STERLING

ENGINEERING CONSULTANCY SERVICES PRIVATE LIMITED

Newsletter Issue: 7 | June 2012

// Ramanujan IT City, Chennai

FEATURED PROJECT

INTRODUCTION

In view of the vast growth in IT sector in the city, Tata Realty & Infrastructure Ltd decided to venture into developing a large ultra modern IT facility at Chennai. The project is located at the beginning of Chennai's IT corridor – Rajiv Gandhi Salai or popularly known as OMR – Old Mahabalipuram Road. The area offers a healthy, natural environment with its verdant green cover and clean air.

ARCHITECTURAL PLANNING

Ramanujan IT City comprises of two zones spread over 25 acres.

» Processing Zone (PZ): This has 3.4 million sq. ft. of office space spread over 17 acres which offers high-quality infrastructure combined with extensive amenities for work, recreational facilities and everyday activities.

» Non-processing Zone (NPZ): This zone spread over 8 acres includes an International Convention Centre and Serviced apartments set in exclusive areas.

We shall be concentrating on the Processing Zone of this project which is recently completed in terms of RCC work and progressing to its finishing touch.

The PZ comprises of 3 basements, entrance lobby at ground level, 2 parking levels and 4 IT towers named as Tower A, B, C and D each having 12 office floors with refuge areas at different levels. IT tower A has a extremely efficient floor plate admeasuring 1,00,000 sq. ft. where as the remaining IT towers have floor plates admeasuring 50,000 sq. ft.

The common high end services such as DG, Chillers, Cooling Towers, Transformers etc. are accommodated in a dedicated Utility building at rear of Tower A. Transient distributor hubs are located in the basement under each tower foot print. Grand entrance lobby at ground floor of every IT tower is provided with equally grand staircase and escalator to reach the podium area and cafeteria located two levels above drop off area. Podium also provides the facilities such as open to sky coffee shops, external sit outs and recreation zones.

Sterling played a very important part in the finalization of the architectural concept very much in the initial stages. As a responsible Alliance Member (Learn about Alliance Concept elsewhere in this issue), we offered many valuable suggestions to economize the structure which influenced the architecture of the project substantially.

STRUCTURAL SCHEME

As the overall cost of the project was already worked out in detail and was set as the target maximum cost, it was very important to monitor the impact of every small and large structural decision at every stage as well as in formulating the construction methodology.

Shoring system: Our team worked out the best suitable and yet economical shoring system with 100 M post tensioned rock anchor at every fifth shore pile amongst 12 different options of combinations of piles and anchors that were designed and quantified to the last detail. The options included shore piling system having permutations and combinations with or without rock anchors at various levels in numbers, secant piles with different diameters. The shoring system was necessary to prevent lateral flow of sandy marine clay over the founding strata for a depth of about 8 meters.

Foundation system: As per the Geotechnical report, a suitable founding strata was available at about 10 mts below the original ground level with safe bearing capacity of 200 T/Sq. mt. To control the cost of foundation system, our team once again explored various options such as raft with counterweight, thicker raft plate over entire area, stitched raft to downturned footings with rock anchors in the middle as well as footing strips etc. Foundation system with 300 thick raft stitched to the top of footing with 150 MT rock anchors in middle strips and 120 MT rock anchors in footing strip turned out to be the most economical foundation system for the project. The unusual conclusion to rely heavily on rock anchors was possible due to extremely low cost of the rock anchor work quoted by a willing agency. The system afforded avoidance of substantial rock excavation and counterweight filling over basement raft against uplift pressure due to sub-soil water.

Flooring scheme: The structural scheme selected was that of PT flat slabs supported on RCC shear core and columns with peripheral beams. The floor system was finalized after comparing number of floor plate options including, composite floor with steel beams, RCC flat slab with/ without drop panels, PT flat slab with / without drop panels, RCC slab beam floor etc. The average PT flat slab thickness was 250 mm with a drop panel size of 2.7 M x 2.7 M x 450 mm.

CONSTRUCTION METHODOLOGY

The contractors Leighton India Ltd. who executed the project with professional finesse, in time and within the agreed budget. The concept planning began in November 2008, when the target completion date for the Phase I, i.e. the Processing Zone was locked at December 2011. The quality of workmanship was far superior to what our eyes have become accustomed to. There were very negligible material grade and workmanship problems throughout the construction period. They also assisted in arriving at the most economical and yet practically feasible structural systems by providing the necessary inputs from time to time. Being the manager of the Alliance Team (See separate article on Alliance Concept), Leighton carried the responsibility of meeting the cost, time and quality targets set in the initial stages of the project.

