ROVEREAZ VILLA'S PNEUMA

GIVING A NEW BREATH TO A 19TH CENTURY VILLA IN LAUSANNE

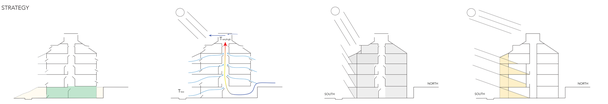
Pneuma is an ancient Greek term for «Breath», it designates at the same time the air, the spirit and the soul of something or someone. This concept was used by Italian Renaissance architects such as Palladio to give ventilation a central place in their buildings, ensuring the health, the well-being and also the enlightenment of the inhabitants.

The object of study is a villa in the heights of Lausanne, in the middle of the Rovéreaz agricultural domain. Occupied by an association, it is composed of a cave, two office floors and two floors to house volunteers. Constructed in the 19th century as a leisure guest house, it was renovated in 1993 after a long period of neglect.

Today, inhabitant observes discomfort issues directly related to poor air circulation. The building experiences high humidity, overheating in the summer and unusable cold rooms in the winter. The project proposes passive solutions inspired by Palladian climatic designs to improve the comfort of the inhabitants and reduce energy consumption of ventilation, air conditioning or heating.

Based on discussions with the inhabitants, simulations of heat flows and observations translate to a video of existing atmospheres, the project proposes to enhance the sensory experience by bringing air, sun and water inside. The interiors or facade interventions make the building permeable to the climatic elements and present the diversity of atmospheres and uses according to the seasons.

STRATEGY



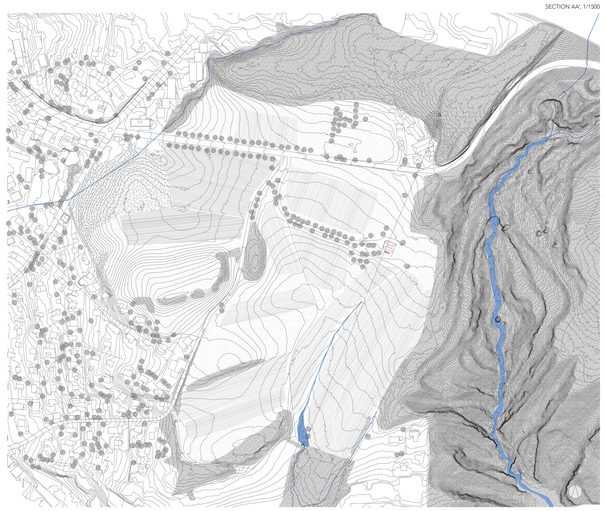
OPENING THE CAVE
Rehabilitating the cave, which is becoming one of the most comfortable places. It benefits from the thermal inertia of the ground to keep a stable temperature all year long.

VENTILATION
The solar chimney and new openings allow natural ventilation to prevail against humidity issues and enhance cooling and global well-being of the villa.

SHADING
In summer, the added volume on the south facade works as a loggia protecting the south facade of direct solar radiation and avoiding overheating of the inside.

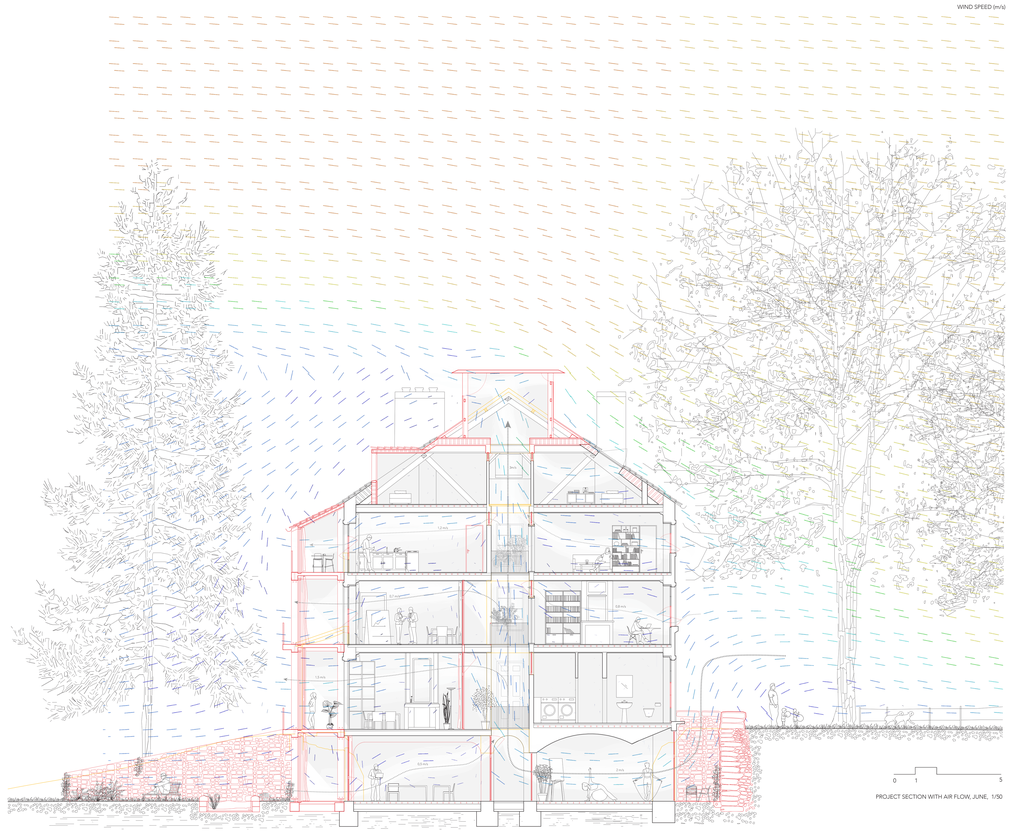
HEATING
In winter the loggia is closed by glazing and creates Winter Gardens. Coupled with the enlargement of the south openings this allows south spaces to be heated passively.

