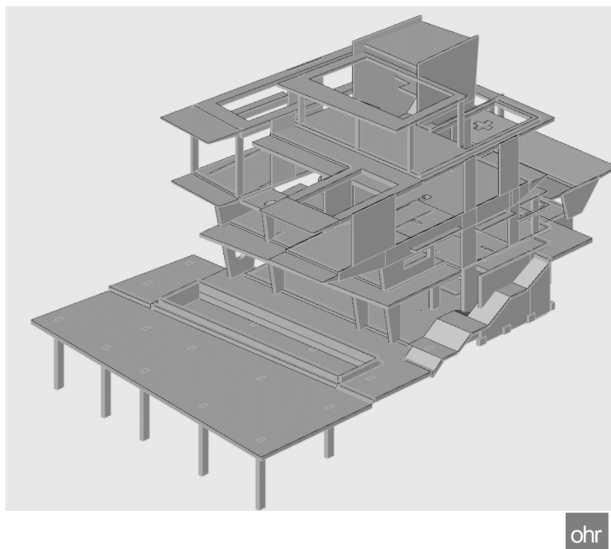


COST EFFICIENCY / ARCHITECTURAL INTENT / STRUCTURAL DESIGN

Cost efficiency in context

Pantai Residence / Project 23007



Higher material quantities do not, on their own, mean inefficient engineering.

At Pantai Residence, the material quantities per square foot are higher than those of a typical private residence. That comparison needs context: long spans, extended cantilevers, transfer columns and large floor openings place demands on the structure that a regular residential floor does not.

The structural design uses a reinforced-concrete flat-slab system to meet these demands within a shallow structural zone and maintain the intended slim, beam-free edges. Material efficiency is considered together with the spaces and architectural form the structure enables.

15 m

First-floor span.

6.8 m

First-floor cantilever.

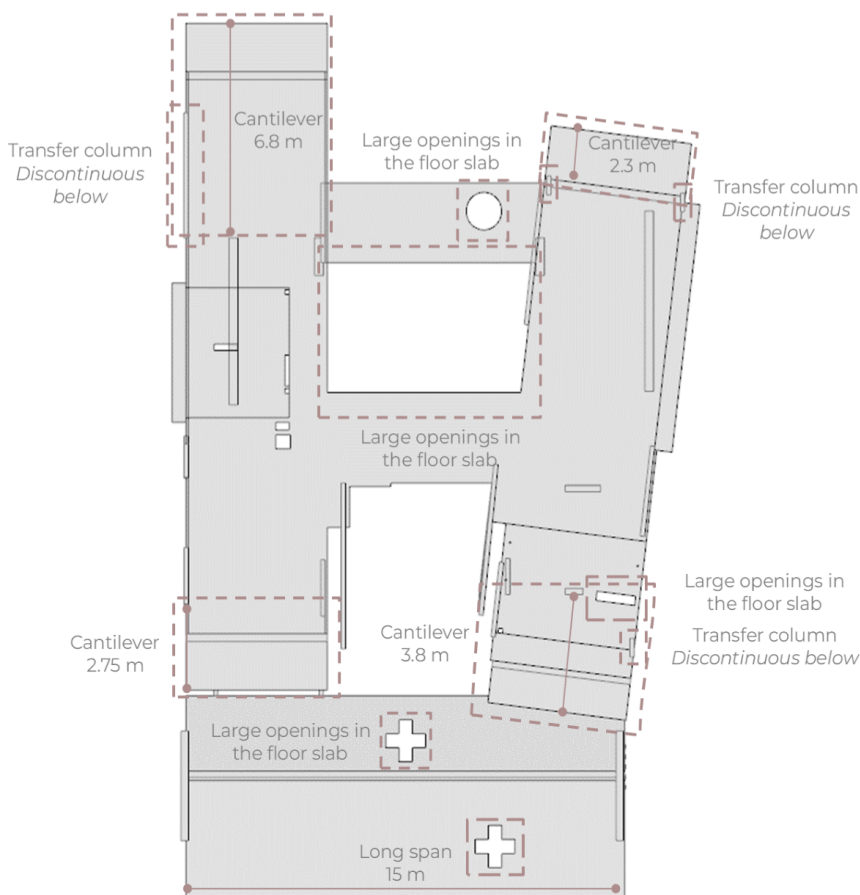
Flat slab system

A shallow structural zone with flexibility for the architecture.