The housekeeping on site was excellent. Two batching plants, three tower cranes, use of couplers for column bar splicing, very neat formwork system and other up to date construction equipment was managed on site with continuous educational training of the construction personnel in technical and safety aspects helped the contractor to produce an elegant building product that can be a model for future construction projects.

Most important aspect of the construction of this project was the full involvement of contractors in decision making process and productive collaboration with architects, structural engineers, services consultants and the client himself, which culminated in the successful completion of the first phase of the project.

Success of the alliance team was seen in the outcome at the end of Phase I

STERLING TEAM


AMIT SURLEKAR


SANJAY SHIRKE


SANGITA WAKDIKAR


SAURABH BUTALA


NISHANT MHATRE


KETAN NAIK


KUNAL THAKUR

// Structural Optimization For Ramanujan IT City, Chennai

Structural optimization was at its best in the TRIL Project at Chennai, Ramanujan IT City. Being a partner in the Alliance Team (See article on Alliance in this issue), Sterling went beyond the usual scope and attempted numerous options of structural systems wherever possible.

The optimization exercise began right from the architectural concept stage, when our advice related to grid dimensions not only resulted in most economical structural member sizes and reinforcement consumption but also in maximizing the car park capacity.

The structural optimization included combinations of concrete grade, percentages of reinforcement, member sizes and thicknesses and composite materials. One of the key features was that the optimization in this project was not carried out only on individual elements but on the whole building frame. For example, when column optimization was to be exercised, the ETABS model itself was edited as many times as the combinations planned. Each time a variable parameter was changed, the ETABS model was run to compare the performance and the quantities with the other models. It was like analysing 30 different buildings (obviously with the same architectural geometry) to decide the best combination of material properties, member sizes and reinforcement content to arrive at the most appropriate structural configuration.

COLUMN OPTIMIZATION:

- RCC Column with varying percentage of Reinforcement.
- RCC Column with varying grades of concrete.
- RCC Column with varying sizes and percentage reinforcement
- RCC columns with varying size, grade and percentage reinforcement
- Composite column

Similarly, a number of combinations of shore piles in terms of their fixity conditions, diameters, numbers and capacities of rock anchors, spacing of piles etc were studied. The study identified the best system that helped the contractor to execute the work in the given time with least cost.

The floor optimization went far beyond with study of at least twenty options. The combinations studied were:

FLOOR OPTIMIZATION:

- Flat Slab with Drop panels with varying thicknesses (three options)
- Flat plate with varying thicknesses (three options)
- Post tensioned Flat slab with varying thicknesses (three options)
- Post tensioned Flat plate with varying thicknesses (three options)
- Composite deck slab with structural steel secondary beams at 2.8 m c/c
- Composite deck slab with structural steel secondary beams at 2.9 m c/c
- Conventional slab with structural steel secondary beams at 2.8m c/c
- Conventional slab with structural steel secondary beams at 2.9m c/c
- Composite deck slab with structural steel secondary beams at 4.2m c/c
- Composite deck slab with structural steel secondary beams at 4.3m c/c
- Conventional slab with structural steel secondary beams at 4.2m c/c
- Conventional slab with structural steel secondary beams at 4.3m c/c

BASEMENT RAFT OPTIMIZATION:

- 400 mm thick raft with upstand footings
- 1400 mm thick raft all over
- 600 mm thick raft with downstand footings and pre-stressed rock anchors at centre of the span
- 400 mm thick raft with upstand footings and pre-stressed rock anchors at half grid excluding column locations
- 300 mm thick raft with downstand footings and pre-stressed rock anchors at 1/3rd grid excluding column locations

The best result was obtained from the comparative study for the basement raft and foundation system, where a rock anchor vendor showed his preparedness to execute a large number of rock anchors at unimaginably low price. The already designed system of 450 mm thick stitched raft with upstand footings and counterweight to resist uplift was about to be executed, when the lowest quotation was received for the rock anchors, which turned the scales. Last minute comparative study revealed that countering the entire uplift by using permanent ground anchors could bring the raft system cost down to a never heard before level. Prompt action on the part of the contractor and Sterling was instrumental in helping the Alliance to achieve its total target cost.

