

Introduction.

ARCHIER —

The following document includes plans and details for a house that meets the competition brief to design a resilient timber home for the geographic location of Mount Gambier in SA.

However, our submission aims to go beyond a basic house design and instead proposes a timber-centric ecosystem that supports designers and architects to craft durable, location-tailored homes throughout Australia's diverse regions.

This ecosystem is Candour, which is a new system of architectural prefabrication that makes designing and constructing timber buildings straightforward. Candour aims to revolutionise construction by increasing access to advanced manufacturing and streamlining workflows for architects and builders.

Developed by Archier, this design-led system provides certainty at every stage of the building process.

Currently Archier has successfully executed multiple projects utilising Candour's prefabricated building components and we are seeing the real-world benefits associated with advanced timber fabrication and working with a DfMA workflow.

Our research and development facility in Melbourne that has recently acquired a Hundegger Robot Drive 1300, a significant asset that empowers us to design, prototype, and deliver timber buildings at an unparalleled speed.

Through this design competition submission we will explain the Candour system and show how it can be utilised to create resilient timber homes throughout Australia.

Do more in timber, with Candour.



Render - Proposed Design

What & Why?

ARCHIER —

In order to have a significant impact on the construction industry we need to scale good ideas fast.

Education is one way to achieve this, but time and time again we have seen that this process is too slow, costly and fraught with errors and miscommunication.

Instead, we want to provide designers with tools that empower them to execute best practice design and construction with ease - tools that provide them with the information they need as they draw, not days or weeks later.

Candour achieves this through providing a suite of building components that make up the core of a building - the floor, walls, roof and façade.

Connected to each component is a CAD plugin with embedded manufacturing, costing and technical information, paired with standardised details for quick integration into architects documentation.

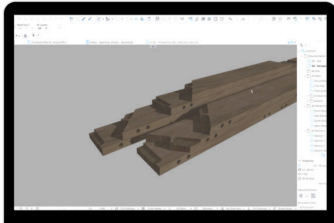
During the design phase architects use our CAD plugins to incorporate prefabricated building components into their plans. The plugins provide instant pricing and buildability advice through a direct connection to the fabrication facility, allowing rapid manufacturing and transport to site.

The protection of the environment is a driving focus with the CAD plugins providing carbon footprint calculations with each design change, embedding smart and sustainable decisions to be projects earlier.

With the ability to connect to manufacturers all over the country the system is scalable and able to facilitate the delivery of high-quality and sustainable buildings to more people.

Through Candour a large scale resilient, timber-based ecosystem is within reach.

DIGITAL TOOLS



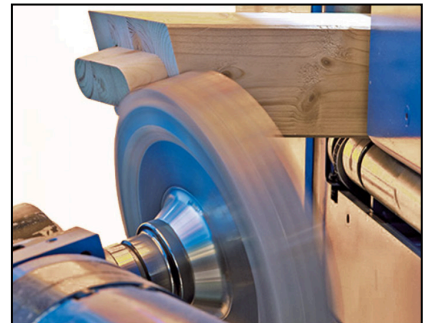
Candour Tools. Software for Designers

- Instant pricing.
- Everything modelled can be built.
- Reduces need for training.
- Integrates with the industries two largest BIM platforms.
- Customisable components, not modular blocks.

Connection

Simplifies and Automates
Resilient Design.

FABRICATION



Candour Fabrication. Hardware for Builders

- Advanced, highly accurate timber fabrication.
- Higher quality, efficient production.
- Designed for efficient installation.

Diagram 01 - The Two Sides to Candour.

How It Works.

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We have developed a plug-in for ArchiCAD that offers enhanced design flexibility within a component-based system.

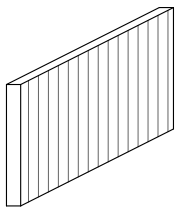
This tool allows architects and designers to seamlessly incorporate various components into their projects, enabling greater customisation and adaptability.

Furthermore, we are continuously improving this tool, and the next iteration will include exciting new features with the ability to provide instant price and carbon footprint information.

These features empower users to make informed decisions regarding cost and environmental impact during the design process.

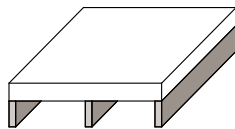
This integration of price and carbon data will enable architects to optimise their designs in terms of both financial feasibility and environmental sustainability.

The Candour Tool Kit of Building Components



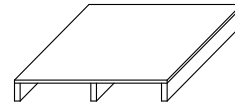
WALL 1

Timber clad prefabricated open-wall cassette with let-in braces.



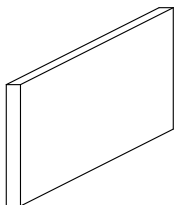
FLOOR 1

Prefabricated floor cassette with site-fixed Hebel Powerfloor.



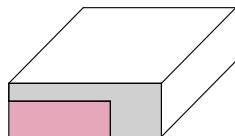
CEILING 1

Prefabricated roof cassette w' R5 PIR.



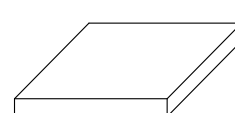
WALL 2

Prefabricated open-wall cassette with let-in braces.



