

Tree House

Secure reuse via a maintenance and servicing contract



- **Context:** The Tree House project was conducted by Studio Acte Agency for the IONA foundation, owner of a house on Amsterdam's historic canals. The foundation wanted to benefit from a meeting room (10m²) at the back of its garden. Studio Acte, who define themselves as self-builders, handled the procurement and transportation of reuse materials, as well as the project design and construction.
- **The challenge:** The IONA foundation wanted to benefit from a warranty covering the wooden structure coming from the old mooring piles from the port of Rotterdam. A maintenance and servicing contract was proposed in order to verify the ageing of the structure every year.
- **Location:** Amsterdam (Netherlands)
- **Reclaimed materials:** Old wooden mooring piles, acrylate panels, wooden plywood formwork panels, oak barrels.

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Chronology of the project

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- November 2021 - Definition of the program and site visit
 - December 2021 - Start of the design phase
 - March 2022 - Start of sourcing - adaptation of the design to the sourced materials
 - April 2022 - Study of the structure and final choice of materials
 - May 2022 - Collection of materials and transport
 - June 2022 - Start of the project
 - August 2022 - Delivery of the project
 - September 2022 - Added details and verification of the built structure

The process of controlling technical-insurance risks

1/ Control the origin of reclaimed materials

- The selection of the reclaimed materials was done after visiting the collection premises listed on the Opalis platform, or on second-hand online platforms, but also by "word of mouth" for wooden products. This offered good knowledge of the materials available and their method of selection. The criterion was to limit transportation to a distance of 100 km for environmental and economic reasons.
- The steps of identifying, selecting and transporting reclaimed elements for construction is essential since they determine the sizing and the implementation conditions of the project. They also provide a guarantee to the longevity of the structure.
- The building is composed of a beam-floor framing resting on natural stone and small pavings. All the materials except for the zinc roof come from prior deconstructions. The structure and the wooden floor (Basralocus) come from the old mooring piles of the port of Rotterdam (at the origin, this wood came from the forests of Surinam and Guyana). The acrylate panels come from deconstructed trusses. The wooden formwork panels and the plywood respectively come from the old floor of a nightclub and from non-downgraded stocks.
- The quantities used are as follows:
 - ✓100 kg of rammed earth
 - ✓14 river stones (of the granite type)
 - ✓200 kg of gravel
 - ✓38 cement blocks/pavings
 - ✓3 m³ of tropical hardwood flooring (Basralocus)
 - ✓A tank with a capacity of 150 liters
 - ✓2.93 m² of plywood
 - ✓2.77 m² of acrylic sheets
 - ✓1 m³ of Basralocus beams, joists, battens

2/ Adapting the design of the building to the sourced and reconditioned materials



Image source: Studio Acte

- The building's design was adapted to the available materials. The structure was conceived as a dry assembly using bolting, screwing and interlocking which allowed for great flexibility and favored the interchangeability of elements. This approach also eased the constraint linked to the availability of resources.
- Collaboration with the Bollinger-Grohmann design office (structure and façade design office) was fundamental. This entailed correctly sizing the structural elements according to their conditions and properties at the reuse stage. This control was essential to guarantee the stability of the structure. This collaboration is also the result of the engineer's commitment to second-hand materials for structural needs.
- The architect integrated the project into a comprehensive self-construction approach. After retrieving the materials, Studio Acte sanded, cleaned, recut, recorded, and protected them using vegetable oils.
- This versatility throughout the entire project development process and the revaluation of materials through a craftsmanship approach contributed to cost control. €7,500 was allocated to design and material sourcing, €7,500 to material supply and transportation, and €12,500 to construction. Reuse allowed for staying within the €32,000 budget, covering both human and material expenses.

3/ The specificities of the project from an insurance standpoint

- This case is particularly special from an insurance point of view. The traditional mission of an architect is usually limited to the issuing of the building permit and an on-site follow-up mission on architectural conformity. In other words, an architect does not usually handle the management and execution of works. In a previous project, the solution was to declare an "artistic production": this made it possible to be covered by the insurer. In certain circumstances, in the Netherlands, it is possible to be the architect, general company and promoter of one's own project.
- The client, the IONA foundation, wanted the building to have a service life of at least 30 years. According to Studio Acte, a warranty of 5 years posed no problem. Beyond that, it is preferable to assess. Indeed, due to the specificities of Amsterdam, and particularly its canals, the foundations of many homes are subjected to tension. Moreover, Amsterdam is sometimes subjected to storms and winds that can reach 180 km/h. In the present case, if the foundations remain stable, no problem should affect the building for 15 years. The structure could at most be slightly deformed.

4/ Establishing a maintenance and servicing contract to guarantee the durability of the building

- In order to favor the durability of the structure, Studio Acte proposed establishing a maintenance and servicing contract based on regular inspections of the building's structural elements. The roof, wood assemblies, and the condition of the materials could thus be subject to regular verifications. The objective of a maintenance and servicing contract would be to ensure that the building ages well and in line with the architect's expectations.
- The client expressed interest in this solution, which ensures the maintenance of the structural quality. The client agrees with the frequency of the visits (once a year). Each visit would lead to the inspection of the condition of the materials and of the assemblies and cleaning the roof. In the Netherlands, maintenance is cultural. Stakeholders know that a maintenance and servicing contract extends the service life of the materials and favors the durability of the building.
- The contract is not yet drafted, but the goal is to have a contract that could be used as a reference for establishing a report in case of a defect. It is then the responsibility of the client to handle the cost of a replacement. For example, if a material was shown to be defective, it is the responsibility of the client to arbitrate and decide if replacing it is acceptable from an economic standpoint.

Conclusion on good practices related to insurance

- The insurance issue was raised at the end of the project by the design team and the response obtained was based on the unique structure of the project team. The architectural team simultaneously handled the procurement of reclaimed materials, design, transportation, and construction. It became evident that the best guarantee for the client was to ensure that no problems would arise with the reused elements. The proposed maintenance and servicing contract aims to meet the expectations of the IONA foundation and to guarantee the durability of the building and its structural elements.
- Collaboration with a structure and façade design office was fundamental to guarantee the stability of the structure. The calculations made aimed to correctly size structural elements with regards to their intended use.
- The Tree House project is of a small scope as the budget was only 32,000 euros. However, there is a lot to be learned from and it shows that the stakeholders in charge of servicing and maintaining buildings are among the best qualified and in the best position to characterise the performance of products used in buildings and assess their aging conditions. Some building equipment manufacturers have already adopted a similar approach by offering maintenance services to extend the lifespan of their products and replace defective components at the end of life. For example, Mitsubishi, the elevator manufacturer, includes maintenance in its contract to prolong the lifespan of elevators and give them a second life. Furthermore, 95% of components from a used elevator are reconditioned and reused.
- Company specializing in maintenance of major heating, ventilation and air conditioning equipment could similarly position themselves to assess end-of-life equipment and provide a guarantee for proper operation for a certain duration.

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