



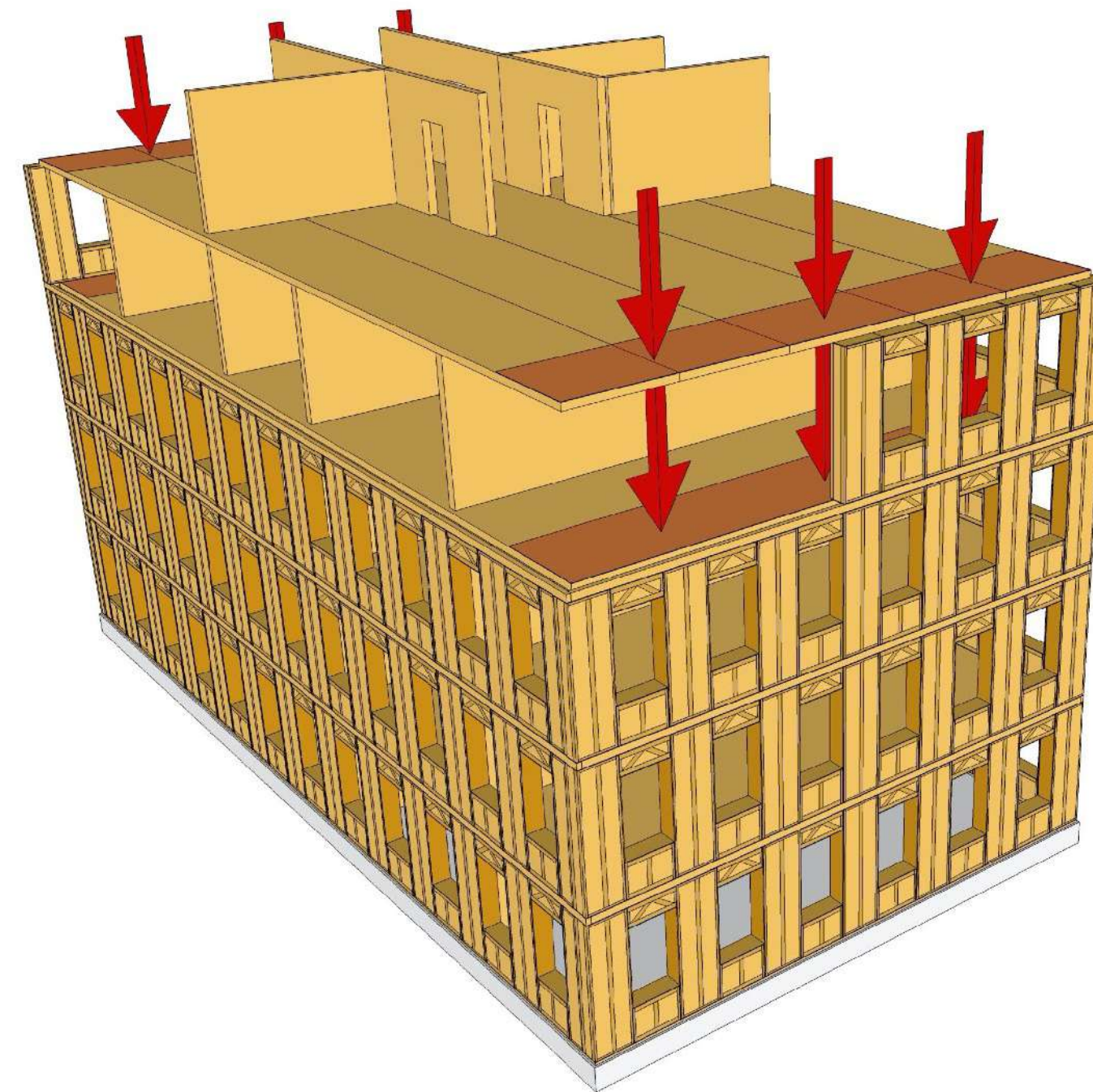
Low-Rise Buildings

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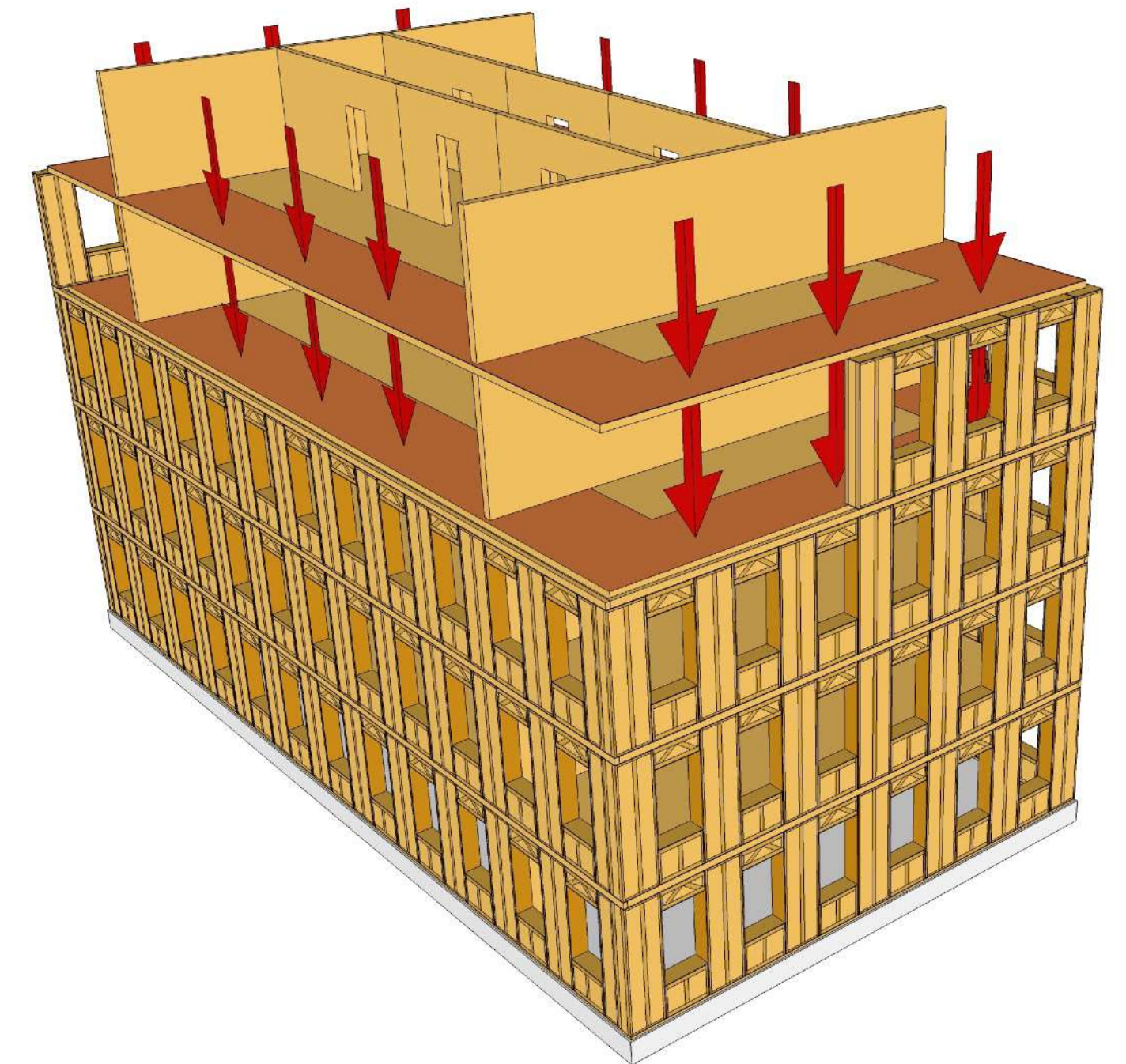
Concept developed by CREATERRA.