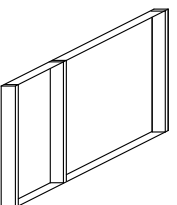
FLOOR 2

Concrete Slab with EPS



CEILING 2

Closed Cassette



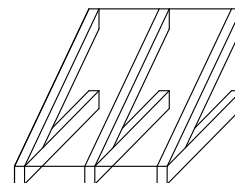
WINDOW 1

Structural Timber Glazed Facade



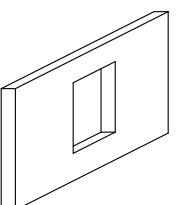
DECK 1

Timber



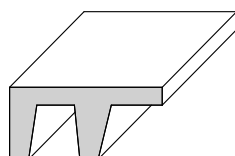
CEILING 3

Truss



WINDOW 2

PVC Double Glazed



DECK 1

Precast Concrete

Our Strategy.

We believe water inundation in a flood is invertible; therefore, we have opted for a wet floodproofing solution where water damage can be reversed by allowing moisture to escape.

We've designed a flood-reversible solution using prefabricated open-wall cassettes, which include machined let-in braces and graded bottom plates. This eliminates the need for OSB or ply and expedites drying after a flood. Our design incorporates timber industry practices, such as moisture-removing graded bottom plates after sacrificial plasterboard removal.

Our 'air-tight' design features removable air 'plugs', and we use blower door test-like fans to aid moisture removal post-flood. Suspended floors in our design help balance hydrostatic pressures during flooding and aid post-flood ventilation.

Hiandri bottom plate packers and PGA-vented wall battens in our walls boost evaporation, moisture removal, and air and water flow behind the timber cladding.

We utilise Candour's Hundegger RobotDrive for fast and complex framing, supplemented with Candour's off-site prefabrication for a cost-effective solution, especially vital when replacing buildings in flood-prone areas swiftly.

The Candour digital tool integrates these details, providing the cut file, including the let-in brace, without extra architect training. Overall, our measures drastically mitigate water damage, simplifying post-flood restoration.

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Diagram 02 - Structural Breakdown

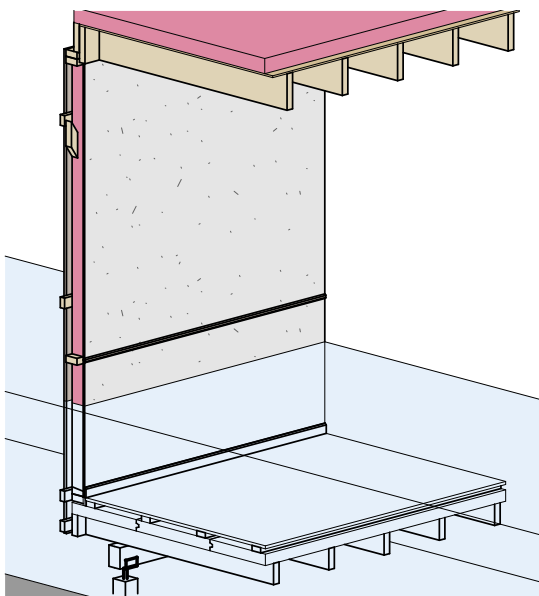
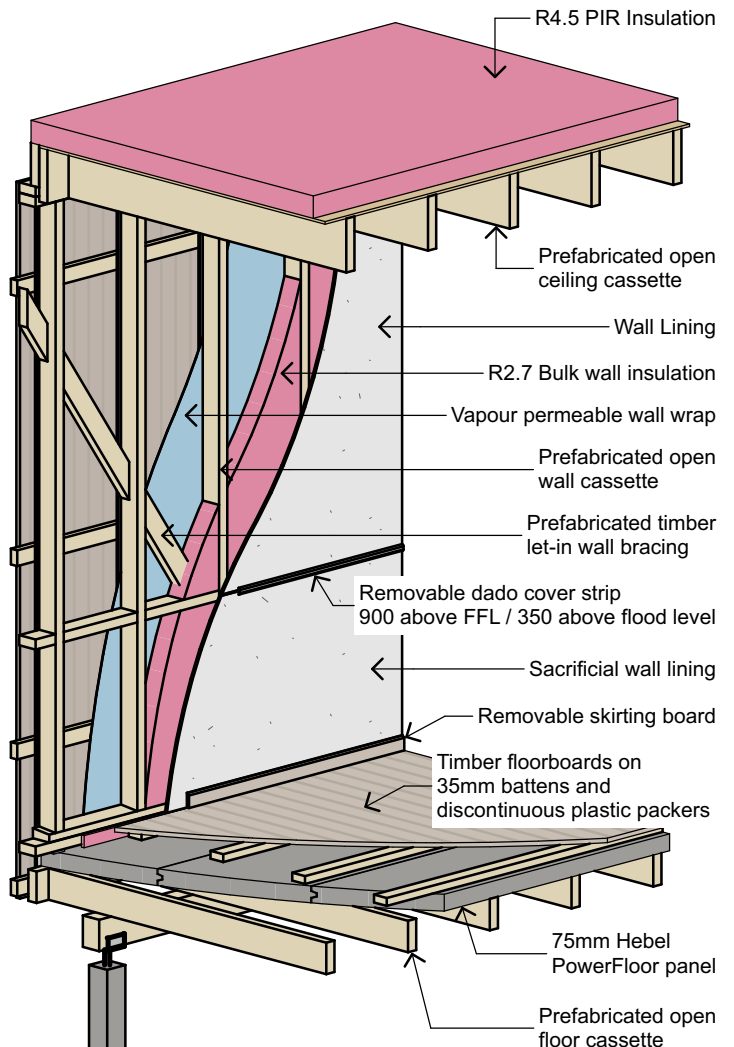
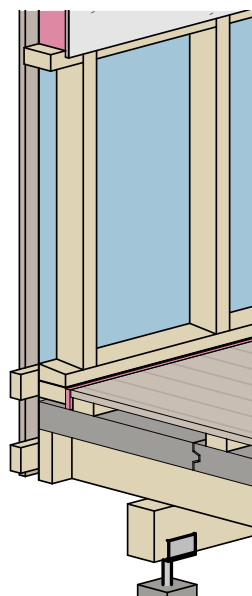
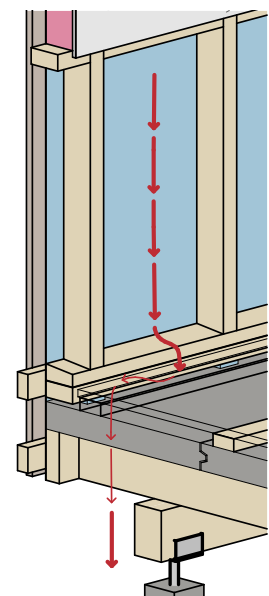


