

OUTDOOR STRUCTURES

Outlasts and outperforms

April 2013 Newsletter

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For Infrastruxion Pty Ltd

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[Lessons from a Failed Boardwalk](#)



Last month one of my readers emailed me saying that I should go to a certain location and photograph a failed boardwalk as my readers could learn a lot from it. He was right, there was a lot to learn as here, the theory in my guides gets put into practice, or more correctly doesn't get put into practice. Do you have my guides in your library yet. I suggest it would be worthwhile as you will see in the topic "F14 - You Deserve Better" below.

Perceptions of Environmental Responsibility Overruling Experience.

The most obvious thing about this boardwalk, apart from the fact it is broken is that it is made from treated pine. This boardwalk was built at a time when people incorrectly thought that to be environmentally responsible we had to use timber cut from a sustainable pine forest, after all it came with a 40 year warranty. But people didn't consider that the only way you had an exotic pine forest was to bulldoze a perfectly good native forest, leaving in its wake a wasteland as far as native animals were concerned. As well, people filed away the guarantee with the job documentation without checking what the treated pine was actually guaranteed for. Refer to my Timber Preservation Guide for a discussion of warranties on treated timber.

To be fair, where the pine decking is under cover it is fine but, in the Queensland weather (i.e, "weather on steroids"), it is self destructing, and it could do nothing else. Fortunately I do not see pine boardwalks being built in Queensland now. As far as environmentally responsible use of hardwood is concerned, the Boardwalk Design guide shows you how to design in a sustainable way with timber produced under the SE Qld Forests Agreement.



Another newsletter dealing with the performance of pine can be found at http://www.outdoorstructures.com.au/pdf/osa_newsletter_01_11.pdf Scroll down to the article Noahs Ark found in Hong Kong.

Deck is not self cleaning

The Outdoor Structures boardwalk system is designed to be self cleaning. We achieve this, in part, by raising the kerb above the deck to let litter clear. The patented Deckwood profile completes the system allowing leaf litter to just drop through.



Foundations

Foundations are simply inadequate here. In this application, beside a tidal creek, we would have used a driven pile. But is it correct to use a H5 treated pine post in this marine application? Back when this boardwalk was built, the Australian Standard may have allowed it. It is a pity it did not work and they had to amend the standard with the clause starting "Experience has shown...". Our Boardwalk Design Guide explains how to ensure a pine post works in a marine environment. Now you might say, this post looks fine, but design should be about certainty, not luck. If the foundations were correct a new boardwalk could have been built on them as you should expect 50 years from this foundation material if used correctly.



I can only imagine the difficulties trying to install a potted post when there is a high water table.

End clearances

The end clearances were not maintained on the post tops and on some of the bearers. When designing a boardwalk it is important to incorporate into the post layout the reality that they may not be placed very accurately.



Bolts too close to the post top



Bolts too close to the bearer end

Nails in construction

It is no wonder that the boardwalk is laying to the side as the joists were simply nailed to the bearers. I assume that the nails were galvanised, but readers, they do not work, neither do galvanised bolts. As they rusted they expanded splitting the timber.



Joists were only nailed on



Rusting nails have damaged the timber

Where there have been new sections installed some stainless brackets were installed instead of nails but for some reason the builder didn't install the second screw making the bracket ineffective when required to work. That is why inspections are important.



Conclusion

This boardwalk was birthed in perceptions of environmental responsibility in the choice of material and seeking economy over long proven but more expensive best practice. (after all an apparent 40 year guarantee for an inexpensive product would seem too good to pass up, even without a track record to back it up). It had little chance of success. The asset owner, it should be pointed out, does not design or build like this now but unfortunately, whenever price and lack of experience rules over best practice, similar structures will still be being built today – see next section.

F14 - You Deserve Better

A timber wholesaler rang me asking if I knew anything about a large timber quote doing the rounds valued at about \$1.2M. That probably means a finished project cost of \$3M. I am surprised that someone could design such an expensive deck without reading my Guides. It is an investment, mainly of time, that is well worth making.