Structural concepts

Inner walls load-bearing and partial load on 2 facades



Partial load on all facades

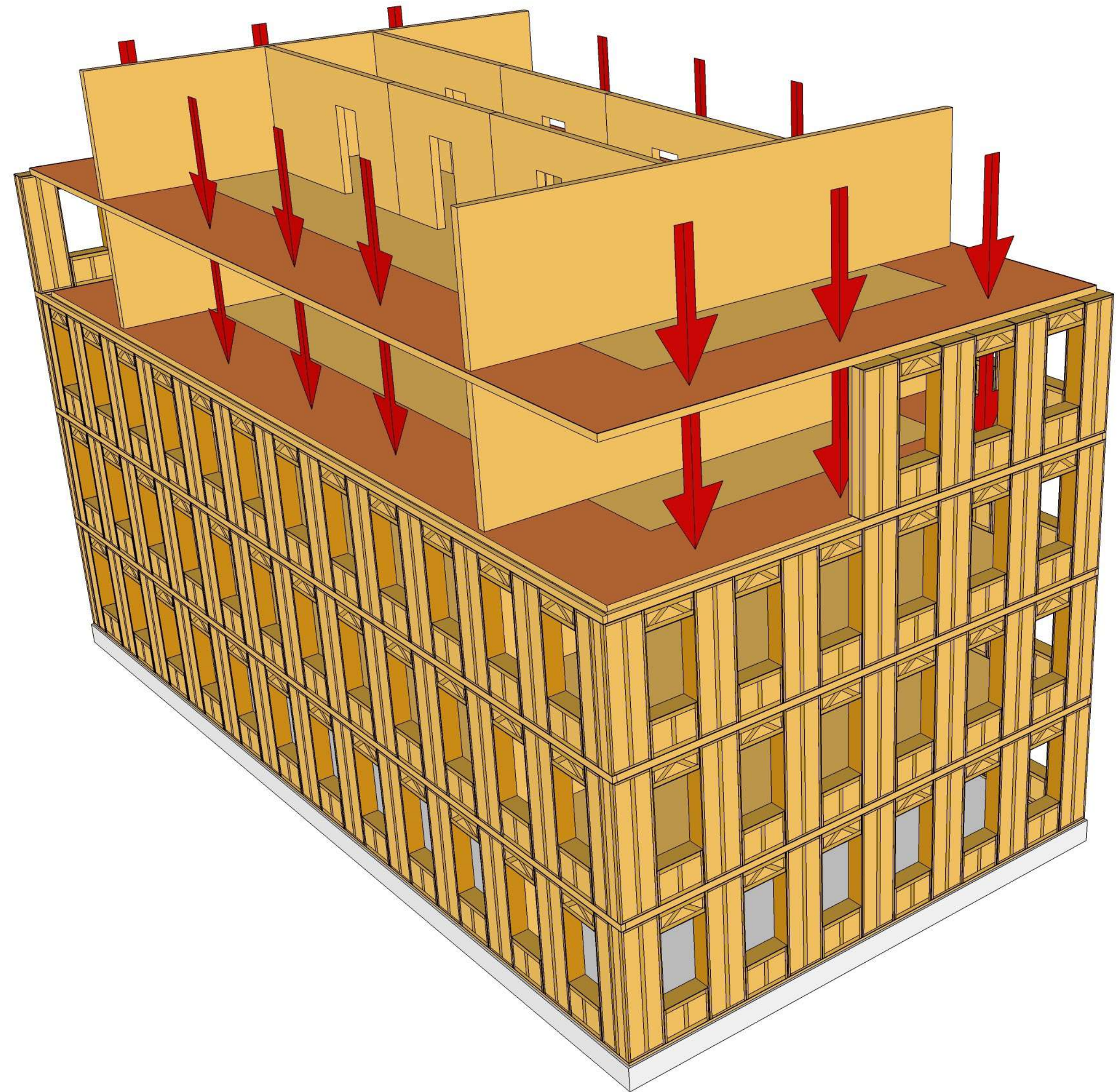


» Most loads can be taken up by internal walls made with CLT.

Load-bearing capacity and number of stories depends mainly on structural design decisions.

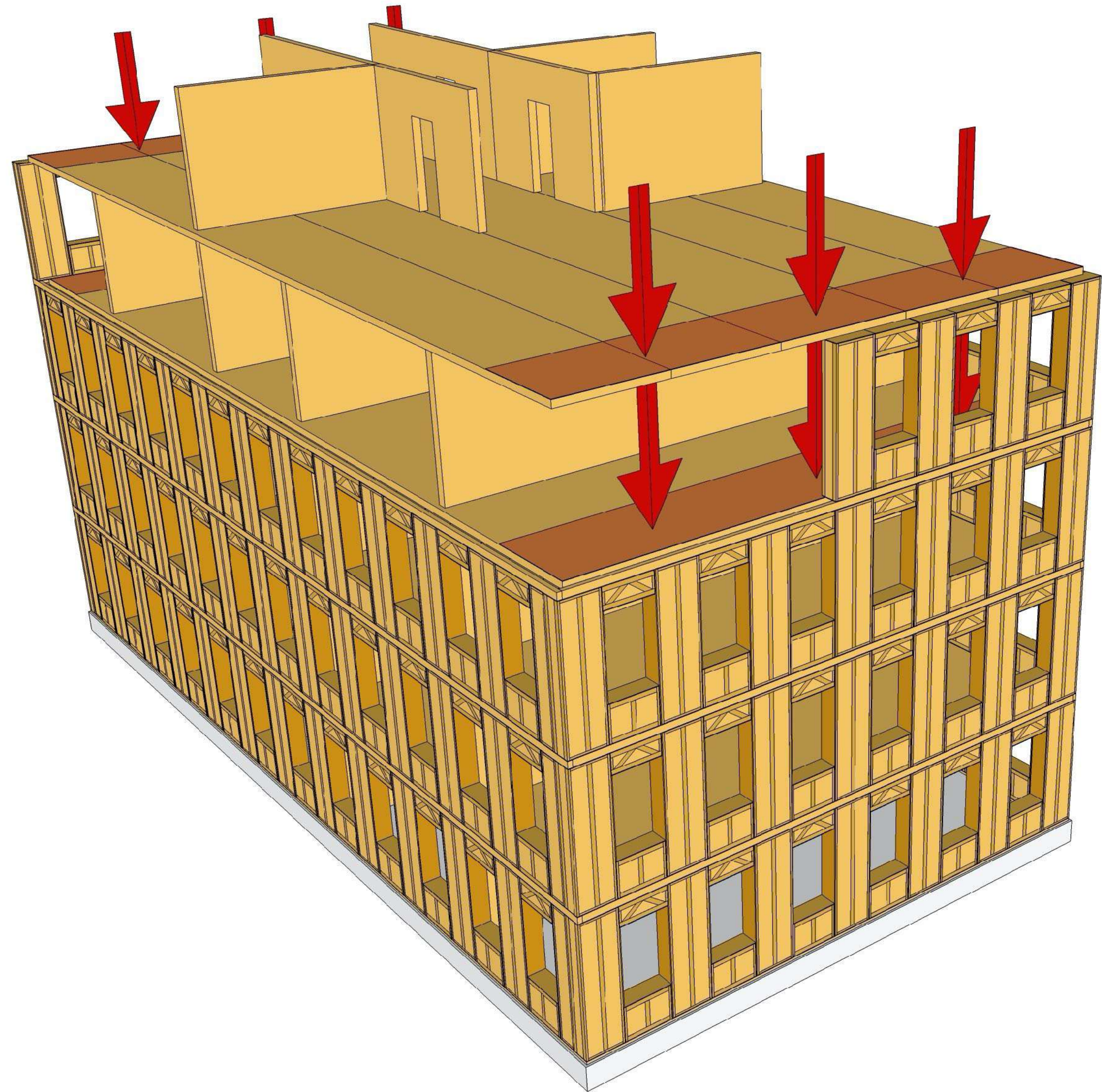
All facades are load-bearing

- » All facade elements are taking loads from the building
- » The internal wooden structure carries approx. half of the load from the floors
- » Stiffness of the building can be in part provided by the internal structure

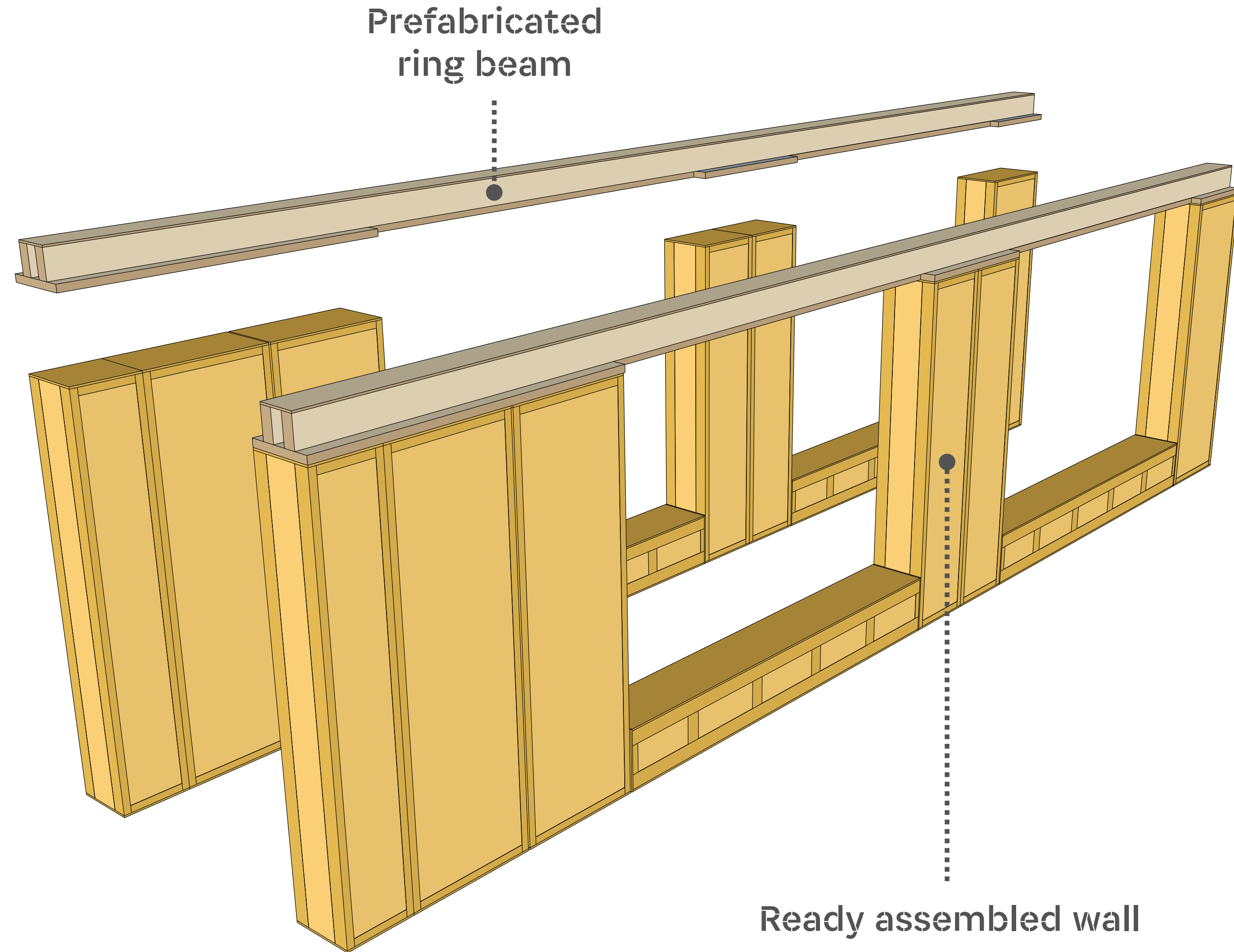


EcoCocon on two load-bearing facades

- » Only the end facades are taking loads
- » The internal wooden structure carries most of the load from the floors
- » On the long facades the panels carry only themselves
- » Stiffness of the building can be provided by the internal structure at least in one direction