Diagram 03 - Flood Recovery Process

1. Defined flood event inundates dwell. Sacrificial wall lining exceeds flood level by 350mm, protecting upper wall linings, insulation and services



2. Skirting and dado cover strip are removed. Lower wall lining and insulation are removed.



3. Phenolic foam 'air plug' is removed. Lower portion of wall is able to freely drain down the bottom plate packers due to use of Hiandri bottom plate packers.

Costs & Compliance.

ARCHIER —

We have assessed this design in relation to the following Codes and regulations:

- NCC 2022 vol.2 Section H, and the Housing Provisions (HP)
- NCC 2022 vol.1 NT S4C3
- Hazards (Flooding) Overlay of the SA Planning & Design Code
- ABCB Standard: Construction of buildings in flood hazard areas
- US Federal Emergency Management Agency (FEMA) Technical Bulletin 7-93, Wet Flood proofing Requirements for Structures Located in the Special Flood Hazard Area
- US National Flood Insurance Program (NFIP) Technical Bulletin 2, Flood Damage-Resistant Materials Requirements

Code+

Our design for Brief A assumes the geographic location of Mount Gambier in SA.

Hazard risk reduction strategies:

- The ventilation of the sub-floor exceeds HP6.2.1 requirements.
- Timbers used for floor structure to be of durability class 1 or have H5 preservative treatment. Fasteners to be 316 SS exceeding HP6.2.5 requirements.
- While our design is constructed below the Flood Hazard Level, our wet flood-proofing strategies extend 350mm above the FHL exceeding the 300mm free board recommended by the Hazards (Flooding) Overlay of the SA Planning & Design Code.
- Utilities and services located in walls are also raised 450mm above the FHL.
- Additional structure and cladding clearance above NGL exceeds HP7.5.7 requirements.

Indoor environmental quality improvement strategies:

- We have incorporated room heights that surpass the HP10.3.1 minimum requirements.
- Our design provides superior lighting conditions and ventilation, exceeding the HP10.5.1 and HP10.6.2 minimum requirements.
- In relation to HP13.2.6, for climate zone 5 (Mount Gambier), our design incorporates thermal insulation for suspended floors with a higher R-value than R1.5 to R2.0.

Costs

As we are proposing a platform based solution the costs of each dwelling can vary greatly depending on which building components are selected.

However, we have made an estimation of the relative cost of each component in the details section of our submission.

Regarding costs specific to this design:

1. The square form used in the plan is the most efficient shape in regards to the ratio between floor area to facade area. This reduces costs and increases thermal performance.
2. Utility core centralises the services reducing the length of plumbing and electrical runs, reducing costs and material usage.

Higher costs associated with flood damage resistant materials for the structure of the dwelling are off-set by a reduction to the number of materials needing to be replaced after a flood.

Sustainability

HIP V. HYPE Sustainability have conducted a relative assessment of each building component for thermal performance and embodied carbon.

HIP V. HYPE Sustainability provides advice that is commercially grounded, yet ambitious. They lead, collaborate and support others to deliver impact and build Better Cities and Regions, Better Buildings, and Better Businesses.



Render - Alternative Archier Dwelling Exterior

Component Details.

ARCHIER —

WALL 1

Timber clad prefabricated open-wall cassette with let-in braces.

BUILD UP:	EMBODIED CARBON (kgCO2e/m2)	TOTAL INSULATIVE VALUE:
- Hardwood Cladding	19.8	
- PGA Vented Batten	1.3	
- Rothoblaas Traspir Evo membrane.	8.1	
- 90mm Earthwool Batt	7.7	
- 90mm Stud	3.6	
- 10mm Plaster	5.8	
Total:	46.3	R:2.32

REASONING

We believe water inundation in this situation is invertible; therefore, we have opted for a **wet floodproofing solution**, water damage can be reversed if moisture is allowed to escape after a flood. We propose using a prefabricated open-wall cassette with a machined let-in brace and graded bottom plates to achieve this.

