POLYTECHNIC OF TORINO
FACULTY OF ARCHITECTURE
Degree in Architecture
Honors theses

Intervention in Beirout
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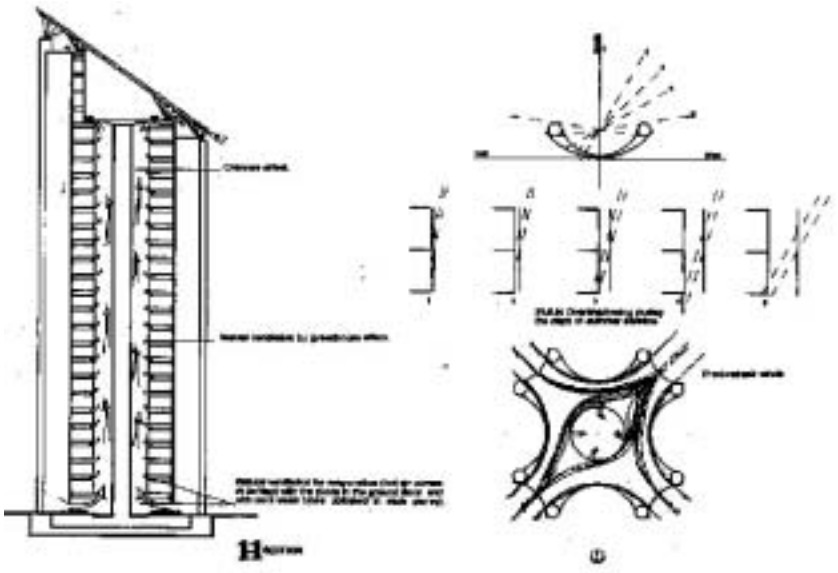
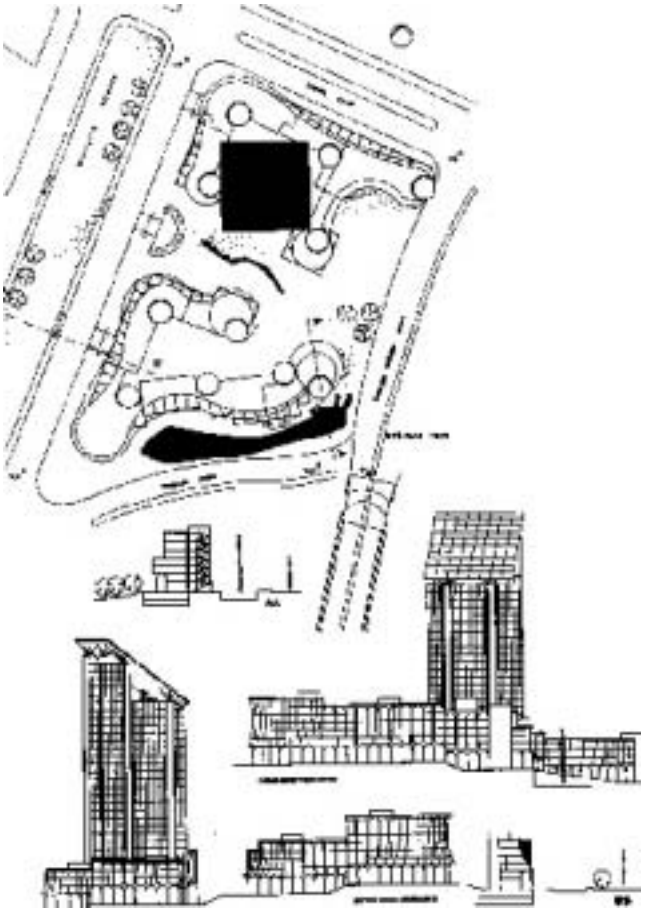
This multifunctional building rises in a Mediterranean locality at 35° latitude in a central city area. It offers services such as offices, a shopping center and a hotel. The various activities carried out in this building have different energy requirements for lighting, heating and espescially cooling, for the max. summer temperature is 30°C while winter min. temperature is 10°C.

