

Training cum Consultation Programme “Innovative Construction Technologies & Thermal Comfort for Affordable Housing”

Presentation on Light House Projects

Date: 21st Nov 2023

Venue: Hotel Vivanta, Bhubaneswar



Building Materials & Technology Promotion Council
Ministry of Housing & Urban Affairs
Government of India



Light House Project (LHP) at Ranchi, Jharkhand

(Technology: Precast Concrete Construction – 3D Volumetric Construction)

No. of Dwelling Units : 1008 Nos. (G+8)

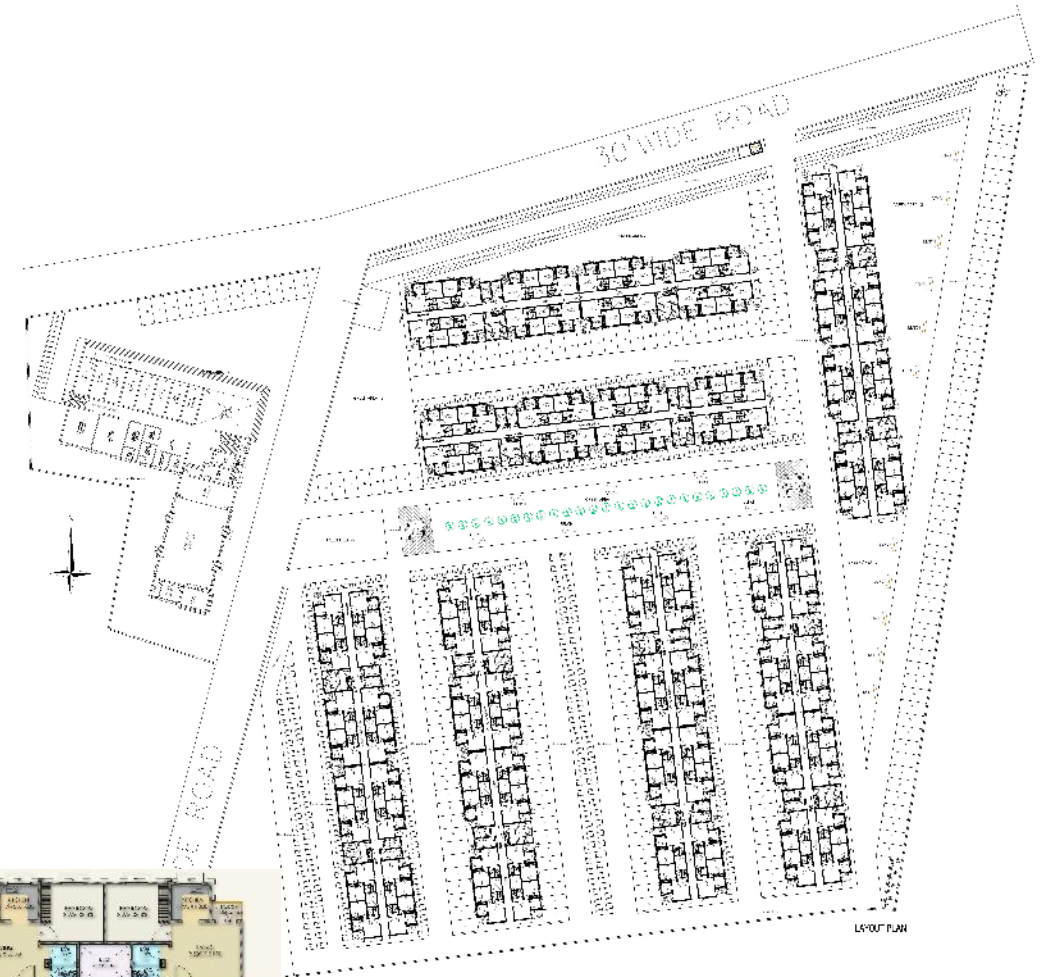
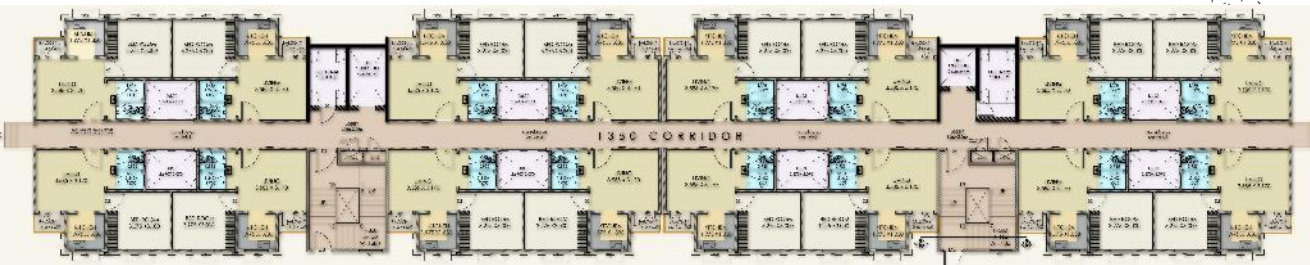
No. of Block / Tower : 7 Blocks

Units in each Block / Tower : 144 Nos.