The let-in brace eliminates the need to cover the prefabricated wall with OSB or ply, providing significant bracing while making it easier to dry out after a flood. We have also incorporated details from the timber window industry, including graded bottom plates that aid in removing moisture from the structural member once the plaster is removed.

Furthermore, our wall build-up includes Hiandri bottom plate packers, which facilitate the evaporation or mechanical removal of moisture from under the bottom plate after a flood. We also recommend the use of PGA-vented wall battens to allow for the free flow of air and water behind the timber cladding.

The **Candour** digital wall tool integrates these details as standard providing the cut file, including the let-in brace.

Refer to the detailed diagram for more information regarding our wall buildup reasoning & sacrificial elements.

THERMAL PERFORMANCE:



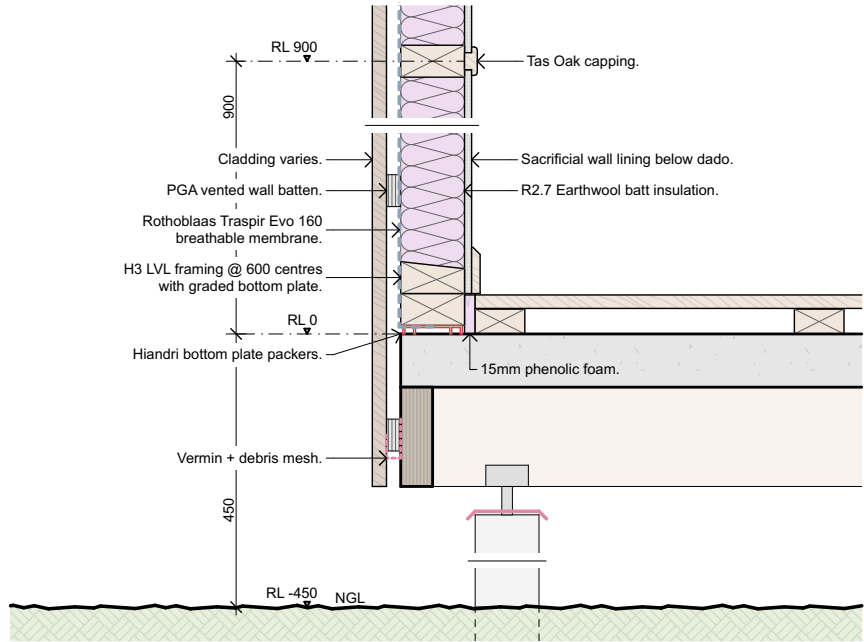
COST:



DURABILITY:



EMBODIED CARBON:



WALL 2

Prefabricated open-wall cassette with let-in braces.

BUILD UP:	EMBODIED CARBON (kgCO2e/m2)	TOTAL INSULATIVE VALUE:
- 90mm Brick	52	
- PGA Vented Batten	1.3	
- Rothoblaas Traspir Evo.	8.1	
- Earthwool R2.7 Bulk	7.7	
- 90mm Stud	3.6	
- 10mm Plaster	5.8	
Total:	77.2	R:2.33

REASONING

Using the same rationale as wall 1, here we illustrate how a conventional brick veneer wall would be constructed while maintaining our approach to resilient timber construction. We believe it is vital to provide flexibility to designers and clients.

THERMAL PERFORMANCE:



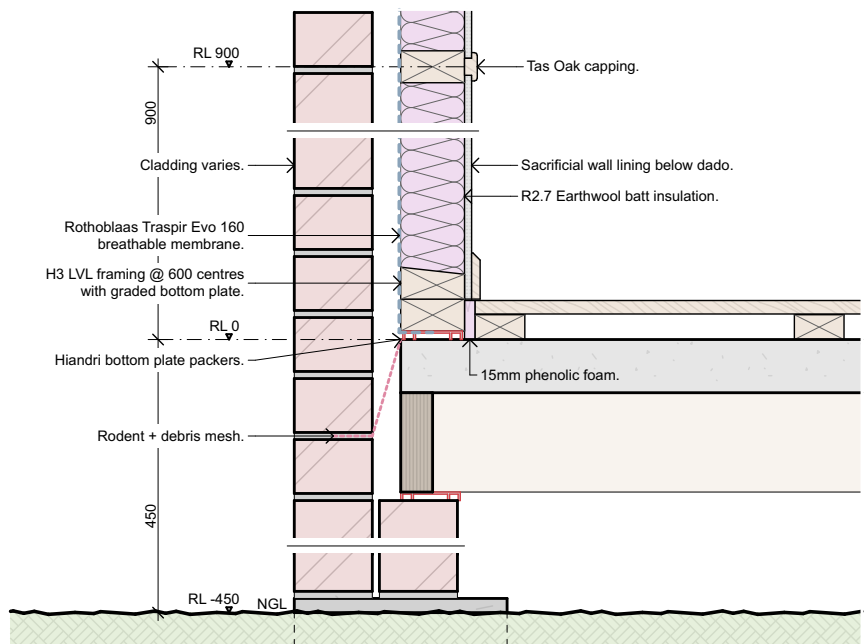
COST:



DURABILITY:



EMBODIED CARBON:



Component Details.

