STERLING

ENGINEERING CONSULTANCY SERVICES PRIVATE LIMITED

Newsletter Issue : 13 | December 2016

Merry Christmas and a Happy New Year!

Editorial

PROUD TO BE INDIAN

Dear Readers,

We are delighted to present the 13th issue of our Newsletter and extend our warmest wishes to our Employees, Clients and business associates for a **Very Merry Christmas and a Happy New Year!**

In this issue, we have captured a few landmark projects that we have designed across our nation – Sterling truly has a national presence and continues to contribute to the country's progress in building mega structures. From the beautifully crafted **MIER Auditoriums** in Rajasthan to the sprawling **ITC Mixed Use Complex** at Rajarhat in Kolkatta there has been a tremendous learning for the entire organisation.

The humongous 7 star **ITC Colombo One** project in Sri Lanka, is one of it's kind and shows tremendous tenacity and sincerity of our team in learning new techniques when delivering complex projects with tough timelines. We are proud to feature the stunning **TRITVAM** residential project which has changed the skyline of Kochi. In our constant endeavour to cater to sustainable development, we are very pleased to be a significant part of the city's **first cluster development** uplifting the living conditions and creating new opportunities for residents at **Bhendi Bazaar**.

Striving to enhance our design skills and deliverables, we are proud of our **Lupin Research Lab** project in Pune where our aesthetic engineering skills were put to test! Our residential projects in Mumbai, Hyderabad and Bangalore continue to deliver aesthetically pleasing structures which are efficient in the structural planning while meeting a number of Client's needs - **Celestia Spaces** Mumbai and Bangalore's **Ecopolis** do just that.

Our newsletter is a platform to share this valuable learning and expertise developed within the organisation with our employees, Clients and stakeholders! I thank all our engineers for their valuable contributions and making this issue a success! We hope you enjoy this adventurous journey through India!

Dr. Deepali Hadker

A jewel in the Land of Kings

Auditoriums For Mody Institute Of Education And Research, Lakshmangarh, Rajasthan *Mohammed Mulla*

The Mody Institute stands apart due to the state-of-the-art, high end facilities that it has provided which is not commonly seen in other institutes. This facility has been designed with two Auditoria – one Main Auditorium (1100 seats) and the other a Mini Auditorium (300 seats) along with a fully equipped Cafeteria. The available plot size was 3 acres and the carpet area constructed is about 1,50,000 sq. ft. The project cost was 45 crores and was completed in 2015.

A very impressive double height entrance foyer with the 13 foot high dancing Nataraj statue in bronze, welcomes the visitors and the Entrance and Side foyers are embellished with numerous artworks like the Sun Mural and Indian Dance Forms.

The architect, Mr. Rahul Manohar, designed the foyers such that they could be “one-with-nature”. Hence, the double height entrance foyer is enveloped with a full glass façade, thus blurring the line between the “Inside” and “Outside”. Temperature control and cross ventilation in the foyers is facilitated by having louvers in the glass façade and ventilators below the roof skylights.

The Auditoria are designed for seminars, presentations and placement interactions. The **Main Auditorium**, has an expansive stage area with elaborate facilities for multiuse. The stage can be divided by Main, Mid and Rear curtains as per the requirements of the event. State of the Art Audio Video equipment is installed along with Cinema quality projector from Christie, audio system from Bose, and Senheisser microphones. Elaborate rigging system with provision for flying scenery, presentation screen, cinema screen, scenery, backdrops, hanging mikes, chandelier, and multiple options for stage lighting are also provided. There are multi-level dressing rooms for single and group occupancy with attached toilets.

The **Mini Auditorium** has a seating layout which envelops the stage from 3 sides. This arrangement is especially designed for better interaction between the stage occupants and the audience and also for intra-audience interaction.

There were several structural challenges which Sterling overcame successfully. The building is in Zone 4 for Earthquake loads and hence posed a challenge.

The roof slab over entrance lobby has a 6 meter cantilevered overhang and this slab was supported on 9 m tall free standing columns. Hence, the roof is designed as a waffle slab on a 3 m x 3m grid and is cantilevered out from the facade. The main beams which span from column to column are 600mm wide. The secondary beams are 300mm wide and create the waffle slab effect. The overall depth of 1200 mm was dictated by the 6 m overhang all around. The slender 9 meter tall columns are designed as 700mm x 700 mm chamfered columns on a 9 M x 9M grid.

