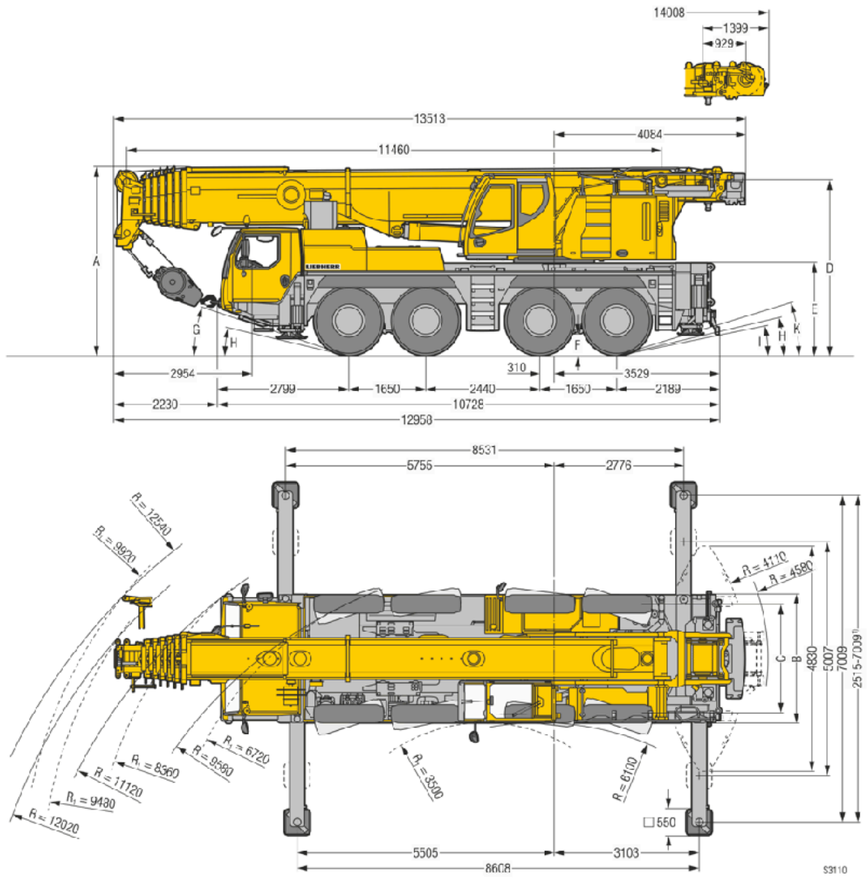
Having discussed the project with CLT suppliers KLH (who supplied the CLT panels for our Blackwood project, left), they worked out that we would need a 100 tonne crane, which would typically be a Liebherr 1100, the dimensions of which are below.  We have checked and this will easily navigate the access route.

Panels would be specified at less than 7.8m length, which would allow WAV type lorry with a bed length of 7.8m to deliver the panels, which will again easily navigate the access.




$R_1$ = **Alradlenkung** - All-wheel steering - Direction toutes roues - Tutti gli assi sterzanti - Dirección en todos los ejes - Поворот всеми колесами
[1] **nur mit VarioBase®** - only with VarioBase® - seulement avec VarioBase® - solo con VarioBase® - sólo con VarioBase® - только с VarioBase®

**Maße/Dimensions**/Encombrement/Dimensioni/Dimensiones/Габариты крана

| | A | A 100 mm* | B | C | D | E | F | G | H | I | K |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 385/95 R 25 (*14.00 R 25) | 3950 | 3850 | 2750 | 2330 | 3667 | 1890 | 378 | 17° | 11° | 10° | 16° |
| 445/95 R 25 (*16.00 R 25) | 4000 | 3900 | 2750 | 2330 | 3717 | 1940 | 428 | 18° | 13° | 11° | 17° |
| 525/80 R 25 (20.5 R 25) | 4000 | 3900 | 2990 | 2370 | 3717 | 1940 | 428 | 18° | 13° | 11° | 17° |