Open spaces, interrupted load paths

The structural arrangement changes from floor to floor. Long spans open up the spaces between supports, while cantilevers extend the floor beyond the columns or walls below. Transfer columns allow the spatial arrangement to change between levels, passing concentrated loads into the supporting structure.

Large openings further interrupt the floor plates. These features act in combination: stiffness, deflection and the paths available to carry loads have to be considered together.



First-floor geometry

Several demands within one floor

The first floor combines a 15 m span and cantilevers up to 6.8 m with transfer columns and large slab openings. Similar spatial arrangements and structural demands recur across the other floors.

02 / The structural response

A shallow structure for the intended form

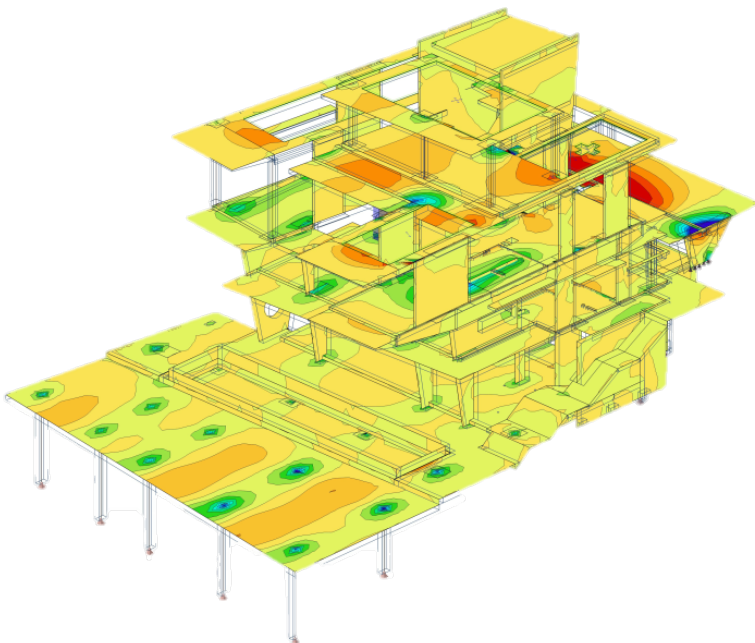
The flat-slab system accommodates long spans, transfers and extended cantilevers, independently and in combination, within a shallow structural zone. This limits overall building height and maintains the intended slim, beam-free edge profiles.

A conventional beam-and-post solution would require deeper beams or additional vertical supports, affecting the building height, spatial arrangement and edge profiles. The flat-slab response resolves these demands within the architectural form. Its value therefore extends beyond the concrete and reinforcement quantities alone.

03 / The engineering assessment

Material demand tested against structural behaviour

The building structure was assessed as a whole using three-dimensional finite element analysis, taking into account the loads and forces it will be subjected to and the effects of the changing geometry.