COST COMPARISION FOR GENERAL RAFT:

Particulars	Units	Quantities			Rates	Amount (In Crores)		
		600	450	300		600	450	300
Concrete	Cu. mts.	22708	17031	11456	3740	8.49	6.37	4.28
Reinforcement	M. Tons	1363	1363	802	35700	4.86	4.86	2.86
Relative Excavation	Cu. mts	22708	17031	11354	1500	3.41	2.55	1.70
Rock Anchors 120 MT	Nos.	464	464	1206	35500	1.65	1.65	4.28
Grand Total						18.41	15.44	13.13

Assumptions:

1. Rates are assumed as per DG rates given in Target Outrun Cost (TOC) Document
2. Cost has been calculated for basement area of approx. 37,850 sq. mts.
3. Cost saving for formwork is not considered.
4. Excavation cost has been calculated considering top of raft as datum
5. 300 thk. raft has been designed with additional rock anchors of capacities 120 Tonnes
6. Time-cost analysis has not been performed
7. No of Rock anchors may vary as per basement layout by +/- 5%
8. Raft concrete quantities are calculated excluding the footing areas.

First Round of optimization was carried out at the time of fixing the TOC. Substantial exercises were carried out at that time, which helped in arriving at "close to accurate" reinforcement ratios and structural member sizes for Target Outrun Cost (TOC).

Optimization exercises continued even after fixing TOC based on the inputs received from various trade contractors and site conditions, thus economizing on the rebar ratios and structural member sizes further than those considered for TOC. For example, the actual average rebar consumption has reduced by at least 10% from that which was estimated by extensive optimization at the time of TOC.

Since almost all types of structural systems have been studied right in the beginning of the commencement of the structural design process, there was no doubt about the best option for the given project planning in the set of associated conditions such as TOC, site conditions, time targets, method of construction and architectural and MEP considerations.

Finally, the project consisted of the following structural systems which turned out to be optimum – from the cost as well as construction suitability points of view:

- Basement raft of 300 mm thickness, the uplift pressure being completely countered by pre-stressed rock anchors.
- Column concrete grades M:60, 50 and 40 all floors, retaining walls, raft and foundation being M:40. Concrete grade for piles was M:30
- Columns were found to be most economical when the percentage reinforcement was restricted to 2% at the lowest level and reduced to minimum permissible at the top.
- Contiguous shore piles 900 diameter with 100MT rock anchor at every fifth pile.
- Post Tensioned Flat slab for all floors with drop panels with thicknesses 225 mm, 250 mm and 300 mm for various loading cases.

CONCLUSION:

Although it may not be possible to carry out such exhaustive comparisons in every project, occasional research on a project schedule which incorporates the time required for an indepth study, can help enhance our understanding of the influence of various parameters on the overall performance and economy of the structure. This knowledge then can be used as a judgmental tool in other projects, to benefit the construction industry in particular and the society in general.

// Alliance - A Lean Construction Approach


GIRISH DRAVID

When we were appointed for Ramanujan IT City project at Chennai, the first brief by the client was that we were to be part of the Alliance Team! We learnt that Alliance is one of the five established models of the much talked about Lean Construction Approach.

LEAN CONSTRUCTION

By definition, Lean Construction is a production management-based approach to project delivery which changes the way work is done throughout the delivery process. The objectives of Lean Construction are to maximize value and minimize waste by supporting positive iteration and reducing negative iteration. Lean Construction aims to improve total project performance and not focus on any particular activity. In Lean Construction, "Control" is redefined from "monitoring results" to "making things happen by reliable release of work among specialists in design, supply and assembly.

Naturally, any production or construction model will not be effective unless it is supported by a strong commercial framework, which benefits the participants. To facilitate the smooth realization of the concept, we found that there were at least five principal forms of contract that support Lean construction:

» Integrated Form of Agreement for Lean Project Delivery (USA)

» ConsensusDOCS300 (USA)

» AIA C191-2009 Standard Form Multi-Party Agreement for IPD (USA)

» PPC2000 International (UK)

» Alliance Agreement (Australia)

Clients of TRIL Infopark alias Ramanujan IT City adopted the Alliance Agreement which has been tried and tested. The decision could have also been influenced by the fact that the pre-selected contractor for this project was M/s Leighton India Ltd, having their principal business in Australia, and who had previous experience in working with the Alliance Concept.