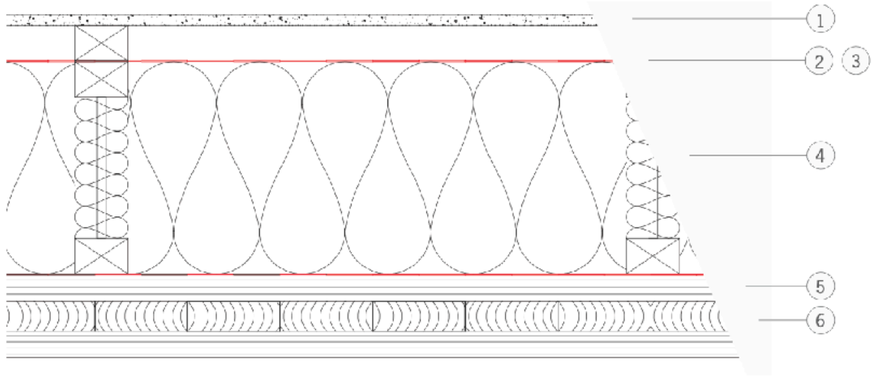
* abgesenkt : lowered - abaissé - abbassato - suspensión bajo - шасси осажено

CLT offers all the traditional key advantages of prefabricated components of speed, efficiency and precise tolerances, and combines them with attractive environmental and energy-efficient attributes such as use of a renewable resource, carbon sequestration, low waste, relatively low embodied energy and an inherent high standard of airtightness and thermal mass if exposed.

The relatively light weight of panels allow for reduction in the size of the foundations compared with traditional construction. Reduced concrete equates to reduced embodied energy.

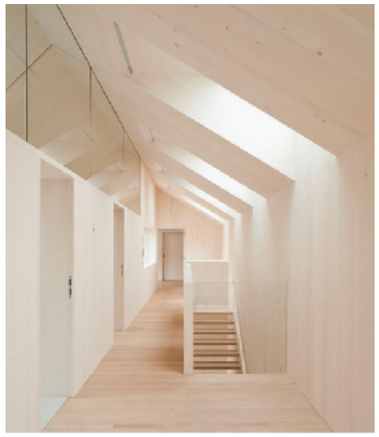
The CLT panel is also able to form the finished internal surface - in this case the ceiling soffit - as the walls will be used for services. There is a wonderful honesty about a building that is legible, that you're able to read easily and understand how it is put together…

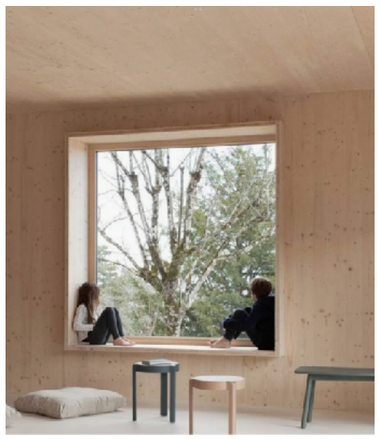
TYPICAL CLT WALL BUILD-UP:




| | CONSTRUCTION MATERIALS | s [cm] | ρ [kg/m³] | [kg/m²] | μ [-] | $s_d$ [m] | c [J/(kg*K)] | s' [MN/m³] | λ [W/(m*K)] | $U_m$-value [W/m²*K)] |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Facade | ... | ... | ... | ... | ... | ... | ... | ... | |
| 2 | Back ventilated air layer, vertical | 4 | ... | ... | ... | ... | ... | ... | ... | |
| 3 | Wind proofing | 0,05 | ... | 0.5 | 22 | 0,01 | 1.000 | ... | 0,170 | 0,12 |
| 4 | Insulation between webs | 33 | 35 | ... | 1 | 0,33 | 910 | ... | 0.040 | |
| 5 | Airtight layer | 0,01 | ... | 0,40 | 100.000 | 10 | 790 | ... | 0.500 | |
| 6 | KLH panel | 9,4 | 500 | 47 | 25/50 | ... | 1.600 | ... | 0.130 | |

A unified approach to the construction, with the structure entirely internal to a layer of continuous insulation wrapping around it means that achieving an excellently efficient fabric, with no thermal bridges and a continuous airtight layer is made easy.





examples of CLT as the internal finish, which will be used for the roof soffit / ceiling in this instance

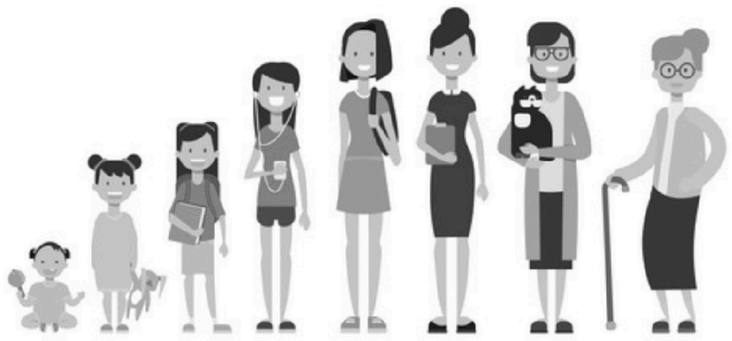
CLADDING

So, we know what the structure is, and it is lightweight and externally insulated - the next question is what to cover it with / what the outer skin of the building will be…

Lightweight cladding of some sort is the obvious choice - something that ties back to the CLT rather than a heavy outer skin like stone which would need separate foundations. This is obviously particularly true of the part which projects over the water.