ARCHIER —

FLOOR 1

Prefabricated floor cassette with site-fixed Hebel Powerfloor.

BUILD UP:

- Hardwood Flooring
- 35mm Cavity
- 75 Hebel Power panel
- 140mm

EMBODIED CARBON (kgCO2e/m2)	TOTAL INSULATIVE VALUE:
69.9	
3.6	
24	
6.9	

Total: 107.1 R:0.51

REASONING

Our proposal involves utilising suspended floors to maintain equalised hydrostatic pressures during floods and promote well-ventilated drying post-event.

To achieve this, we suggest combining lightweight aerated concrete and timber. This combination offers excellent thermal performance and durability during and after a flood.

The lightweight concrete ensures dimensional stability regardless of moisture content and adds thermal mass to the building envelope during regular habitation. In the aftermath of a flood, owners can remove the skirting boards and phenolic foam, and then use a blower door fan system to expedite the drying of the cavity between the hardwood floor and bottom cords.

THERMAL PERFORMANCE:



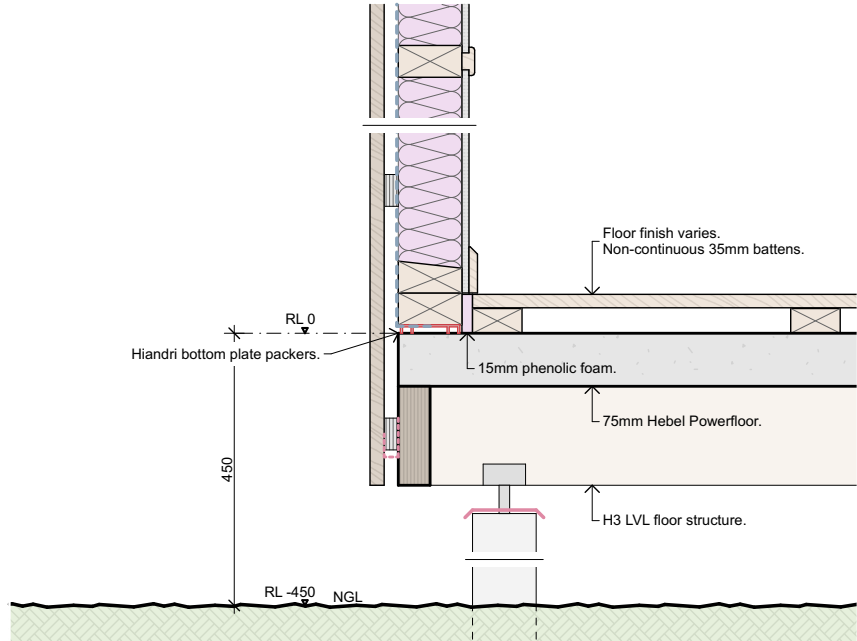
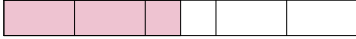
COST:



DURABILITY:



EMBODIED CARBON:



FLOOR 2

Concrete Slab with EPS

BUILD UP:

- Hardwood Flooring
- 35mm Cavity
- 125mm Concrete slab
- EPS Formwork

EMBODIED CARBON (kgCO2e/m2)	TOTAL INSULATIVE VALUE:
69.9	
3.6	
62	
6.9	

Total: 145.5 R:1.83

REASONING

Concrete slabs are not our preferred solution, however, we believe it is important to provide design flexibility and optionality. Here we demonstrate that the system has the agility to integrate with a conventional concrete slab.

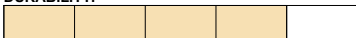
THERMAL PERFORMANCE:



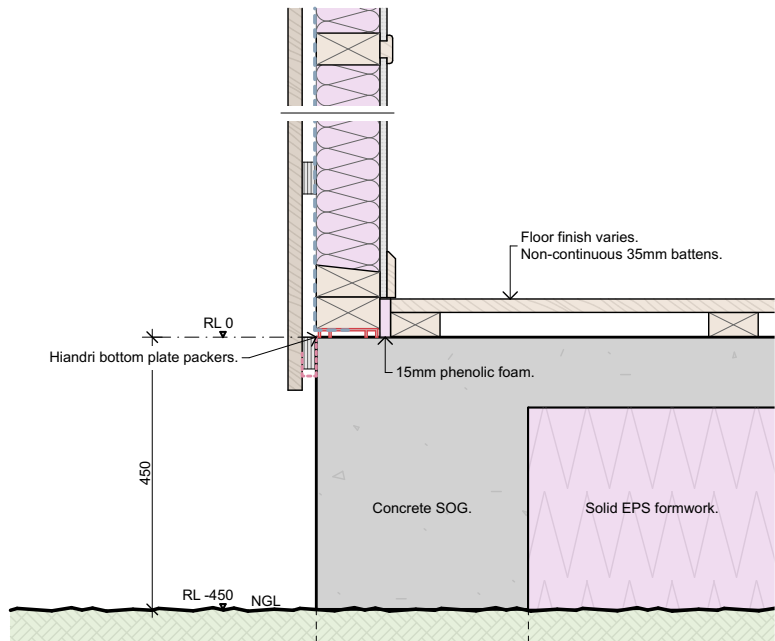
COST:



DURABILITY:



EMBODIED CARBON:



Component Details.