Different options were evaluated with varying spans of floor plates. Waffle slab over the entrance foyer at 9 meter height provided adequate stiffness for the roof having 6 meter cantilevered overhangs.

The exposed structure not only turned out to be economical but also eliminated the need to provide a false ceiling due to its own aesthetic beauty. The consumption of concrete and reinforcement was low compared to flat slab solution and proved to be cost effective. Skylights were provided within the waffle slab to utilise natural daylight. Savings also took place by avoiding air-conditioning, artificial ventilation and lighting in the lobby by creative architectural design.

The **Main Auditorium** had to be designed with a clear span of 32 meters. Here, deep girder beams are introduced at 4 meter intervals, spanning 32 meters. They have a depth of 2 meters in the centre and are tapered to 1.6 meters at the periphery to ensure efficient drainage of rainwater without adding too much screed. The entire formwork design was examined carefully to ensure safety during concreting operations. Load calculations were carefully prepared. Lateral supports were designed at every 3 meter interval. This ensured that the formwork did not slide due to the slope and heavy weight of the concrete.

There are a couple of very innovative ideas implemented in this project. For example, the cavity walls on both sides of the auditorium were designed to work as the main structural frames to provide stability against lateral loads on the entire building. They act like shear walls. These double walls not only provided the necessary acoustical barrier but also ensured stability. Thus the elegant and slender columns seen in the foyer, supporting the roof, were not required to resist lateral loads!

MIER Auditorium Night View

TRITVAM Residential Development at Marine Drive, Kochi, Kerala *V. L. Naik*

Facing the serene back waters of Kerala, 5 majestic towers in phase 1 of TRITVAM residential project have sprung up in the Marine drive area of Kochi. The entire project is divided into two phases. The first phase of the project consists of four towers and a Premium Tower. The four towers are connected by a common podium with a wavy profile at first floor level . The premium tower is separate from the podium.

The second phase consists of Tower 5 surrounded by a four level podium for parking. Phase 1 towers consist of ground and 25 residential floors. The ground floor is used for parking. Each of the residential floors has a floor height of 3.15 m. A Helipad is provided on top of all towers as per statutory requirement. The total height of the towers at terrace level is approximately 83 m from ground level. A single storey podium connects towers 1 to 4. A two storey clubhouse and a swimming pool along with landscaping are provided over the podium slab. An expansion joint of 50 mm is provided between the 4 towers and the podium.

Phase 2 of the project consists of tower 5 with ground floor, 4 parking floors and 26 residential floors. The total height of tower 5 at terrace level is 99 m from ground floor level. Podiums of the two phases are separated by an expansion joint.

All the towers are designed as column-beam framed structures. The podium slab is a flat slab structure. Bored cast-in-situ piles are provided as foundation below the towers and podium The podium columns have individual pile caps connected by raft while the tower columns rest on 1.5 m deep raft supporting all the columns of the tower. The piles below the tower raft are arranged in a diagonal grid to get the most compact foundation.

The tower structure was modeled using ETABS software and analysed for both vertical and horizontal loads as per relevant IS codes. For calculating earthquake loads, seismic zone III was assumed. For wind loads, appropriate gust factors were used. The raft for the towers was analysed and designed using SAFE software.

The soil strata was very weak even at a depth of 50 m below ground level. Hence, 50 m long bored cast-in-situ piles were used for transfer of column loads by friction. To expedite the construction, pre-cast stairs were added after the cast-in-situ floor slabs were cast.

LUPIN RESEARCH PARK, Pune A visually stunning treat *Dinesh Bhaud*

Located on a sprawling 15 acres plot, this Research Park was completed in March 2016 for Lupin Laboratory. With a carpet area of 3,50,000 sq. ft the laboratory building has been designed with several artistic structural elements. The external façade is designed in structural steel with glazing and part of it is finished in concrete form finish. There are several specially designed landscape elements which enhance the overall ambiance of the research facility.

There are two very attractive, unconventional staircases with single side supports. One staircase is a 9 M Dog-legged cantilevered staircase in structural steel. The design intent was to have a column free staircase and a mid-landing free from any kind of supports. Thus, it was decided to take support for this staircase from the beams available at floor levels only. The supporting member was selected as a pipe as it was prudent that torsion will play a major role in transfer of forces from staircase to the parent RCC structure and circular section was best suited for this load transfer mechanism. The Main structure of this staircase is made up of plates springing from the circular pipe at every floor, reaching the tip of the mid-landing and again going towards the supporting pipe at other floor level. The total cantilevered projection is 9M with 3M wide mid-landing.