- There are 7 blocks in Ground + 8 configuration with 1008 houses along with basic and social infrastructure.
- Ground coverage of the project is 29.3% and FAR is 2.21.
- Green space is 20%.

Typical floor plan

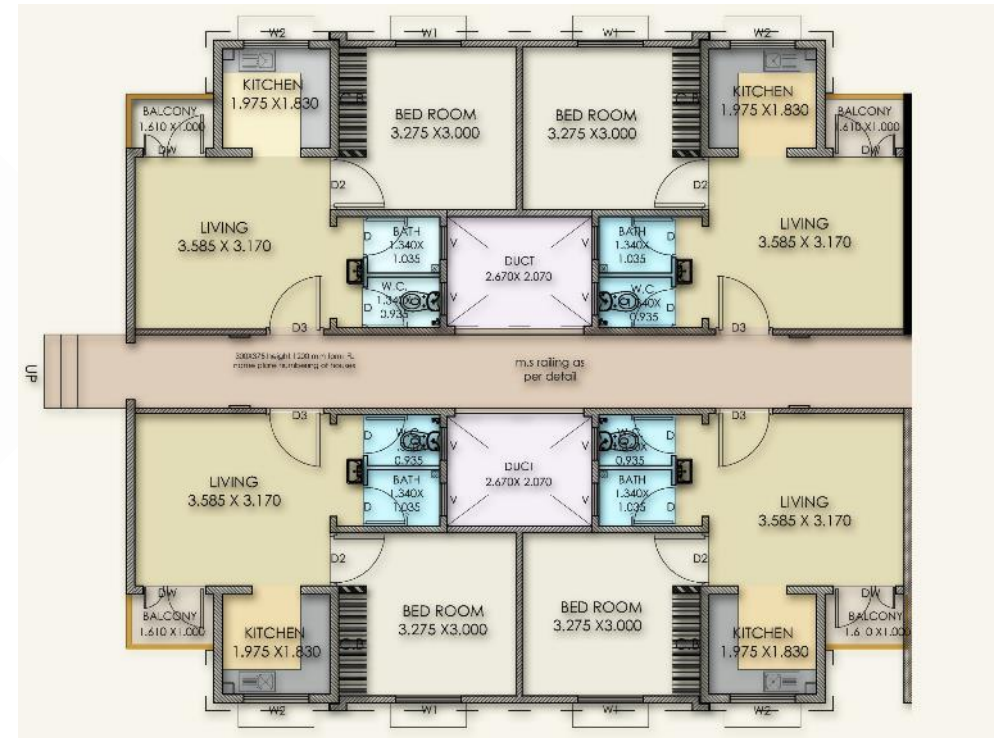


- 16 dwelling units at each floor of building block with provision of lifts and staircases.

■ Typical Dwelling Unit plan



Each dwelling unit consists of one hall, one bed room, a kitchen, WC, Bath and a balcony. The carpet area of each unit is 30.27 Sq.mt. The sizes of individual rooms & service areas conform to NBC norms.



Other special features:

- Green rating as per GRIHA
- Use of renewable resources:
 - Rain water harvesting
 - Solar lighting
- Solid waste management
- STP with recycling of waste water
- Fire Fighting System conforming to NBC

Prevalent Construction Systems

Load bearing Structure



RCC Framed Structure



Technology being Used

Precast Concrete Construction - 3D Volumetric



It is the modern method of building by which precast concrete structural modules like room, toilet, kitchen, bathroom, stairs etc. & any combination of these are cast monolithically in Plant or Casting yard in a controlled condition.

These Modules transported, erected & installed using cranes and are integrated together in the form of complete building unit.