NATURE OF RELATIONSHIP

The participants in this agreement were the Client TRIL, Contractor Leighton, Architects Edifice, Structural Engineers Sterling and Services Consultants Spectral. Participants understood that the Alliance Agreement was not intended to create any legal partnership or joint venture relationship. Each of the Participants remained an independent entity, while each Participant indemnified each of the other Participants.

The aim of the temporary alliance was that the participants worked together to produce outstanding results in delivering the Alliance Works and in doing so, they share risks and opportunities (PAIN SHARE and GAIN SHARE). The concept of PainShare and GainShare has been instrumental in making them sincere stake holders in the project. In simple terms, if the project cost and time could be reduced, the participants were eligible to claim a share of profit that the owner would make. In case of exceeding the target cost and time, the loss would be shared by the participants. Thus, the concept of reward and penalty are in-built in the agreement. Since the participants are willing partners of the venture, they strive sincerely and honestly to make the project profitable, in turn, support each other's interest ensuring there is no failure on part of any other participant.

PROJECT VALUES AND BEHAVIOURS

» **HONESTY** is demonstrated by good ethics and candid, open and transparent communication

» **RESPECT** is observed by listening, understanding, collaborating, supporting others and being fair

» **COMMITMENT** is verified by punctuality, delivering on promises, accountability and a "can do" attitude

» **EXCELLENCE** is established by challenging the status quo, continuous improvement and exceeding targets

» **FUN** is experienced with laughter, appropriate humour, rewarding achievements and celebrating success

Key to the successful performance of the Alliance is to avoid disputes. In order to achieve this, participants were trained to ensure frank disclosure of any conflict of interest or duty, avoid participation in any decision leading to conflict and honest, open and timely sharing of information with respect to the work under the Alliance. The participants were expected to make decisions on a 'best for project' basis, giving the project as much weight as to their own self interest.

The alliance was formed as a non-legal entity similar to a company. As any company would have its memorandum of articles defining its goals and values, Alliance also came up with its objectives in a crisp and definite charter. All participants, including their office staff working on the project would strive to realize the project objectives.

LEVELS OF MANAGEMENT & LEADERSHIP

A Project Alliance Board (PAB) was established to direct and govern "The Alliance", a concept similar to the board of directors of a company.

Alliance Management Team (AMT) was formed to manage the day-to-day affairs of the Alliance under the leadership of an Alliance Manager. A parallel can be drawn with a CEO of a company, who is in charge of the daily affairs of the organization.

Integrated Project Team (IPT) was created to perform the works of the project, which was supervised and managed by The AMT.

PAB sets the policy and give strategic direction for the Alliance, by establishing objective outcomes and deliverables. The board also Initiated and approved the commitment of the Integrated Project Team and ensured availability of appropriate resources to the Alliance. PAB's scope also included monitoring the performance of the Alliance and implementing appropriate measures to correct undesirable trends. PAB acted as a medium between the owner and the project team by implementing decisions and directions received from the Owner in relation to any Reserved Powers. PAB was authorized to make decisions as required under the Commercial Framework, including decisions related to a Target Adjustment and resolve any differences among participants.

The Alliance Manager fulfilled the responsibility of day to day leadership and management of the AMT and the Integrated Project Team. His task was to implement directions and decisions of the PAB. Assembling, developing, managing and sustaining a high performance team to perform the Work under the Alliance and Overseeing and coordinating the preparation of the Alliance Management Plan for the review and approval of the PAB came under Alliance Manager's scope.

AMT members advised Alliance Manager on various design, planning, costing and implementation. AMT members would take unanimous decisions on all matters after due deliberations.

No Arbitration or Litigation

The PAB dealt with any Alliance Disagreement and the Participants did their utmost to ensure that the PAB was able to fulfil this crucial function effectively and efficiently and no arbitration or litigation between the Participants on any Alliance Disagreement was required.

No Blame

The Participants acknowledged that a critical element in the foundation of the Alliance was that they would not allocate blame to other Participants for errors, mistakes, negligence and poor performance made under the Agreement. Each Participant released and discharged all other Participants from liability on any legal basis for any expense, loss or damage they may incur as a result of any act or omission by a Participant done or not done in connection with this Agreement.

KEY ACHIEVEMENTS

Positive benefits could be actually seen during and after the project period, some of which are as follows.

» Project could move forward whilst design issues were being resolved.

