

MATERIAL CHOICE / ARCHITECTURAL INTENT / CONSTRUCTION COST

The right choice of materials

Izmir's House / Putrajaya



Photography: C2 Builder

Rigorous engineering brings value even for small-scale projects - realising architectural ambition, improving buildability and delivering considerable cost savings.

At Izmir's House in Putrajaya, an existing steel scheme designed by others used deep beams that could not achieve the intended slim profile of the long cantilevering roof. The appointment began with optimising that scheme. A comparison with reinforced-concrete and hybrid alternatives was then initiated alongside the steel optimisation, before subsequent novation to the design-and-build contractor.

6.5 m

Critical roof cantilever

8.5 m

Critical column height

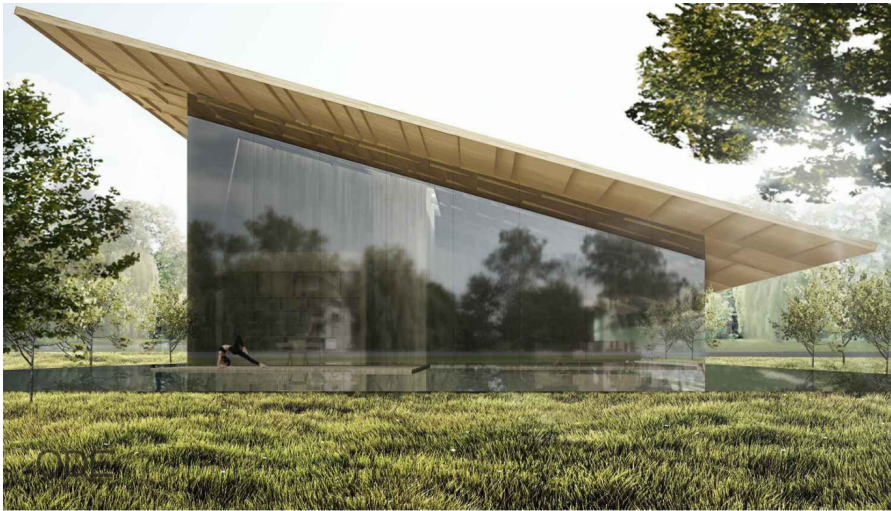
75 mm

Tapered roof edge

01 / THE BRIEF

Meeting the architectural intent

The architectural intent called for a roof that projected well beyond its supports while retaining a slender edge. Structural behaviour, roof depth and column proportions had to be considered together within a construction budget of RM2.1 million.



The architect's conceptual vision

The architectural visualisation shows the long cantilevering roof, slender edge and expansive glazed façade that informed the structural studies.

Architectural visualisation: ODE.

The structural alternatives were developed around the architect's original vision, retaining the slender roof profile and open glazed spaces as the material strategy evolved.

02 / THE INITIATIVE

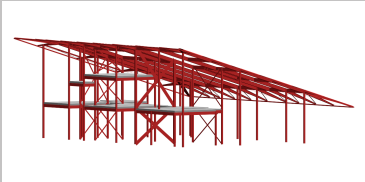
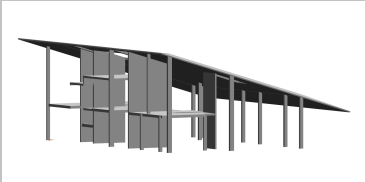
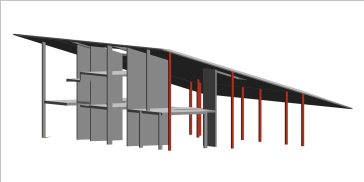
Optimising the steel and assessing alternatives

The study was initiated with the architect and client to demonstrate how alternative material choices could achieve the intended slender roof profile while influencing buildability and construction cost. Reinforced-concrete and hybrid schemes were developed alongside the steel optimisation, enabling informed choices about the structural system. Steelwork optimisation also achieved considerable savings against the original steel design.

Material choice also had to reflect how the house would be built. For a small project in Malaysia, securing a suitable steelwork subcontractor with the required fabrication and workmanship quality can be challenging. The study considered constructability alongside cost and architectural expression.

Three schemes, one architectural ambition

Historical structural option estimates. These are not total house construction costs.

OPTIMISED STEEL	SUBSEQUENTLY ADOPTED	STUDIED ALTERNATIVE
Steel	Reinforced concrete	Hybrid
		
RM399,000	RM193,000	RM201,500
Roof member: 305 × 165 × 46 UB	Roof slab: 200 mm reinforced concrete	Roof slab: 200 mm reinforced concrete
Roof edge: Tapered to 75 mm	Roof edge: Tapered to 75 mm	Roof edge: Tapered to 75 mm
	Columns: 200 × 400 mm reinforced concrete	Columns: 150 × 200 mm RHS steel

RM206,000 lower: the concrete estimate was approximately 52% below the assessed steel option. The hybrid estimate was RM8,500 above concrete.

The saving from optimising the original steel design is a separate comparison; that original-design cost is not quantified in the source study.

04 / THE DECISION

From comparative study to concrete construction

- 01 Before novation: The material comparison was initiated with the architect and client and developed alongside the steel optimisation, establishing an informed basis for selecting the structural system.
- 02 The study: the hybrid offered a balance between architectural appearance and structural function at a cost close to all-concrete. The comparison also demonstrated the suitability of concrete for the architecture and scale of the project.
- 03 Design and build: The design-and-build contractor proceeded with the reinforced-concrete option. The appointment expanded from initial optimisation to responsibility for the structural design, continuing through construction and project completion following novation.

The completed house uses a reinforced-concrete roof and slender concrete columns to realise the intended proportions and long cantilever.



Realising the slender architectural form

The reinforced-concrete roof and slender columns during construction show how the long cantilever and intended proportions were realised.

[Explore Izmir's House →](#)

STUDY BASIS / 2021-2023

C35 concrete RM420/m³; reinforcement RM5,000/t; structural steel RM8,500/t; profiled metal deck RM300/m². Rates were current at the time of assessment. The comparison informs material selection and does not represent a final construction account.

CS 002 / Source Rev 01 / Updated edition October 2026. Final adopted scheme: reinforced concrete. Original comparison © 2021-2023 Ohr Engineering.