ARCHIER —

ROOF 1

Prefabricated roof cassette with R5 PIR.

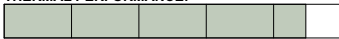
- BUILD UP:**
 - CustomOrb
 - Roof Wrap + Battens
 - R5.0 PIR
 - 18mm PLY
 - 240x60GL18 Vic Ash

EMBODIED CARBON (kgCO2e/m2)	TOTAL INSULATIVE VALUE:
17.9	
11.7	
20	
44.6	
47.4	
Total: 141.6	R:7.47

REASONING

This roof system is a beautiful tribute to Australian timber. With exposed rafters, it brings warmth and height to the interior while a 100mm layer of PIR creates a high-performance barrier that's airtight. The design features a concealed eaves gutter and a timber fascia, reminiscent of the charming 1970s merchant builder homes. The **Candour roof tool** empowers designers and architects with integrated structural detailing and live pricing. Enabling them to specify Australian timber with confidence.

THERMAL PERFORMANCE:



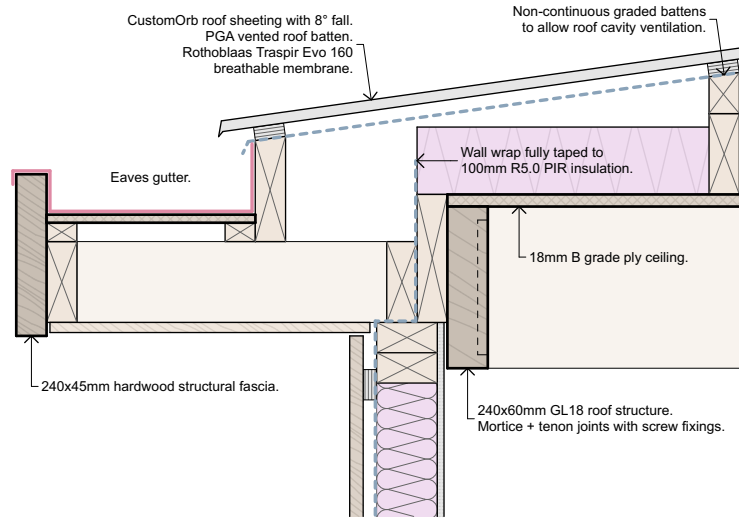
COST:



DURABILITY:



EMBODIED CARBON:



ROOF 2

Prefabricated closed cassette.

- BUILD UP:**
 - CustomOrb
 - Roof Wrap
 - Rothoblaas Traspir.
 - 12mm H3 OSB
 - R5.0 Bulk
 - 12mm H3 OSB

EMBODIED CARBON (kgCO2e/m2)	TOTAL INSULATIVE VALUE:
17.9	
11.7	
20	
9	
10.6	
9	
Total: 68.3	R:5.69

REASONING

This high-performance solution is deployed when clients or designers seek a passive house buildup. Internal linings are flexible and can be coupled with high-performance walls. This **Candour roof tool** future-proofs the system for the changing regulatory and social environment.

THERMAL PERFORMANCE:



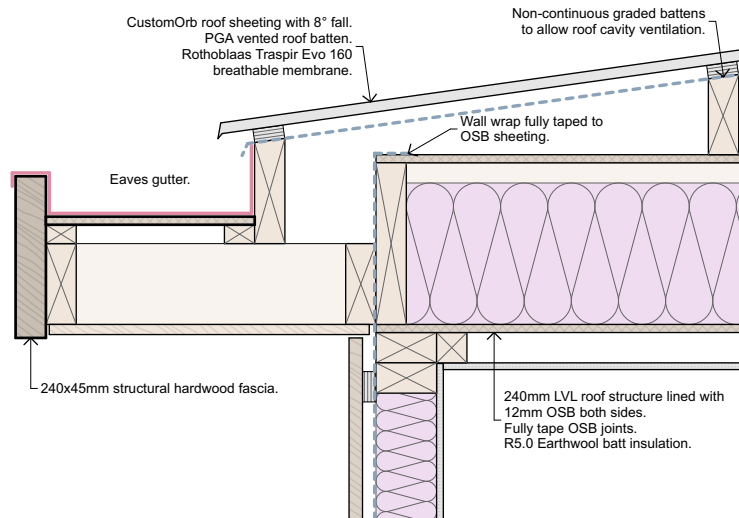
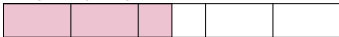
COST:



DURABILITY:



EMBODIED CARBON:



ROOF 3

Traditional truss

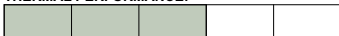
- BUILD UP:**
 - CustomOrb
 - Roof Wrap
 - R5.0 Bulk
 - 10mm Plaster on batts

EMBODIED CARBON (kgCO2e/m2)	TOTAL INSULATIVE VALUE:
17.9	
11.7	
10.6	
9.4	
Total: 49.6	R:5.27

REASONING

While not our preferred option due to the difficulty in achieving an air-tight envelope, designers and clients sometimes require short-term, cost-effective solutions. The **Candour** platform integrates with these solutions, enabling design freedom and product variation.