» Transparent / collaborative approach has ensured best outcome for project in design and costing

» Value management exercises had been conducted throughout development of design and cost planning

» Alliance resources were minimized by ensuring efficient communication between the Alliance members

» Benefit of certainty of outcome regarding cost and time for TRIL

For the structural engineers, it was quite unusual to have gone through the most desired work sequence. What we could achieve was:

» Appropriate sequence of structural concept building

» Formation of scheme compatible with overall project needs

» Formation of schemes compatible with available resources

» Online costing

» Ideal work flow - Analysis, Design, Detailing & Final costing

PROJECT OBJECTIVES

1. Exceed completion dates of Processing Zone (31st December 2011) and Non Processing Zone (31st March 2012)
2. Complete works under the TOC by 5%
3. Achieve an environmental gold leed rating
4. Develop, implement and monitor strategies to foster a safety culture
5. Reduce % of re-work (quality design and construction)
6. Create an affirmative impact on the wider community
7. Develop an alliance culture of employee satisfaction & high performance teams
8. Cultivate strong relationships with all stakeholders
9. Achieve model alliance status and a lasting legacy
10. Celebrate success and enjoy what we do

The most important reasons that could bring an environment conducive to the successful project assisted by the Alliance agreement can be listed as below.

» Transparency

» No unnecessary margins in consultants' requirements or estimates

» Knowledge of contractor's resources – no claims

» No hidden agendas on Owner's part – all requirements spelt in the beginning

» Implications of any changes were informed to Owner on the spot

» Decisions were guided by TOC and TDC

» A direct result of Pain share and Gain Share stakes.

» TOC monitoring

» Almost on-line during design process

» A sharp contrast to the usual experience of having to re-work for frequent changes in planning during execution.

The commitment to the Alliance concept was strengthened by conducting behaviourial workshops such as:

» Management and Behaviourial Training Programmes

» Risk and opportunity workshop

CONCLUSION:

Alliance concept showed a way to design the construction system, to minimize waste of materials, time and effort in order to generate the maximum possible value. This was possible through the collaboration of all project participants (Owner, Architect, Consultants, Constructors, Marketing Managers and in some instances the End-users) at early stages of the project.

This went beyond the usual contractual arrangement where contractor and sometime Project Managers, merely react to designs instead of informing and influencing the design.

Alliance concept recognizes that desired ends affect the means to achieve these ends and that available means affect realized ends.

It is very much possible to create an Alliance like concept in our office by assigning duties of PAB, Alliance Manager, AMT and IPT to various groups and individuals and create an environment of teamwork, transparency, no-blame, value engineering and setting achievable but stiff performance targets.

// Sports Events at Sterling

APRIL / MAY 2012

Sterling's Cricket Teams ready for face-off!

Ravi Surlekar receiving Man Of The Match Award

Carom Championship at Bandra West office

// Congratulations!

As we continue to celebrate good times at Sterling we are happy to announce that...

» Harshad Mahtre from BKC office got married to Harshada on 3rd Feb - we wish the young couple a very long and happy married life!

» Engineer Sameer Pednekar tied the knot to Pratibha Keskar on 18th February.

» Ujjwala Almeida became the proud mother of a cute baby girl on 22nd March.

» Kunal Thakur was married to Yojana on 26th April and we wish the couple a bright future ahead.

» Sagar Patil our draftsman at Bandra West office was blessed with a baby boy on 15th May, both son and mother are keeping Sagar busy!

» On 29th May, Ravindra Ravande became the proud father of a baby boy!

// Welcomes & Goodbyes

We are always happy to welcome new members to our Sterling family. They are:

- Sterling Fort: Vijay Pawar, Dev Maurya, Vaishali Patil, Faisal Chogle and Nitesh Kadu
- Sterling BKC: Hrishikesh Shinde, Winster Thomas, Hemali Iyer, Nitin Kamble, Mrunali Nawkar and Sagar Sakore
- Bandra West: Shivabaswaraj Hosamani and Shrijay Kalghatgi

We wish those members who have bid us goodbye the very best for their future. They are:
Milind Gaikwad, Deepak Rakhode, Pankaj Patil, Abhijit Gundaye, Mahesh Patil and H. M. Jha

// Recent Events

// On 20th January, Mr. Kamal Hadker was invited to deliver a lecture on "Architecture For Safer Buildings In Earthquake" at the Kamala Raheja Vidyanidhi Institute for Architecture and Environmental Studies, Mumbai. The workshop was aimed at providing practicing architects, architecture faculty and senior architecture students with fundamental knowledge of how buildings can be made safer in earthquakes. Mr. Hadker's presentation gave an insight into understanding basic concepts of earthquake resistant design.

