



Design Workshop: Building for a busy lifestyle

Penny and Paul are making the shift to an eco-community 40 minutes south of Adelaide. They want to build a home that suits their creative lifestyle, while being energy efficient and sustainable. Carol Marra of Marra + Yeh Architects helps them with their design.

“We are returning to South Australia soon after two years in Broome,” says Penny. “We have agreed to sell our Adelaide house to our daughter, son-in-law and baby grandson who have been renting it, and plan to build a new, efficient, low-maintenance house on a block we found in the Aldinga Arts-Eco Village.

“Having friends already living in the village, we had known about it for a long time. We like its principles, design guidelines and community commitment, and love the fact that it’s situated only two-and-a-half kilometres along a linear park to the beautiful Port Willunga beach.”

Penny and Paul are expecting frequent interstate and overseas guests and also want to accommodate their grandchildren for seaside holidays. They also have hobbies requiring suitable spaces: “Paul meditates and does massage, so he needs a quiet room,” says Penny. “I need a studio for silk painting, sewing and beading.” To keep the house size modest, they plan to ensure spaces have multiple purposes.

Inspired by Balinese traditional architecture, Penny and Paul have designed a home with an upstairs room housed in a central pagoda. They are hoping to use Tropical Building Systems in Bali to prefabricate the roof structure and external wall framing. “We like the information on the TBS website about the sourcing of their tropical hardwoods, which seems sustainable



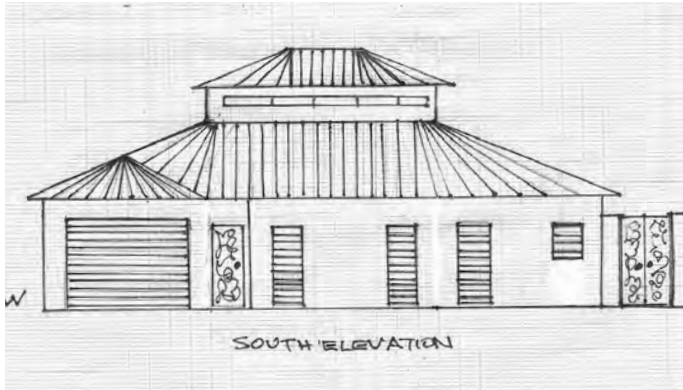
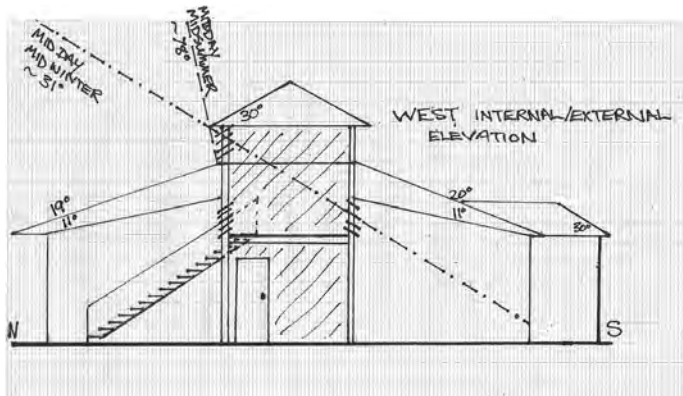
and well managed,” explains Penny. However, their plan is still to be approved by the Arts-Eco Village’s building committee, which may disapprove of the embodied energy involved in importing tropical timbers.

According to the proposed design, the timber-framed home will sit on a polished concrete slab with in-slab hydronic heating. Internal walls will be rendered besser brick with sand filling, for thermal mass, and Scyon Linea boards will clad the exterior. Windows will be timber-framed, argon-filled double-glazed units, side-hinged on the east and west walls to catch prevailing breezes. Penny and Paul are planning a grid-connected photovoltaic system and solar water heating for kitchen, bathroom and laundry needs and for the hydronic heating.

Penny and Paul had some specific questions for Carol:

- Please advise about suitable ventilation pathways and thermal mass to keep the house at a liveable temperature during an Adelaide summer heatwave.
- Will internal walls of 100 millimetre wide besser bricks filled with sand act effectively as thermal mass if they do not receive direct sunlight?
- What kind of insulation would be best for the west-facing wall?
- Could you please discuss the energy efficiency of hydronic heating in the concrete slab? Do all rooms in the house need to have hydronic heating coils installed? →

PROPOSED ELEVATIONS



i Penny and Paul's level block in the Aldinga Arts-Eco Village is a blank slate. Existing homes to the south display photovoltaic and solar water heating systems.

