

# BUILDING BETTER HOMES WITH CONCRETE



CEMENT CONCRETE  
& AGGREGATES AUSTRALIA

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# BUILDING BETTER HOMES WITH CONCRETE

Concrete is one of the world's most trusted building materials. In fact, around the world more people live in homes made from concrete than from any other material.

Why? Because the strength, durability, thermal efficiency, speed of construction, design versatility and raw beauty of concrete make it an ideal solution for designers, builders and homeowners alike.

## KEY BENEFITS



### SPEED OF CONSTRUCTION

- Modular concrete elements can be factory manufactured to precise specifications, then delivered to site for fast installation
- Poured concrete is a fast and effective solution for slabs, floors, walls and driveways
- Building with concrete allows for more efficient scheduling of trades, saving time and money
- There's little wastage on site, so clean up is fast
- Shorter construction times mean faster handovers (and happier homeowners)



### ENERGY EFFICIENCY

- Concrete forms an integral surface – solid, continuous and airtight – to help reduce heat transfer
- When combined with suitable insulation and sensible design, concrete can help keep your home cooler in summer and warmer in winter, resulting in cheaper energy bills



### HEALTHY LIVING

- Concrete doesn't contain Volatile Organic Compounds (VOCs) found in many building materials and household products - good news for allergy or asthma sufferers
- It doesn't need to be covered by dust harbouring carpet or any other finishes



### COMFORTABLE AND SAFE LIVING ENVIRONMENT

- Concrete is a great noise and vibration insulator – it reduces the transmission of sound and vibrations, creating a quieter, more peaceful home environment
- Its thermal mass helps maintain a more constant internal temperature inside your home
- Many materials used in and around the home can release toxins and chemicals. Not concrete – it's inherently stable and void of any known carcinogens



### LONG LASTING AND DURABLE

- Concrete is resistant to termites and other pests
- It won't rot and requires little or no maintenance, reducing the cost and saving you time



### RESILIENCE TO NATURAL DISASTERS

- Concrete structures withstand exposure to flame, making them an ideal option for bushfire-prone areas
- The inherent strength and water resistance of concrete makes it ideal for homes and buildings in areas subject to flooding and cyclones



### DESIGN FLEXIBILITY

- The fluid nature of concrete lends itself to an infinite range of shapes and finishes, so you can design a home that is not only stunningly beautiful, but also unique
- Its strength and load-bearing capacity means you can create more flowing, open spaces inside your home



# CONCRETE SOLUTIONS FOR HOMES

TO SAY CONCRETE IS A  
VERSATILE BUILDING MATERIAL  
IS AN UNDERSTATEMENT.  
IT LENDS ITSELF TO SO MANY  
APPLICATIONS – AND NOT  
JUST STRUCTURAL.

Concrete can be used to create almost every major built element of your home, inside and out – from ground and upper floor slabs to walls, roofing, pavements, driveways and retaining walls.

You can even use it to create unique design features like polished concrete floors, internal feature walls, and kitchen and bathroom bench-tops.



# CONCRETE SLABS

A REINFORCED CONCRETE SLAB IS THE MOST POPULAR FORM OF GROUND FLOOR CONSTRUCTION IN AUSTRALIA TODAY, USED ON ABOUT 90 PER CENT OF HOMES. CONCRETE CAN BE EASILY ADAPTED AND TAILORED FOR DIFFERENT SITE SLOPES AND SOIL CONDITIONS.

## KEY BENEFITS



**QUICK AND  
EASY TO INSTALL**



**RESISTANT TO  
TERMITES**



**EXCELLENT  
THERMAL MASS**

Helps to create an even, comfortable temperature inside your home year-round, and reduce energy costs



**ALLOWS MORE  
HEATING OPTIONS**

Cost-effective electric or hydronic heating elements can be incorporated in the slab (prior to the pour)



**IT'S BEAUTIFUL**

Can be coloured and polished to create an attractive, low maintenance finished floor

## GROUND FLOOR SLABS

Concrete is unmatched as a ground flooring material – strong and stable, termite and rot resistant, and virtually maintenance free.

Slabs can be designed and formed for all soil conditions.

## SUSPENDED FLOOR SLABS

A suspended reinforced slab is the ideal solution for ground floor slabs on sloping or uneven sites. They are also an excellent solution for first floor slabs.

It can be manufactured off-site or poured in situ using either permanent or temporary formwork. Supported off the ground by piers or walls, it can span large areas due to its high strength.