SECTION AA', 1/1500



SITE, 1/2000

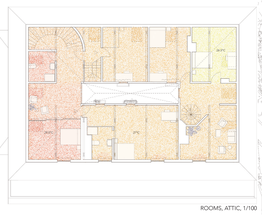
NATURAL VENTILATION : FRESH AIR FLOWS GENERATED THROUGH THE VILLA



PROJECT SECTION WITH AIR FLOW, JUNE, 1/50

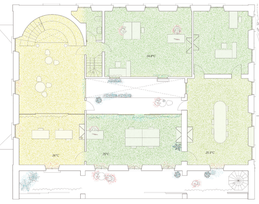
MICROCLIMATE ANALYSIS

SUMMER



ROOMS, ATTIC, 1/100

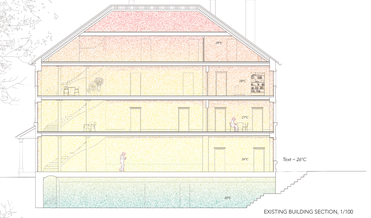
APARTMENTS, 2ND FLOOR, 1/100



OFFICES, 1RST FLOOR, 1/100

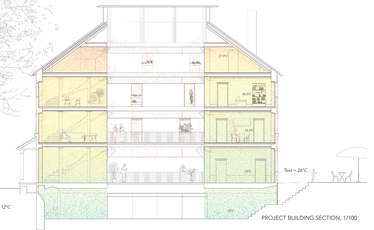
OFFICES, GROUND FLOOR, 1/100

BEFORE RENOVATION
15TH OF JUNE AT 3 PM

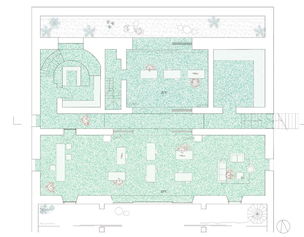


EXISTING BUILDING SECTION, 1/100

AFTER RENOVATION
SAME DATE

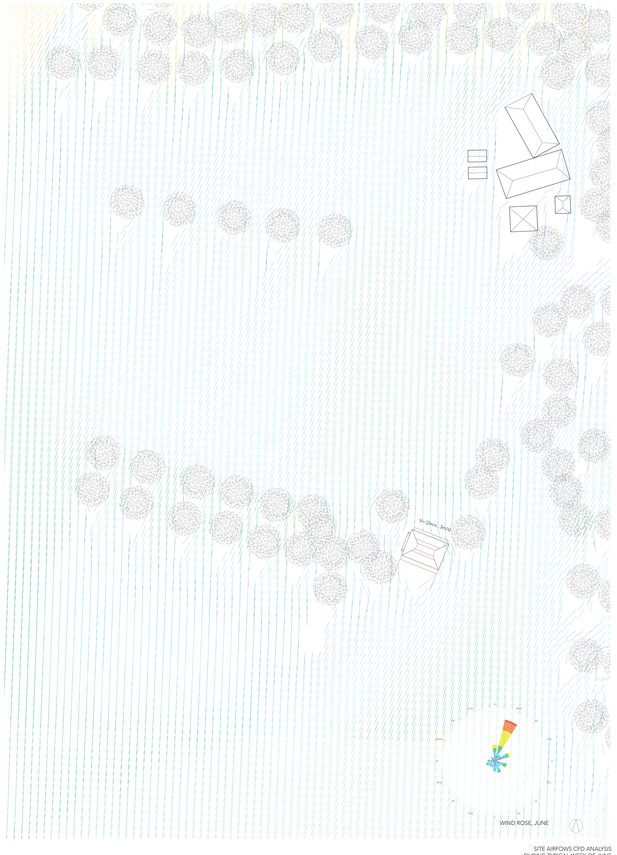


PROJECT BUILDING SECTION, 1/100

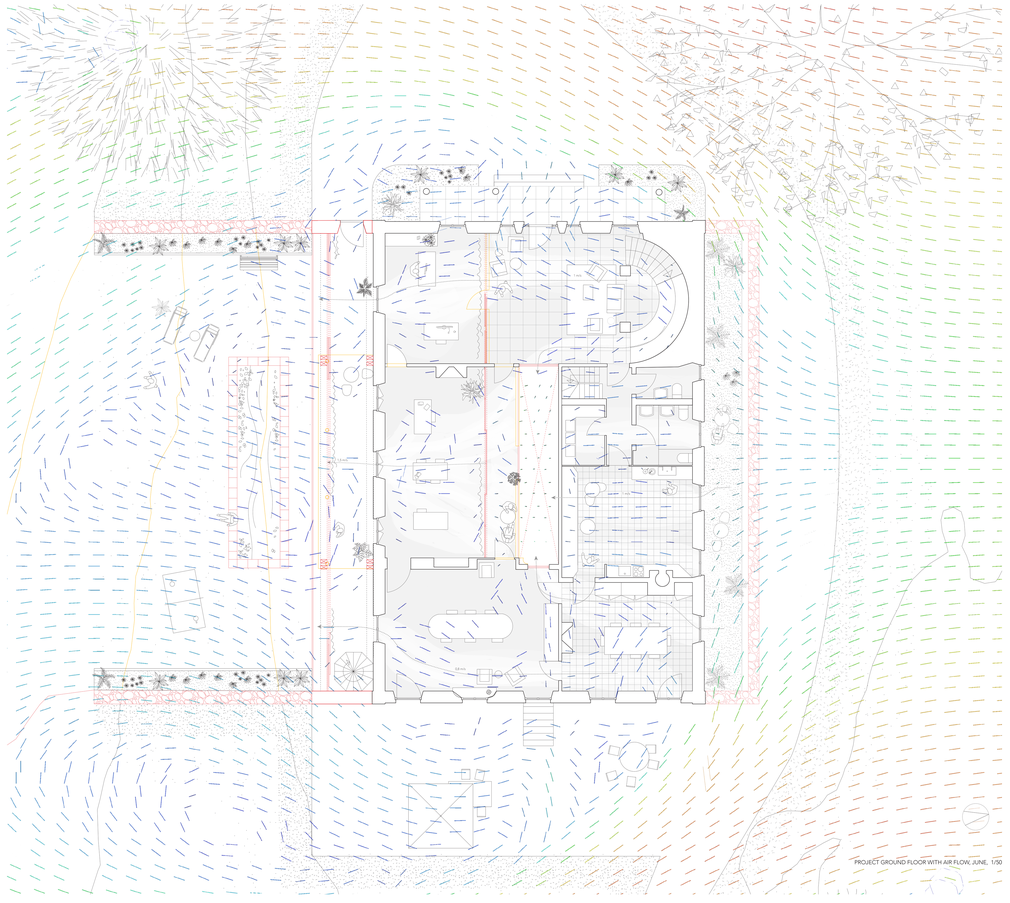