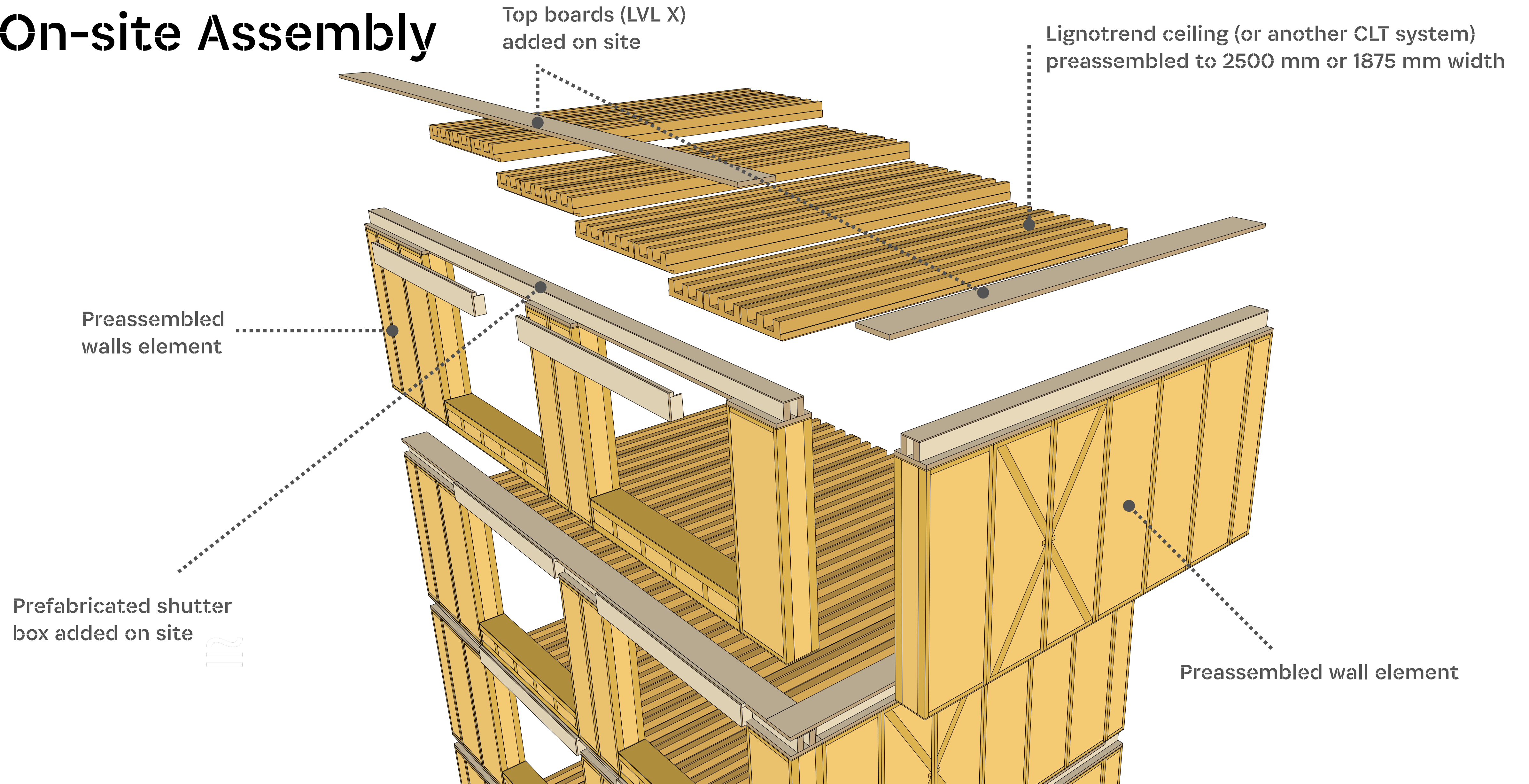


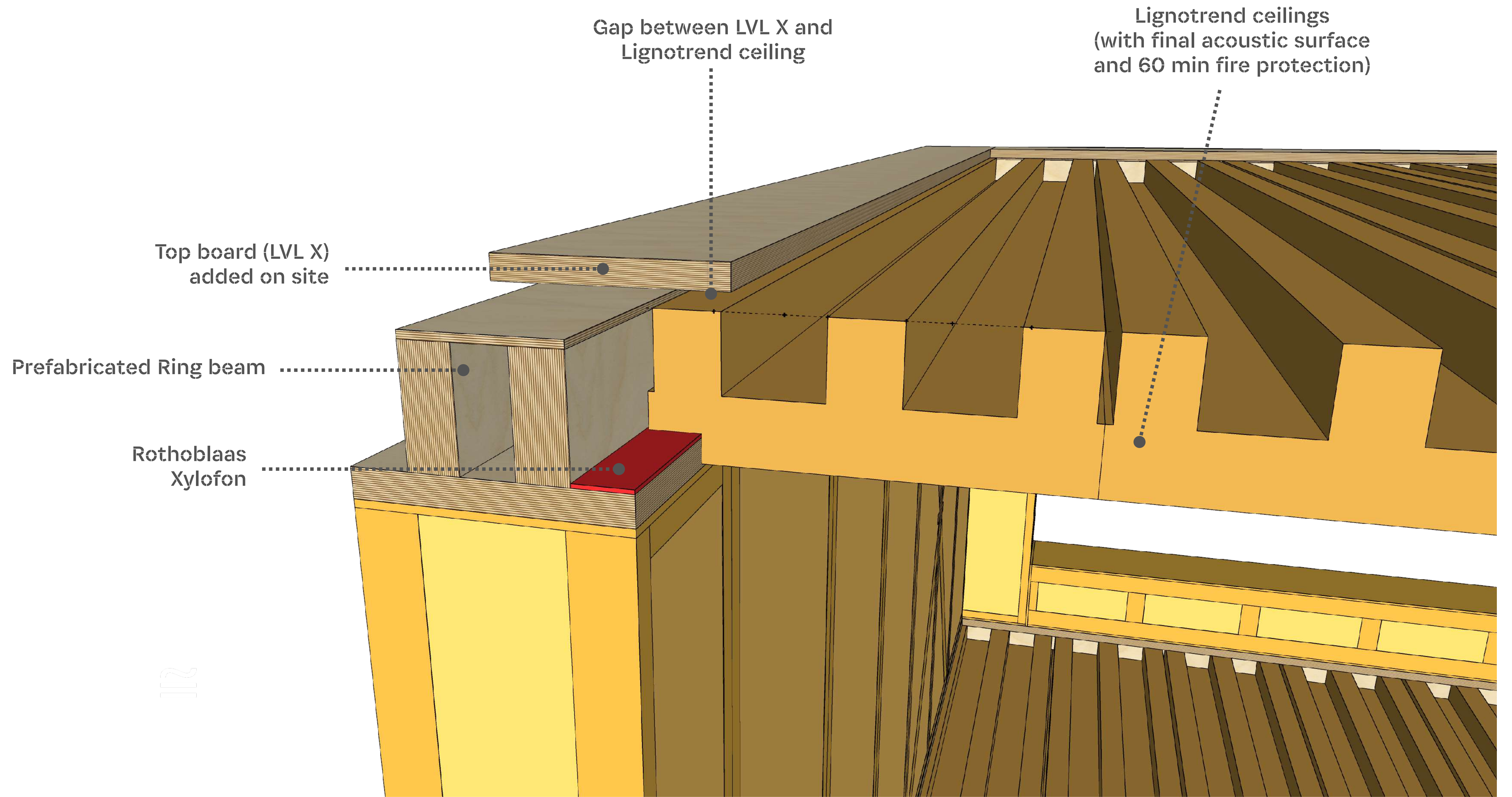
Prefabricated walls



- » Walls transported to building site pre-assembled
- » Ring beam is strong enough for all lifting and handling

