



POLITECNICO
DI TORINO

Honors thesis

MASTER'S DEGREE IN SUSTAINABILITY DESIGN

Abstract

**MILANO RAISED GARDEN: project of a multifunctional
tower in the skyline of the city**

Tutors

Orio De Paoli

Roberto Apostolo
Giuseppe Andrea Ferro

by

Stefania Buggè
Noemi Gambaccini

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The thesis project begins with the participation in a student competition organized by the non-profit association of Chicago CTBUH (Council on Tall Building and Urban Habitat); the call required to develop the project of a tower, allowing participants to choose the site where to built (anywhere in the world and in an existing urban location), the form, the size, the height, the function and the technological features.

We choose to work in Milan, mostly for the interesting presence of EXPO MILANO 2015, but also because of the vertical connotation of some districts such as Porta Garibaldi, oriented towards a new modernity in architecture.

The aim was to deal with the approach to the project from the environmental point of view, technological and structural.

The criteria used for design purposes have been dictated by a systemic aggregation in a project mixing matrix of environmental need and functions, which has originated the shapes.

Firstly was important to define the functions to insert, carefully analyzing the context, so that the building did not constitute an unnecessary presence, wasteful of resources, but could became an active organism in a building-environment system.

The identified scheme has determined the split of the building into two blocks: the tower and a lower edifice which height refers to the volume of the adjacent building (the White Wave). The lower block constitutes the basis of the tower, even if it's separated from it: it has got a purely public nature and a it's directly relatable with the user.

The functional program internal to the tower includes the presence of some floors dedicated to vertical farm. They constitute a systemic heart, not only for the designed building, but also for the whole district, which is already very active in urban horticulture for educational purposes, thanks to the initiatives of Riccardo Catella Foundation. The vertical farm function, characterized by the presence of crops in hydroponic, aims to establish a consecutio with some issues related to the sustainable crop treated at Expo 2015.

For this purpose, the public area includes exhibition spaces that blend whit farming and food laboratories. Vertical farm products are shared between the sale in the market (three floors in the block at the base of the tower), and the supply for the two restaurants at the top of the tower. One of the restaurants is public while the other one is reserved for the guests of the internal hotel, which is located in the eight floors right below it. Other storeys, in association with the hydroponic cultivation in the vertical farm, accomodate offices for nutraceutical and food research.

At last, the tower expects to offer a view of the city thanks to the panoramic terrace on the top of the building.

Compositional choices derives from studies regarding environmental needs: that's because the tower has a plan with circular conformation, which optimize exposure without interfere with the prevailing winds.

The public block at the base of the tower presents a frame structure, different from the tower, characterized instead by a diagrid exoskeleton structure with steel tubular and concrete core (for services and vertical connections). This particular kind of structure allows a lower consumption of material but also a freedom in the plan distribution. It also confers greater rigidity to the entire tower, which reacts only to the normal force, while shear forces and moments are drastically ebbed. Diagrid structure is also favorable to the