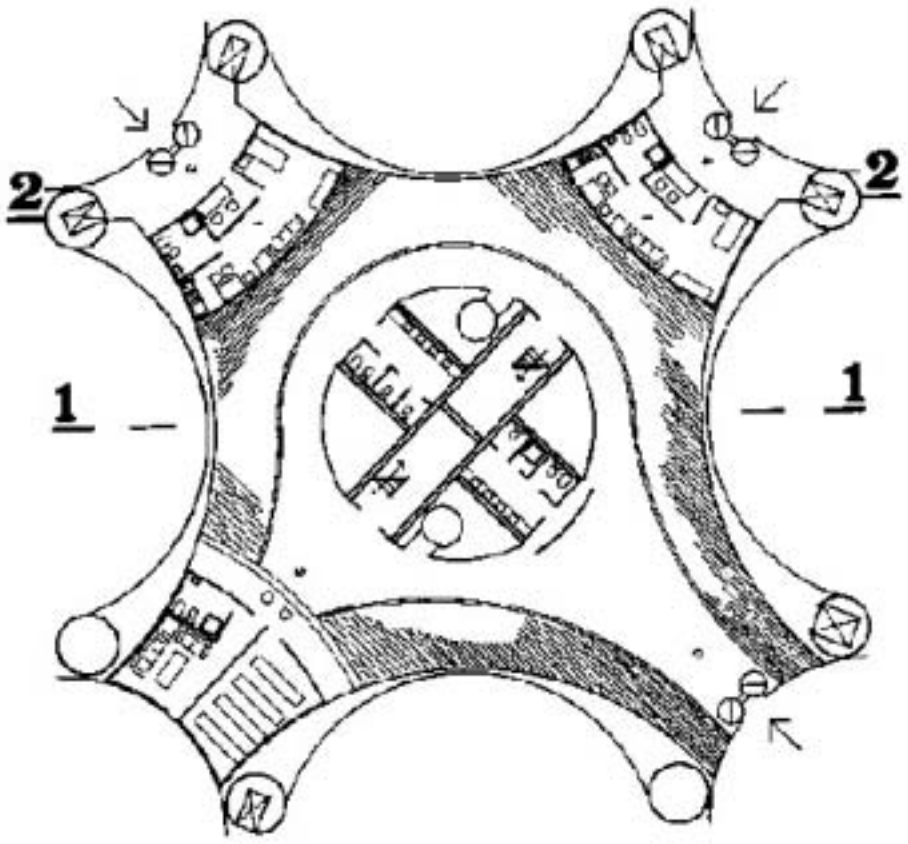
The aim of this project is to create a "breathing shell" able to supply transparence and coolness at the same time; the integration of Photovoltaic Technology in the external "skin" of the double fa‡ade permits to overshadow the inside, avoiding overheating summer sunrays especially on the southern side.



PV opac panels shall cover the 50% of the vertical surface in order not to hinder the outside view and winter lower sunrays. This way the light shall reach the inside whithout raising the temperature.



The other important PV integration is the 35ø(latitude angle) sloping roof of 2000mý that would produce 500MWh/year (the annual solar incidence of the area is 2000kW and the sunshine duration annual average of 3500h.) and that would work as an "umbrella" for the fourteen upper stories. The energy production of the fa‡ade panels is of about 850MWh/year. This calculation is based on the number of hours of insulation of each direction (N, N/E, E, S/E, etc.) taken from the sun path diagram considering that only unshadowed surface will be covered with PV panels.



Ventilation is another essential element for both comfort and panel cooling. We have illustrated the natural airflow and the airconditionning system in the following figures. The ratio between the volume of the building (83660mý) and its shell surface (15400mý, 4800mý of which glazed with PV panels) has been reduced to the minimum in accordence with the space needs. Annual energy request becomes 3900MWh, 56% for cooling, 34% for lighting, 10% for heating. This way the produced energy would cover the 35% of the global energy need.

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