On-site Assembly



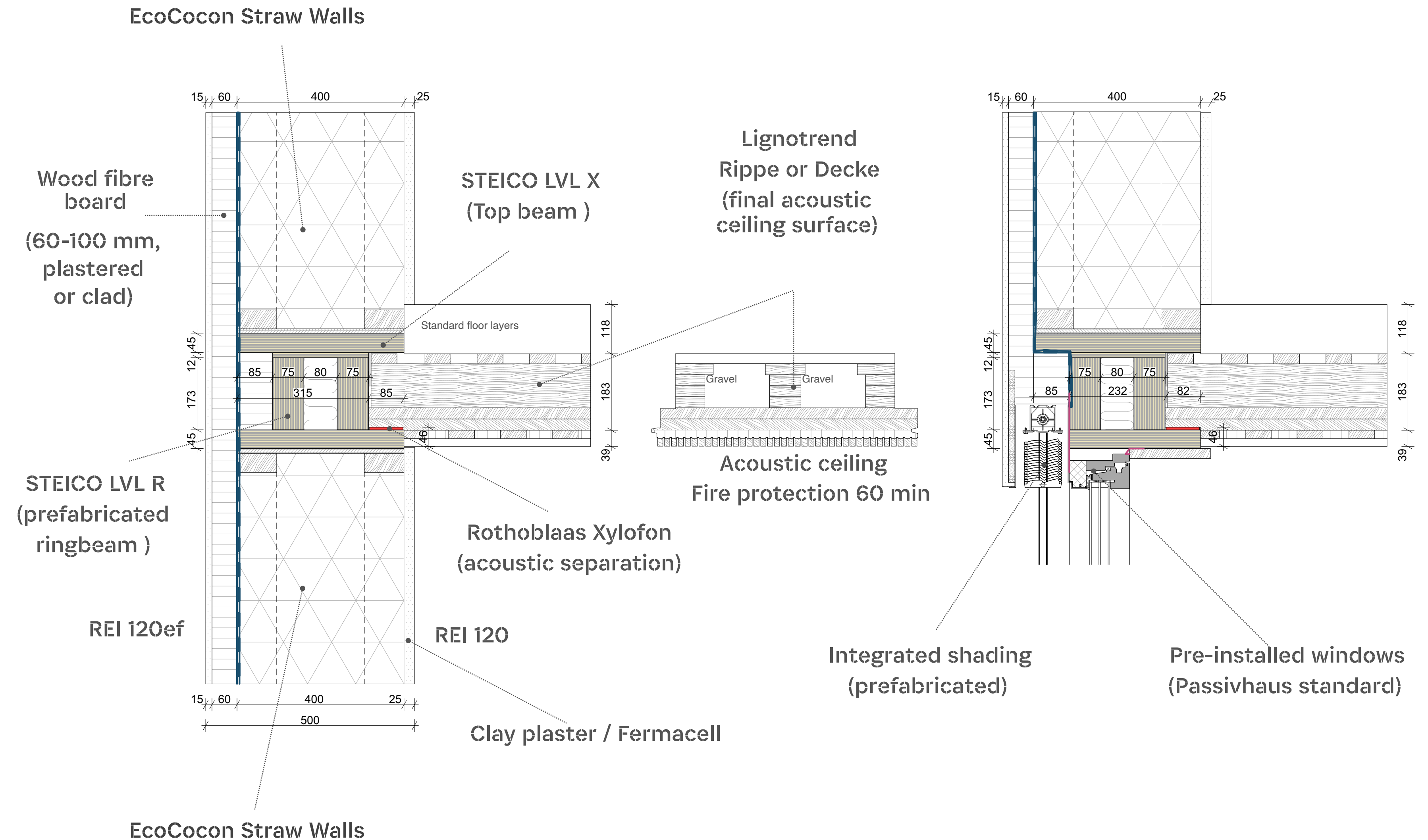


Ring beam detail

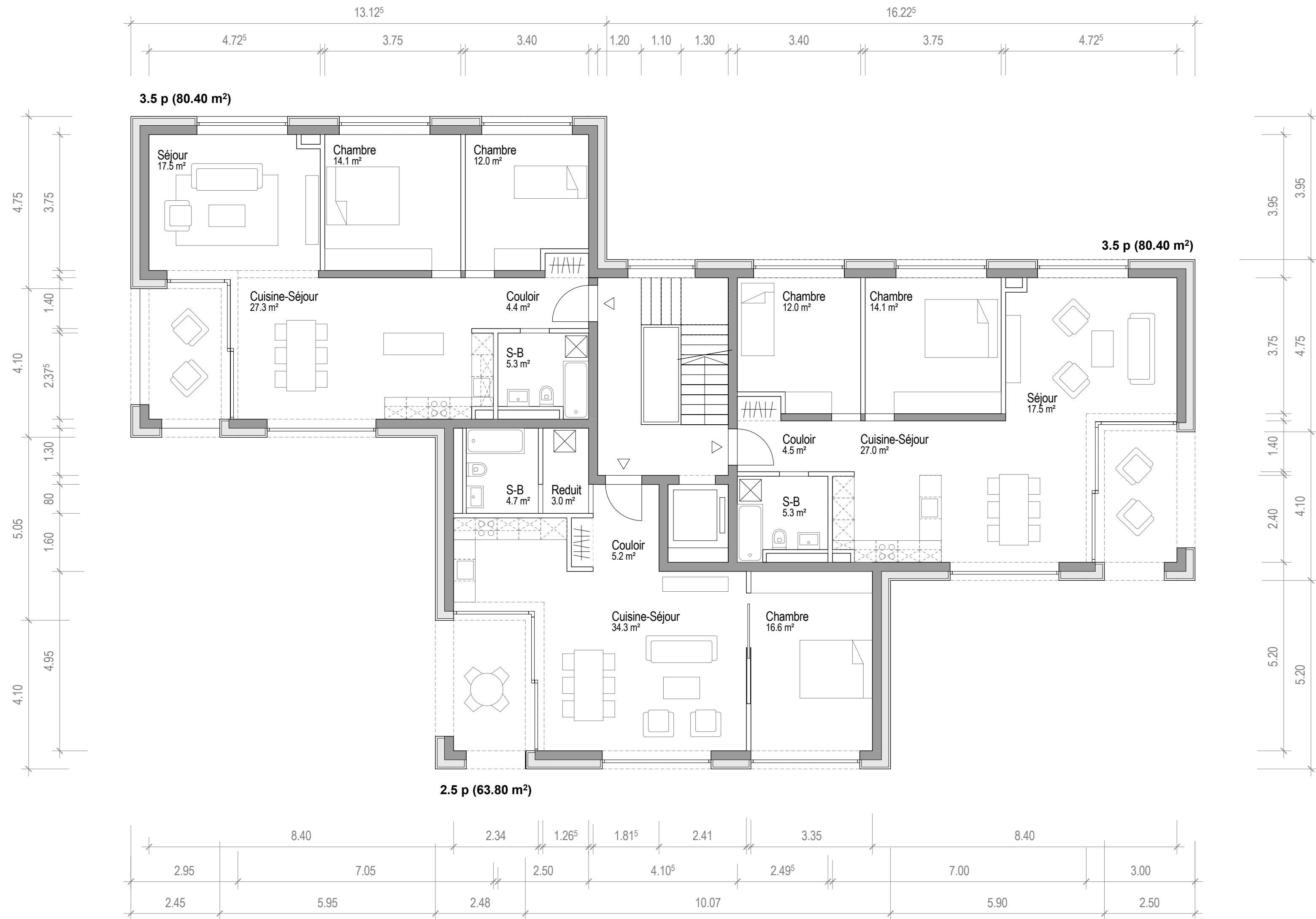
Concept by CREATERRA

Ring beam detail

- » Ringbeam provides space for shading devices
- » Airtight layer is in one level on the outside and protects against the elements
- » Standard CLT floors can be used instead of Lignotrend elements