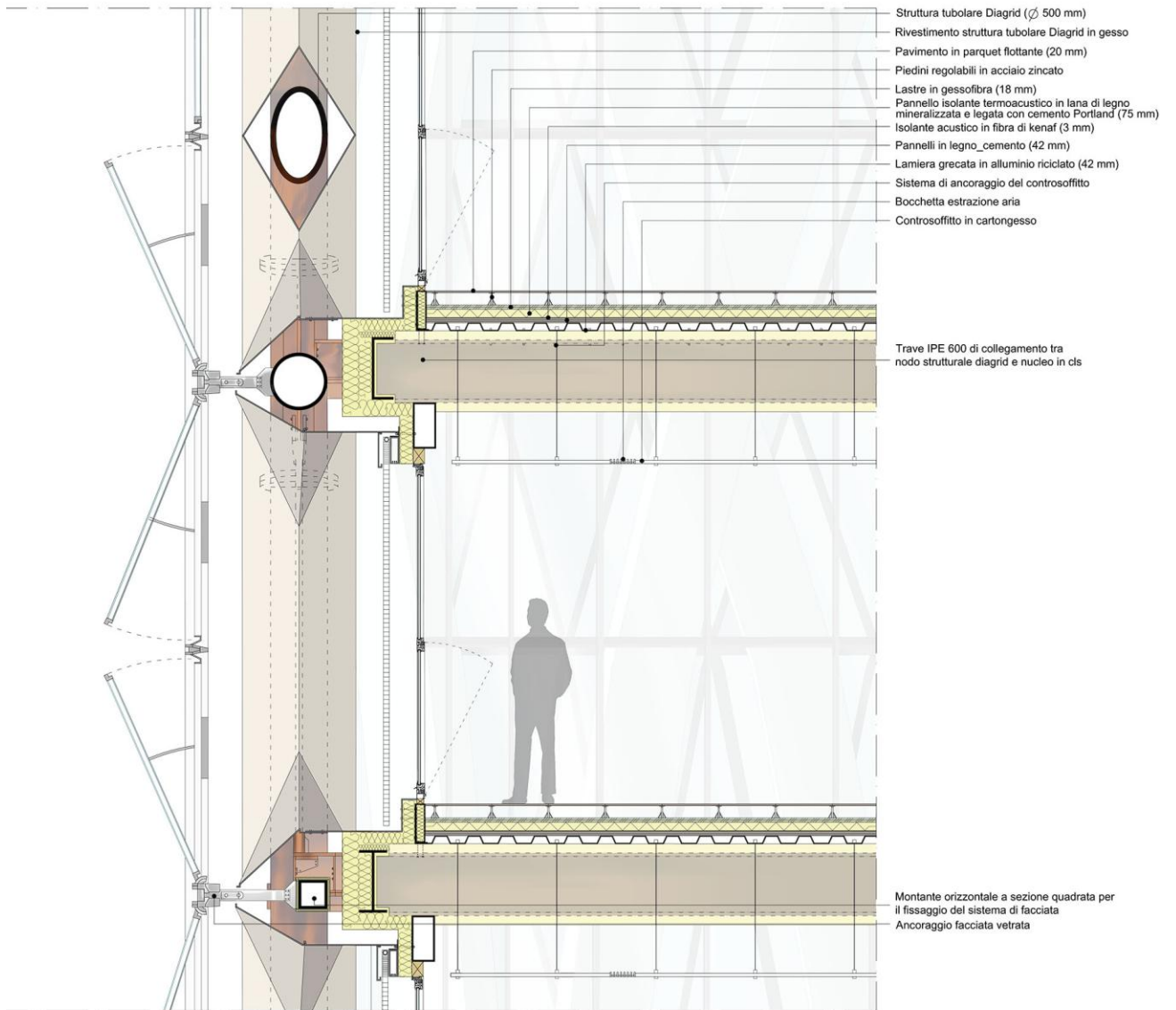
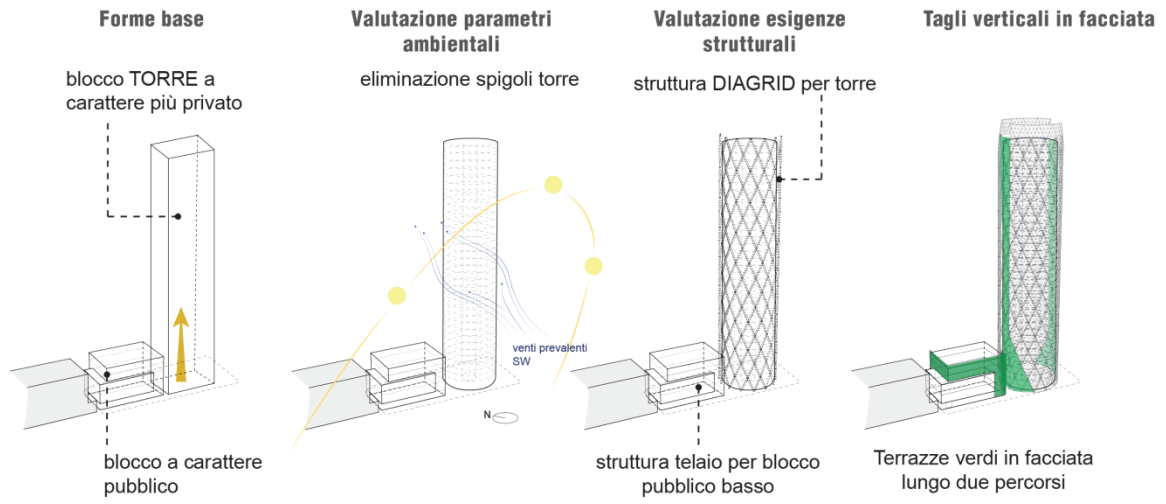
adoption of the double skin which optimize the object by reducing the dispersions and by exploiting the thermal benefits of greenhouse effect in winter.

The technologies adopted for the building envelope vary according to sun exposure: this is marked in the facade with the choice of splitting the double skin by green "cuts" which host terraces on the single level. They separate the northern portion to the south, recognizable by the presence of photovoltaic film on some bands of glass to contribute to the supply of electric energy.

The proposed project aims to express a possible solution for the design of a tall building in a still immature context as the Italian one.



1_Render from piazza Gae Aulenti



2_Detail of the facade

For further information please contact:
Stefania Buggè, stefania.buggè@gmail.com
Noemi Gambaccini, noemi204@gmail.com