The other staircase is a Self-supporting Spiral staircase using a combination of concrete and structural steel. There are two structures united in a very artistic manner. The RCC part is a spiral coil which is ranging across all floors and is self-supporting. It is like a continuous spiral ring made up of RCC flat plate. The thickness of this plate was arrived at considering the axial settlement under the effect of expected loadings. The staircase was cast considering overall settlement at each floor and appropriate camber was given to account for these settlements. The base of the staircase was a solid thick raft as it was proposed to carry the load of the entire staircase. The formwork was specially designed for this staircase to achieve the desired form. The second part of the structure which is a steel staircase was then placed and erected over the sloping slab. The steel staircase has 4 landings which were fabricated by negotiating the slope of the slab below.

Another design challenge was to have a large conference room with no internal columns and had a landscaped garden above. Specially designed “V” shaped columns support the large span of the RCC flat plate slab. The slab in turn supports the heavy load of landscaping above the conference room.

During the course of construction, a well planned activity schedule led to savings in cost. Also, a higher grade of concrete was used and member sizes were designed to maximize repetition. In order to save time, flat slab construction was adopted.

Also, form-finish concrete was used, which did not require plastering. Structural steel was used for the critical elements of the building. Form finishing and strict adherence to the tolerance limits and specifications was maintained to achieve better quality product.

Sterling has added value in detailing a number of complex landscape features such as bridges, sloping steps at the entrance, pathways, pool areas and compound walls.

This project won the 2nd Place at the ACETECH ALPHA AWARDS 2016 in the STRUCTURAL DESIGN CATEGORY!

UNDER CONSTRUCTION PROJECT - ITC COLOMBO 1

Manish Negandhi

The ITC Colombo One Project at Colombo is located on the coast having the oceanfront on the west side and Beira Lake on the east. The architectural concept has been prepared by Gensler of Los Angeles, California, and Surath Wickramsinghe Associates of Sri Lanka are architects on record. Sterling Engineering and Thornton Tomasetti Inc. have been engaged as structural consultant and peer reviewer respectively.

The project includes a 49 storey Residential Tower (224 meter) and a 28 storey Hotel Tower (139 meter). The towers are connected by a 54 meter long sky-bridge at levels 19 and 21, featuring an exterior pool deck on its upper level and lounge and dining area on the lower level. The foot print of each tower at its base is approximately 21,200 sq. ft.

A four story podium surrounds the towers providing space for lobby, retail, office, and special events. Four below-grade levels are dedicated for parking, MEP and back of the house functions. The residential building comprises of 132 flats with a total built up area of approximately 12 lakhs square feet. The hotel building comprises of 354 keys with a total built up area of approximately 11 lakhs square feet. The project has a total built up area of almost 23 lakhs square feet. The footprint of the entire podium is approximately 1,83,000 sq. ft. including the towers.

The project is primarily designed using reinforced concrete construction, with only a few components utilizing structural steel. Lateral stability for the towers is provided by reinforced concrete shear walls organized around the cores of each tower. Concrete link beams connect individual wall segments, within each core, enabling them to work together to resist lateral loads.

The gravity system consists of a reinforced concrete flat slab supported on concrete columns and core walls. The Hotel Tower utilizes a 'double column' scheme with columns located on every other hotel unit demising wall, yielding a span length of 10 meters. The Residential Tower utilizes a 'single column' scheme with column locations coordinated with the interior planning requirements of the tower, also yielding a span length of 10 meters.

During the concept design phase, several structural systems for the towers were studied, including:

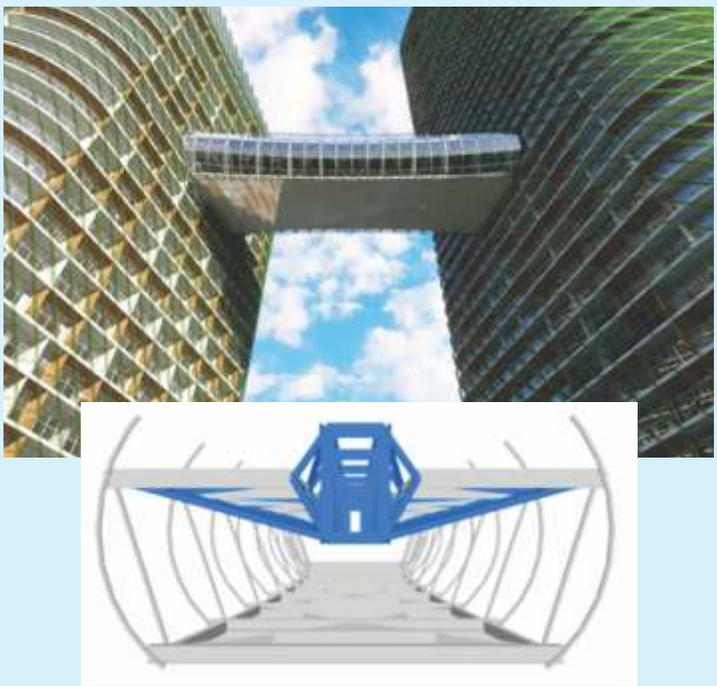
- Concrete core with outrigger beams on all levels
- Concrete core with lumped outrigger walls at designated levels
- Concrete core with a perimeter moment frame
- Concrete core-only scheme with flat slab.

After this study, it was decided to proceed with the core-only scheme with flat slab scheme as this system provided a better solution with respect to structural performance, cost, construction speed, coordination with other disciplines as well as architectural intent.

Aerial View of the ITC Colombo One Project

Connecting Bridge between Towers

A sky-bridge connects the Hotel Tower with the Residential Tower at Level 19 and 21. The sky-bridge will include an outdoor pool and deck at the upper level and a bar lounge area at the enclosed lower level. During the Concept Phase, several structural schemes for the sky-bridge were studied. After comparing the various options it was decided to proceed with the central box truss system.



Hotel Drop Off Area

Open Recreational area at level 04

PROJECT UNDER CONSTRUCTION - ITC Rajarhat, Kolkata *Amit Surlekar*

This Mixed Use project at Rajarhat, New Town, is planned on 17 acres of land. There are office spaces for IT and ITES sector, along with a Knowledge centre, Hotel and a Residential complex. The built up area is more than 2,50,000 sq.mts. Morphogenesis, the architect on board, designed the project by arranging different buildings in a pattern which resembles "Book Shelves". Each building is designed for efficiency in air distribution, lighting and workspaces. The regional heritage and traditions of Kolkata are expressed on the building facades with sand-stone cladding, murals and GRC jali in combination with contemporary structural glazing. Landscape design over podium has been integrated with sculpture courts, pedestrian spine with cultural artwork, literature and statues.

There are two 15 storey Infotech office buildings reaching a height of 72mts and two corporate office buildings, 7 storied, reaching a height of 35mts.

The Knowledge Centre is planned with a large hall at ground floor with meeting rooms and an open air amphitheatre at roof level. The 200 key Hotel is a luxury business hotel having 7 levels above ground with 2 podium levels housing recreational facilities like swimming pool, gymnasium, health club etc. The Residential Complex consists of two towers of 25 storeys each having a total height of 90mts.

There are 2 common basement levels, with a footprint of 90,000 sq.mts., for parking and MEP services. The Utility Building is a single storied structure housing all heavy MEP equipments fulfilling the requirement of the entire project.

Structural System :

- Mostly all buildings have central lift core planned which have been effectively utilised as main lateral load resistant element along-with partial contribution of perimeter column-beam moment frame.
- Flat slab system was preferred for its advantages like flexibility in interior planning, high clear ceiling and fast construction. In the chosen option, further evaluations of different systems were studied to arrive at the most optimised structural flooring system. Post-tensioned flat slab with column drops was chosen for office, hotel and non-tower footprint, residences with flat plate and Knowledge centre with conventional beam and slab system. Heavy gravity loads have been considered on flat slab system in different levels of buildings for landscape, data center, MEP equipment requiring large thicknesses.
- Column sizing at typical floor levels have been maintained throughout the building in view of aesthetics and interior planning requirement. They have been optimised by varying the grade and reinforcement content along the height of the building.
- The soil strata was clayey and sandy in nature and hence, pile foundation structure was proposed for the buildings with high demand of column loads like Infotech, Residential and Hotel Buildings. ITC corporate and Knowledge Centre building having low gravity loads compared to other buildings and have been provided with open foundation with stitched raft. Removal of soil below existing ground for excavation of basement structure helped to release overburden pressure at founding strata which in turn helped to generate bearing pressure of close to 18 T/sq.m. This has been effectively used to cater for super-imposed load of ITC Corporate and Knowledge Centre building structures. Adequate tension piles have been provided below the footprint of these buildings to negate the overall uplift due to presence of high ground water table. Close to 1500 load bearing cast-in situ bored piles and 500 tension piles have been provided for the entire project. Sheet piling has been proposed to hold the sides of deep excavation pits.
- A Cantilevered Vierendeel Girder has been designed in ITC corporate building to meet the architectural design intent of column free space at the Entrance.