Sample Floor Plan



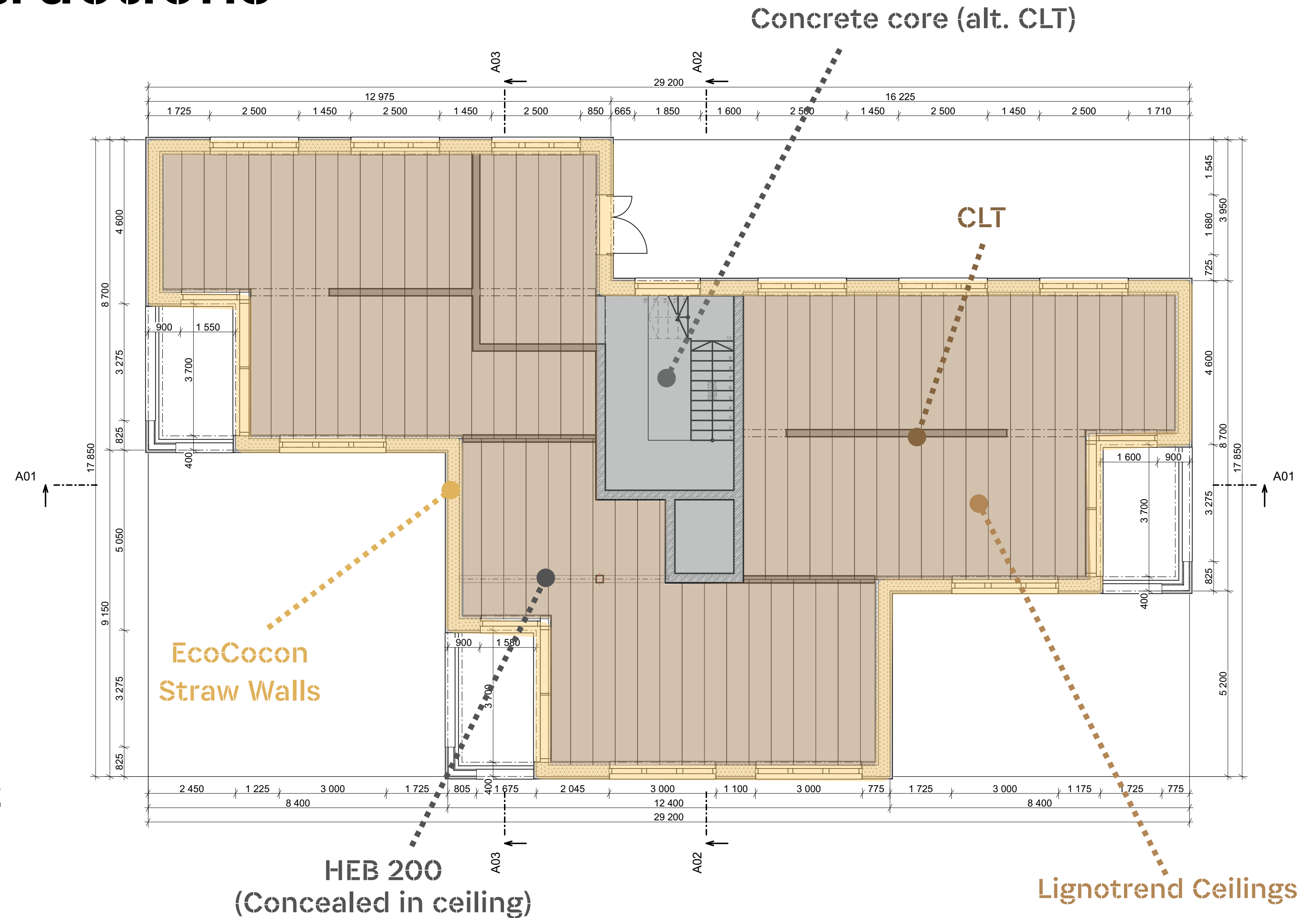
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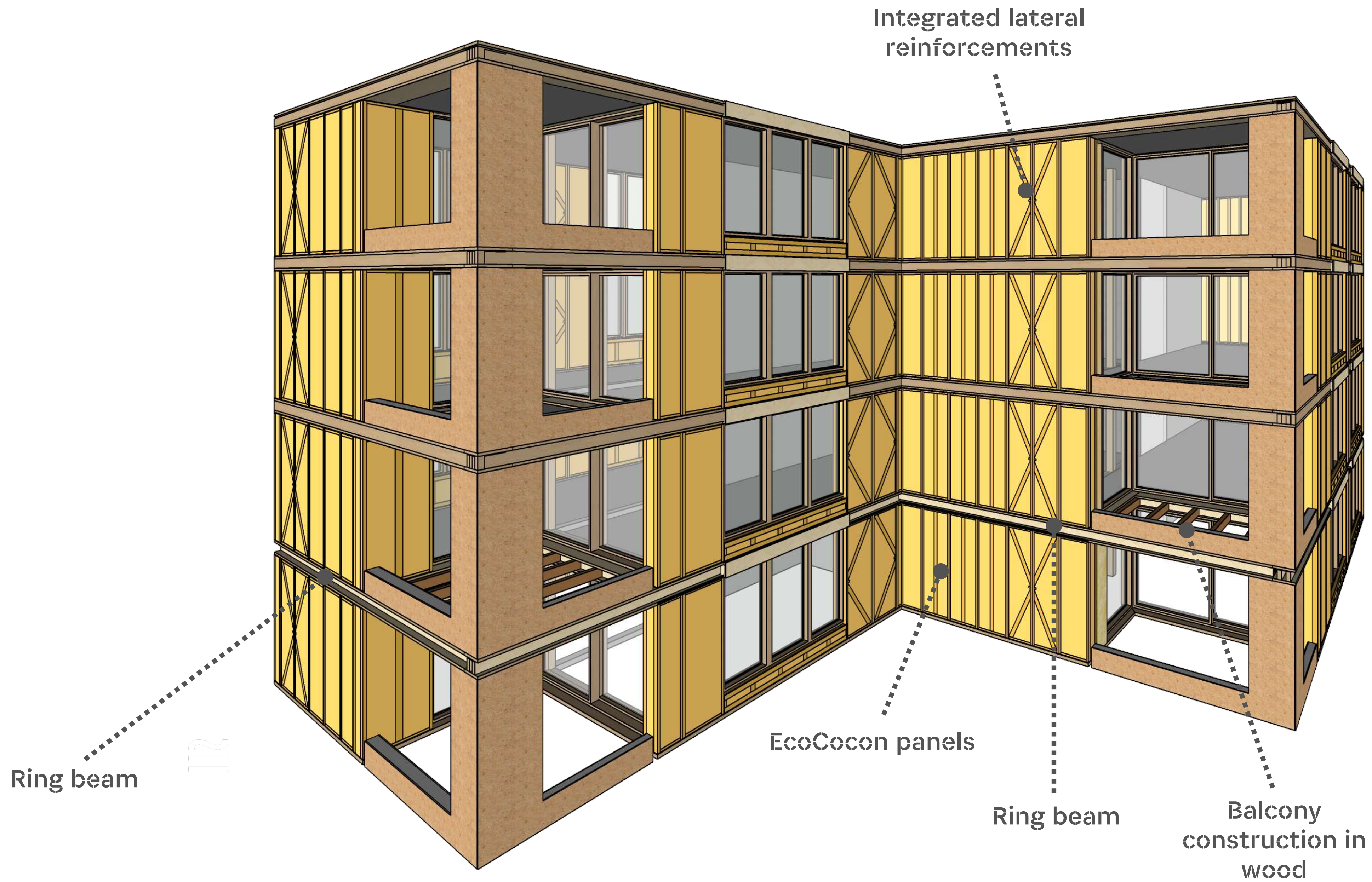
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projet parcelle nord

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Load-bearing constructions

- » Load-bearing facades
- » Straw wall surface in model 912 m² - windows / openings = **approx. 775 m²**
- » 58 000 kg of CO₂ sequestered in EcoCocon wall





EcoCocon exterior walls

Concept by CREATERRA

Ring beam optimizes load distribution inside/outside

LVL X plate calculation

Geometric parameters:

Height: $h := 51 \cdot \text{mm}$
 Width: $b := 400 \cdot \text{mm}$
 Length: $l := 800 \cdot \text{mm}$
 Load from span: $B := 6 \cdot \text{m}$
 Eccentricity: $e_1 := 75 \cdot \text{mm}$ $e_2 := 230 \cdot \text{mm}$

Space between posts: $t := 800 \cdot \text{mm}$

Moment of inertia: $I := \frac{b \cdot h^3}{12} = 442.17 \text{ cm}^4$

Section modulus about the main axis: $W := \frac{b \cdot h^2}{6} = 173.4 \text{ cm}^3$

Sum of actions: $P_1 := 5 \text{ kPa}$ $P_2 := 3 \text{ kPa}$

Load intensity to the linear meter $q_{\text{roof}} := P_1 \cdot B \cdot 0.5 = 15 \frac{\text{kN}}{\text{m}}$ $q_{\text{floor}} := P_2 \cdot B \cdot 0.5 = 9 \frac{\text{kN}}{\text{m}}$

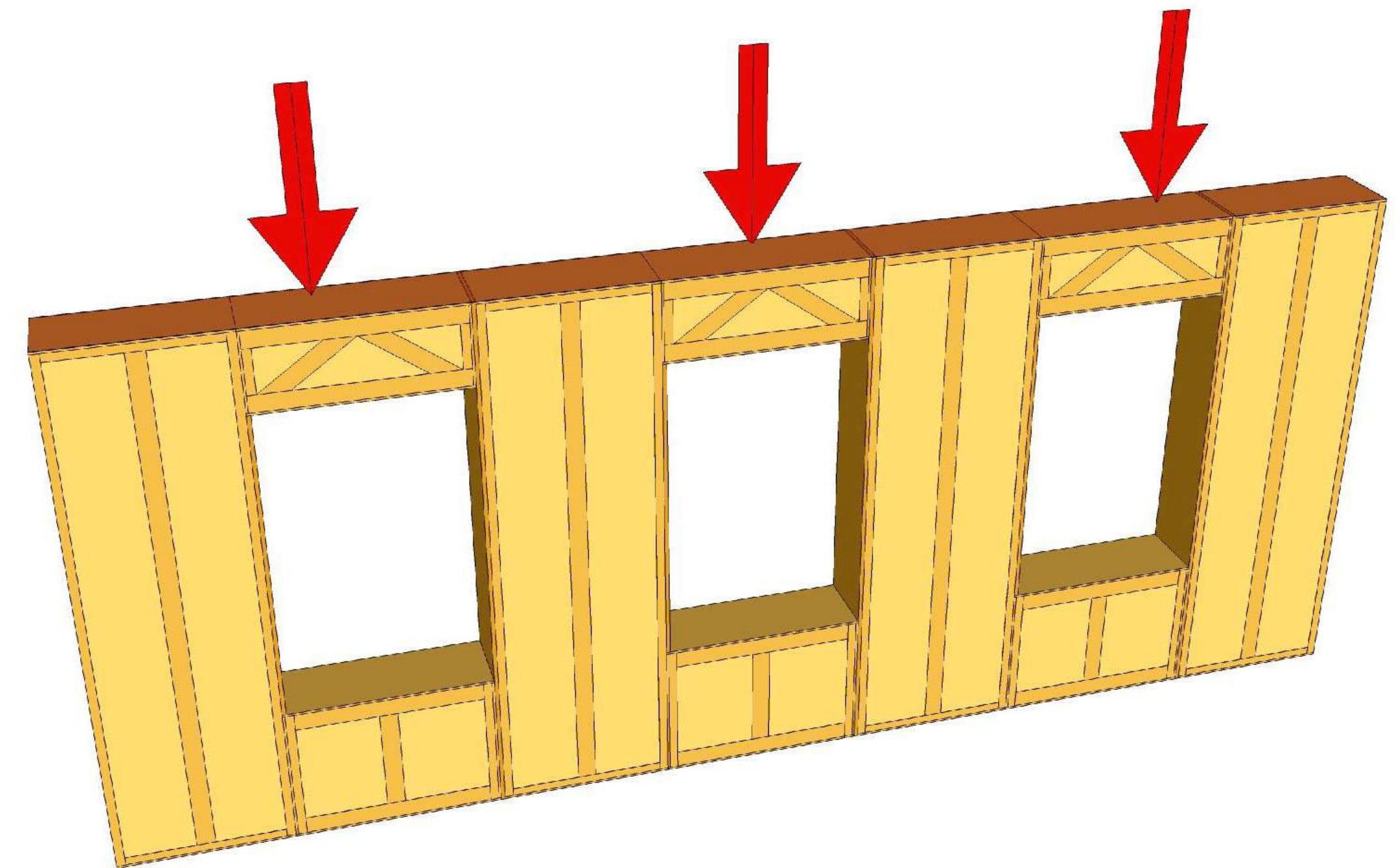
Fig1. Geometry

Inner side:	Outer side:
$q_{1.1} := q_{\text{roof}} = 15 \frac{\text{kN}}{\text{m}}$	$q_{1.2} := 0 \frac{\text{kN}}{\text{m}}$
$q_{2.1} := \frac{e_2 q_{\text{roof}}}{(e_1 + e_2)} + q_{\text{floor}} = 20.311 \frac{\text{kN}}{\text{m}}$	$q_{2.2} := \frac{e_1 q_{\text{roof}}}{(e_1 + e_2)} = 3.689 \frac{\text{kN}}{\text{m}}$
$q_{3.1} := \frac{e_2 q_{2.1}}{(e_1 + e_2)} + q_{\text{floor}} = 24.317 \frac{\text{kN}}{\text{m}}$	$q_{3.2} := \frac{e_1 q_{2.1}}{(e_1 + e_2)} + \frac{e_2 q_{2.2}}{(e_1 + e_2)} = 7.776 \frac{\text{kN}}{\text{m}}$
$q_{4.1} := \frac{e_2 q_{3.1}}{(e_1 + e_2)} + q_{\text{floor}} = 27.337 \frac{\text{kN}}{\text{m}}$	$q_{4.2} := \frac{e_1 q_{3.1}}{(e_1 + e_2)} + \frac{e_2 q_{3.2}}{(e_1 + e_2)} = 11.844 \frac{\text{kN}}{\text{m}}$

