

## The Shansion SHD Handout

### **Internal Blockwork**

Insulate then lay a full height, internal 90mm blockwork wall with brick ties to battens that help create reflective air spaces for insulation.

We battened off existing 190mm external block wall with piers that supported the trusses above, this was insulated with RMAX Thermastar 40mm Standard with 2 reflective foil surfaces and an additional 10mm Foilboard and reflective airspace. A new 90mm blockwork wall was laid to the interior achieving a total wall thickness is 500mm.

With 25mm Battens to 190 exterior blockworks to create a reflective air space, before we sheeted over the battens with a 10mm foilboard (additional insulation to the 7.2 Star Rating achieved). More 25mm battens were added to create another reflective air gap, to 40mm foil faced Thermastar, 100mm reflective air space to internal block except at Piers.

The internal block gives us a captive internal mass in addition to the uninsulated slab, lime washed and sealed throughout. Which acts to create a thermal flywheel that moderates our internal temperature beautifully. Lime is a special material, as it slowly converts back into its original form of calcium carbonate and fixes roughly the same amount of CO<sub>2</sub> that was produced in its manufacture as it cures.

The external 190mm blockwork has been left and retains its original raw appearance. The lime wash is a cheap alternative to render and is easily applied without the need for render beads and complexity for extensive expanses of wall. The mortar joints remain expressed, but the overall effect is soft and helps reflect light into the upstairs spaces. Lime has a slightly translucent appearance that has more depth than a flat painted surface.

**LANGUAGE WARNING, GEEK SPEAK** *if you feel your eyes glaze over please skip ahead.*

The efficiency of blockwork is remarkable. They are relatively cheap to buy and a single bricklayer, can lay 200+ blocks a day for a low straight run, which equates to 16 square meters of wall. The embodied energy in a 90mm block that weighs 9.7 kg is approximately 14.55 MJ per block excluding mortar and any reinforcing. At 12.5 blocks per square meter of wall, that equates 121.25kg and 182 MJ per square meter. Block work can be managed by traditional trades and is easily estimated, ordered and manipulated.

### **Floor and Wall Frames**

200 x 45 LVL and chipboard were laid for floors and covered with a secret nailed recycled already varnished hardwood. The chipboard provided a platform to plaster and paint before the second hand flooring was laid.

The Plumbing run for the toilet and bathroom required the LVL's run parallel to plumbing runs to eastern external walls, and we had just enough space to accommodate the required fall.

90 x 45 pine frames for walls. As the existing structure was not protected from termites, being concrete, block and steel, we used H2 termite treated pine for wall frames. LVL's for the floor structure are also H2 treated. Termites in central Victoria are a serious issue.

## **Ceiling/Roof**

The existing roof structure consisted of 150 steel purlins over the steel trusses. The design objective was to retain visibility of truss top cord after plastering and maintain as much height in the raked ceiling as possible. We worked to maximize the insulation in a relatively narrow cavity, which led to the use of RMAX Thermastar 95mm with a 20mm pvc angle to support insulation panels between purlins 25mm below existing sisilation and 25mm above with an additional layer of foil board and an additional extra reflective air space not accounted for in the First Rate Assessment.

## **Plaster**

The full height shed doors provided moisture protection and allowed us to plaster prior to lockup which helped keep the project moving quickly.

## **Insitu Steel Frames**

The Northern Insitu steel frames were built to receive fixed panel double glazing, while Aneeta Sashless double glazed units were installed to provide ventilation.

Laminated 8mm was installed in an angled added to the web internal trusses to receive the glass and silicone. The laminated glass helps reduce sound transmission.

Bent Ironwork was responsible for all steel work on site, from windows, doors, front gate, hand rail and stair stringer.

A steel frame door was also built insitu and provides one of the 2 access points

The trusses have a 4.4 meter spacing so we used the trusses to define the bedrooms and studio. As we were bound by love cathedral ceilings.

Steel Stair Stringers were fabricated on site with 40mm angle to receive timber risers, custom made hand rail.

## **Electrical**

3.5 kW array offsets a significant proportion of our energy use, but isn't enough to significantly offset CO2 production of new materials used in the build.

- Low profile Martec LED Lights with minimal clearance requirements throughout to allow for close proximity of insulation. Although the transformers still need specific clearance.
- Quantum Heat hot water system
- Daikin split system air conditioners  
Fans to Living Areas and Bedrooms
- Gas Cooktop and Electric Oven. (My Partner was a cook and prefers Gas. Personally, I'm a big fan of induction cooking and all electric houses)

## **Floors**

Travertine tiles to bathroom and toilet upstairs

The hard crisp lines of black steel and plaster painted in a warm off white (low VOC Resene Paint), needed softening so we used natural materials such as sealed Travertine to provide a

unique and varied surface on the floor to the upstairs bathroom and toilet .  
Chipboard was laid over the LVL's supported by the steel structure to create a working platform. We laid recycled Victorian Ash floorboards with an existing varnish over the chipboard with hidden nails. Second Hand Flooring from the salvage yard already varnished.

Polished existing 150mm thick slab downstairs and sealed with lithium sealer. The quality of the existing slab was one of the key selling points. Minimal cracking after decades of vehicle loading indicated the slab was well constructed. Original engineering drawings specified a 100mm slab, it was however 150mm thick, as we discovered were we cut to place new pads for our steel columns to take concentrated loads.

### **Roof**

We replaced a damaged roof sheet where an old 44 gallon drum pot belly flu exited and cut sheet metal closers to seal the ribs of the existing roof to prohibit rodent entry. This detail also works to prohibit ember entry and capillary action of water on a low-pitched roof. The process is time consuming, but a worthwhile detail.

### **Landscaping**

It was our intention to hide vehicles and vehicle movement from the interior and exterior living spaces. The driveway hugs the eastern boundary into the existing carport with a new turning area to the north of the outdoor living terrace hidden from the interior by a step in the landscape, raised waterproofed blockwork wicking garden beds immediately accessible to the house and a native garden beyond.

From the high steel pergola, we suspended cables to train passionfruit, jasmine and wisteria to help create a high green room for our outdoor living space.

Large sandstone rock and Native gardens towards the street and productive raised garden beds with that provide food and shelter for local birdlife.

And soften the existing colorbond fence to the street with a Hardenbergia .