RGA Park, Sarjapura Road, Bengaluru *N. N. Nagendrakumar*

This is a large IT and Commercial complex comprising of 4 towers and a food court . The building is essentially RC Structure with columns and flat slab system. Access to all the blocks are provided through driveways and ramps at several locations for easy flow of traffic. A central driveway divides the complex with Towers B1and B2 on the left side and B3 and B4 on the right. As the 3 basements are located below the existing ground level, RC wall is provided all around to retain the earth. The structural system is of flat slab system with 11m x 11m grid. There are 3 – basement floors. These basements are intended for car parking, electrical and DG room. Also the under – ground tanks, sewage treatment plants are placed below ground floor level and access is through the basement floors. Ground floor is used for car parks and access driveways and is also used for building services such as DG, electrical room, chiller plant room etc. Landscape will be carried on the ground floor slab with soil fill on top. Food court is located at ground floor level in between tower – 1 & 2.

Block 1 comprises of 3 common Basements with a Ground floor and 9 upper floors with a Terrace. Building is rectangular in shape with recessed corners. Beams are provided at periphery, lobby area and ducts etc. Main entrance to the block at ground floor is provided at west side, leading to central lift lobby. AHU room is provided on either side of the main lift lobby and is located at all typical floors. Block 2 and 3 are very similar and have 3 Basements and a Ground and 10 upper floors and Terrace. Main entrance to the block at ground floor is provided at west side, leading to central lift lobby. Certain portion of the area has a triple floor height.

Block 4 comprises of 3 Basements + Ground + 10 floors + Terrace. Building is of rectangular in plan. Chiller platforms and cooling towers are located at terrace. Double height electrical room is provided at ground floor on west side opposite the main lobby.

As per the soil report, area explored has got top soil of 0.5M. The underlying layer is disintegrated rock with medium rock appearing at depths varying from 1.5 to 14 M below ground level. No water table was met in the bore holes at the time of exploration, considering all the factors, isolated/combined footings are used.

APCO Hotel, Lucknow *Rohan Hadgal*

This iconic hotel with approximately 120 guest rooms is planned to cater to the needs of the business world. With an approximate construction area of 2.2L sq. ft., the hotel building consists of 3 basements, ground floor, 2 mezzanine floors, Food and Beverage level, Service floor, 6 guest floors and a terrace. The plan dimensions of the structure at ground floor level are 72 m x 32 m. A grand entrance canopy leads to a 4 storey high entrance lobby. A 15,000 sq ft Banquet Hall is located at the ground floor.

The foundation system is designed for the upward pressure due to sub soil water taking into account the counterweight provided by the fill at Basement 3 level. The foundation is detailed using 600mm thick raft slab connecting the individual inverted footings. Two lift cores are placed on either side of the building, one for service purpose and the other for guests. The first mezzanine level and the service floor levels together house 12 floor deep girders which are provided to support 6 guest floors and Terrace above. These girders are framed tactically to create more column free space in the guest floors by considering T – Shape peripheral floating columns. Necessary openings are provided in these girders to allow for services. Most of the flooring system is flat plate type with beams on the periphery. Hanger columns from girders or deep beam from the Service floor are used to support the Mezzanine 2 level. Conventional beam slab framing is used in the lift cores. Since the building lies in Zone III of seismology graph of India, ductile detailing has been carried out.

The Bhendi Bazaar Cluster Redevelopment Project, Mumbai *Girish Dravid*

Sterling has been appointed as structural consultants for the 1st cluster redevelopment project launched in Mumbai's Bhendi Bazaar, comprising of mixed use tenanted Chawls that were constructed at least 70 years ago. In addition to being home to many families Bhendi Bazaar continues to be one of South Mumbai's busiest commercial belts.