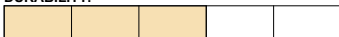
THERMAL PERFORMANCE:



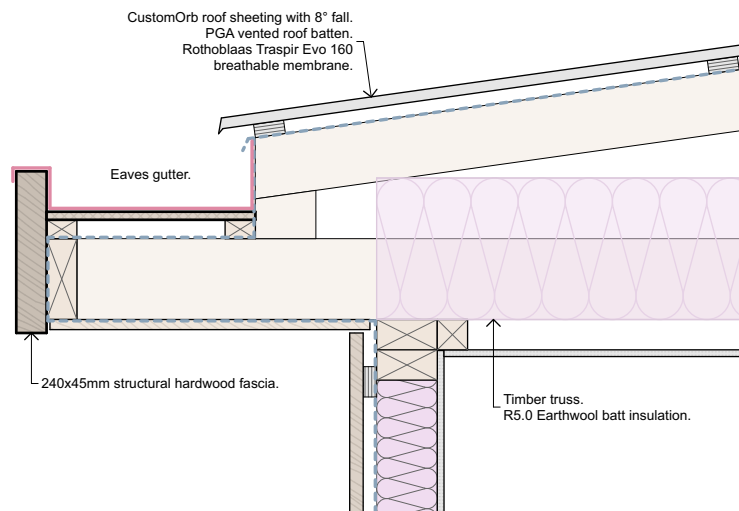
COST:



DURABILITY:



EMBODIED CARBON:



Component Details.

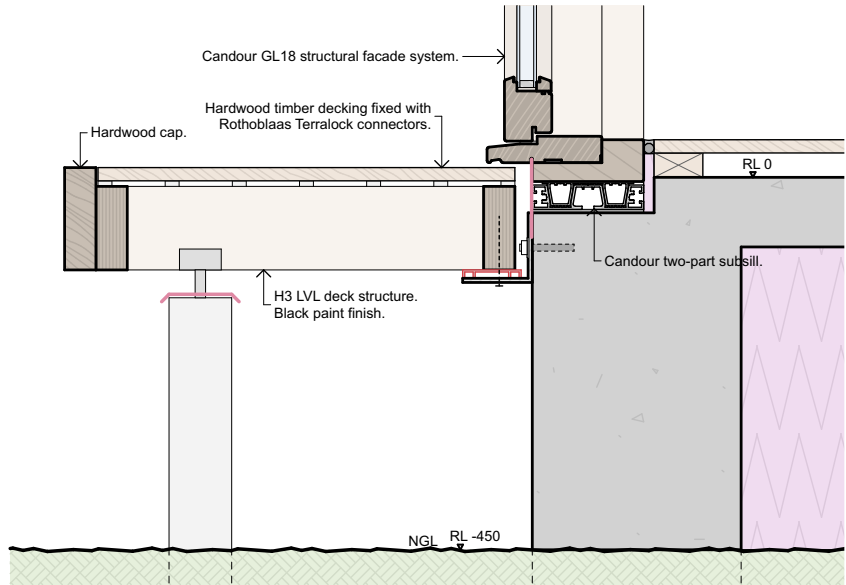
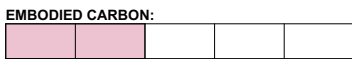
ARCHIER —

DECK 1

Prefabricated timber Decking

BUILD UP:
 - 19mm Hardwood decking
 - 140mm H3 LVL

REASONING
 The Rothoblaas deck fixtures fix the timber at the edge of the board, removing the need to screw through the face. This makes it quick to install and extends the life span of the deck. The **Candour deck tool** allows designers to account for landscape elements outside of the building envelope quickly

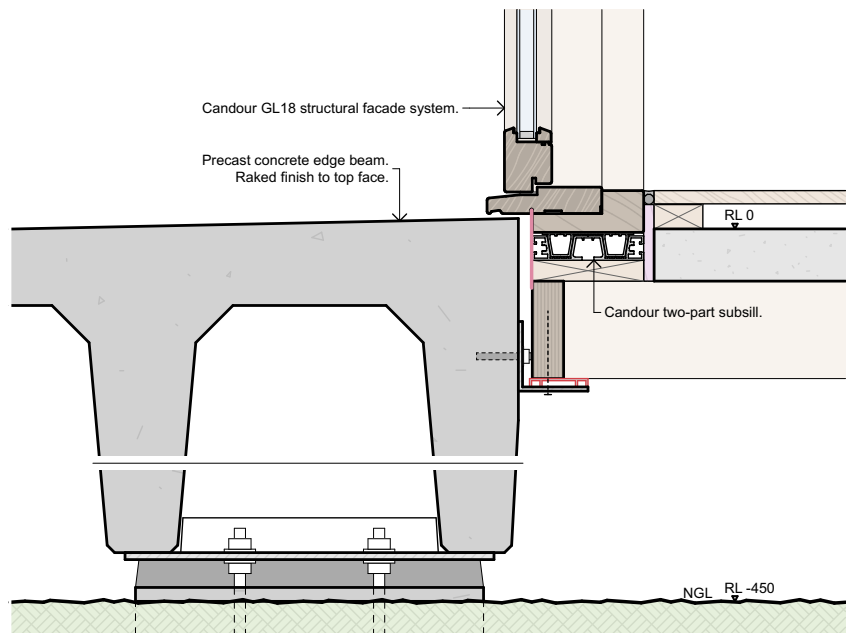
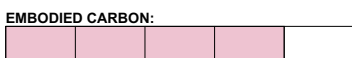