# WALL SYSTEMS

## KEY BENEFITS

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### SPEED OF INSTALLATION

- Prefabricated panels or insulating formwork walls can greatly reduce construction time, enabling you to fast-track to lock-up and completion
  - Concrete creates less waste, making for a faster (and less costly) site clean up
- 



### SOLID, SECURE, LOW MAINTENANCE

- Solid, continuous concrete walling can be manufactured and constructed with great accuracy, saving time and hassles when it comes to on-site installation
  - Concrete walls create a strong, airtight envelope around your home, protecting you and your family from the worst of the elements
  - There is no risk of concrete walls rotting or being damaged by termites
  - Because of its inherent durability, concrete walling requires minimal maintenance over the lifetime of your home
- 



### THERMAL PERFORMANCE

- As with concrete slabs, the thermal mass of concrete walling contributes to an even, comfortable temperature distribution in the home throughout the year
  - Insulation can be easily incorporated into both precast and in situ (poured) concrete walls to achieve even higher levels of thermal performance
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### EXCELLENT ACOUSTICS

- Solid concrete walls help reduce noise entering your home - an important consideration as urban housing densities increase
  - When used for internal walling, concrete helps reduce sound transfer between rooms to create more tranquil and private personal spaces
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# INSULATING CONCRETE FORMS

INSULATING CONCRETE FORMS (ICFs) ARE A TYPE OF PERMANENT FORMWORK USED IN THE CONSTRUCTION OF CONCRETE WALLS.

Unlike normal formwork that is stripped away once the wall has hardened, ICFs stay in place as a permanent part of the wall assembly, providing an additional layer of thermal insulation as well as a barrier against air and sound transmission.

ICFs come in two basic configurations - hollow-core blocks that stack and interlock, and individual panels or planks that connect with plastic or steel ties. Steel reinforcing is used to ensure the overall structural integrity of the finished concrete wall.

*" RESEARCH SHOWS THAT HOUSES BUILT WITH ICF EXTERIOR WALLS TYPICALLY REQUIRE 44% LESS ENERGY TO HEAT AND 32% LESS ENERGY TO COOL THAN COMPARABLE TIMBER FRAME HOUSES"*

VanderWerf, P.A. (1997). "Energy Consumption Comparisons of Concrete Homes versus Wood Frame Homes", Portland Cement Association, Illinois



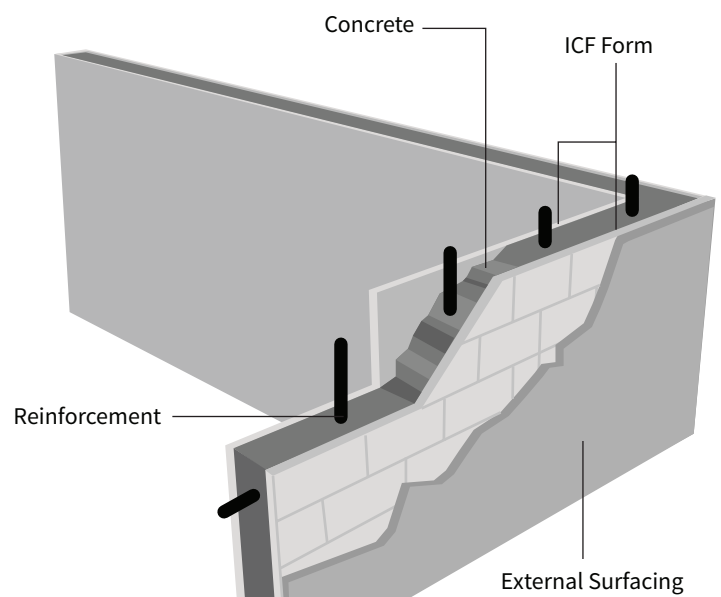
## BENEFITS FOR BUILDERS

- Speed of construction - contractors can complete the walls for a single-storey house quickly
- Lightweight and easy to erect - bracing and alignment systems are provided by most manufacturers
- Reliability - the insulating forms provide protection from the weather, so the concrete pour is less likely to be delayed by rain
- Eliminates the need for additional insulation
- Many ICFs incorporate integral attachment systems that allow for direct fixing of external and internal claddings, including plasterboard, to the form faces
- Meets building codes
- No need for bricklayers
- Plumbing and electrical services are easily installed by routing the surface
- Suitable for all Australian climatic zones



## BENEFITS FOR HOMEOWNERS

- Solid with excellent acoustic qualities to reduce noise and create a more peaceful living environment
- Thermally efficient - reducing energy use in the home and lowering energy costs for heating and cooling
- Mould, mildew, rot, pest and termite resistant for a healthier, low maintenance home
- Safe and secure - provides long term resistance to natural disasters such as floods, cyclones and bushfires
- Durable - lasts a lifetime



# PRECAST CONCRETE PANELS

PRECAST PANELS ARE MANUFACTURED OFF-SITE IN A CONTROLLED FACTORY PROCESS BY POURING CONCRETE INTO MOULDS. THE HARDENED PANELS ARE THEN TRANSPORTED TO SITE AND INSTALLED AS EXTERNAL AND INTERNAL STRUCTURAL WALLING.