The once beautiful structures of this vibrant area are now at a point of appalling urban decay. Time has caught up with the old wood and brick structures and they have now become a threat to the lives of its occupants. Over 80% of the existing buildings have been declared 'Dilapidated and Dangerous' by the authorities.

Now a large part of the area is being developed under the Cluster development Scheme by Saifee Burhani Upliftment Trust (SBUT). which is a public charitable trust that has been established specifically for the purpose of undertaking the redevelopment at Bhendi Bazaar. This is a community initiative with the goal being to transform the congested area into a thriving residential and commercial space for its residents with new infrastructure and civic amenities.

This first of its kind cluster redevelopment project shifts the focus from merely constructing housing to a more holistic development that aims to fulfill all human needs. The project aims to replace 250 dilapidated buildings housing 3200 families and 1200 businesses, 17 new towers and requisite urban amenities on 16.5 acres of land have been planned. The precinct is designed using best principles of urban design considering – Socio-economic growth, sustainability and cost effectiveness.

The rejuvenation of Bhendi Bazaar will also encompass the celebration of heritage – Fatimid architecture, latticework and domes to add a distinct aesthetic to the neighborhood.

The project is pre-certified to Gold rating by IGBC (Indian Green Building Council) Indian equivalent of LEED. Each of the nine sub-clusters will be self-sustained backed with modern technology and e-friendly practices. Through this the project tries to establish a blue print for the future smart cities in India. In this era of globalization, high speed fiber-optic infrastructure will not only allow the inhabitants to pursue trade opportunities but also allow exchange of knowledge and information with people across the world. In addition to this, the following measures will make the project sustainable:

- Decentralized Sewage treatment plants aggregating to (3700 CUM/Day capacity) will be installed Sub Cluster wise, which will recycle soil and waste water for flushing and cleaning purposes. This will reduce the load on the municipal sewage system. It is anticipated that water requirement from Municipal Corporation will remain same or even less, after redevelopment and addition of sale apartments, due to the water conservation methods being adopted. (Such as rain water harvesting, STP, etc.)
- Solar-powered lights will be used in streets and public areas like staircases in order to reduce electricity consumption. Energy efficient lights (LEDs, T5, etc.) will be installed and is expected to save a minimum of 40% energy as compared to conventional fittings.
- The project also aims to have intelligent parking and traffic management systems that will save time and fuel. Inhabitants would be able to know the availability of parking spaces in each cluster and vehicles would be appropriately routed to locations where parking is available.
- Air and water quality sensors would be installed relaying the information to inhabitants when required

Additionally, building orientation with gradually increasing building height ensures ample natural light and sea breeze for its residents. Significantly more space will be available with the addition of open areas, green spaces, play and recreational areas. Wide roads will replace the narrow and congested lanes to accommodate tree lined footpaths that will allow for the smooth flow of human and vehicular traffic. This will considerably reduce fuel consumption and carbon footprint. This project is the first of its kind and much experimentation is expected to take place during planning, designing and construction. Apart from the technical engineering, exceptional human engineering is involved in this cluster redevelopment project. The SBUT management has been so far successful in motivating the residents of Bhendi Bazaar and also achieving substantial progress on Cluster 3, the first cluster undergoing construction.

CELESTIA SPACES Residential Project At Sewri, Mumbai *V. L. Naik*

Celestia Spaces is a super luxury residential project developed by Peninsula Land Ltd. in the industrial area of Sewri. These 50 storey residential twin towers, consist of one basement level, a ground floor and 6 podium floors. There is a stilt floor, a catwalk floor, a service floor and two fire check floors. The total height of the towers is 201.5 m from ground level to terrace level. The minimum base width of the towers at ground level is 21.8 m resulting in a high slenderness ratio of 9.24. The ground floor of the towers has 3 storey high grand entrance lobby of height 9.8 m. At parking level, the floor heights are 3.1 m. The stilt above podium terrace has an impressive, 6 m high entrance lobby. A two storey clubhouse and a swimming pool along with landscaping are provided over the podium terrace. Each of the 50 residential floors have a floor height of 3.25 m. The lift machine room and water tanks rise 12 m above terrace level. Above this, is a 16 m tall crown.

The public podium has three levels of public parking for heavy and light commercial vehicles. The next 6 levels are captive for parking around the tower. A 9 m wide ramp for fire engine meanders along the outer periphery of the podium from ground floor to podium terrace.

