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Location: Point Lookout, Queensland

Owner: Brit Andresen & Peter O'Gorman

Architect: Brit Andresen & Peter O'Gorman

Engineer: John Batterham

Builder: Peter O'Gorman & Graham Mellor

Constuction Date: 1996

written by: Judith Abell | **design:** Peter Walker

Mooloomba Beach House

Point Lookout, Stradbroke Island - Queensland

Nestled within the Stradbroke Island beach community at Point Lookout, is Brit Andresen and Peter O'Gorman's Mooloomba House. Sitting on an elevated north facing site, the two storey building is composed of a series of rooms of varying levels of enclosure or exposure, stretched along the length of the sloped boundary. In this house, living takes place amongst a wild garden of Banksias and Boxtrees, wrapped by a light framework that houses the more complex requirements of dining, sleeping, bathing and preparing food.

The site is dominated by garden, and edged by building. The siting strategy places the house along the long western boundary, so that the living spaces look east across the garden. Following the movements of the microclimate, the house faces the sun while the eastern wall is a filtering edge to the breezes that swing from southeast to northeast.

The hardwood and laminated ply structural system was developed for the building as part of an ongoing desire of the architects to express the strength, durability and aesthetic potential of Australian hardwood. Through the lamination process, hardwood's potential to warp, twist, cup and crack while seasoning is diminished, while its strength and durability is maintained.

top
north facing belvedere with basketwork batten balustrade, as seen from the path to the beach
photo - courtesy of the architects

•**Description** - This house is designed to accommodate a simple series of holiday living requirements: to sleep, eat, bathe, read, and relax. The two-storey building is composed of two systems of framing and several different 'characters' of construction. These construction differences throughout the building are linked to the way that the building is organised, occupied and sited .

The garden boundary side of the building is the structural core, housing the living requirements for sleeping, bathing, and preparing food. The western side of the house is slung between the structural core and a series of irregularly spaced cypress poles. It interacts with the garden through a freeform combination of structure and cladding that lightly frames a series of multipurpose 'outdoor' living rooms. The living room is an insulated, double skin space designed with an increased potential for enclosure, as a 'warm' place during cold weather.

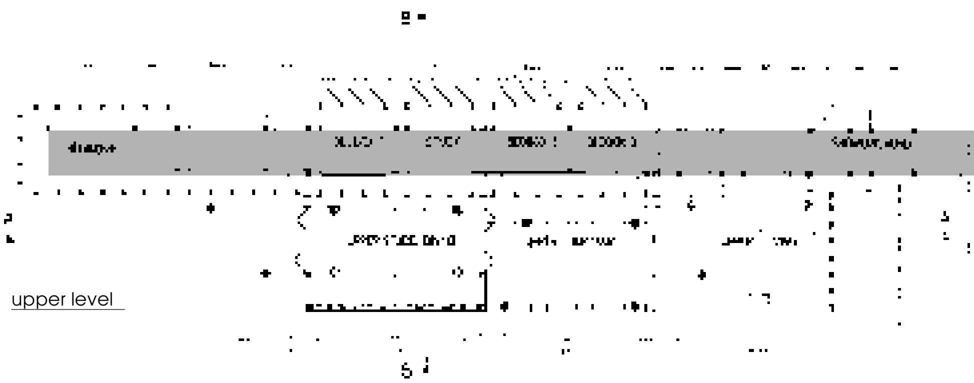
Sleeping boxes, large enough for a bed and a little storage, are off a narrow open walkway on the upper level that overlooks the garden side of the house. The spaces are tight modules fitted within strict framing based on the dimensions of standard plywood sheets.

The house is large, yet has only sixty-five square metres of internal space. Its small enclosed floor area helped maintain a low overall cost, and this economy has been assisted through O'Gorman constructing the house with Mellor. Using a single skin structure in response to the climate, fixing uncut, standard size sheets of plywood to the building, using locally sourced Cypress poles, and maintaining minimal kitchen and bathroom spaces, are also factors that have contributed to low costs.

