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Concrete Giants & Timber Towers

Triodos bank Zeist

The new standard for offices

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The new central office of the Triodos bank in Zeist sets the new standard for modern office buildings. Nature-inclusive, optimal connection with the surrounding nature, sustainable, and a healthy indoor climate. This all was realized with barely more cost compared to a traditional office. The biggest, fully timber, building of the Netherlands offers a unique balance of nature, culture, and economy.

Estate De Reehorst

What does a bank do that wants to offer a sustainable alternative to other banks if it needs a new office building? Will it add another glass palace to the Zuidas? Triodos bank has chosen to approach things completely different. Their choice was to move into an existing estate: De Reehorst, located in Zeist. This brings the bank back to its roots, where it was once founded. The estate is located at the station of Driebergen-Zeist and is an important link in the Ecological Main Structure (EHS). A conscious decision was made to make the walking distance from the parking longer than the distance to the station. Constructing in such a vulnerable area requires special attention. At the same time, the new use of the estate means a strengthening of its survival. The estate will be restored, expanded and opened to the public by Triodos.

Respect for nature

As mentioned, caution was necessary when developing a building in the middle of nature. The starting point for the design was to allow the building to become part of its environment. On the one hand, by matching the shape of the building to the surrounding nature. With its organic form, the building follows the existing trees and bat routes. Also, the building does not rise above the forest. The highest roof floor is in line with the crowns of the existing trees.

On the other hand, the all-glass facades bring nature inside. Maximum daylight deep into the office and maximum view of the greenery from all workplaces. By locating the timber rafters on the inside and keeping the facade as transparent as possible, your eye is automatically drawn to the spectacular view.

Structural Design

Except for the basement and the foundation, no concrete has been used in the building. The construction of the upper structure is entirely made of timber. The cores for stability, the floors and the rafters together form the construction. Each tower contains 26 characteristic timber rafters per floor, which function as a column and a floor girder. In a flowing form, the rafters bend from vertical to horizontal. They span 6.5 m from the corridor to the facade. Because a cantilever of this length would cause excessive deformations in the

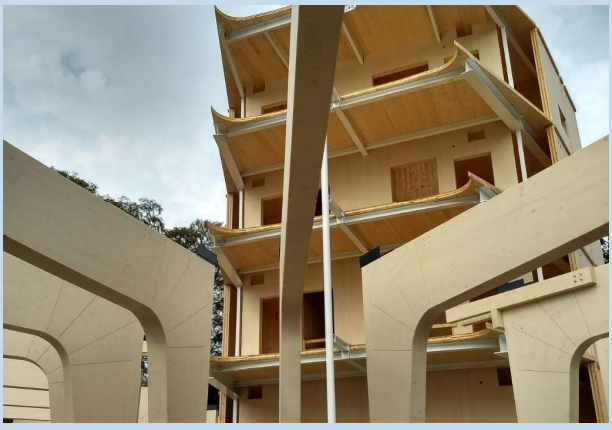

Figure 1: Timber cantilever rafters and core

Figure 2: Standard floor with timber rafters

facade, it was decided to make the facade structural. This was not easy given the desire to give the facade maximum transparency. Placing a column at the end of the rafters was therefore not an option. What did offer a solution were the open parts in the facade. Every 3.6 m there is a window that can be opened by the users. At the location of these windows, frame profiles were provided in the architectural design, and facades in the further profile were empty. And although these frames are not on top of each other and also not directly under the rafters, they have nevertheless been used to create a structural line in the facade. In order to respect transparency, the facade posts are made very slender as steel box profiles (120x60 mm). A steel edge beam takes care of the load transfer from the rafters to the facade posts.

Timber Core

The office building is the first building of this size in the Netherlands that obtains its stability from timber cores. Each tower has a stability core made of CLT (Cross Laminated Timber) walls. The cores that, in addition to the stairwell and elevator, also contain the toilets and pantries, have a curved shape on the outside. The straight walls from the core have been used for stability. Through the rigid floor diaphragm effect in the floors, all three cores are used for the stability of the 23 meters high building. Naturally, the timber core meets the same horizontal deflection requirements as all other buildings (u <h / 500 mm). The CLT walls of the cores, with a thickness of 200 millimeters, are vertical. As a result, the 3.5 meter wide panels were placed over four floors at once. The reason for this is that this allowed the number of joints to be considerably reduced compared to a horizontal division of the walls.

Fire safety

The floors are, just like the walls of the core, made from CLT. The vibration behavior was decisive for the dimensioning of the floors (thickness d = 120 mm). The floor is dimensioned according to the SBR guideline Vibrations in floors due to walking, class D (office functions). Although the entire

Figure 3: CLT-walls of the elevator

Figure 4: CLT-walls of the core of 4 building layers

building is equipped with a sprinkler system due to the compartment size, and there is no requirement for fire resistance under the Building Decree, a requirement has nevertheless been retained with regard to fire safety. This requirement, of at least 30 minutes, applies to the rafters and floors. For the cores, a fire-resistance requirement of 60 minutes has even been met. To prevent the steel facade posts from having to be protected against fire, the rafters are designed for a free cantilever in the event of a fire.

Installation site instead of a construction site

In the view of the architect, Thomas Rau, the circular building is "temporary merging of products, components and materials with a documented identity". A 'material bank' has been created, as it were, in which materials are temporarily stored. The condition for this is that the materials can be reused without damage, which requires dismountable connections. The timber construction lends itself perfectly to such connection details, which can be detached and reassembled. All connections on the construction site are made with screws, pins and timber thread bolts. In total 165,312 pieces. The construction site has thus become a mounting location. Virtually all parts, in addition to the timber construction, for example also the facades, were delivered prefabricated and connected to each other by means of demountable connections. In addition to being suitable for circularity, this has also significantly reduced the nuisance on the estate during construction.

The future

The timber construction in the new office shows the circular and sustainable future of offices. Due to the relatively low requirements for fire resistance and sound insulation, offices are ideally suited for timber. Achieving climate goals increasingly demands different materials. Solutions with biobased and circular materials will largely solve this question. With a construction entirely of timber, this new office is the new standard for this. ◄

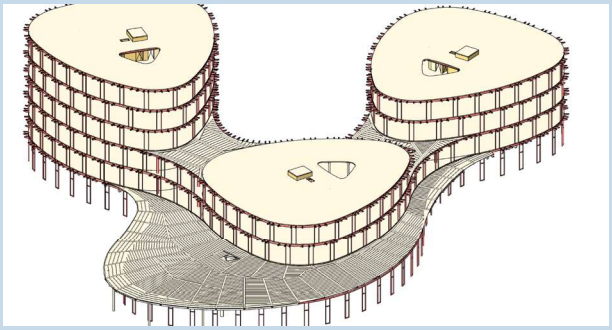

Figure 5: 3D-Revit model of the structure