Details

PROJECT

New build

LOCATION

Aldinga Arts-Eco Village
40km south of Adelaide, SA
aldinga-artsecovillage.com.au

DESIGNER

Self-designed; some input from designer Matt Queenan
matthewqueenan@gmail.com

LAND SIZE

485 sqm

PROPOSED HOUSE SIZE

House 188 sqm; deck 40 sqm

BUDGET

\$250,000

The Brief

Conform with Aldinga Arts-Eco Village's sustainable design guidelines concerning orientation, building materials, ventilation for cooling and passive solar heating

Minimise steps and obstructions to possible future wheelchair access

Ensure minimal space wasted on corridors

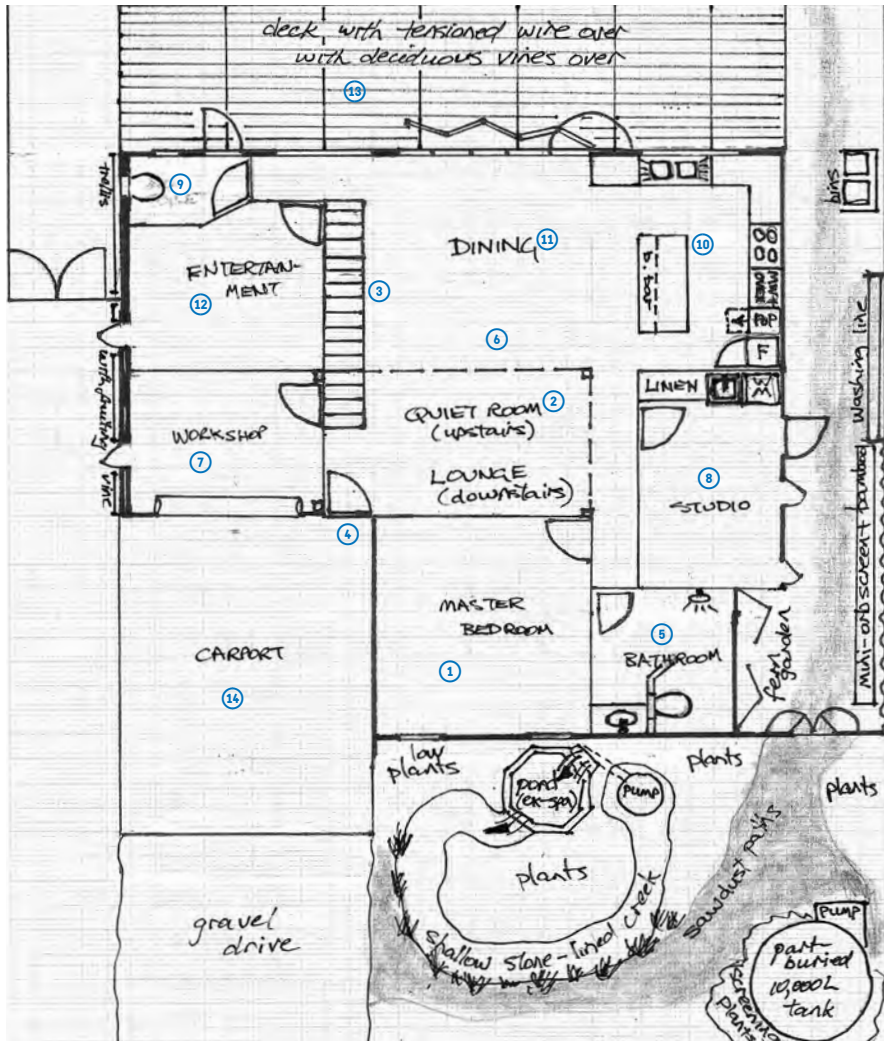
Provide large master bedroom with built-in wardrobes and ensuite or easy bathroom access

Include bathroom opening out to private garden to give feel of "Bali bathroom" while maintaining capacity to close it up in cold weather

Provide a TV/entertainment room separate from main living areas of house

Include a space for meditation and massage, and a sewing/crafts studio.