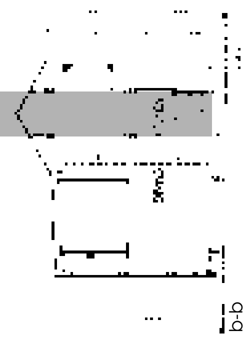
site plan

site sketch

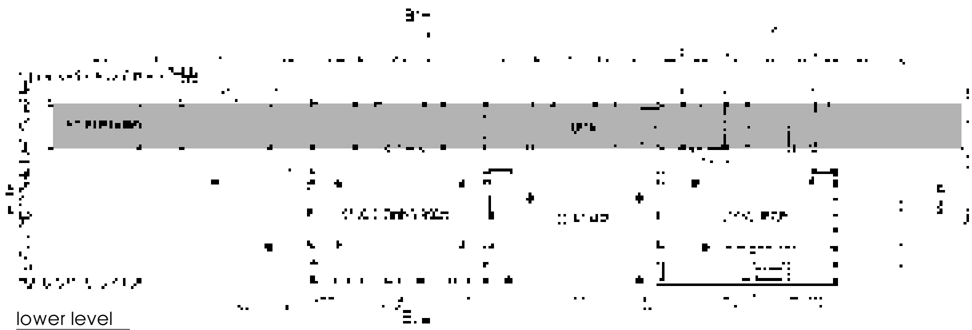
section a-a



upper level



section b-b



lower level

top right
site plan + sketch

top left
section a-a

middle left
upper floor plan of beach house

bottom left
ground floor plan of beach house

bottom right
section b-b
drawings - courtesy of the architects

The major framing of the structural core is composed of two rigid, longitudinal, post and beam frames spaced 1200mm apart. This frame is constructed from an 18mm **plywood** core, set between two dressed, 90x42mm hardwood members. The plywood acts as a spacer to maintain similar construction dimensions throughout the building. The hardwood pieces, with grains opposed, are bolted to the plywood in order to reduce the tendency of the originally unseasoned hardwood to warp, twist, cup or crack as it dried. The frames were constructed from a single species of green, structural timber. The two frames are spaced 1200mm apart to allow for standard plywood sheets to be fixed between them as shear wall bracing along the length of the building.

A secondary frame at 600mm centres is supported on the ceiling and first floor beams of the longitudinal frame. This frame is constructed of three laminated pieces of 18mm hardwood, with opposed grains for reduced warping. The members are framed as rectangular portals with rigid bridge joints at the corners. These portals form a cage for all of the first floor spaces, and give lateral bracing to the structure. Further bracing is achieved with a series of lateral steel cross braces, and horizontal steel cross braces within the major frame.

A cross-braced hardwood frame spans between the structural core, and a series of living trees and cypress poles, to form the 'garden' side of the building. The poles are set 1.5m into the sand, and are left with the bark on in the outdoor rooms. These support the roof and are braced internally, so that the walls can be non-structural. The walls are clad in a free combination of battens, louvres, tall glass doors, and corrugated acrylic roofing. The rafters are also spaced irregularly to work with the spacing of the poles, and to experiment with the co-existence of opposite conditions in architecture.

top left
sleeping shelves and stairs to upper level

middle left
preliminary sketch of sleeping shelves

top right
interior of courtyard
photo - J. Gollings

main image
western elevation of beach house
with northern decks towards the right
photo - J. Gollings

A strategy for design with timber

•Using Hardwood - Beck and Cooper (1996) relate that: "the architects have a long-time interest in the sustainable use of Australian hardwoods, which are largely undervalued. Eucalypt is a maligned material because it warps and twists (as it seasons) yet it is so strong that it is used on the prows of Antarctic icebreakers."

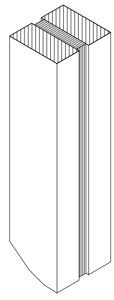
Timber achieves a moisture content of 10-15% as it dries and reaches **equilibrium** with its surrounding environment. As the wood dries below its fibre saturation point (a moisture content of about 30%) it shrinks. This reduction in dimension does not occur equally in all directions. Radially, hardwoods shrink 3-6 %, dependant upon species, whereas tangentially (in the direction of the growth rings) they shrink approximately twice this amount. This can cause the timber to warp, check, cup or twist, as the timber will naturally dry on the outside faces first. The effect of shrinkage is also dependent on the arrangement of the growth rings and grain in the piece and this is determined by the way the timber was milled from the log.

