

BIOWONDER CORPORATE PARK, KOLKATA

harmonizing the nature with architecture



BioWonder is the ultimate destination of maximizing energy quotient of business. The Gold Rated Biophillic Wonder harmonizes nature with architecture. It is a statement of cost innovation for the business that synchronizes with natural generation of higher efficiency level for the work force. BioWonder is the first Biophillic project in India. In the evolutionary scale of green buildings, it is the most intelligent and evolved category with actual effective green cover of 100 per cent.

With composite arrangement of convenient stores, food courts, gyms, spa, business centers and all round banking facilities productive time and conveyance hours are saved. Adjacent building houses a four-star arrangement offered by ITC having facilities like dining, clubbing and roof top swimming, or late night partying.

BioWonder has won the prestigious City Scape Award-2012 for best sustainable development in Dubai. BioWonder communication collateral won the LACP Platinum Award for its design and concept in Atlanta. BioWonder also won the prestigious Credai Bengal Award for Best Green Project in 2014.

Wonder Recreated

BioWonder, designed by Salient Design Studio, has redefined the Kolkata skyline on account of its unique structural structure. The challenge was to enable seismic stability to the entire book-stack structure, and yet, make it biophillic. The terraces are pulled out of the building to the extent of 8 meter in width and 26 meter in length, which is one of the largest cantilever structure in India.

This is done artfully, strategically ensuring that the center of the mass is maintained along the center of the building's axis. The architecture of the building required the

terraces to have uninterrupted views and also having terrace gardens. So it became necessary for the cantilever portion of 8 meter by 26 meter at different levels to be executed by using structural steel.

Meeting Expectations

The project started with a brief for Corporate Park. The client was expecting a cohesive environment for the end users in the building wherein two-third should be consumed for office and one-third for hospitality which includes a hotel. Eventually, as it was developed, it became the first-of-its-kind development in Kolkata with mix. Salient Design wanted to bring in substantial values in the development for the people and their environment.

Kolkata is going under an urban environmental crisis with people suffering from lower productivity, absenteeism, higher medical problems like lung cancer etc. So the thought was can we make an office with less stressful environment, and on the other hand, we can give back the city its value system.

Then came the idea of Biophillic development with enhanced productivity as well as well balance economic sustainability. Offices with a green terraces came in design from this thought.

Evolving Design

While evolving the design, the designers came up with a form wherein it had cantilever terraces staggered vertically as green daylight pocket gardens and also to enhance the solar performance in the building. To achieve this, 8.5 meter of cantilever steel offered an interesting option with lesser opacity than the concrete cantilever. This also enhanced the Biophillic performance to the design. Also,

the process of construction was relatively safer and faster. Not to forget that steel in structural form is recyclable and reusable.

Steeling Benefits

To construct such high quality and challenging structure, the Client appointed Eversendai on board. The entire design, procurement and erection of the structure steel part of the building including deck sheet laying has been done by them, and the structural design have been proof checked and weighted by IIT Roorkee. Flexibility in design and aesthetic, superior material strength, high speed of construction, were the few benefits that were achieved by using structural steel. It was found that to implement the architectural intent completely in construction, especially, when it is very challenging, steel is the only option. Architectural marvel can only be created by composite (steel + concrete) or by steel only.

The project has been inspired by the proportions in Golden Ratio. This ratio has helped achieve higher surface area within the same floor plates, and thereby, gaining



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ASHOK PASARI

Chairman, Pasari Multiprojects Pvt. Ltd.



FACT FILE

Client: **Pasari Multiprojects Pvt. Ltd.**
Architect: **Salient Design Studio**
Structural Consultant: **Eversendai**
Steel Fabricator: **Eversendai**
Steel Tonnage: **525 tonne (approx)**
Current Status: **Under Construction**
(Structure steel work completed)

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38 per cent higher views, daylight and Bio-hormonics for the people inside. The cantilevers are self-supported by a staggering geometry and are held to the main core by diagonal steel beams/ties. The design is essentially systematic to the core which provides substantial structural balance in case of seismic and wind performance.