An expansion joint of 100 mm is provided between the 2 towers and the podium.

Structurally, both the towers have shear wall/column/beam framed structures. The captive podium slab is a flat slab structure with column drops while the public podium is post-tensioned ribbed beam/slab structure. A 2.5 m deep raft is provided below the tower columns. The podium columns rest on individual footings connected by 600 thick raft at the bottom.

The tower and podium structure were modeled using ETABS software and analysed for both vertical and horizontal loads as per relevant IS codes. For calculating earthquake loads, seismic Zone III was assumed. For assessing wind loads wind tunnel study was done by RWDI.

The raft for towers and podium and flat slabs were analysed and designed using SAFE software.

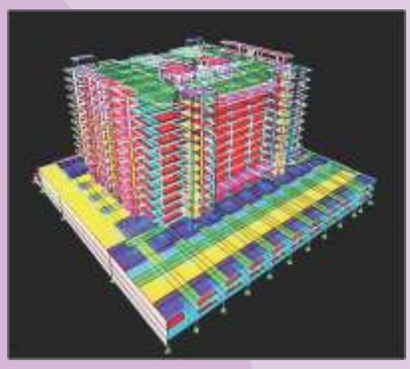
The design challenge was to provide Transfer girders at the cat-walk floor level to support RCC walls above. These girders span over the tower columns coming from foundation level. Post-tensioned beam/slab structure was provided in public parking area to get shallow depth of structure for large spans up to 13.0 m. The entire structure above catwalk floor up to terrace level is being constructed using pre-engineered MIVAN shuttering.

ECOPOLIS, Bangalore *Ramesh B*

This mixed use development by Hindujas is on 30 acres of land, near Yelahanka, consisting of a Mall, food hub and Business center, Service apartment and Hotel block, 2 MLCP block and 9 Blocks surrounded by parks - with a combined total built-up area of almost 8 million square feet.

At present one MLCP, block 3A and B has been completed, block 2A and B is in completion stage and block 4 is about to commence. Each of the Blocks comprise of 3 Basements + Ground floor + 10 floors and Terrace. The three basements are used for car parking and services like electrical and plumbing requirements. On the ground floor, is the podium with landscape and driveways for fire engine movement around the buildings.

The building has PT flat slab with drop panels for the extended office/ IT mall portion and beam-slab, supported on RCC columns and shear walls on the core portion. Floor slabs and beams are designed to act as a semi rigid diaphragm to transfer the lateral forces of the columns and shear walls.



AWARDS & RECOGNITION

We are very pleased to announce that Sterling has won the INSDAG Award for the structural design of Sunshine Tower in Mumbai.

A national competition was announced by INSDAG (INSTITUTE FOR STEEL DEVELOPMENT & GROWTH) for Professionals in Structural Steel Design and Construction in 2013-2014. The Jury Members comprised of Dr. Prem Krishna, IIT,Roorkee; Dr. S R Satish Kumar, IIT Madras; Mr. Gurunath Dalvi, Architect, Mumbai and Mr. Dhruba Bhaduri, Sr. Manager (P&A and Corp. Affairs), INSDAG.

We are delighted that Sunshine Tower bagged the THIRD PLACE.

The 1st position went to L&T for the design and construction of our International Airport (T2) in Mumbai and the 2nd place was given to an auditorium designed in steel in Kolar.

We are very proud of this award and extend our special congratulations to Mr. Sunil Goregaonkar and his team including Mr. Ganesh Sahani in our Fort Office who worked very diligently on this project.

Our special thanks to Architect **Raja Aederi** and the progressive attitude shown by **Sunshine Group** in encouraging us to design this extraordinary structure! It will pave the way for many more structural steel buildings in future.

Campus in Bangalore Bags the Outstanding Structures Award

The Campus for Huawei Technologies Ltd, in Bangalore, consists of an Office block with multilevel car parking, Utility block and Cafeteria block.

The main building structure comprises of RCC Column and flat slab with drop panel construction with peripheral beams connecting the peripheral columns. Keeping in mind the car parking layout as well as floor planning for workstations, the columns are designed on a 10.8 m x 10.8 m grid.

In Multilevel Car parking block as well as the Utility Block are designed with RCC columns and slab-beam systems accounting for appropriate vehicular load as well as services requirements.

This project has won the ICI-KBC Birla Super Award for the Outstanding Concrete Structure of Karnataka.

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