The advantage of precasting is that it allows for a high degree of precision and finish quality. An insulation layer can also be incorporated into the panels to provide even better thermal performance in exterior walling applications.

Precast panels have long been popular for the construction of commercial buildings. But increasingly, home designers, builders and owners are turning to precast panels to take advantage of the speed of construction and resulting cost savings.

*"THIS IS A FAR MORE EFFICIENT WAY OF BUILDING HOMES. WE HAVE LESS WASTE ON SITE, THE WALLS ARE ALL STRAIGHT AND TRUE, AND OUR CUSTOMERS ARE GETTING INTO THEIR QUALITY NEW HOME MUCH SOONER, WHICH IS GOOD FOR THE CUSTOMER AND GREAT FOR BUSINESS."*

- Kain Bliss, Greenbuild Constructions

## KEY BENEFITS



### RAPID CONSTRUCTION

Walls can be delivered and installed in as little as one day



### QUALITY

Off-site manufacturing allows for tighter quality control, ensuring finished panels are straight and true



### RELIABILITY

The risk of construction delays caused by bad weather is reduced considerably



### ON-SITE SAVINGS

Reduces the need for on-site scaffolding, minimises waste and saves storage space



### PERFORMANCE

Excellent thermal and acoustic performance for a more comfortable and energy efficient home



### VERSATILITY

Allows for a high degree of freedom in home design and finishes



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# PERMANENT FORMWORK

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AS ITS NAME SUGGESTS, FORMWORK IS USED TO 'FORM UP' A WALL ON SITE BEFORE CONCRETE IS POURED. IT EFFECTIVELY ACTS AS A MOULD TO SHAPE AND SUPPORT THE CONCRETE UNTIL IT IS STRONG ENOUGH TO CARRY ITS OWN WEIGHT.

Sometimes the formwork is left in place after the concrete has hardened. This is known as permanent formwork. The use of permanent formwork reduces overall construction time, and is particularly useful in situations where it's difficult to remove the formwork because of access restrictions.

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## TYPICAL RESIDENTIAL APPLICATIONS INCLUDE:

- EXTERIOR WALLS
- RETAINING WALLS
- BALUSTRADES
- BASEMENTS
- FOOTINGS AND BOUNDARIES
- PLANTER BOXES

Commonly used materials for permanent formwork include plastics, fibre cement sheet and carbon/epoxy thin shell. The installation process usually involves fixing a floor track, then erecting and bracing the formwork panels by hand. Steel reinforcement is placed in the void between the panels before premixed concrete is pumped into the space, generally using a boom pump.



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## KEY BENEFITS

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### SPEED OF CONSTRUCTION



### EASE OF HANDLING

Formwork panelling is lightweight and easy to install

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### ON SITE-SAVINGS

Scaffolding requirements are minimised and the requirements for stripping eliminated

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### DESIGN FLEXIBILITY

The formwork can be produced in many shapes and be prefinished to create a unique facade

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### RELIABILITY

The concrete pour is protected from the weather avoiding site delays

# UPPER FLOORS

CONCRETE IS THE IDEAL CONSTRUCTION MEDIUM FOR UPPER FLOORING. ITS DENSITY AND STRENGTH ENSURES YOUR FLOOR WON'T CREAK OR VIBRATE AND HELPS MINIMISE THE TRANSMISSION OF NOISE BETWEEN FLOORS. THERMAL MASS HELPS KEEP YOUR HOME COMFORTABLE ALL YEAR ROUND.