The grade being asked for pricing was F14 (nothing more). I do not know if that was the specification from the engineer, but heaven forbid, I have seen worse (F11 KD hardwood). When it fails prematurely, as it must, the timber will be blamed not the design.

What does F14 Mean?

Stress grades for hardwoods and some softwoods are designated by an 'F' number (F5, F14, F17, F27 etc.). The stress grade indicates the basic working stress and stiffness to be used for structural design purposes.

Does specifying an F14 timber mean you are getting a good "Durability" as well?

Durability has very little to no relation to a "Strength Rating" of a piece of Timber

Durability of timber is the ability to perform its task for a required period of time when exposed to hazards such as decay (fungi) and insects (termites and borers). Important considerations are whether the timber is going to be in a weather exposed situation or a covered/indoor environment, in contact with the ground or well clear of the ground.

What defects are allowed in a piece of spotted gum that grades as F14?

There is a long list of natural feature that is permitted, here is a very short summary

A knot less than 1/3 of the width of the board, and/or
Loose gum veins 1/4 of the length of the board, and/or
Tight gum veins unlimited and/or
Wane & wane 1/4 of the cross section of the board

Are these defects going to be “fit for Purpose” in a commercial boardwalk?

Here are some photos



Species

There are many different Hardwood species that will easily grade “F14” in Australia. Few of these species are suitable for commercial boardwalks because they simply do not have the durability.

Have you also considered shrinkage? Do all hardwoods shrink the same?

It is important that a timber species is selected which has the properties suitable for its intended use

The timber in the images did at least have the right natural durability but not the right quality. But with just an F14 specification you can be assured that you will not have the durability as the better species are more expensive) and you are not likely to have the right quality. In blackbutt, (unsuitable for this type of work and what they will probably end up with because it meets the inadequate specification, is in ready supply and is at the cheaper end of the hardwood price spectrum), it represents timber with 48% of the strength of timber free of defect, and for ironbark it is only 38%! All these defects quickly deteriorate in the weather.

Remember that the labour and all other costs are the same whether you use appropriate or inappropriate timber. It does not add a large amount extra to the project cost use suitable timber but the beneficial effects will be noticeable for the small extra costs involved. Do people make decking of F14 grade? People will make whatever you ask for, If there is any doubt, look at http://www.outdoorstructures.com.au/pdf/osa_newsletter_05_12.pdf

Last week I had a phone call about a deck that had failed. It was F17 not F14 but it was Victorian Ash (Durability Class 3 Above Ground)!. I will try and bring you images. The January newsletter contained a warning about F17 see http://www.outdoorstructures.com.au/pdf/osa_newsletter_01_13.pdf

Consultancy Services by Ted Stubbersfield

The stories I am now hearing about substandard material and performance are frightening. If you are looking for quality materials and good performance I can work with you from the design stage through to final completion. In our area of expertise, often it is the art that proves more important than the science. Weather exposed structures normally do not fail because of incorrect member size calculations, but because a myriad of small points of detail are not taken care of. to ensure you receive good performance from your next timber project.

As a timber design assistant we offer:

- The provision of high quality technical guides on timber design. (accessed from our website on a pay per view or membership basis)
- The review of professional drawings to identify potential timber design issues that may impact service

life

- The preparation of proposed AutoCAD cross sections of structures
- To be a sounding board for ideas
- Lectures and presentations
- The assessment of best practice in construction.

As a grader I can assist with grading for confirmation to a nominated grade but more importantly I can assess whether timber is graded to an appropriate grade. Often these are not the same thing.

Contact me on 07 54625532 or by email (edgarstubberson@gmail.com) to discuss how I can be of assistance to your organisation

Bridge Quote Requests

If there is any doubt that OSA make the best kit bridges in the country look at the [Berrinba Wetlands Project](#) . Not all bridges are equal. After encountering three bridges in one month that did not meet the Bridge Code I wrote the [May 2012 newsletter](#). Refer to it when assessing the suitability of quotes.

[Steel bridge Quotation Request Form](#)

[Timber Bridge Quotation Request Form](#)

More information:

If you have timber road/rail/heritage bridge issues,

we suggest you talk to:

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Senior Engineer

Wood Research and Development

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