage and minor movement of the material is to be expected as it dries to be in balance with its surroundings. The moisture content of timber (MC) will always fluctuate slightly to be in equilibrium with its environmental conditions. Coatings which reduce the take up of moisture will enhance the performance of the product and help in reducing these movements particularly as a result of rain exposure and subsequent uptake of moisture.

As the palings may shrink slightly, if privacy issues exist, a lapped type fence is more appropriate as this style of fence maintains privacy even after some shrinkage takes place. Where a standard paling design is used, the shrinkage may result in some minor gapping between palings.

## **CONSTRUCTION PRACTICES**

### **Installation**

The installation specifics for each fence type will vary slightly depending on the fence type, height, soil type and structural requirement. In principal there is some common approaches for all fences.

### **Check for Services**

Before commencing the fence it is imperative that the location of services potentially impacted by the installation are clearly known. Gas, water, phone and electrical lines may be precisely where you are digging and hence any failure to locate these services may result in damage to the service or potential injury to the installer(s).

### **Location**

Boundary fences and the location of them may lead to disputes with occupants / owners of adjoining properties. It is important to have an accurate set out mark for the fence in terms of being on the boundary of the property. In many cases, existing fences which are being replaced, are NOT on the boundary. They may be either within the property, effectively reducing the useable area of the block or alternately encroaching into the property of the adjoining block or possibly at an angle, running from within the property to an encroachment on the neighbouring block. The fence may have been in this position for some years so any movement of this existing alignment may be met with howls of protest from neighbours – some communication and preferably an agreement should be reached before the construction commences.

Note: A survey may be required to accurately locate the boundary and to minimise neighbourly disputes.

### **Council or Building Authority and Adjoining Property Owners**

Depending on the local authority and the requirements they have – it is advisable that all local requirements in terms of gaining necessary approval be attended too. There may be requirements on appearance, design, height, colour, safety and amenity which will all need to be addressed. Waste removal may be an additional area requiring advice ie waste skips etc.

Generally, the neighbouring property is required to pay for 50% of the costs. This will require some negotiation and potentially a number of quotes. It may also mean discussions regarding fence type, materials and design. It is good practice to sort this out and confirm all details in writing to prevent disputes at the end of the project.

## Site Preparation

The area in which the fence is to be erected should be cleared to a minimum of being able to readily erect the fence without impact from vegetation, garden refuse or other obstacles. It is advisable to check the soil conditions at this stage, generally to gain a feel for any potential problems, ie rock, fill or other issues which will impact on the installation and footing requirements.

## Sizing posts and rails

Sizes used for posts and rails tend to be based on tradition rather than on a set of engineered span tables.

### Posts

Post sizes are generally 125 x 50 for hardwood and 125 x 75 for treated softwood. They are generally 1500, 1800, 2100 or 2400 mm high or to suit the design requirements.

Typically, posts are placed at 2.4 or 2.7m centres which may vary slightly to fit in with the length.

### Rails

The number of rails is generally dependent on the height of the fence, with two rails for fences below 1800 mm high and three rails for 1800 mm and greater. Local practices also impact on the rail number with some states more commonly utilising a three rail design. Typical rail sizes are 75 x 50 mm for unseasoned hardwood and 70 x 45 for treated softwood. Lengths are generally no more than 2.7 m.

## Post Installation

### ■ Step 1

The first step is to set a string line along the fence line, this may entail running more than one line where the fence change(s) direction. The end or finishing posts, gate posts and corner posts (where the fence changes direction) should then be located and the footing holes marked.

The footings have traditionally been dug to allow an embedment of one third of the post height. Details are as per Figure 15 and in accordance with the footing section. The tops of these posts should be set at the required finished level – typically 1500, 1800, or 2100 mm high or to suit the design requirements.

Excavate the footings for these key posts and place posts into position; brace the posts plumb whilst the concrete is placed and cures and any backfilling is completed.

A string line may then be run from these posts – post to post attached to the face side (paling side) of the posts. This forms the upper height and line for the intermediate posts.

### ■ Step 2

The second step is to locate the positions of the intermediate posts. This is best achieved using a long measuring tape with the distance between the key posts (end posts / gate posts and corner posts) then being divided into the desired panel length.

Typically, panel lengths are 2.4 or 2.7m however this may vary slightly to fit in with the length. On long fence runs, the standard panel size is conventionally utilised with the odd panel, making up the length being sized to suit and located at the most visually obscure end. Short fence runs generally divide the run into equal lengths rather than utilising standard panel widths.

