What is open building?

Open building is a perspective on the design of buildings that sees the open environment as a natural manifestation, but not necessarily one that is inherently hostile or in need of change. This approach regards the built environment as a dynamic system with emergent properties. Change and development are seen as natural, continuous processes that are influenced by the interactions of various factors. The idea that built environment is the product of an ongoing, never ending, design and building construction that are compatible with it.

The idea that, more generally, designing is a process with multiple participants also supports the open building approach. Each of these levels relates to the one below and above it according to certain principles and goals. The open building approach recognizes these levels and their interactions as integral parts of the design and construction process. This helps in the avoidance of conflict between people and the parts of the system that they each control, and improves the chances of balancing common interests. Each of these levels relates to the one below and above it according to certain principles and goals. The open building approach recognizes these levels and their interactions as integral parts of the design and construction process. This helps in the avoidance of conflict between people and the parts of the system that they each control, and improves the chances of balancing common interests.

Thermal Effect Of Greenery

Besides creating a comfortable environment, it is also helpful for the greenness on the roof. It increases the concentration and reduces the feel of the outside air. The outside air is then drawn into the building, and the heat and moisture are reduced. This helps in the avoidance of conflict between people and the parts of the system that they each control, and improves the chances of balancing common interests.

3. Exterior view

4. Thermal Effect Of Greenery

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5. Three-dimensional street

A street is defined as a structural element that is a material element of the building, ecological garden, and other environmental factors. The changes in the street environment can be seen as a result of the interactions between different levels. The process can be improved by understanding the behavior of each level and its interactions with others.
Garbage crushing / transporting device

Garbage crushing / transporting device. Statistics shows that about 40% of the waste produced in households is garbage. At NEXT 21, this garbage is collected in a special receptacle located in the kitchen sinks of each household, and is sent to an adjustment tank in the basement by a garbage crushing/transporting device located under the kitchen. Kitchen-bath-toilet waste treatment system. Wastewater is collected and treated by a contact aerating biological treatment system.

Electric Power System

Electric Power System. Electricity at NEXT 21 is supplied by a self-contained power supply system comprising 100kW Fuel Cells, 7.5kW Solar Cells, and 1000Ah storage batteries. When DC power from these power supplies is converted in AC by an inverter, an energy loss results. At NEXT 21, the three DC power supplies directly provide DC power to electrical equipment such as common lighting, elevators, and pumps that cannot be run on AC power, thus increasing the efficiency of power supply facilities.

Thermal energy systems

Thermal energy systems. The core of the Total Energy System is the Fuel Cells. From this Fuel Cells, a variety of energy sources can be extracted: 160°C high-temperature steam, and 55°C low-temperature hot water. These are then used to power heating and cooling systems. For more precise control, the ESC forecasts the heating and cooling loads, and the amount of electrical power produced by the solar cells. It then creates an optimum operating schedule, determines the operating capacities of the Fuel Cells and other facilities, and transmits the required control signals. Also, in order to ensure overall accuracy, control instructions are executed every 15 minutes while compensating for control errors.

Total energy control system

Total Energy Control System. All of the energy systems at NEXT 21 are controlled by the energy system controller (ESC) in order to achieve maximum operating efficiency. The ESC forecasts the loads placed on the electrical and thermal systems and automatically controls the entire facility. This is achieved by a system designed for absorption of load spikes and real-time management of the power produced by the Fuel Cells.

Experimental Adjustments: Before and After

Beginning in 1998, a series of planned adjustments have been implemented to evaluate the project management principles incorporated into the design and construction of NEXT 21. Figure 1 shows the complete reconfiguration of a dwelling unit including alteration of its façade, shown in Figure 2. In this experiment, all of the work of modifying the façade was done from the inside of the units, thus avoiding danger of falling equipment and materials and minimizing disruption of immediately adjacent dwelling units.

Figure 3 and 4 show the subdivision of one large dwelling unit into two separate units. This adjustment included the reconfiguration of spatial layout and technical equipment. These experiments continue. (source: Professor Mitsuo Takada, Kyoto University Department of Architecture)

case studies of RESIDENTAL OPEN BUILDING

built designs

environment / energy

plans

First floor

Second floor

Third floor

Fourth floor

Fifth floor

Sixth floor

experimental adjustments: before / after

1. Dwelling unit conversion

2. Facade transformation of converted dwelling unit

3. Dwelling #404 subdivided into two separate units

4. Interior views of converted dwelling

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