

Bronze 2008 Asia Pacific

Energy-efficient office complex, Hyderabad, India

Project data

Type of project Architecture (admin/business)
Estimated start of construction May 2008



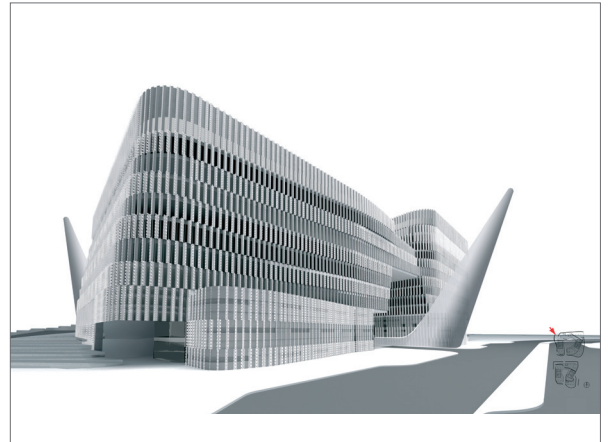
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Hill County SEZ office complex: view looking from north-east.

Comment of the Holcim Awards jury Asia Pacific

The dominant design target of this new office building at the outskirts of Hyderabad was the optimization of maximum shading and maximum use of daylight in order to reduce energy consumption. The proposed solution follows a twin strategy to achieve these conflicting goals. Firstly, the general layout of the courtyard building optimizes orientation and provides maximum fenestration for work spaces in the north and south wings, whereas the east and west wings in which radiation levels are high are occupied by cores. Furthermore the building shape steps out upwardly on its south façades to create self-shading effects. Secondly, the façade design is carefully analyzed to minimize solar heat gain while maintaining views and high daylight levels.

Vertical shading fins on the façade run the full length of the building. The varying but fixed angle of the fins for each orientation is optimized through extensive shading coefficient analyses. To enhance the contributions to a sustainable performance of the building, rainwater is harvested to be used for irrigation and replenishing the aquifer and an onsite sewage treatment plant processes grey water for non-potable use. This project has been commended because it is an outstanding example of a perfectly designed and engineered building that provides a multitude of sound contributions to sustainable construction without using any gimmicks.



Detail view of the façade.

Project description by author

The economic boom of India in the past decade has brought with it a surge in the construction industry. To further boost development and increase exports, the central government set up export processing zones, known as Special Economic Zones (SEZs). The city of Hyderabad is on the forefront of development and a maximum number of SEZs have been established in Andhra Pradesh, most of which are IT-based. The Hill County Special Economic Zone is one such development under the SEZ program on the outskirts of Hyderabad, and is being developed by Maytas Properties.

The current design of two buildings connected through bridges constitutes a total of approximately 110,000m² of office space with amenities on the lower floors. The spaces are designed to be occupied by IT and IT-enabled services companies. India has only recently introduced the Energy Conservation Building Code (ECBC) and so many buildings built in the past decade lack energy-efficient measures. Furthermore, many IT buildings with large floor-plates and high occupancy density have a poor indoor environment. In light of this background, Hill County SEZ design has driven the idea of an energy-efficient building with increased indoor environmental quality from the onset.

Since the building only experiences cooling loads, it is essential to minimize insolation (direct sunlight) onto glass areas whilst still allowing for daylight penetration. The design optimizes orientation and provides maximum fenestration for work spaces to the north and south. Relatively narrower floor plates of 22m are accommodated in a courtyard type building where the north and south wings are office spaces. The east and west wings where radiation levels are high are occupied by cores.

In the next series of massing studies, the building form steps out upwardly on its south-facing façades to create self-shading effects. The façade design is carefully analyzed to minimize solar heat gain. The window wall ratio (WWR) is roughly 30% while maintaining views and daylighting levels. Vertical shading fins on the façade run the full length of the building. The angle of fins for each orientation is optimized through an extensive shading coefficient analysis. Informed by the traditional jali, the fins incorporate kolam patterns which are part of local traditional arts.

All the passive design measures applied to Hill County SEZ building design helped reduce the size of the proposed mechanical system. In addition, the active systems design complies by not only ECBC codes but also American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). Overall, at current stage of design, the energy consumption of Hill County SEZ buildings is 35 to 40% lower than an average office building in India and roughly 15% lower than an ASHRAE-compliant building while maintaining a high level of indoor environmental quality.

Relevance to target issues by author

Quantum change and transferability

The building breaks free from the perceived generic image of an international standard office building. Shallow lease-spans, unique to developer building typology in India, have been incorporated and justified through energy savings. Reduced chillers are in direct response to the shaded façade. In essence, a courtyard shaped building has been made efficient and viable in the developer market.

Ethical standards and social equity

Maytas holds ISO certifications for environmental and quality management as well as occupational health and safety and social accountability. Specifically at Hill County SEZ, almost every occupied space achieves a daylight factor of 4% and retains a good balance between lighting and thermal considerations. Ventilation rates have been increased to 30% over what is prescribed by the ASHRAE codes.

Ecological quality and energy conservation

Lighting in offices generally accounts for a large proportion of energy loads. By maximizing daylighting, lighting loads have been minimized. Rainwater is harvested to be used for irrigation and replenishing the aquifer. An onsite sewage treatment plant processes grey water to be used for non-potable applications including the chilled water for the air handling units (AHU). No potable water supplied by the municipality is used for flushing.

Economic performance and compatibility

The use of local materials and techniques has allowed for the unique structure and an intricate façade within margins of the proposed budget. Whilst maintaining a level of quality in building services and indoor environment, the building efficiency hovers around 80%.

Contextual and aesthetic impact

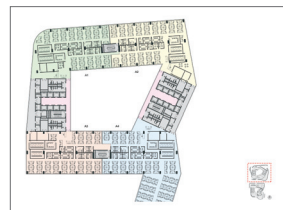
The building forms and site walls take advantage of the unique site by carving itself into and out of the dramatically contoured and rocky site. The building elevates as extensions of site contours themselves. As these contours rise, the ribbon forms wrap around to create courtyards which have been integral to the local vernacular.



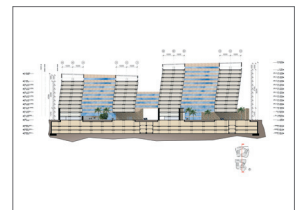
Extension of the landscape.



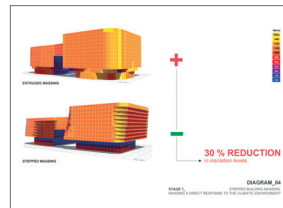
Ground level and lobby plan.



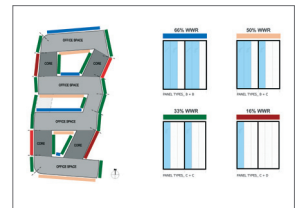
Typical office floor plan.



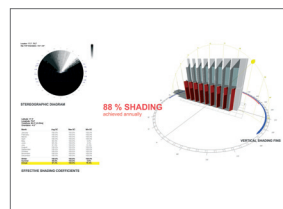
North-south section through courtyards.



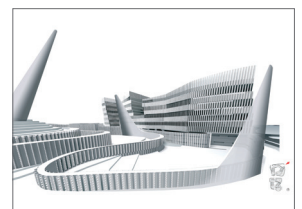
Stepped massing study.



Window wall ratios.



Fin angle studies.



View looking from north-west.