// Dr. Deepali Hadker gave a presentation at the Symposium of Architectural Textiles held in Mumbai on 14th March 2012. She spoke about "Architectural Application of Tensile Structures". The international symposium also had speakers from around the world who spoke about the design, analysis and construction of tensile fabric structures. Ashok Sawant, Sanjay Shirke and Mayur Patil also attended this Symposium.

// In April, Mr. Hadker participated in Metal Buildings and Steel Structures Expo 2012 held at the Bombay Exhibition Centre in Mumbai. There was a Round Table Discussion themed "Steel Structures in India – An Opportunity to Evolve" comprising of end users and the key stakeholders of the industry. The session was chaired by Mr. Hadker and covered different segments viz. Buildings, PEB and Infrastructure. The objective of such a forum was to offer a more meaningful interaction between the end users, consultants, suppliers and fabricators while focusing on numerous key ingenuities in the sector and towards more productive industry growth.

// On the 11th of May - Mr. Kamal Hadker presented a paper in Kolkata for the Institute for Steel Development and Growth (INSDAG) his presentation covered "Prospects and Constraints of Steel Based Construction"

For any of you interested in seeing these presentations, please contact Dr. Deepali Hadker on deepalihadker@sterlingengg.com

Newcomers Speak

WINSTER THOMAS

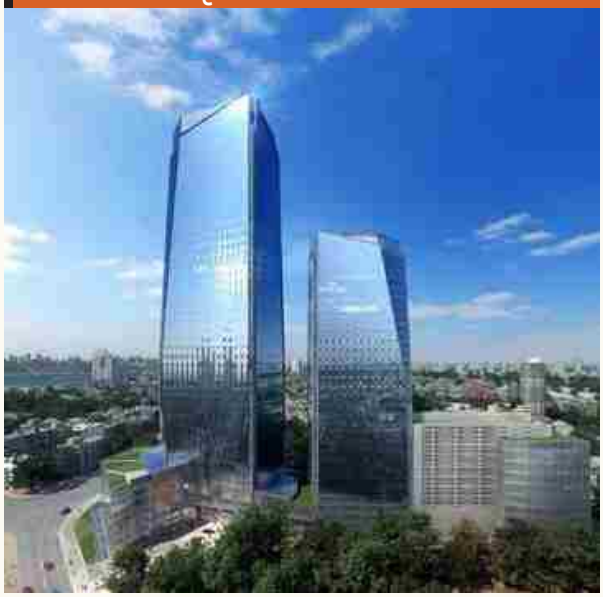
"My journey with Sterling began a few months ago and in these few months, Sterling is my home away from home. I can relate myself very well to the company and to the people working here. The work culture at Sterling is quite phenomenal, for a person like me, fresh out of college (and still in the college mood) it is like passing out of the college and joining another college!! Sterling has definitely taught me a lot technically and professionally and also has improved me as a person. The homely environment at the office makes me feel like wanting to go to office each morning. It is said "The world hates Mondays"; but at Sterling "We look forward to everyday, be it Monday or Friday! "

HRISHIKESH SHINDE

I'm grateful that I got the opportunity to join the Sterling family as a Design Engineer immediately after completing my Masters in Structural Engineering from the University of Sheffield, UK. Initially I was a bit nervous as this was my first experience in the industry. However, I got accustomed to the system within just a couple of days and everyone was very helpful in making me feel at ease. It's a fantastic work environment; everyone is extremely friendly and cooperative. It gives me great pleasure to be a part of the design team which handles various prestigious projects. I look forward to acquiring extensive knowledge not only in designing but also in all other aspects related to our field under the able guidance of my seniors"

// Projects Under Construction

KOHINOOR SQUARE



Kohinoor Square is being constructed on 4.8 acre Kohinoor Mill plot at Dadar. The project is a mixed use development of about 15 lac sq.ft. The entire plot has three basements which are used to accommodate parking, essential mechanical and electrical services, water tanks, etc.

The Commercial tower is 50 storeyed - about 203 m above ground level and has 44 office floors, one mechanical plant floor and some refuse areas. Above the office floors are four Hotel floors. There is also provision for Helipad over Terrace. The structural scheme of this tower is a combination of shear wall cores and peripheral columns. Due to large spans, slabs and beams are in pre-stressed concrete wherever necessary. On the West of Commercial Tower there is a 5 storeyed Retail complex.