Features Galore

- The Golden ratio in massing and planning geometry to maximize solar performance
- BioWonder compensates for 100 per cent green cover
- Solar insolation (solar heat gain) is minimal due to offsets and terrace forestry
- Reduced heat island effect
- Green pockets created to facilitate conducive microclimate for outdoor activities, conserve and promote biodiversity (Offset terraces make

- shorter bird paths to reach heights)
- Passive cooling induced by trapping the prevailing wind
- Massing projections creates natural cooling turbines forces the wind to form vortices
- Industrial pollutants managed by specific plantation on above levels
- Traffic pollution till 14.5 m managed by urban forestry in 3 levels
- Nucleated core to contain the super built up loading within 20 per cent
- Site planning employs ancient science of magnetic zoning of vastu shastra
- Polymer solar cell installations in west and east façade

Structural Distinctiveness

Eversendai has done complete structural design for the steel portion, along with connection design, shop drawings, material procurement, fabrication, blast and paint and delivery to site and site erection works including metal decking installation. The building is designed in steel concrete composite cantilevered box floors which are completely covered with glass facade. Also, the roof of the boxes is with earth filling for landscaping and greenaries. Deflection control, short term and long term are the primary factors.

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The embedments particularly are the unique part of the structure. One of the complex embeds proposed and fabricated, covering the full column size accommodating all the vertical and horizontal column/beam main reinforcement bars. Plates as high as 80mm plates are also used which are checked for z through thickness. Secondly, the main primary cantilever beams, which are prepared with green length and precambered on the other side are formed from plate built ups.

Erection Techniques & Challenges

The first floor in the first box erection was raised up using temporary prop from the ground level, whereas, from the second box onwards, all the time, the bottom floor of the box was erected on the temporary cantilevered trusses and then remaining floors are progressed as normal column beam floor frames. The tower cranes are used all the time for erection.

The embedment which are designed with eccentric cg, erected with temporary props using hydraulic jacks to level the embeds, fouling of vertical rebars, which are precisely detailed and accommodated and the embed outer to outer matching the concrete surface is one of the main challenge.

Also maintaining upward precamber, since cantilevered and precisely got erected with minimum erection tolerance utilised is another challenge. Lot amount of engineering involved and very accurately the weights are predicted including its stiffness and precamber for dead weight is calculated with precise numbers. And this not been

considered, otherwise the structure might have faced issues from glazing facade.

Adhering Safety

Every floor, joints, cantilever area etc. are completely provided with working platform through steel scaffolding, including toe board and all beams are followed with life line protection. Eversendai followed OSHAS standard apart from internal HSE policy/manual during the erection of the steel structure.

At the factory, SAW, SMAW methods were followed with highly qualified skilled welders in all necessary positions. And at the site, maximum SMA welding followed, since the maximum engineering were bolted joints with minimum welding, as this helps for faster and accurate dimension control at site. Around 670 MT of structural steel was used in this project. Raw materials were purchased from steel suppliers like JSPL, Posco, SAIL as per the approved quality procedures. Around 70 skilled workers average in a month were engaged.

Steel Sections/Grades:

UB 610, UB 533, UB 457, UB254 BEAMS, UC 305, 254 columns, built-up columns and beams where no rolled sections available. All the grade of the material is E350, IS 2062.

The project was slated for 36 months, but, due to fluctuating economy, it has stretched for 48-50 months. Almost 2 years were also taken up in pre-construction activities.



"The project has been a great turning point for me as an individual architect and for organization in whole to grow our value system. The designing and detailing has been a process towards greater sensitivity and towards economic sustainability especially when they are associated with economic fluctuations. Lot of evolutions happens when we have to accommodate the fluctuating markets.

Also how we stretched ourselves and accommodated while working with over 16 consulting agencies."

VIVEK RATHORE

Principal, Salient Design Studio