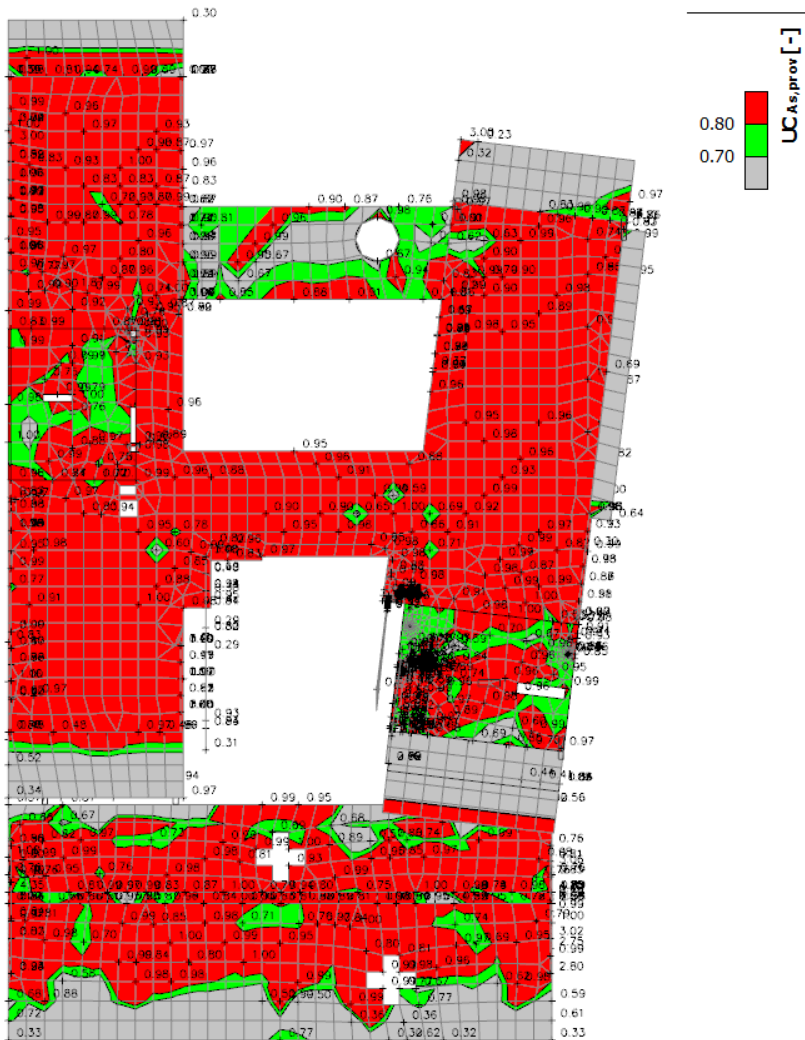
Finite element analysis

Following the forces through the building

Three-dimensional finite element model used to analyse and design the building structure.

Structural utilisation

How much of the structure is working



The first-floor utilisation plot from the three-dimensional analysis and design model compares the calculated reinforcement requirement with the reinforcement provided. A ratio of 0.80 means the requirement is 80% of the provision.

Across much of the floor, the reinforcement provision closely matches the calculated demand, as shown by the extensive red areas. The material is being used at high utilisation to meet the floor's structural requirements.

Legend: red $\geq 80\%$; green 70-80%; grey below 70%. The colours show utilisation bands, not a pass/fail assessment of the complete structure.

Reinforcement is tailored to the calculated demand while maintaining the minimum quantities and continuity needed for a coherent, buildable arrangement. The design balances high utilisation with consistent detailing and ease of construction.

DESIGN APPROACH / MATERIAL EFFICIENCY / BUILDABILITY

Efficiency with room for change

Allowance for construction changes

Ohr considers a typical utilisation of around 80% an optimal balance between material efficiency and reserve capacity for this project. The allowance anticipates changes to the brief after the design is finalised and unexpected conditions encountered during construction. It reduces the likelihood of having to enlarge structural elements later, protecting the intended spatial arrangement and architectural appearance.

Reinforcement with buildability in mind

Ohr's approach to reinforcement detailing combines a regular base arrangement with local additions where needed. For this project, H12 bars at 200 mm centres each way form the typical slab base reinforcement, supplemented with H12 to H20 bars. The selected base size and spacing also allow a mesh option, giving the contractor flexibility in placing the reinforcement.

04 / The cost perspective

Efficiency measured against the same brief

Material quantities are useful benchmarks when the requirements behind them are comparable. A regular slab on closely spaced supports and a floor with long cantilevers, transfer loads and large openings are performing different tasks.

Structural value comes from using material efficiently to fulfil the brief.

Design context

Pantai Residence · Project 23007

Material quantities are considered in relation to the architectural and structural requirements. The comparison is qualitative; no cost saving is quantified.