The Residential cum Parking Tower is 32 storeyed - about 125 m in height. The initial 14 floors are for parking of cars. Further floors from 15th level to 32nd level are residential area with four large sized apartments per floor. The structural scheme for this tower is also a combination of shear wall cores and internal / external columns with rigid beam column frames.

- Mr. S. B. Malekar

GODREJ PLATINUM

Godrej Platinum, located in Vikhroli is a modern high rise luxury condominium comprising of 4 towers of 28 stories each with a provision of 2 additional floors, wherein the lower 15 stories have 2 BHK flats and upper 12 stories have 2 and 3 BHK flats. The top two stories have duplex flats. First two towers house single basement, club house, children's play area etc. and the other two comprise of double basement, sewage treatment plant and additional car parking spaces for the residents. An attractive structural feature is the 12m X 6m entrance canopy for every tower done in structural steel and clad in ACP. Speed in construction was achieved using Mivan formwork which also resulted in a smooth texture of partition walls. Hence plastering could be eliminated before painting.

The unique feature of this project is its full compliance under the Green Building norms

- Aakash Badjatya

DOSTI IMPERIA

Dosti Imperia is another massive residential project by Dosti group in Thane. The project scales to 28.42 lacks Sq.ft. The project comprises of 5 residential towers standing 110 meters high above ground and 5 rental buildings of 56 meters each. All five rental buildings are to be handed over to MMRDA.

The residential towers comprises of five levels of podiums which accommodate shopping malls, club house and parking and 30 upper residential floors. All the buildings are essentially RCC frame structures with RCC slab at typical floors. The columns and shear walls are connected to each other with a network of beams and slabs. The slabs provide in-plane rigidity at each floor.

It is interesting to note that one of the five towers is completely supported on floor deep transfer girders so as to eliminate the columns and allow bigger space in the shopping mall below.

- Nilesh Karmalkar

// Recently Completed Projects

LE PALLAZO

Located in Nana chowk, this is an ultra-luxury 42 storeyed residential tower comprising of a basement, 4 shopping floors, 7 parking floors and 25 residential floors. Also, there are 2 intermediate service floors and 3 duplex penthouse floors. Major part of the building is done in conventional beam-slab construction system using system formwork. Some floors such as upper lobby and car parking areas are done in waffle slab system to achieve large column free spaces in limited floor to floor height. This building is L-shaped in plan with perfect symmetry along the central right angle. In order to avoid torsional effects in earthquake / wind loads, large shear cores and walls have been provided. At the top of the last car parking floor, large landscape garden has been provided. This floor also houses the grand entrance lobby for the upper residential floors. The entire elevation of the building has uniformly placed large openings, which gives it a sense of unrestricted open space and an urbane touch.

Various construction challenges were faced during the construction of this building such as use of shore piles since the plot was in close proximity to the other properties, provision for heavy construction equipments such as self climbing tower cranes, concrete pumps and material lifts etc.

- Mr. S. R. Goregaonkar

OBEROI COMMERCIAL II

Clearly visible from the western express highway, in Goregaon, this 30 storeyed commercial building has a height of 144 meters above ground level. The plan dimensions of the building are 37.5 m x 49 m and floor to floor height provided is 4.1 m. The foundation of the building rests on a 3 m thick raft over hard basalt with SBC of 150 T/sqm.

Two strong cores are located eccentrically on either side of the building to resist lateral forces connected with circular column. One of the core stops at 16th floor. Drop panels have been designed especially for the un-balanced moments due to lateral forces. The flat slab structure has wide beams with shallower depth all along the periphery. The bottom of the drop panel is tapered to reduce the self weight of the structure to some extent.

High performance concrete (M: 80, M: 70, M: 60) and reinforcement (fe-500) have been used to minimize the cross sectional area of the RCC columns. Special "table form-work" and "slip form-work" have been used to reduce the slab cycle. One of the challenges lay in designing a 11.5 m cantilever canopy at the main entrance. The canopy is supported without a tie back rod. The self weight of the canopy has been reduced by tapering the main cantilevers members at the free end. The cantilevers members are supported on 750 dia. circular pipe between two columns. Large torsional moments from the main members have been transferred in bearing action to tower columns by jacketing the column with steel plates.

- Abhijit Gundaye

SOFITEL HOTEL

This is a five star luxurious hotel in BKC is built for the Accor Group by Naman Developers.

