DURABILITY

Bunker House, NSW, by FUTUREFLIP.

Well designed concrete buildings are long lasting and low maintenance. They are disaster resilient and have the potential to be reused many times over in their lifetime, meaning less demolition and reconstruction.

Durability is the ability of a building to maintain, over its lifetime, the performance for which it was designed. It is a vital part of sustainable construction, as insufficient durability can result in additional unexpected costs due to repair or reconstruction, as well as environmental and social impacts. With higher durability, the upfront embodied impacts can also be effectively spread over a longer period, reducing annualised embodied environmental impacts.[1][2]

One of the key benefits of concrete is its durability. It does not rust, does not rot, and is inedible to vermin, resulting in high durability without recourse to sacrificial layers, shorter designed service life, or protective systems.

Concrete can also have durable properties when exposed to freeze/thaw cycles, chemicals (e.g. wastewater), sea water, and abrasion, when specified to do so. This is especially true for unreinforced concrete, as any degradation in concrete structures is typically due to corrosion of the steel reinforcement.

Yet even reinforced structures, when well designed, built, and maintained, can perform well, and even exceed their design life, because the inherent alkalinity of concrete is ideally suited to protecting the steel from corrosion.

As a result, concrete structures have long lifespans and reduced maintenance requirements. They are therefore able to be repurposed and re-used – potentially multiple times – over their lifetimes, avoiding repeated demolition and rebuilding. Meanwhile, in the event of a disaster, concrete structures require less repair and reconstruction and can be returned to a usable condition more quickly.

These benefits ultimately reduce the environmental impact by requiring less construction and reconstruction, lowering CO_2 emissions, raw materials consumption, and energy use, as well as noise and dust emissions.

References:

[1] **AS 3600:2018 Concrete Structures. Standards Australia**
Clarifies that design life is 50 years for reinforced concrete buildings in Australia and provides details on how to achieve this for reinforced concrete in all exposure environments

[2] **AS 5100.5:2017 Bridge Design Concrete. Standards Australia**
Clarifies that design life is 100 years for bridges and similar infrastructure assets in Australia and provides details on how to achieve this for reinforced concrete in all exposure environments