Structural load capacity

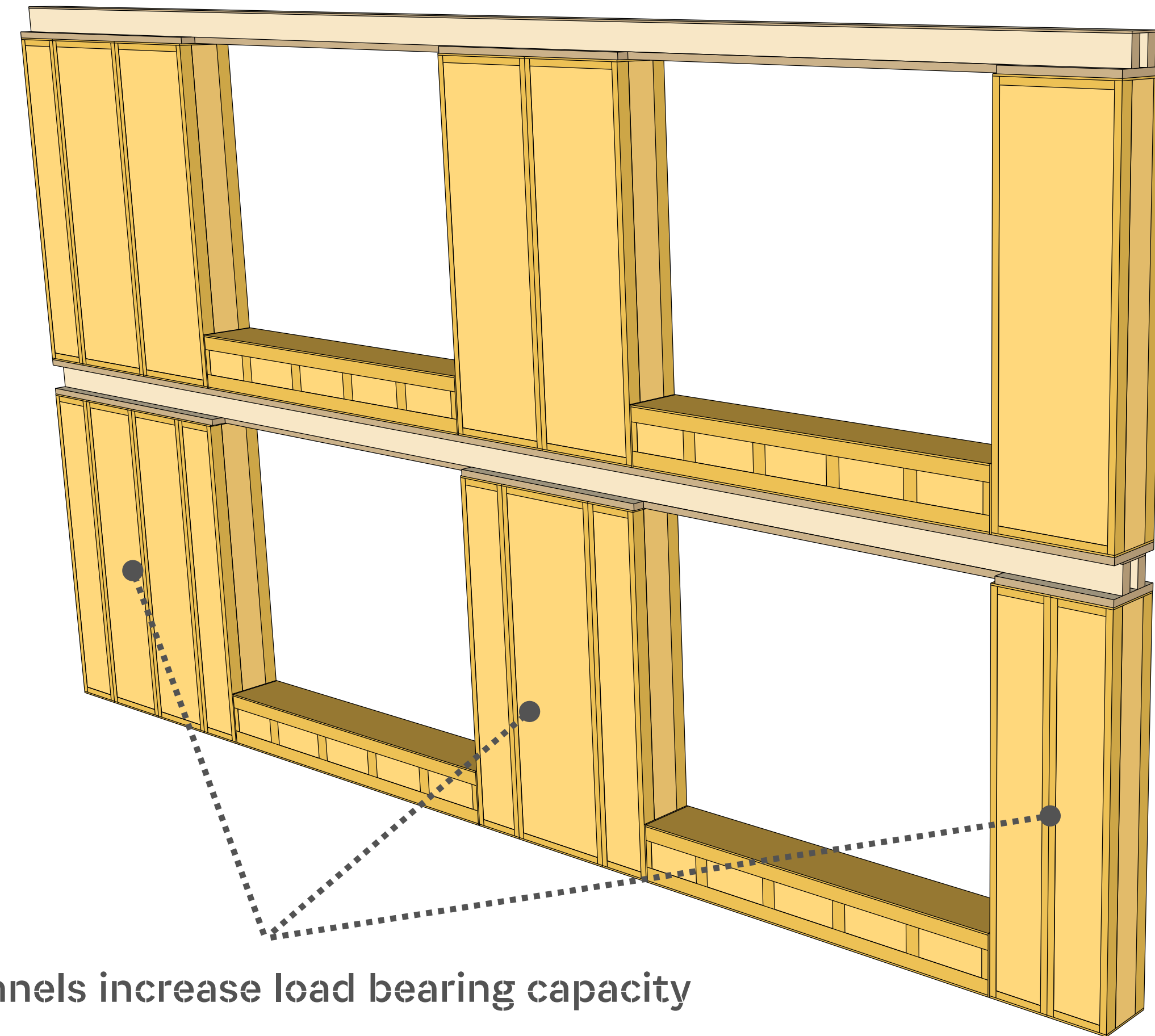
A standard wall can take min. 40 kN/m, tested at 70 kN/m.

The exact load-bearing capacity can be calculated by any structural engineer with experience in wood construction.

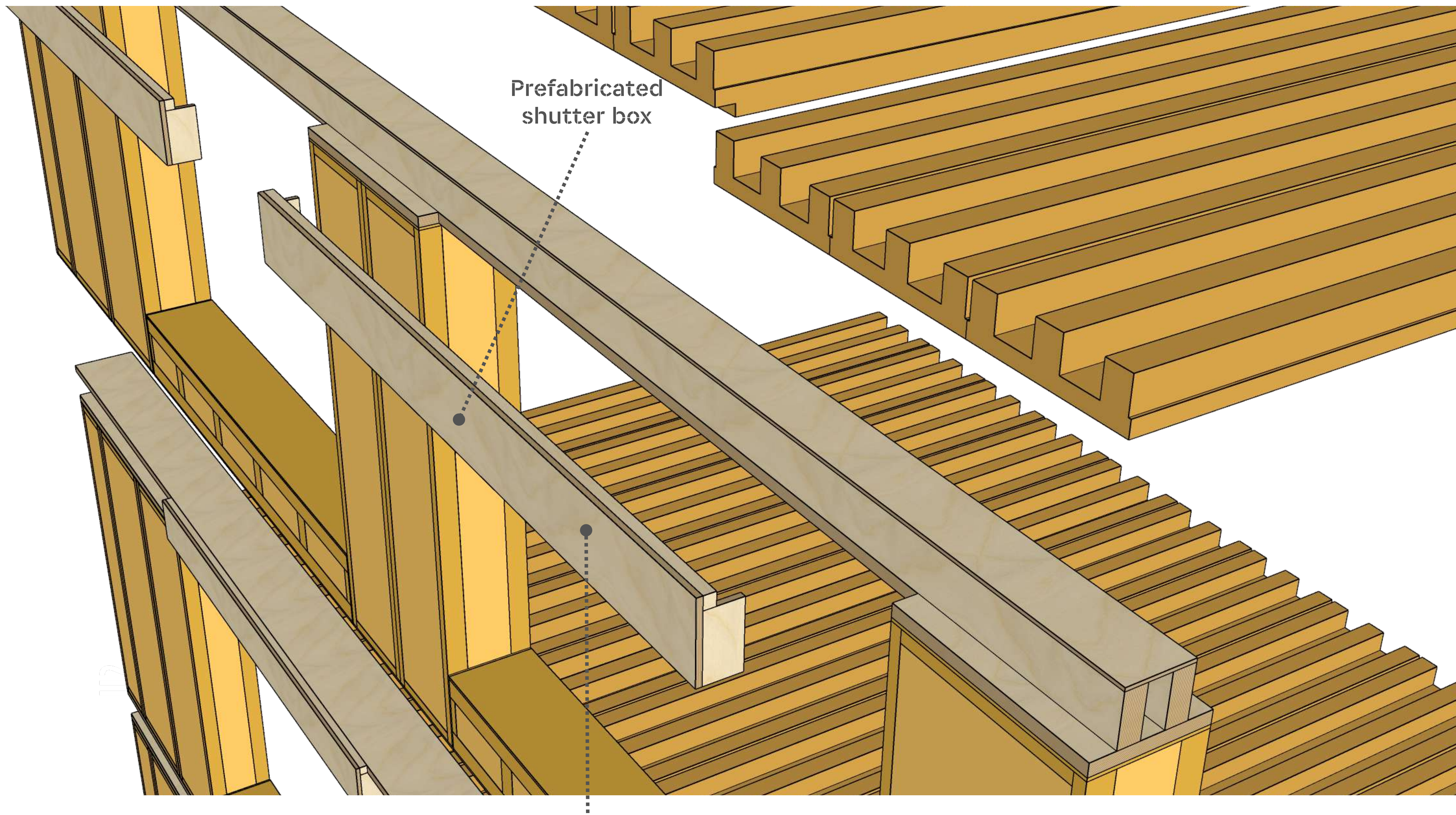


Enhancing load-bearing capacity

- » Using narrower panels increases the number of posts per m
- » Very flexible system as ring beam distributes weight from columns



