

SUSTAINABILITY IN BUILDINGS

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Bangalore, the IT hub of India, has Moderate Composite Climate. This project attempts at creating a built environment, which is totally a climate responsive structure. The building form, construction materials etc are all in response to the climatic conditions of Bangalore.

This project is designed to house an office with nearly 75 workstations and a small guesthouse attached to it. The site is a long and narrow strip of land located at Domlur, about 3km from Bangalore Airport with access roads on East and North. The huge open drain (9m wide) abutting the site from West dictates the design development as it is in the direction of wind.

DESIGN RESPONSE: A cavity wall using Caddapah stone (locally available material) facing the drain with no openings for air inlet prevents the entry of foul smell from the drain to the interiors of the building.

PASSIVE VENTILATION METHODS: The open nature of the built volume creates natural flow of air within the building. The inlet from the roof vents on the North being at a lower level, sucks in fresh cool air and the outlets towards the south roof expels the hot air. The cavity wall and the solar chimneys on the south enhance the natural ventilation of the building. The earth is raised towards the south (earth berm) to reduce the conduction of heat.

DAY LIGHTING DESIGN: By creating Atrium spaces with skylights the building gets ample amount of daylight resulting in minimal dependency on artificial lighting (compact fluorescent lamps CFLs) during daytime.

RENEWABLE ENERGY SYSTEMS: A 5-KW peak solar photo voltaic system, integrated with the roof skylight caters to the water heating requirements of kitchen and guest rooms as well as produces electricity to support the few CFLs installed.

RAIN WATER HARVESTING: The runoff water from the rooftops and the paved areas gets collected at various levels in small open tanks on the terraces and finally in an underground tank (sump tank) below the garden area in the front yard. This collected rainwater is used to water the plants on the rooftops as well as in the front yard.

ROOF GARDEN: The ground cover, which is disturbed due to building of this structure, is replaced on rooftop, in the form of terrace garden, giving insulation to the building & reducing solar radiation. Thus the design addresses not only thermal comfort but also visual appeal and environmental issues. The five elements of nature, as described in Hindu mythology, have been well integrated in to the system of built form in this design.

AIR: Convection currents within the building through wind induced vents - use of Venturi effect

EARTH: Roof gardens and earth berms for insulation

SUN: Solar panels for water heating, electricity generation; creating stack effect through solar chimneys for effective ventilation.

SKY: Day lighting through skylights

WATER: Rainwater harvesting for water conservation; roof ponds and fountains for humidification.

Architects: Sanjay Mohe and V. Tushar, Bangalore, India, 1998

ECOLOGICAL SYSTEMS IN PAPER EGG

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In 2003 - 2004, we participated in an open international architectural competition for an Environmental Centre in Chicago, U.S. With the title "Paper Egg", we proposed to use paper as structural and cladding materials of an egg-shaped building. Our entity was selected as one of the five winners in 1st stage, but was not awarded as the winner due to the concern of constraints of budget and Chicago design guideline.

EGG AS HABITAT

Due to the needs of industrialization in Chicago, the original marshy landscape of the Calumet Park was slowly manipulated, and over the 20th-century, a new landscape was formed. Today, contamination from abandoned industrial sites, hazard waste dumps and landfills continue to threaten these natural areas. Aggressive non-native plants, such as the Purple Loosestrife, are disrupting the natural ecosystems that native animals depend upon. The perception of the Calumet Park is now one of a forgotten landscape.

Despite these changes, the land remains the home of a rare bird: the yellow-headed blackbird, although their population is declining dramatically.

The egg of the Yellow-headed Blackbird is employed as both a symbolic and generative force within the design. Ultimately the egg represents new life, bringing hope for the revitalization of the mistreated land.

Recycled paper has traditionally been considered as a physically weak and forgotten material, similar to how Calumet Park has been perceived as a wasteland. Through advanced technologies and ecosystem renewal, the "perceived weakness" of paper and the park becomes the strength of this project.

INNOVATIVE GREEN TECHNOLOGY - REUSED PAPER TECHNOLOGY

We propose to take advantage of the ecological value of reused paper: It is local, recyclable and inexpensive, and its production and treatment are not toxic. Advanced treatments also allows for a high fire resistance rating and structural stability.

We have accumulated much expertise in the techniques of paper architecture, and would like to display the material qualities of paper tubing that have allowed us to design, detail and construct the Calumet Paper Egg.

Natural evolution has given us the inherently strong shape of the egg, easily resisting the elements through its aerodynamic shape.

We have proposed the structure as a mesh-shell system. The mesh-shell system is comprised of paper tubular structural elements interlaced in a mesh and combined with steel rings to bind the structure together. The system is an independent shell structure that will support the outer skin, its own self-weight and additional structural live loads.