

POLITECNICO DI TORINO
SECOND SCHOOL OF ARCHITECTURE
Master of Science in Architecture for Sustainability
Honors theses

Temporary housing: Cross-LAM and energy efficiency for a new way of living in the city

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"Temporary Housing" is a project that takes its cue from the "Instant-house temporary housing" competition, sponsored by Federlegno Arredo Srl in collaboration with the Polytechnic of Milan, at the "Made Expo" in Milan of 2012. The goal is experimenting of a residential structure intended for researchers and "visiting professors" who will work at the Polytechnic of Milan for limited periods.

The project originates from the union of three main themes, which are the three parts of the thesis: temporary housing, energy efficiency, wood.

The first topic addresses the function of the building, the temporary residence, which is a new way of experiencing the city, a time-limited housing. The intent is to integrate a number of collective functions within the building, ensuring a gradual passage from the private to the public sphere.

The project begins with the definition of a "path", a long central double-height corridor, public and open to the outside, which leads first to the collective functions on the ground floor, and then to the private accommodation on the upper floors.

The second basic concept is the "module": an orthogonal and modular grid is defined within the intervention area. The grid rules the entire project from the definition of the load-bearing walls up to the design of the openings.

The actual functions are placed in four modular blocks positioned transversely to the central corridor, each of which is in its turn divided into two volumes staggered. The cover of the lower volumes and the corridor are used to obtain a set of green terraces, integrated with a system of staggered embankments from the ground floor to the first floor. The building, which is surrounded by greenery, is a kind of small urban oasis where the researcher can move away temporarily from the hectic pace of the city.



Project Renderings

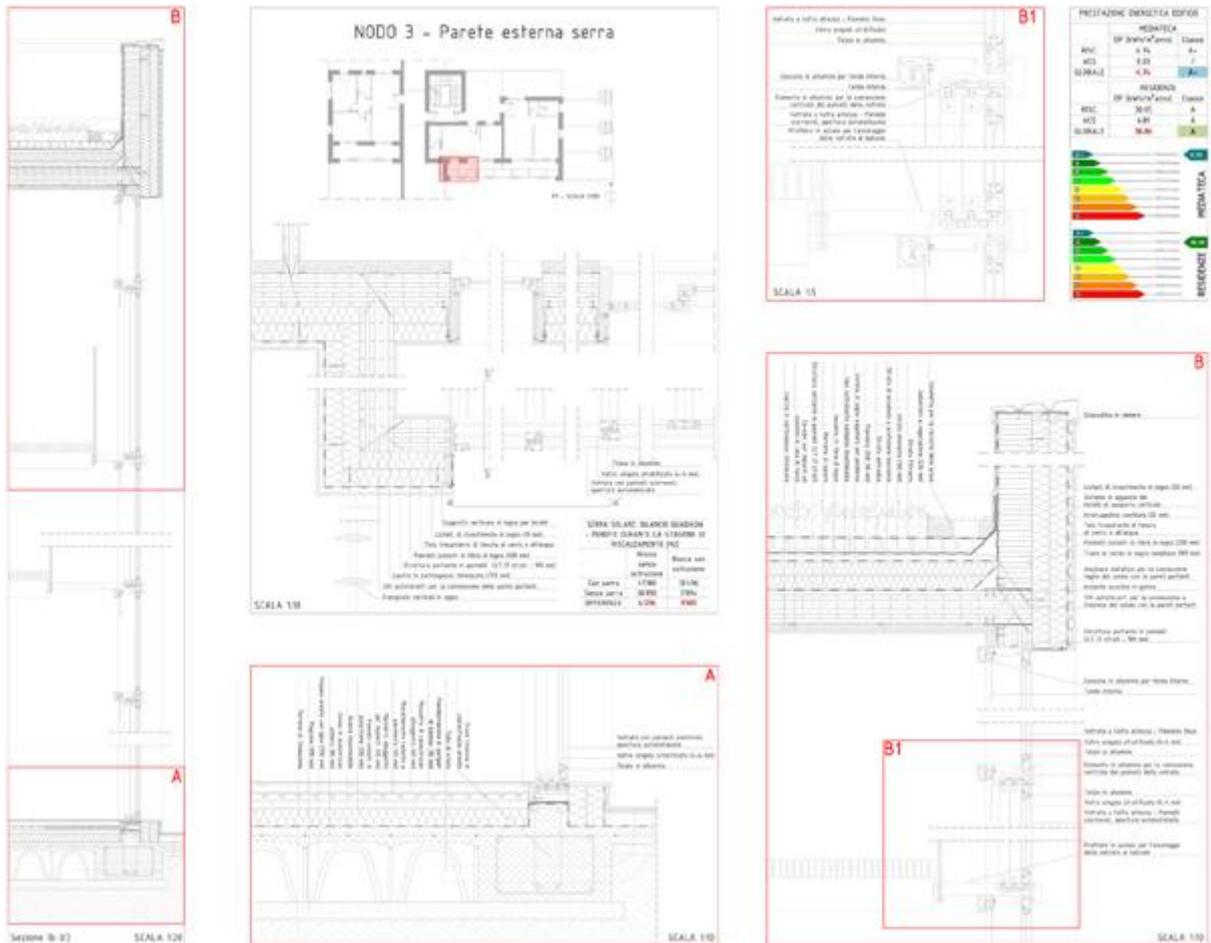


Example of a plant: the first floor of one modular blocks

The topic of energy efficiency is discussed in the second part of the thesis. Here is explained the choice of solutions to maximize the savings: the orientation of the buildings to the south, the use of solar greenhouses, the positioning of solar collectors and photovoltaic panels, the choice of materials and insulation systems. It also carried out a global energy assessment of the building, through the following steps:

- Evaluation of natural lighting;
- Artificial lighting design and evaluation of its electricity consumption;
- Evaluation of thermal energy consumption for heating and for domestic hot water;
- Evaluation of the amount of thermal and electrical energy produced from renewable sources;
- Verification of the efficiency of solar greenhouses;
- Assessment of the energy class of the building.

The very positive results have determined that the building is in class A.



Details of the solar greenhouse and energy assessments

The last topic addresses wood, the main material used for the building. The wood is used for load-bearing structures, made with panels of CLT (Cross Laminated Timber), for the wood fiber insulation, as well as for most of the coatings, made of wooden slats. Specifically, the third section of the thesis explores the behavior of CLT or Cross-Lam. Thanks to its composition, made of solid wood panels cross-laminated, the Cross-Lam has a high load-bearing capacity and an excellent seismic behavior, as well as excellent thermal and acoustical properties and a high degree of prefabrication. The choice of this particular technology had a considerable impact on the design of the building.

The project "Temporary Housing" unifies the three topics described above, in order to provide users with a viable answer to live (temporarily) in the city.

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