LEASURE PLACES AND OFFICES, CAVE, 1/100

TEMPERATURE



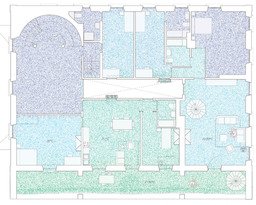
SITE AIRFLOWS CFD ANALYSIS
DURING TYPICAL WEEK OF JUNE
INITIAL WIND SPEED = 5 m/s



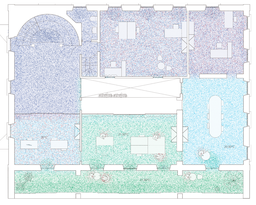
PROJECT GROUND FLOOR WITH AIR FLOW, JUNE, 1/50

WINTER

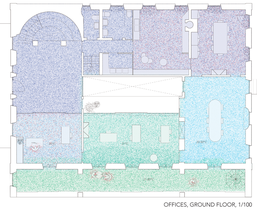
ROOMS, ATTIC, 1/100



APARTMENTS, 2ND FLOOR, 1/100

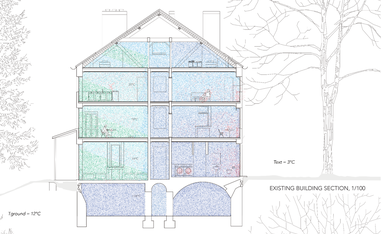


OFFICES, 1RST FLOOR, 1/100



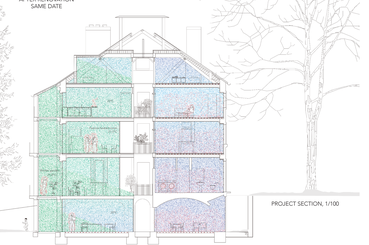
OFFICES, GROUND FLOOR, 1/100

BEFORE RENOVATION
1ST OF JANUARY AT 1 PM,

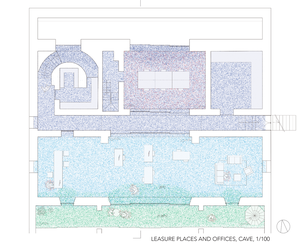


EXISTING BUILDING SECTION, 1/100

AFTER RENOVATION
SAME DATE



PROJECT SECTION, 1/100



LEASURE PLACES AND OFFICES, CAVE, 1/100

TEMPERATURE