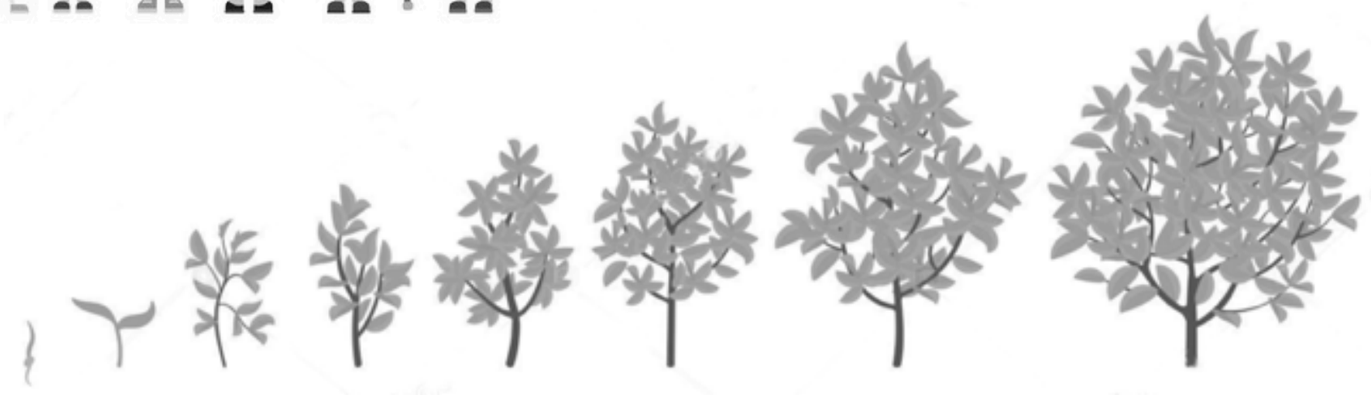
Although ironstone is the most prevalent material for houses locally, we saw earlier that isolated barns are more relevant, and these are mostly clad in timber.

Timber is the logical choice for the above reasons, and because it is a renewable raw material. Trees absorb carbon dioxide during growth - one cubic metre of wood absorbs one tonne of CO2. As with the exposed CLT internally, there is an honesty in the building being clad in the material it is made of. It is also very much in line with our cabin-in-the-woods / treehouse starting point…



The materials used and their design and detailing offer an exciting opportunity to express / manifest the multi-generational concept which forms such an important part of this project.

The use of timber for the building's skin leads to the consideration of the lifecycle of a tree and how this is so clearly manifested in its cross-section with the layered rings representing each year of growth. The same concept can be applied to the facade, with distinct layers, each peeling back to reveal a different layer beneath.