There are two basements in the property and the main hotel building, comprising of a four storey high podium, a lobby and 11 upper guest floors with a plan dimension of 78 M x 36 M. The total built up area of the project is 5.5 L sq.ft.

The main building is constructed in RCC. There are flat slabs with drop panel in the lower ground and podium areas. The cores are designed with conventional beam slab framing. Transfer girders almost 4.5 M deep were introduced above the podium to support the 11 guest floors above. Conventional beam slab framing was used in typical floor levels. 750 mm - 900 mm wide floor deep RCC girders were used to support floating columns. Necessary openings were introduced to allow passage of services. Hanger column supporting three floor levels were introduced through the girder spanning 16 M. The elegant entrance lobby is 4 storey high with sloping glass façade using tension cable system. Structural steel has been used in a designer staircase at the ground floor and in the grand entrance canopy.

- Dinesh Bhaud

// Come on & Celebrate!

- Dr. Deepali Hadker

Welcome to a special issue of our newsletter, the first one to be published in this new format! You will find this issue slightly longer than usual as it contains three excellent articles that focus on some of the major work that has been recently carried out at Sterling. Our cover story is the Ramanujan IT City project in Chennai which we are very proud of. There are two other related articles which explain how Sterling worked as part of an "Alliance" which was used successfully for the first time in India and also the "Lean Construction" approach that was adopted on this project. These new concepts have trained us to think and work in a holistic manner thereby creating benefits for clients, architects and the entire project while minimizing wastage.

Many of you are already of the overwhelming response we had to all the events planned as part of the Birth Centenary Celebrations of Shri. N. B. Hadker, here at Sterling. We saw the true team spirit at work at the one day cricket matches organized by us where more than 50% of our staff participated!

For those of you who missed out on these events do not worry, there are many more events to come. There is a photography competition, a free hand sketching competition as well as essay writing competition and we look forward to your active participation. More importantly, we have some interesting educational Series of Lectures planned in the coming year and the schedule for the same will be announced soon.

Do keep the enthusiasm going and we look forward to a very eventful and busy year ahead!

// Sub-Editorial

- Ashok Sawant

It gives me immense pleasure to announce that I have been entrusted the responsibility of the Sub-editor for our company's Newsletter.

Being a sub editor, gave me the opportunity to interact with everyone in Sterling in order to gather material for this issue. As I discussed various projects with the engineers, it helped me to understand the challenges faced on various jobs and the solutions offered. Putting this data together and compiling the articles actually helped in increasing my knowledge and preparing me for such challenges in future.

Another interesting assignment I am currently working on is to plan and organize various events for the celebration of the Birth Centenary year of our founder Shri. N.B. Hadker (Dada). We have a lot of activities which included sports, seminars, educational visits, lectures from experts in the field, competitions etc.

We kick started the events with carom singles tournaments arranged in all branches. It was a heartening experience to see such an interest shown by all for this event. A total of 50 participants registered for the tournament. Each match was played with a positive attitude and intent. Although there was one winner from the lot, we found out that there are many others with serious talent in this game. Chandreshakar Tambe defeated Ketan Naik to become the Carom - Singles Champion for this year! We also had a series of Carom - Doubles Championships and the winning team was Sandip Kudalkar and Atul Jagtap from our BKC office.

The next sporting event was a series of cricket matches. A cricket ground was booked and four teams were formed - The Fort Tigers, Bandra Blues, BKC Wonders and BKC Dynamics which participated with great enthusiasm. It was a good chance for all the staff, to know each other's talents and make new friends. The best match of the event was played between BKC Wonders and BKC Dynamics. This match had everything required for a blockbuster movie! There were emotions, drama, big hitting, clashes, and a nail biting finish till the last ball. The winners were BKC Wonders and Ravi Surlekar who scored 64 runs in the final was declared "Man of the Match".

It was a great experience to enjoy these moments, to do something different from our day to day life, to be a part of a team with no seniors or juniors, to be happy, to be vocal, and to be ourselves. I am sure everyone would like to have these events every year.

There are lots of events planned for this year and those will be as fun, entertaining and fruitful as the events just completed. Do write to me on ashoksawant@sterlingengg.com with your suggestions for events and seminars in the coming months.

Sterling Offices: **Fort Office:** sterlingfort@gmail.com | **Bandra West Office:** sterlingbandra@gmail.com
BKC Office: sterlingbkc@gmail.com | **Bangalore Office:** sterlingenggblr@gmail.com