## KEY BENEFITS



### QUIET

Excellent resistance to sound transmission



### CREAK-FREE

Quiet flooring



### THERMALLY EFFICIENT

The mass of concrete helps maintain an even internal temperature potentially reducing energy costs



### DESIGN FLEXIBILITY

Allows you to create large, open, free-spanning living areas below, and an attractive, low maintenance polished floor above



### EXCELLENT FIRE RESISTANCE

Concrete simply doesn't burn



### DISASTER RESISTANCE

Provides a safe environment during fire or storms

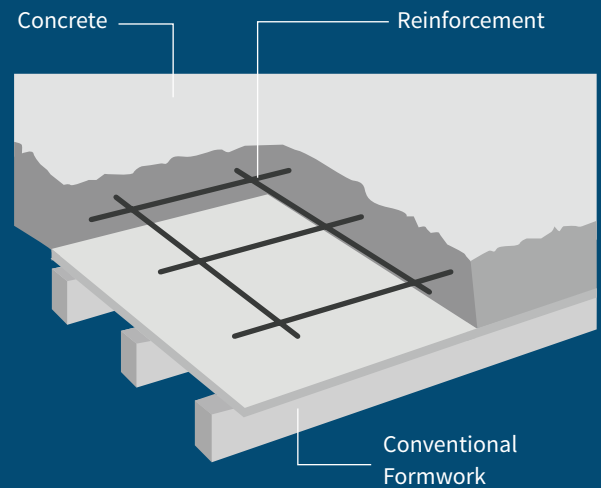
# THERE ARE THREE TYPES OF CONCRETE UPPER FLOORS COMMONLY USED IN HOMES.

## 1. IN SITU CONCRETE FLOORS

In situ floors are poured on site into temporary or permanent formwork, supported by walls or beams. They allow for great design flexibility. The internal walls can be positioned anywhere on the floor, irrespective of the room layout below.

### KEY BENEFITS:

- Can span one way or two ways
- Allows for design versatility with floor layouts
- More options for architectural finishes including off-form soffit

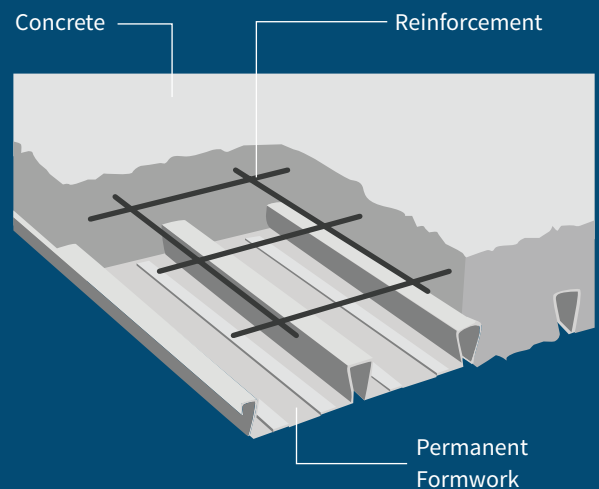


## 2. COMPOSITE CONCRETE AND STEEL

Composite concrete floors are an increasingly common in situ option. The concrete is poured onto proprietary steel decking, supported by walls or beams, which acts as formwork and partial reinforcement for the floor slab.

### KEY BENEFITS:

- Quick to install
- Steel decking provides an intermediate, safe working area during construction
- The decking profile creates a space for the installation of services such as electrical wiring and plumbing

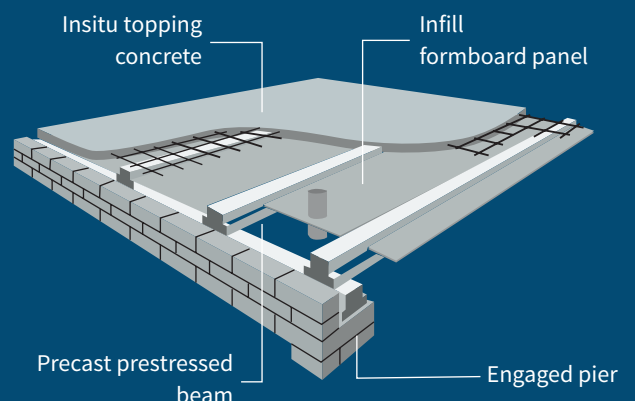


## 3. PRECAST FLOOR SYSTEMS

Precast floor panels are generally factory cast and lifted into position on site. Supported by beams and walls, they are quick and easy to install. A concrete topping may be required for further reinforcement and to ensure a level finish.

### KEY BENEFITS:

- Less formwork required
- Faster construction time
- Lower labour costs
- Reduces site storage requirements and waste



# DRIVEWAYS AND PAVING

WHEN IT COMES TO DRIVEWAYS, PATHS, POOL SURROUNDS AND ALFRESCO ENTERTAINING SPACES, CONCRETE IS UNMATCHED IN ITS FUNCTIONALITY, ECONOMY AND DESIGN FLEXIBILITY.

Concrete lets you create practical, beautiful outside spaces and surfaces that complement the appearance of your home. Formwork can be angled or curved to create flowing lines that follow the contours of your site, while the huge range of colouring and finishing options allows you to create something that's truly reflective of your taste and style.