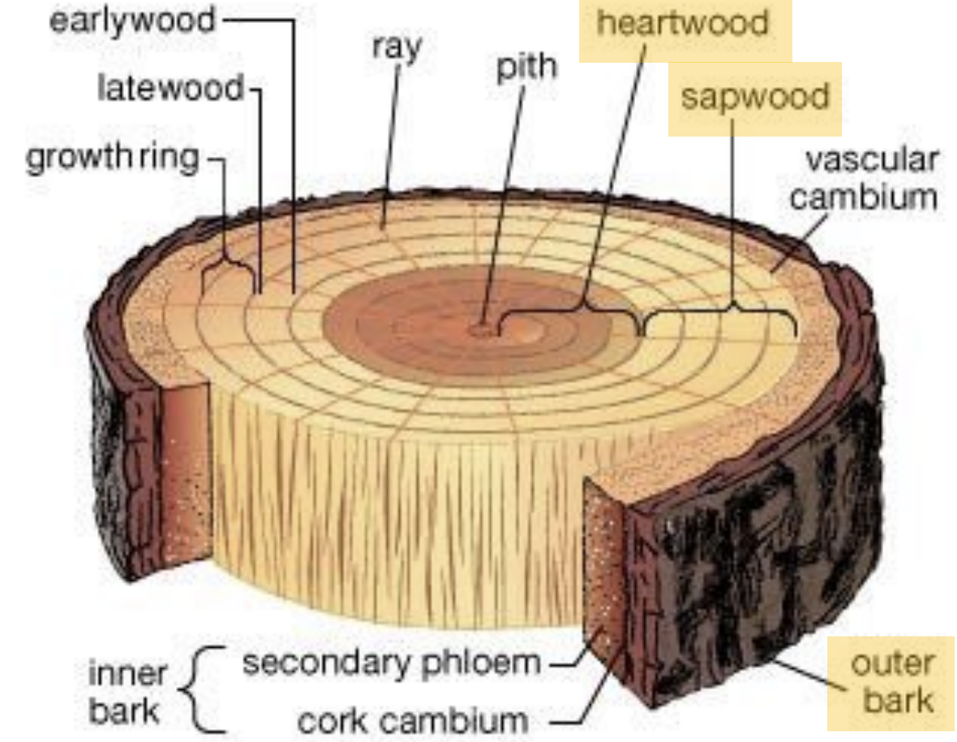


Looking at the typical section of a tree trunk, there are three main distinct elements:

- the central heartwood
- the surrounding sapwood
- and the outer covering of bark

The central heartwood, the innermost layer, is a rich deep colour. The most prolific sapwood which wraps around it is lighter in colour / less saturated. Finally, the bark, which is the outer / covering layer is typically very dark and heavily textured.

These three elements can translate into three different types / treatments of wood used on the facade…



We will be felling some trees on the site, so it would be lovely to be able to use these for the cladding - however, ash is unfortunately not durable enough to be used externally (unless it is thermally modified, which defeats the purpose). However, the ash on site will certainly be used extensively for internal joinery and flooring, with the offcuts making excellent firewood.

The majority of the timber cladding will be British grown larch, which has excellent natural durability properties (50-100 year lifespan) and displays attractive figuring. It would be factory coated in a revolutionary new product called SiOO:X, which effectively creates a weathered appearance straight away and means that there wouldn't be differential weathering of the wood. This is a one-off application, and by the time it wears off, the timber underneath will have naturally weathered to the same silvered appearance, and will require no maintenance.

Below - examples of **larch coated with Si00:X** - this will represent the **sapwood**

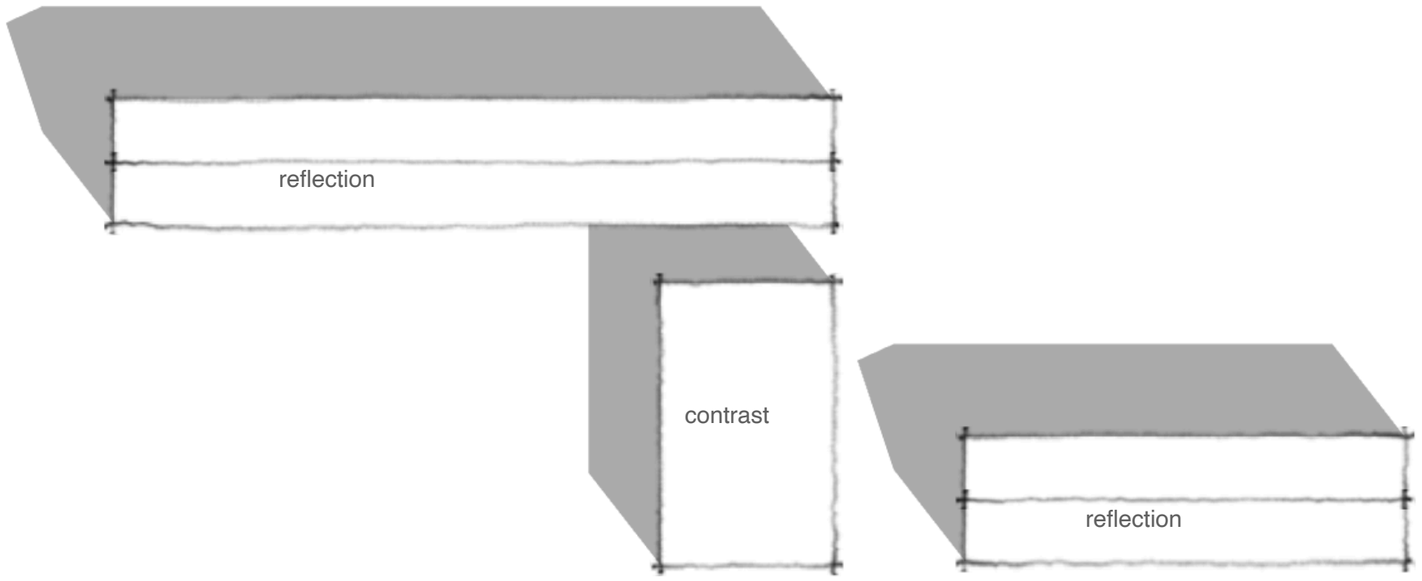
Above - examples of **western red cedar cladding** - this will represent the **heartwood**