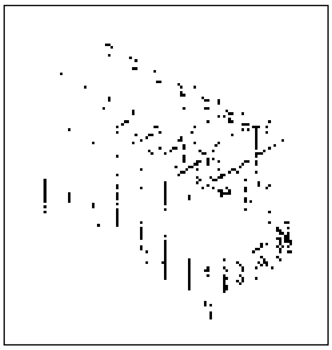
Due to the cell structure of hardwood, it also takes longer to season to the required moisture content than most pine timber. All these issues lead to increased chance of movement in structures, particularly when framing up in green hardwood.

The lamination system applied for the framing members of this building works like an enlarged plywood structure. In the major frame, 18mm marine ply is sandwiched between two pieces of 42 x 90 mm hardwood. As the grains on each of the pieces of hardwood are opposed, the movements within them work against each other to reduce overall movement. In the secondary structure, all three pieces of the lamination are 18mm hardwood.

thumbnails from left to right
- deck from the living room
- horizontal timber shading
- frame assembly detail
- the belvedere and outdoor eating deck at the north of the house
-isometric of basic timber framing
photos + isometric - courtesy of the architects

below
detail of structural frame construction, hardwood with plywood spacer





O'Gorman and Andresen worked with green structural timber as it was cheaper, more readily available, and avoided expected delays (of at least six weeks) for purchase of kiln dried timber. It was also easier to select a single species of eucalypt in **green timber**. They chose to use a single species of hardwood in order to maintain consistency in movement and character. The Queensland market is increasingly dominated by large suppliers that do not necessarily segregate species for structural framing in the forest. This results in a mix of species in the bulk of production, from which single species are only selected for flooring or stair treads. Designers or builders who wish to use a single species therefore currently need to source it from small, more expensive mills.

•Construction with composite members - Using smaller pieces of timber together in composite constructions can extend the height, span and strength of timber framing, and use more of the sawlog. The framing of this building is constructed from 90 x 42mm, or 18 x 70mm pieces of hardwood. With lamination, the composite structural components in place are 102 x 70mm posts/beams, and 54 x 70mm frames. Shorter pieces of timber can be laminated into composite members, increasing the use of what might normally be considered unsaleable, or waste timber. A wide range of interlocking construction joints can be easily incorporated into a structure laminated in this way.

•Prefabrication/domestic assembly - The house was designed in timber to perpetuate the construction traditions of Stradbroke, and to enable Peter O'Gorman to construct the building within his own construction skill and available tools.

The strategy for use of timber employed in the building allowed O'Gorman to prefabricate the frames on site with a simple set of **jigs**, a power saw, a power drill, and a shifting spanner. The marine ply cladding, used in its standard 1200 x 2400 sheet size, also operated as a prefabricated component.

Prefabrication eases the process of construction, as components can be manufactured elsewhere, and put together quickly on site. Once the frame is in place, a top-down construction process can take place, such that further work takes place under cover, away from the sun and rain.

•references

Andresen, B. & O'Gorman, P. 1996, House, Stradbroke Island, Australia, UME 3, University of Melbourne, Melbourne, p.6 ff.

Beck, H. & Cooper, J. 1996, On Andresen and O'Gorman's Stradbroke Island house, UME 3, University of Melbourne, Melbourne, p.12 ff.

Bootle, Keith, R.1983 Wood in Australia; Types, properties and uses, Sydney, McGraw-Hill Book Company

•glossary

equilibrium: the moisture content at which timber neither gains nor loses moisture from the surrounding atmosphere

green timber: unseasoned timber, with free moisture present in the cell cavities

jig: a custom made, or commercially available device to set a dimension, angle or shape for fabrication

plywood: an assembled product made up of veneers of timber glued together so that the grain of alternate layers is at right angles

seasoned timber: timber that has been dried so that the moisture content anywhere in the piece is between 10% and 15% [15]

•on the internet

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