DECK 2

Precast Decking

BUILD UP:
 - Concrete

REASONING
 Our concrete deck is a versatile product that serves a dual purpose. Firstly, it provides a low-maintenance decking solution. Secondly, it serves as a load-bearing footing for timber-framed buildings in bush fire zones. The deck effectively encloses the subfloor and allows for easy installation of floor panels. It is quick to deploy and highly durable. For more information, refer to the Archier Cabin page for additional imagery of this product.



Render - Alternative Archier Dwelling Exterior

Component Details.

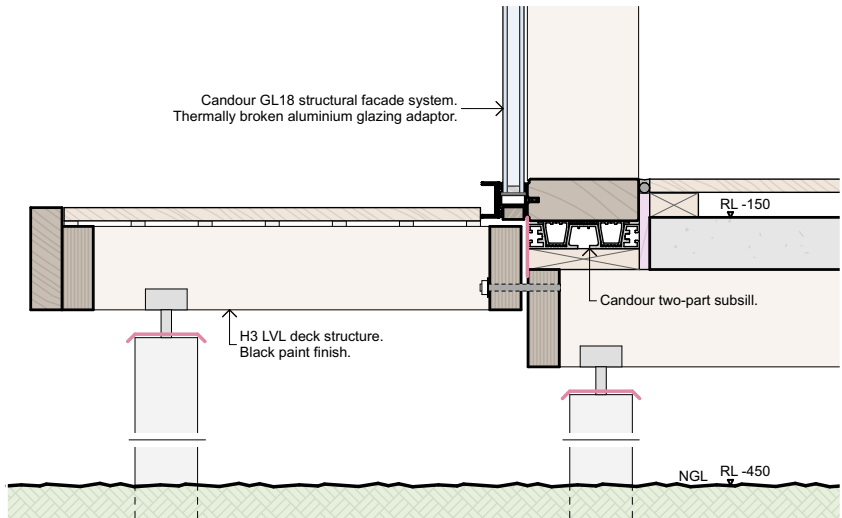
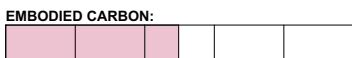
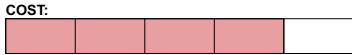
ARCHIER —

WINDOW 1

STRUCTURAL FACADE SYSTEM

BUILD UP:
 - 160x60mm GL18 Mullions
 - Passive house-rated aluminium glazing system

REASONING
 The Glazed Structural Timber Facade eliminates the need for structural steel by distributing roof load through window mullions. This innovative system integrates large glass panels, providing natural light, unobstructed views, and aesthetic appeal. The use of sustainable timber enhances the building's warmth and energy efficiency, while also offering excellent thermal insulation properties.

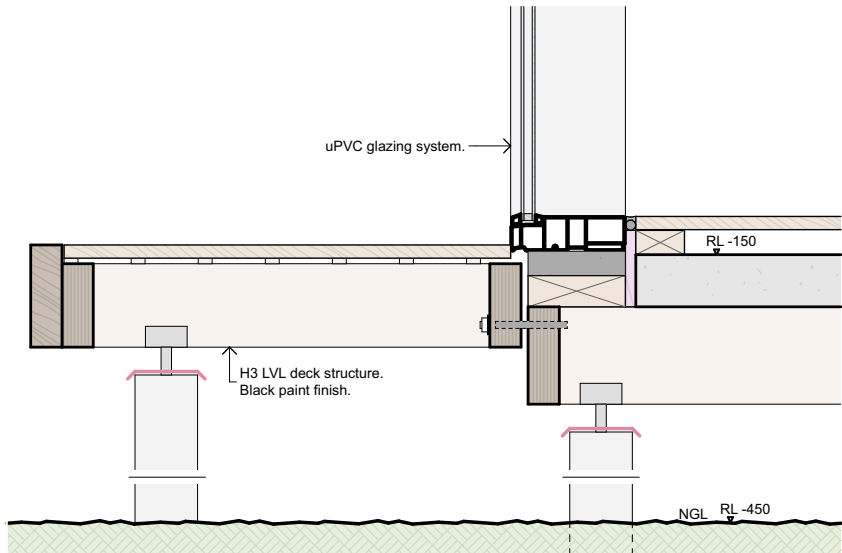
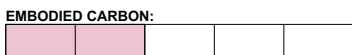


WINDOW 2

Precast Decking

BUILD UP:
 - Concrete

REASONING
 In addition to the Glazed Structural Timber Facade, we also offer cost-effective PVC windows as part of our product lineup. These PVC windows provide an affordable alternative for building projects without compromising on quality and performance. With their durable construction and energy-efficient properties, our PVC windows offer excellent value for customers looking for cost-effective solutions in their architectural designs



Render - Alternative Archier Dwelling Interior