Western red cedar has a similar lifespan to larch, and is an excellent choice for external cladding, being easy to work with and naturally durable. The deep chocolatey colour is a fitting counterpoint to the less colourful larch. This will also be treated with Si00:X to ensure even weathering.

In Japanese building, charring wood surfaces is known as *shou-sugi-ban*; this technique is valued because it wraps up wood in a layer of carbon that's highly resistant to mould, insects, water and even fire. It also creates the desired powerful visual effect.

Below - examples of **charred larch** cladding - this will represent the **bark**

Going back to the concept of reflections and contrasts, with Emma's and Virginia's wings being reflections of each other and Roddy's / the central section being a contrast, this can inform how the different types of wood are used on the facades.




Silvered larch / sapwood will be the common material throughout. For the wings, it will "peel back" in places to reveal the heartwood / western red cedar beneath. In contrast, for the central section, rather than peeling back to reveal a layer beneath, an outer layer of bark / charred larch will surround it in part.

**CLADDING FOR THE WINGS:**

The innermost layer of western red cedar will be revealed in small areas around the windows where the larch peels back to show it beneath:

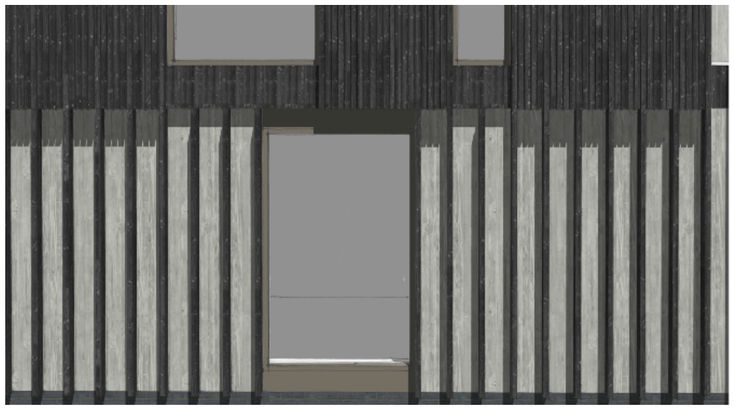
The western red cedar will also be visible where the larch / sapwood peels back to reveal the inner heartwood at the open ends of Virginia's and Emma's wings:

**CLADDING FOR THE CENTRAL PART:**

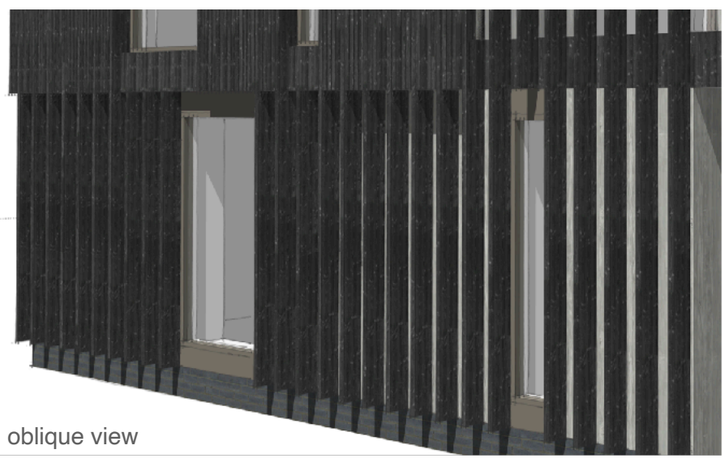
In contrast to the wings where the larch peels back to reveal a different layer beneath, for the central part, the larch has a layer of “bark” **over** it, represented by charred larch fins.

This layer is purposefully textured and three-dimensional, as is the layer of bark on the outside of a tree.

This also allows for a bit of visual trickery as when you look straight on at the fins, you see the layer of lighter wood beneath - whereas if you look obliquely, the wood beneath is hidden.  This is reminiscent of the very regular views down the rows of existing trees on the site versus the random views you get when looking at different angles.



looking straight on



oblique view