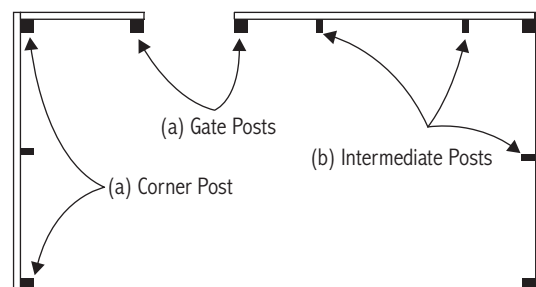
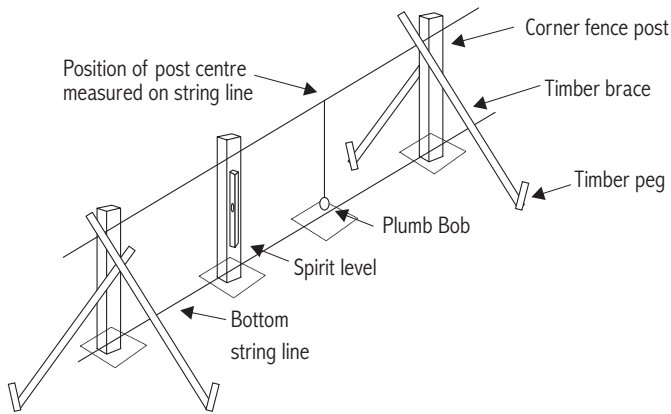


Fig 15: Post Installation ▲

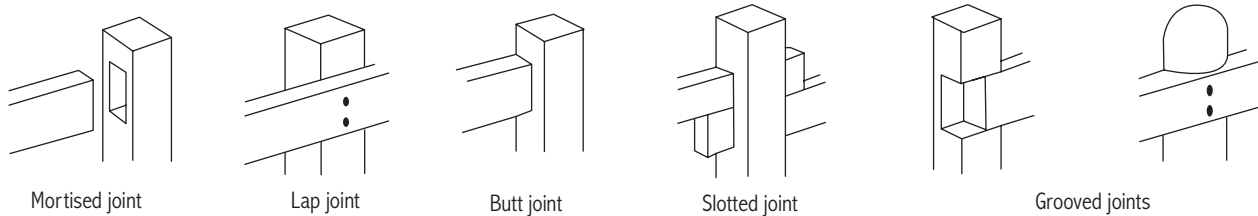


▲ Fig 16: Setting Out Intermediate Posts

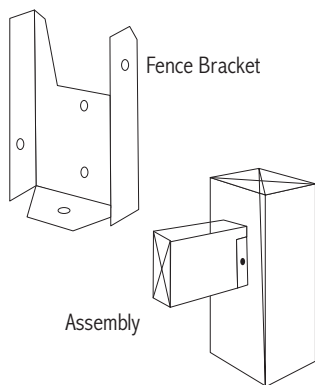
To set out the intermediate post holes, a long tape should be run along the length of the string line, setting the desired panel widths as per the previous step. A plumb bob may then be used from these marked positions setting the post hole and generally the centre of the footing. Alternately a long spirit level may be used held vertically from the measured post position. The ground should be marked at these points with an obvious marking system such as a peg or spray.

### ■ Step 3

The footings for the intermediate posts may then be excavated. Typically for an 1800 mm fence these footings are approximately 700 mm in depth allowing for a post embedment of 600 mm sitting onto 100 mm of gravel which is to be in the base of the hole. This allows for better drainage away from the timber. **Note:** Fence posts are subject to various levels of wind loads based on their location ie exposure, height and area supported; always size the footing and embedment in accordance with these loads. Further advice may be required.



▲ Fig 17: Traditional Methods of Fixing Rails to Posts



▲ Fig 18: Metal Fence Bracket

### ■ Step 4

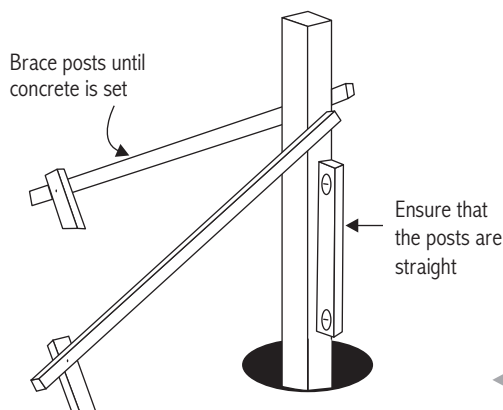
Either morticed, slot or house the post to accept the rails. Figure 17 above describes various methods that can be used to fix the rail to the post.

Alternatively a proprietary system can be used. These systems have an advantage as they generally do not require cutting the posts, therefore reducing time and improving the service life of the post. Refer to Figure 18.

### ■ Step 5

Number each post to correspond with its intended position. Place each post into the hole and whilst holding the post in its final plumbed position (Figure 19), mark in accordance to the string line and trim to length. **Note:** Treat all cuts, notches etc with a preservative treatment before final installation. The posts should then be temporarily braced in position.