PENNY AND PAUL COMMENT ON THEIR PROPOSED FLOOR PLAN



- ① Master bedroom has two floor-to-ceiling louvred windows to the south for cool air intake. Louvres at top of the northern wall allow ventilation from the light well.
- ② Quiet meditation room upstairs in the central pagoda will double as a second bedroom. Louvres at floor level open into the master bedroom and living area. Interior paint very pale and reflective to maximise light penetration into the rest of the house.
- ③ Stairs to pagoda will have open treads and a glass safety barrier. Under-stair area to be used for computer desk, bookcases and broom cupboard.
- ④ Entry has carved front door and storage for wet coats, shoes and umbrellas.
- ⑤ Bathroom is accessible directly from master bedroom and main living area, and has bi-fold windows opening onto a densely planted fern garden. Will feature a composting, waterless toilet, and a greywater system will send basin, floor and shower water directly to fern and bamboo garden outside.
- ⑥ Living room: Traffic ways around lounge setting lead to bathroom, bedrooms, front door.
- ⑦ Workshop: Roller door access from carport. No ceiling to allow access to loft storage area in ceiling space above carport.
- ⑧ Studio/Laundry: Not enclosed to allow airflow across room. Provides water access for crafts and easy access to side garden for drying dyed fabrics.
- ⑨ Second toilet: Accessible from outside.
- ⑩ Kitchen with island bench (benchtap from recycled timber if possible), pull-out pantry, wall oven and induction cooktop. Flooring to be marmoleum or other softer covering (eg, cork).
- ⑪ Dining area: A five-panel bi-fold door opens to the deck; the first panel is for daily use as a back door.
- ⑫ Entertainment room/Guest bedroom: Includes TV and sound system. As it will be used mostly at night, there's little need for extra light from light well.
- ⑬ Deck runs across full width of the house and is covered by deciduous vines on overhead wire supports, providing shade in summer and allowing sun penetration in winter. Having lived in the tropics and the desert, we really like to sit outside, so a big outdoor living area that is easily accessible from the house is very important.
- ⑭ Carport with flat ceiling: Sized to hold a 4WD and allow for unloading out of the rain. Loft storage in ceiling space above carport.

CAROL'S DESIGN RESPONSE

To make places that are sustainable we must look at all aspects, including performance/efficiency, comfort and delight. If we make places we love, if we make them after careful and thorough consideration, with the appropriate skill and care – they will become places cherished by many generations, and they will sustain and be sustained for many decades. These are aspects of sustainability that usually get lost amongst all the talk about star ratings, energy efficiency and the like. Of course those matter too, but what is energy efficient today may not be so in ten years' time and yet the building will still be there. This is a more philosophical or holistic approach and it's how we like to think about sustainability.

Penny and Paul, you have taken a great first step, a commitment to make your new home in a way that requires minimal input of resources over time. This commitment is important and necessary because the process of building a new home is often both euphoric and highly stressful. Your brief states that the house is actually just for the two of you, and that you expect to have visitors often. I feel that at almost 190 square metres, your current design is very big for a two-person house. The issue with size is twofold: on the one hand your stated budget will probably not be able to cover the costs of such a large house. On the other, bigger means more materials and resources going into the construction, more area to heat and cool, more maintenance over time. From a sustainability point of view it is important to build as small as possible, and I would strongly advise you to reconsider the size of your project.

Also, while you get an A for effort in designing your own home, I'd recommend that before going too much further you engage a professional with the requisite expertise to help you turn your dream home into reality.

LOCATION AND CLIMATE

Your block, in a coastal community south of Adelaide, will be subject to climate conditions dominated by:

- Low diurnal (day/night) temperature range near the coast
- Four distinct seasons: summer and winter can exceed human comfort range, while

spring and autumn are ideal for human comfort

- Mild winters with low humidity
- Hot to very hot summers with moderate humidity

These climatic conditions can be addressed through passive means in several ways, including:

- Northerly orientation of daytime living areas
- Appropriate areas of glass on northern facades
- Shading of glass to prevent heat gain
- Thermal mass for storing heat
- Insulation and draught sealing
- Floor plan zoning based on heating needs
- Advanced glazing solutions (double glazing and/or low-e glass).

VENTILATION AND WINDOWS

Your design currently relies solely on stack ventilation to get the air moving within the house. Given the local climate it may be more effective to rely on cross ventilation instead, particularly during the summer months when it can be humid. It is very important that each room be considered separately so that you have control over each specific environment within the house. For example, if you are actively working in the workshop, that particular room may need to be slightly cooler. If Paul is meditating that area may need to be warmer as he won't be moving about much. Thinking through the particular activities as well the specific location of each room will assist you in making decisions about the placement of windows and thus the movement of air.

The same can be said for natural light. It is really important from both a comfort and performance standpoint that activities be considered – what kind of light should enter the room? How should it enter the room? At what time(s) of day? Should the light be filtered in some way? All these questions need to be considered for each space so that they are designed in a way that is both environmentally appropriate as well as taking into account human comfort.

