

## House in the Natural Environment



Brisbane has many areas that are categorised as bushfire prone. Whilst being close to the beautiful natural environment, houses that are built on these types of sites need to be carefully designed to ensure the safety of the occupants. The Insulating Concrete Form (ICF) system is suitable to be used for this type of site due to its excellent fire resistance and durability. It can offer great flexibility in design as well as ease and safety in housing construction.

### Background

The owner builder of this house is an electrical engineer. When he considered building a large family house, he did lots of research in order to find a building system to best suit this particular site. The site is very steep, sloping, surrounded by trees and vegetation and the storage capacity of the site was limited. In order to build up to the maximum allowable height he decided to go with a solid ICF construction system.

Having compared a few different options including masonry, steel frame (traditional timber frame wasn't even considered as it would not allow a build up to four story) insitu and precast concrete. All of these systems can work but come with other challenges. Eventually the ICF system Eco-Block came to the builder's attention as it solved all the problems associated with the conditions of the site. It is also owned and made here in Brisbane plus it is certified at BAL-40 BAL (The highest non-flame-zone Bushfire Attack Level).

### Design

This building is a four level house with a lift. The external walls and lift shaft cores are all made of Eco-Block with insitu concrete. The roof structure uses the Ritek insulated roof system which screws directly into steel SHS beams that were embedded into the top of the Eco Block walls. The owner builder did their own DA submission and also created the concept plus the building and structural designs. The drawings were then reviewed and signed off by an RPEQ structural engineer.

“Design is not difficult. All our structural walls are 150mm thick with no expansion joints which provides sufficient strength for 7 floors” said the owner builder.

“With Eco-Block, we could easily change the wall thickness by changing the spacer length in between the polystyrene layers, so we made the lift shaft with 100mm concrete.”

## Cladding Types

External rendering was a three-coat process starting with base coat and fibreglass mesh which bonds well to the polystyrene foam surface. Following this the Acritex Render was applied and then finally painted with AcriShield paint which results on a very strong 5mm skin for the Eco Block.

Internal cladding uses normal fibro or plaster-board with common plaster-board glue. Screws are fastened into the strong plastic ribbing system which is embedded every 200mm inside the Eco Block (see photo).



ICF Block with removed ribs and panel connectors

Grooves cut using a “Hot Knife” for electrical cables

Cut out for services done using a hand saw

## Building with Eco-Block ICF's

The ICF walls were assembled by the owner builder on site, with help from inexperienced family members. After some initial free training by Eco Block, the family sees the installation of these ICF blocks as “low skill level” work. For each level it took about two weeks for the family to do the foam block assembly after clicking the 65mm thick ICF panels together. They inserted horizontal and vertical 12mm reinforcing bars every 400mm using the cutouts in the Eco-Block connecting ribs. The concrete pouring and clean up each took one day, followed by another week or two to build the flooring system.

According to the owner builder, their building only has one rectangular corner, but a typical rectangular shaped house might take 2-3 days for the foam block assembly plus a couple more days to add in windows and door frames.

“It was the Eco-Block ICF which allowed us to easily build this kind of six star energy rated house structure, with its full width and height portal frame. It simply would not have been possible for us to achieve this using any other system.” He emphasised. “I haven’t seen any other building material with as much potential for fast and easy construction as this Eco-Block ICF. We dug our footings in March 2014 and the entire 4-level structure was completed by June 2015, using mostly family labor. Internal fitting is now progressing with possible completion in early 2016”.

He added “The primary difference is that the building is one continuous ready-mix concrete wall, all the way around the building”. “We used 100 slump line pump ready-mix poured to a

height of 1.5 metres, then we waited an hour and filled to the top of the ICF blocks. The next day we had our walls finished, complete with insulation firmly attached to the concrete, and could start work on the flooring or roofing system.”

### **Benefits**

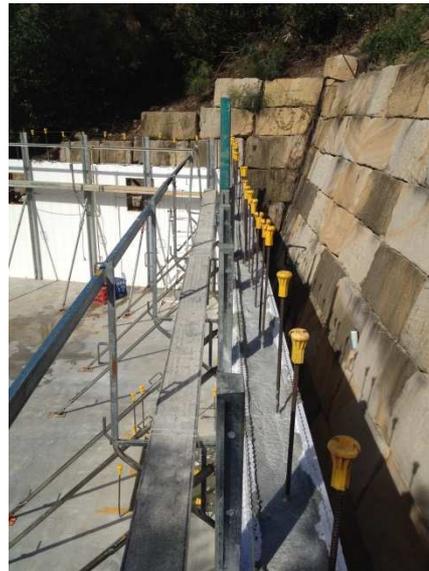
The owner builder says “The high energy and bushfire ratings, lightweight blocks, higher strength and ease of construction are the main reasons for us to choose the Eco-Block ICF system.” He added “Eco-Block ICF gives the building all the benefits that pure ready-mix line pump concrete can offer: termite resistance, fire resistance, strength, durability, speed etc. without the need for any mortar or disruptive expansion joints.

### *Key benefits*

- Easy and fast construction with no heavy lifting and no mortar
- Superior concrete strength curing inside insulated panels
- Structure and insulation all in the one system
- No expansion joints and no mortar cracks
- Can be built using a minimum of unskilled workers
- Flexibility in design and construction with easy cut out for windows and services



ICF wall assembled with concrete line pump in action. For the 150mm walls, we rarely used a vibrator but thumped the sides by hand as the concrete was poured in. However it was critical to have the correct slump.



ICF wall with concrete poured and braces still attached. The attachment method uses screws into the Eco-Block engaging the embedded plastic ribs.



ICF walls require a bracing system that provides both vertical adjustment and scaffold plank support. Prior to the pour we would set a very slight inwards lean. Following the pour we would adjust for vertical and then fine-tune according to a string line along the top.



The 160mm thick Ritek roof was attached using special long hex-head drill-point screws into the 4mm RHS 100x50 which was embedded in and spanning across the top of the ICF Wall.

### **Useful Contact Details**

[www.Eco-Block.com.au](http://www.Eco-Block.com.au)

[www.qicf.com.au](http://www.qicf.com.au)

ICF4U

Saint Engineering Nambour RPEQ

All Areas Rendering

Owner Builder/Electrical Engineer

QICF also has some specialist ICF contractors available

Eco Block Wholesale

Qld ICF Eco-Block Supplier

ICF Specialist Builder

Eco-Block/Ritek Specialist

ICF Specialist Rendering

Phil Best

1800 669 696

0401 839 993

0421 660 599

07 5441 2233

0400 092 538

0411 123400