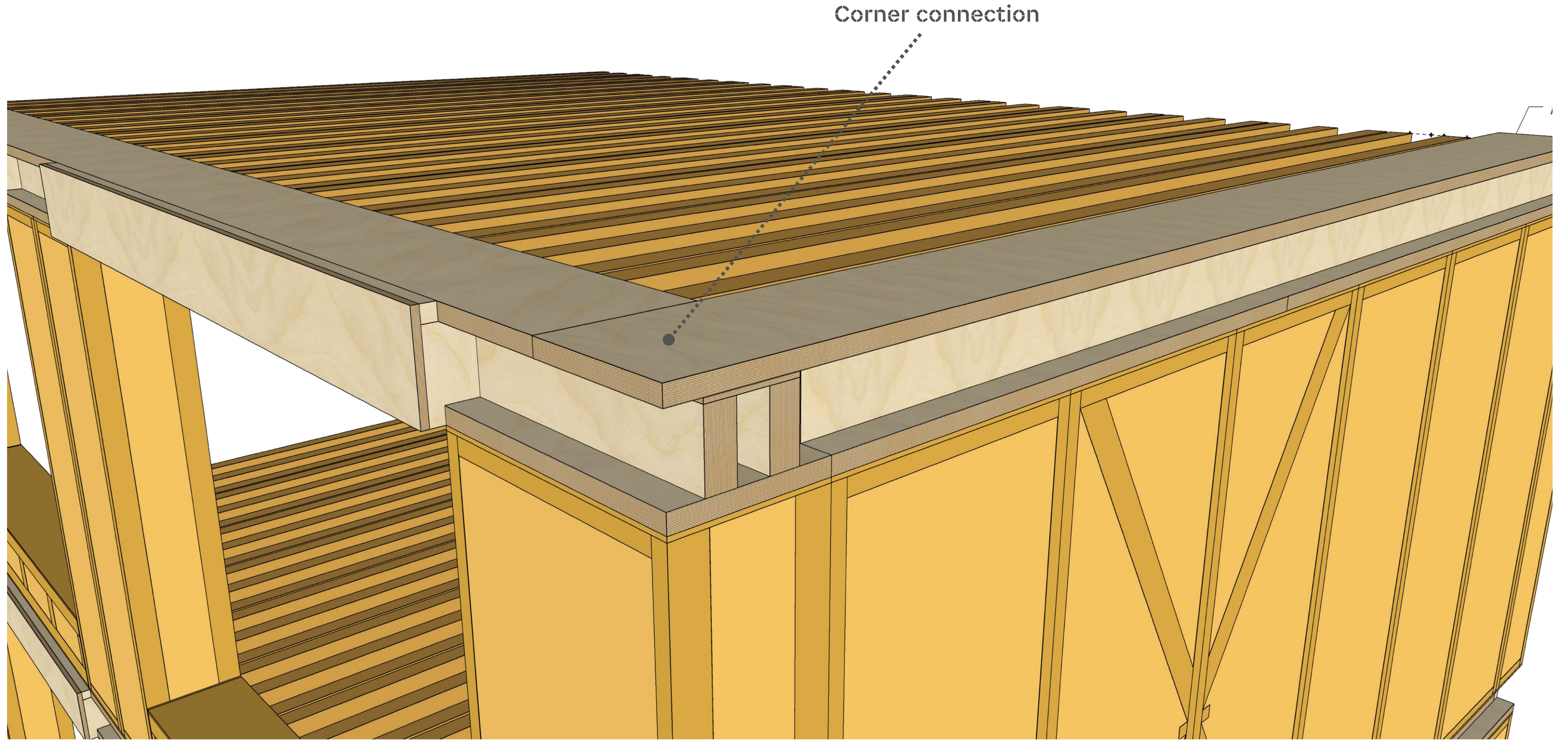
More panels increase load bearing capacity



Shutter box

Mounted on site

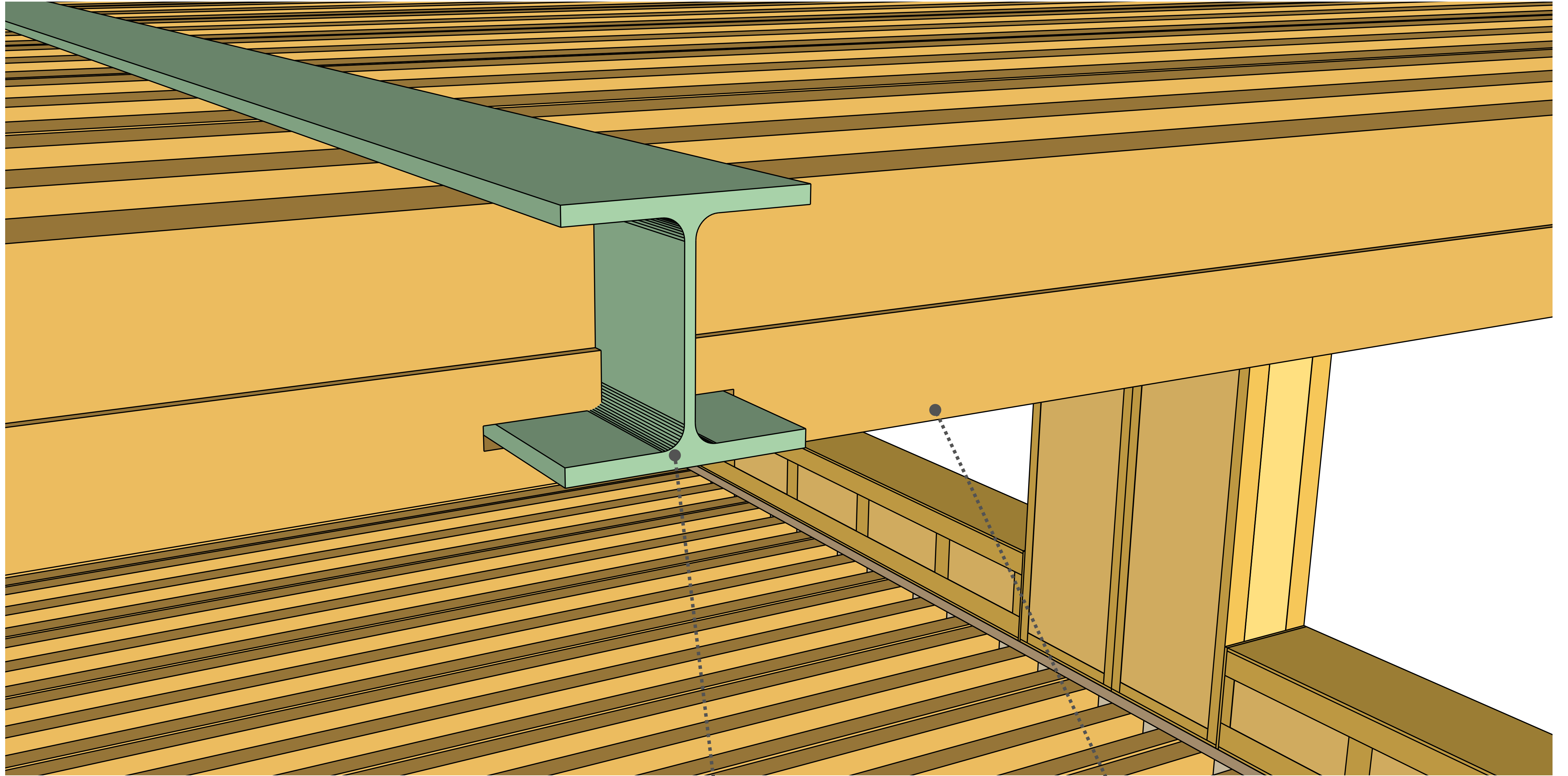
Concept by CREATERRA



Corner connection

Overlapping corner connection (mounted on site)

Concept by CREATERRA



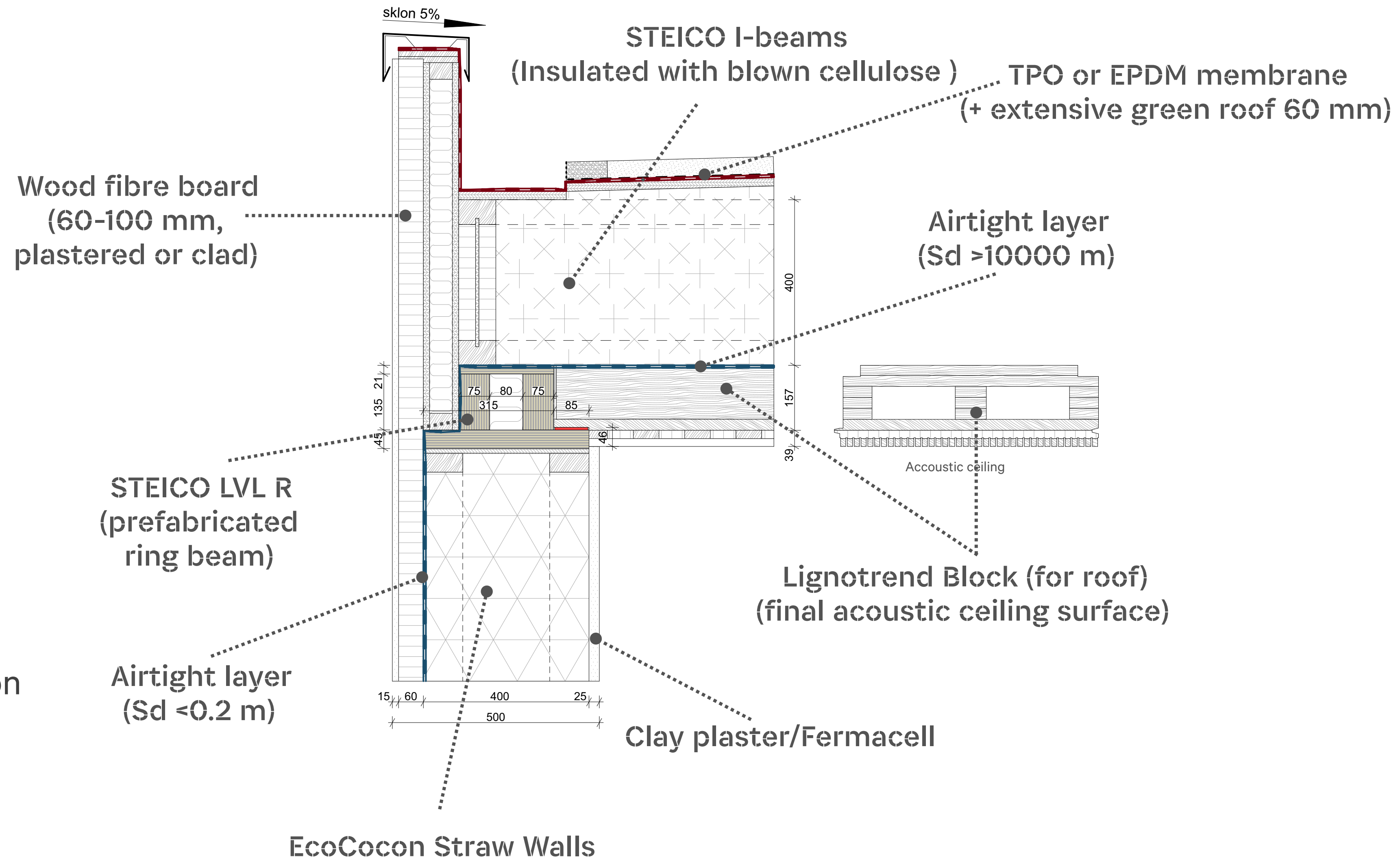
Not visible HEB beam

HEB 200
(uninterrupted acoustic surface - only Lignotrend)