Besides the obvious functional benefits of windows in admitting light and air into a room, we also look at the philosophical meaning they can provide to a space. A window is our

connection between the inner world we create and the outer world of nature. The nature of this relationship in each project of course varies depending on place, climate and client. Sometimes a window may be a place to pause, to take a break or to create a room-within-a-room – this may be architecturally expressed as a window with a seat, or a window within a deep recess, or simply by locating the window along a traffic route. Having windows on two walls of every room not only provides better natural light distribution and cross ventilation but also creates a pleasant atmosphere within that space, making it warm and inviting.

THERMAL MASS

Thermal mass is another important consideration for your climate zone. The first priority is to locate thermal mass where it is most exposed to direct solar radiation, and these spaces should be those used most frequently – the kitchen, living and dining areas. You mentioned hydronic heating in your brief which is a good option, especially if connected to a solar hot water system. To be effective it is important to insulate both the underside of the slab and all the slab edges (something many builders will resist doing because they are unfamiliar with the insulation products and the method of construction).

The hydronic system works best if incorporated into a topping slab, which can then be polished and left as the final finish. You do not need to install hydronic heating in all rooms, and if you do you should do so on separate circuits for energy efficiency. Internal brick walls will not work well in winter unless they receive heat from a direct source (ie, sun or a radiator nearby). They will, however, work in the summer months to reduce the heat build-up within the house. Remember that it is important to insulate the wall construction, including a reflective insulation on the west walls (for summer insulation) as well as bulk insulation in all walls (for winter insulation).

[Ed note: For more information on insulating walls, slabs and other unconventional spaces, see our article on p84.] →

SUGGESTED ALTERNATIVE FLOOR PLAN

(see sketch on p43)

Taking into account the main points in your brief, and with an eye to reducing the overall size of the house, I'd like to propose an alternative floor plan. This plan is around 120 square metres of internal space and only one level, taking into account your budget, your increasing age and your desire for a house that does not require a lot of housekeeping.

1. Courtyard typology: One of the primary reasons for suggesting this typology is your love of the outdoors. My thought here is to bring the outside in, to make the outdoors a part of your everyday lives and not a scheduled activity. In a courtyard home you move in and out and around the courtyard all the time, constantly aware of the weather, the time of day, the seasons. The other reason for a courtyard arrangement is that the building becomes narrow, so that each room has two exterior faces and thus the possibility for good natural light and ventilation. The courtyard is also a sheltered outdoor space which extends its use across the seasons. The walls around the courtyard can be a combination of solid walls and glazed doors and windows. Openings should be placed to allow cross ventilation within rooms.
2. Zoning: The arrangement outlined in the plan zones the various spaces, separating those used more frequently from those used less often. This allows you to heat and cool the different areas more efficiently. It also affords another layer of privacy to the arrangement, especially if you have guests.
3. The master bedroom and bathroom are placed on the eastern side so they receive morning light, which is important for maintaining a healthy circadian rhythm.
4. The workshop is located next to the carport for ease of loading and unloading.
5. The entry is sheltered and opens into a foyer. In the foyer I have placed a window seat overlooking the courtyard and garden beyond. This is a transition space within which one can unwind upon arrival, have a

glimpse of the courtyard and decide which area of the house to move towards. It is the space where visitors linger while putting on their coats and saying a final goodbye.

6. A built-in cupboard for coats, hats and umbrellas opens onto the foyer. Behind it is a cupboard for linen that is directly opposite the bathroom.
7. This room can be used either as an entertainment area or as a guest room. I incorporated a full bath to cater for guests.
8. The studio is combined with the laundry and can incorporate access to the side yard for clothes drying.
9. The quiet room is opposite the activity hub of the living/dining area, across the courtyard and looking out onto the garden – a nice spot to meditate. All doors along the inner passageway are sliding to maximise the useability of spaces.

Lastly, I would like to comment on your proposal to fabricate some parts of the house in Indonesia from tropical timbers. Having worked in South-East Asia and with tropical timbers, I see a number of issues with this approach. The obvious one you have already touched on: embodied energy due to the large distances the materials must travel to the site. The other issue is one of appropriateness. Tropical timbers are a wonderful material due to their natural properties and are best suited for structural work. A house made with these timbers would ideally be designed in large part to showcase them and to express the nature and structural properties of the materials.