There are two simple ways to add colour; pigments and coloured aggregates can be added to the pour, or the finished surface can be stained or painted.

There are also a number of options to add texture and slip resistance to the surface of the concrete:

- Simple float, trowel or broom finishes
- Stamping or stencilling to create finishes that resemble brick, slate, flagstone, stone, tile or even wood
- Exposed aggregate finish

## KEY BENEFITS



### SPEED OF INSTALLATION

Concrete is quick and easy to pour



### DURABILITY

Concrete stands the test of time



### LOW MAINTENANCE



### DESIGN FLEXIBILITY

Concrete can be poured to form any shape and finished in a huge range of colours and textures



### ECONOMICAL

A very cost-effective and attractive alternative to materials like stone

*"THE SPEED OF INSTALLATION AND DURABILITY OF CONCRETE MAKES IT AN ECONOMIC CHOICE, PARTICULARLY WHEN COMPARED TO MATERIALS LIKE STONE."*



# RETAINING WALLS

RETAINING WALLS OFFER PARTICULAR CHALLENGES FOR DESIGNERS AND BUILDERS. THE WALLS MUST BE DESIGNED TO RESIST THE LATERAL PRESSURE THAT THE SOIL EXERTS AGAINST THE WALL. DURABILITY, DRAINAGE AND AESTHETICS ARE ALSO KEY CONSIDERATIONS.

The strength, robustness and versatility of concrete makes it the ideal material for retaining wall applications.

## PERMANENT FORMWORK RETAINING WALLS

Retaining walls can be cast on site using permanent formwork, such as PVC, fibre cement, hollow concrete blocks or precast units.

### KEY BENEFITS

- **Cost and time efficiency** - retaining walls can be poured at the same time as walls and slabs, saving time and money
- **Design flexibility** - can be incorporated with water tanks or swimming pools, and finished to complement your home or other landscaping features
- **Durability** – won't rot, crack or be damaged by pests

## CANTILEVER RETAINING WALLS

Cantilever retaining walls, usually in the shape of an inverted T, are designed to cantilever loads to the footing. They are typically constructed from either precast or in situ reinforced concrete laid on a reinforced concrete footing. Reinforced and core-filled hollow concrete blocks can also be used.

### KEY BENEFITS

- **Material efficiency** - generally use less materials than monolithic gravity walls
- **Design efficiency** - zero lot lines allow for construction right to the boundary
- **Aesthetics** - allows for a range of finishes on the exposed vertical wall face

# ST IVES HOUSE

**FACED WITH THE CHALLENGES OF A SLOPING BLOCK, A FILLED-IN SWIMMING POOL AND POTENTIAL BUSHFIRE HAZARDS, THE OWNERS OF THIS FIVE-BEDROOM HOME IN SYDNEY'S NORTHERN SUBURBS CHOSE CONCRETE NOT JUST FOR ITS STRUCTURAL QUALITIES, BUT ITS ABILITY TO DELIVER AN ELEGANT, EFFICIENT AND TIME-SAVING DESIGN SOLUTION.**

A concrete ground slab provides a solid base for the home to sit securely on its sloping site. Insulating concrete forms were used for all external walls, providing both strength and thermal efficiency. The ICF blocks were installed within a few days and the concrete poured over two days. The upper floor slab was poured and integrated with the wall structure to maximise the building's integrity.

Where the insulating qualities of the ICF blocks weren't required, PVC permanent formwork was used. The click-together PVC formwork created a waterproof layer for the house's water tank (doubling as a retaining wall to manage the site slope). With the same system used for the landscaping retaining walls, it meant all areas could be poured at the same time, saving time and money.

Once all the walls were complete, the external finishes of render and stacked-rock cladding were applied directly to the ICF foam. While this was happening outside, tradesmen were completing the interior fit-out. Plasterboard sheets were fixed directly to the ICF block and PVC formwork walls, without the need for studs or battens.

The benefits of using concrete construction meant the whole house was completed quickly and efficiently.







## BUILDING BETTER HOMES

Concrete is the ideal material for building attractive, high performance homes and reducing construction times. CCAA and its members can help you with all you need to know to build better homes faster with concrete.

For more information on building better homes with concrete visit [cca.com.au](http://cca.com.au)

## ABOUT CCAA

Cement Concrete & Aggregates Australia is the peak body for the heavy construction materials industry in Australia. Our members operate cement manufacturing and distribution facilities, concrete batching plants, hard rock quarries and sand and gravel extraction operations throughout the nation. CCAA works to promote innovative building and construction solutions using concrete.



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

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