Uninterrupted surface

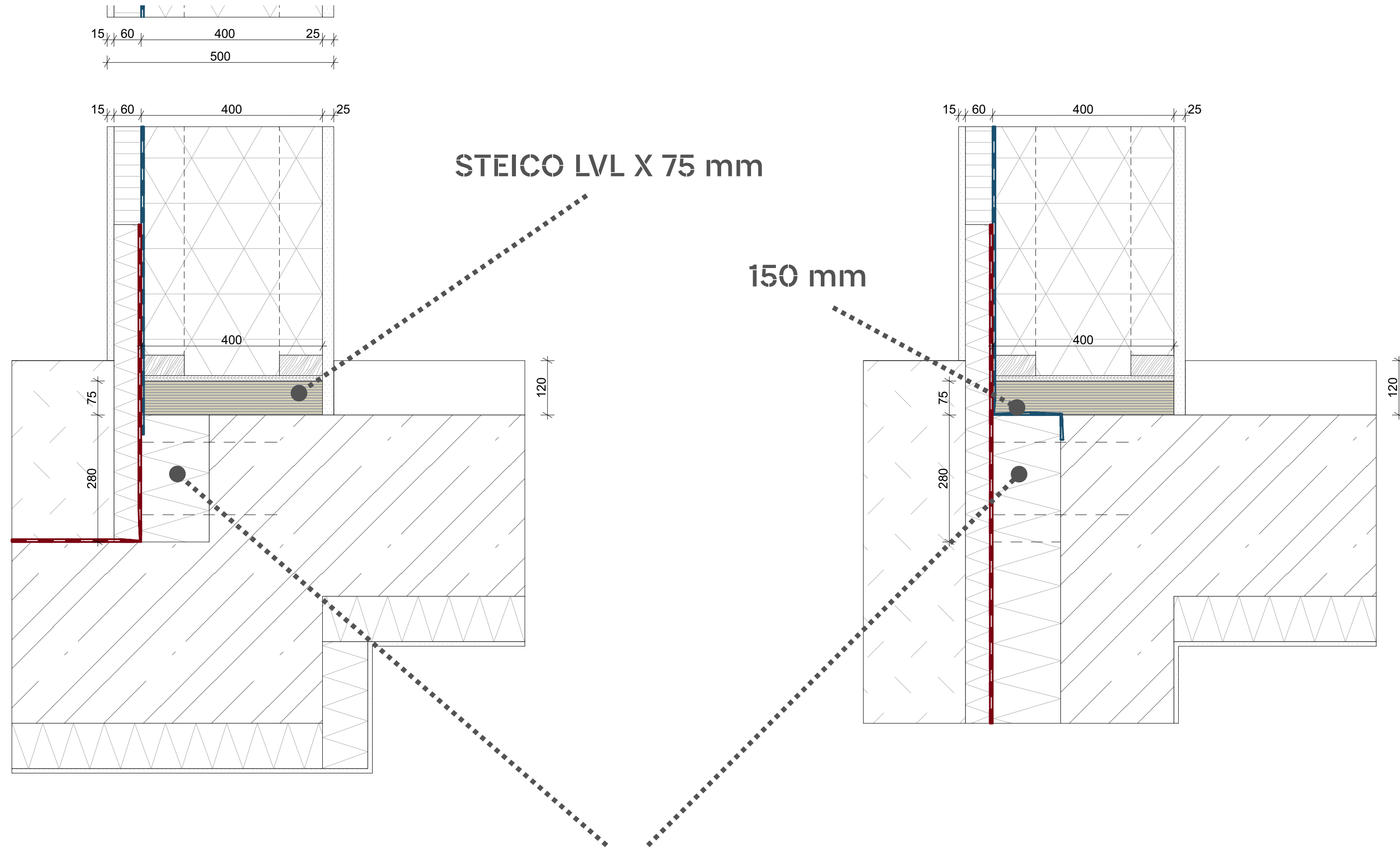
Concept by CREATERRA

Roof detail



- » Same ringbeam can be used for supporting roof
- » Loads from the roof can be applied on the outside to improve load distribution
- » Roof can be constructed with loadbearing I-beams and no massive wooden ceiling to save costs

Foundation detail

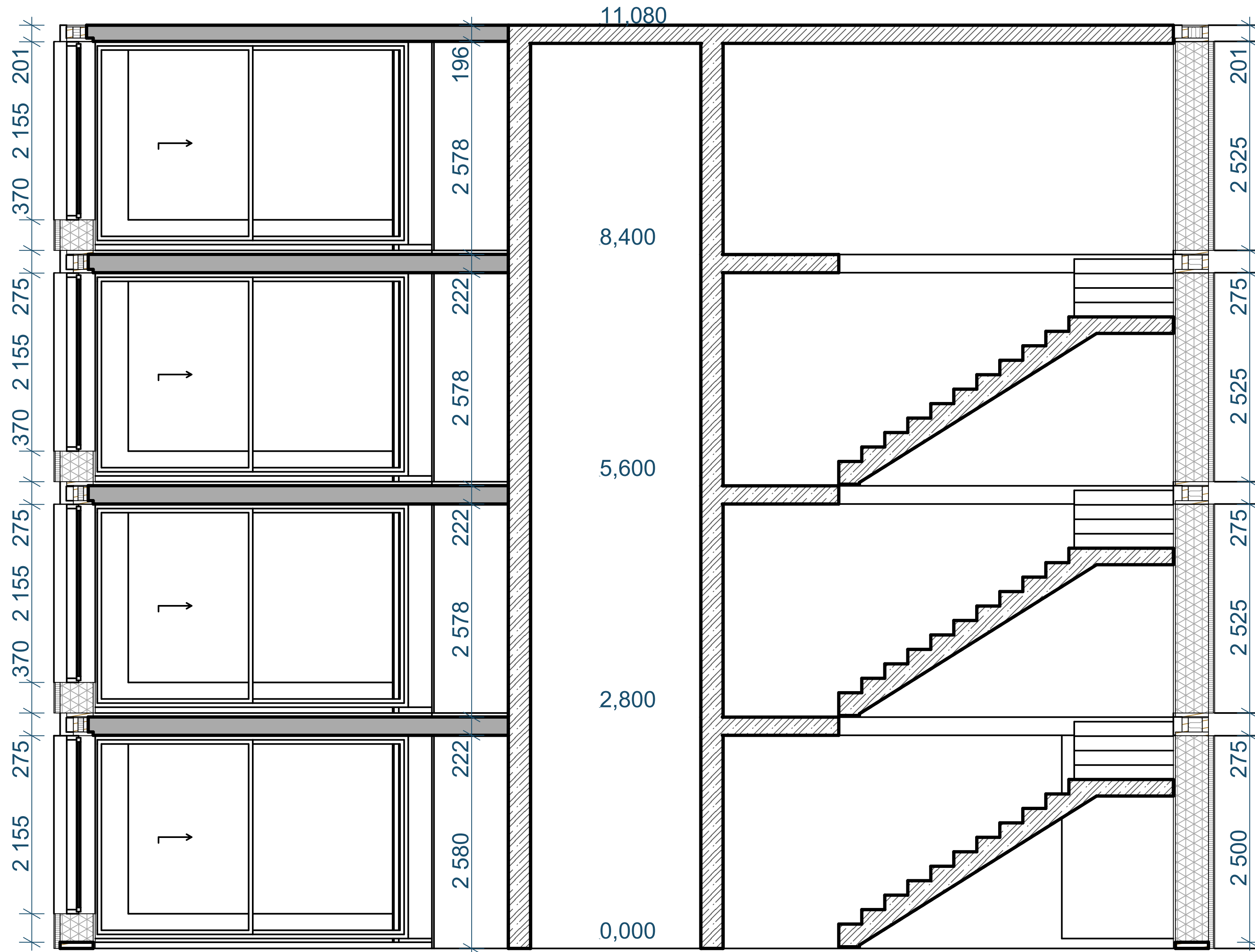


- » The walls are cantilevered 100 or 150 mm
- » A strong LVL X board (thickness depends on structural calculation) ensures a level mounting surface
- » Concrete walls are insulated with XPS from 160 to 200 mm

Insulation + Support for cantilevered LVL X every 60 cm (anchored in concrete)

Floor heights

- » Height of floors can be adjusted as demanded
- » Height of load-bearing Lignotrend ceiling and ring beam depends on structural calculations
- » With some extra height, installation of ventilation system can be simplified
- » Ventilation can be installed in ceiling or floor (in this case, it is in floor, it adds only 80 mm height for square ducts)
- » If higher ceiling in flats (2800 mm), it would be possible to have ducts under ceiling in corridors only



Wall elements with different levels of finishing

- » Panels can be preassembled in a workshop, ideally close to the building site
- » The facade surface can also be finished partially to speed up work on site
- » Openings can be fitted with windows in advance
- » The airtight membrane and weatherproofing can be included in the pre-assembly





Pre-assembly in a hall

Builders: Kontrakting SR | Natural Building Company Oy FI



Express assembly on site

Project by Natural Building Company, Finland