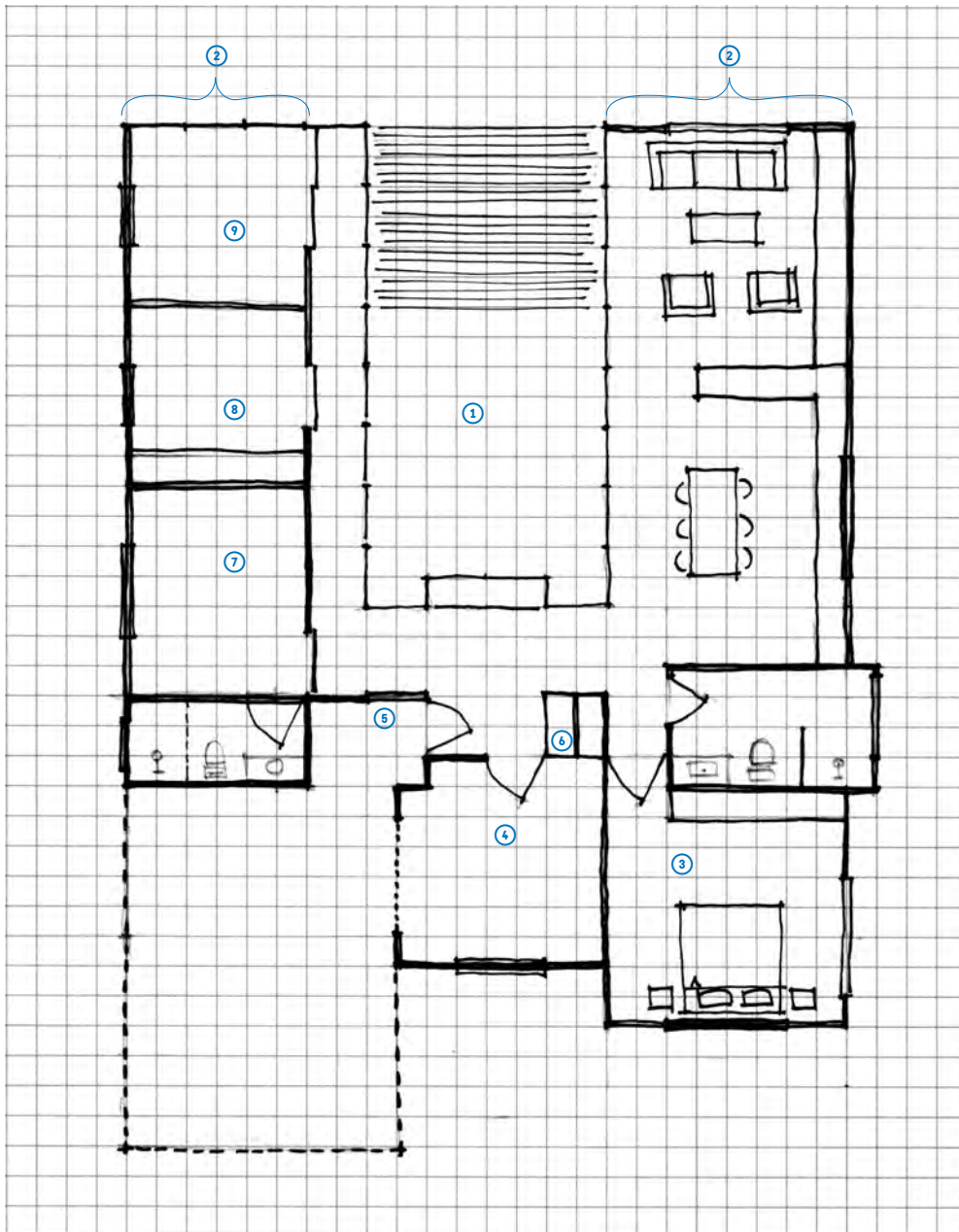
In your case your design is quite conventional: framed walls with an external cladding. When the construction method is conventional I feel it is best to use a fast growing plantation timber – pine is normally used for this purpose. Australia has a number of beautiful timber species that can be used where the timbers will be exposed. I would recommend looking into recycled local timbers – this would be a very environmental option. Best of luck with your project! 



Carol Marra is one of the founders of Marra + Yeh Architects, a Sydney-based practice with projects in Australia and South-East Asia. Marra + Yeh takes a considered approach, looking at both potential and constraints. Their architecture straddles the general and the particular, technology and the hand-made, aspirations and appropriateness. www.marrayeh.com

Would you like your house plans Design Workshopped? Send us an email at designworkshop@sanctuarymagazine.org.au with a brief summary and plans of your project.

CAROL'S ALTERNATIVE FLOOR PLAN



- ① Courtyard (deck)
- ② Zoned living spaces
- ③ Bedroom
- ④ Workshop
- ⑤ Entry
- ⑥ Foyer cupboard
- ⑦ Entertainment/Guest room
- ⑧ Studio/Laundry
- ⑨ Quiet room