The intermediate posts may then be installed. Depending upon the slope of the land, the posts may be in line with the key posts (corner, end and gate posts) or stepped or a combination of these affects. The final contour line of the tops of these intermediate posts will then drive the final fixing lines of the palings. Set the string line to the desired set out as per the preferred contour.



◀ Fig 19: Plumbing Posts

## ■ Step 6

The rails may then be positioned and fixed in place. The rails should be of sufficient length to cover two panels i.e. If your spacing between posts is 2.4 then 4.8m rails should be utilised. Note: Rails should be a sliding fit in the mortice or housing.

The first rail to be fixed will cover only one panel. It is best to cut one long rail to fit this first section, allowing for joint fixing in the end or corner posts mortice or housing (square cut) and an angled or spliced cut at the first intermediate post.

The next rail should be cut to fit this first joint at the housing or within the mortice. Cutting and fitting two panel length rails should continue to the end of the fence. Commence fixing by nailing (in morticed joints) or bolting (in housed posts) from the starting post, temporarily bracing the posts.

Note: This procedure aims to have “staggered” rail joints (ref. Fig 21)

## ■ Step 7

The next step is to plumb and align the posts. This must be done to suit the string lines as originally set.

Each post must now be:

- Adjusted to the stringline for height by adding or removing some filling below the post – it may be possible to ram the post in more firmly lowering the height.
- Aligned to its face edge with the stringline.
- Plumbed on its face edge by adjusting the position of the bottom of the post in the hole utilising a spirit level.
- Have wailing piece attached to the intermediate posts as required.
- Complete nailing or bolting of joints.

The backfill and concrete may now be installed – care needs to be taken with this process to ensure posts are not knocked out of plumb – check regularly to confirm the accuracy of position is maintained. Mowing strips, if required, may be formed up and poured at this point in time.

## ■ Step 8

The frame should now be ready for installation of the timber palings. Palings should be fixed in small batches set to a stringline height. Initially utilise single nails for fixing. Check for plumb utilising a spirit level then nail firmly with two nails at each rail junction. Palings should finish clear of the ground level. Palings are not designed for embedment or for use as retaining walls.

### Recommended Nails and Bolts

The use of suitable fasteners will improve the structural and durability performance of the fence. As a minimum, hot dip galvanised fasteners should be used. In environments where the conditions are extremely corrosive, it may be necessary to utilise epoxy coated hot dip galvanised or even stainless steel fasteners.

### ■ Rails to Posts

2 x 75mm x 3.15mm – Bullet head in hardwood and cypress, flat head, twist shank into softwood. Alternately 10mm cup head bolts, over bored to allow for shrinkage.

### ■ Palings to Rails

Nail lengths should be sized to allow a minimum penetration of 25 mm into hardwood and 35mm into softwood. Flat head nails – twist shanks are preferred for softwood.

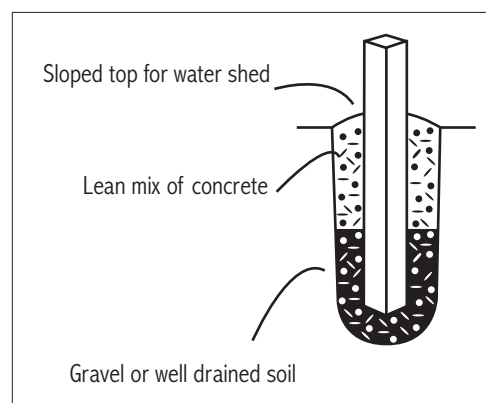


Fig 20: Setting The Post Into Concrete ▲

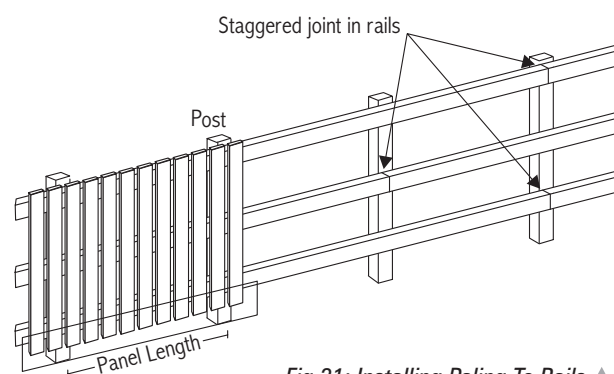


Fig 21: Installing Paling To Rails ▲



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For further information on this brochure, contact the Timber Advisory Service on free call 1800 044 529 or email [showroom@tdansw.asn.au](mailto:showroom@tdansw.asn.au) Level 6, 525 Elizabeth Street, Surry Hills NSW 2010. General Information on the use of timber can also be found at the web page [www.timber.net.au](http://www.timber.net.au)

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