3D Monolithic Modular Precast Process

MANUFACTURING - OFFSITE



TRANSPORTATION



INSTALLATION ONSITE



Structural System

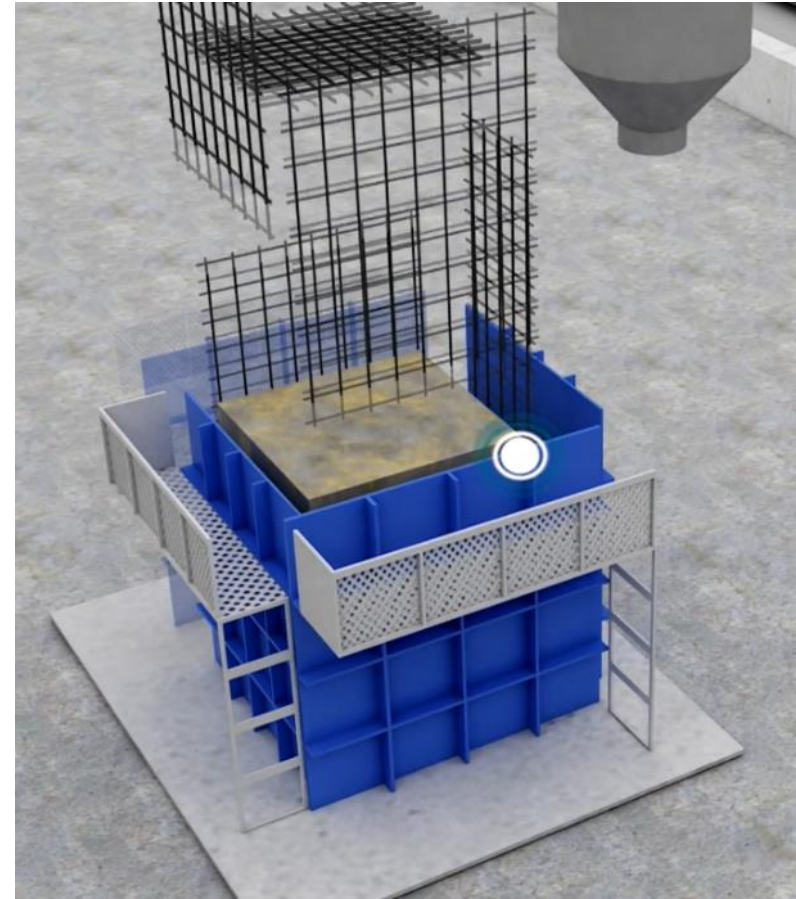
- Structural System comprising of 3D modules, walling panels & solid core slab



Structural System

Manufacturing of structural modules

- 3D Steel Moulds are created as suiting to various sizes of Building units (Pods).
- High strength steel as per the structural design is placed inside 3D moulds.
- Electrical and plumbing lines are set up. Block outs for doors and windows are also set up at the same time.
- The pods are cast into their final shape using high-performance concrete.
- Strict quality checks are taken for each pod before they are transported for erection and assembly at the site.



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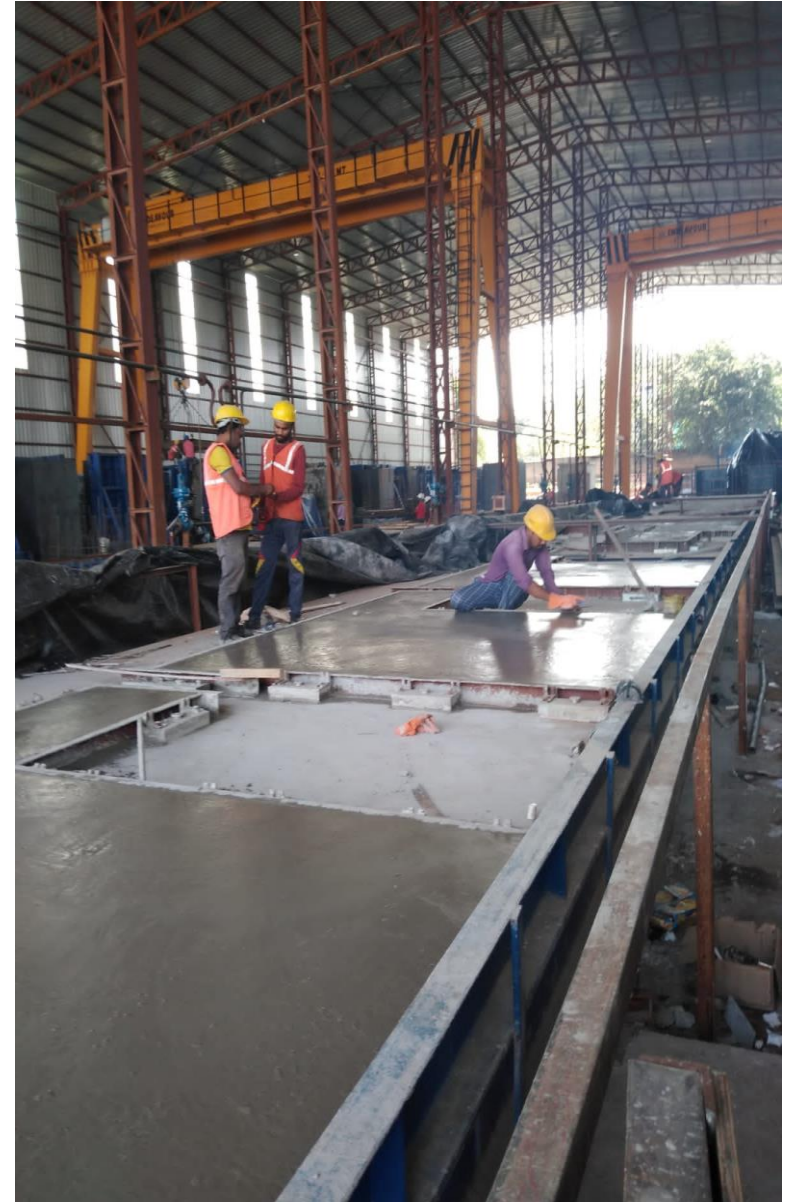
Casting Yard at Site



Casting Yard at Site



Casting Yard at Site

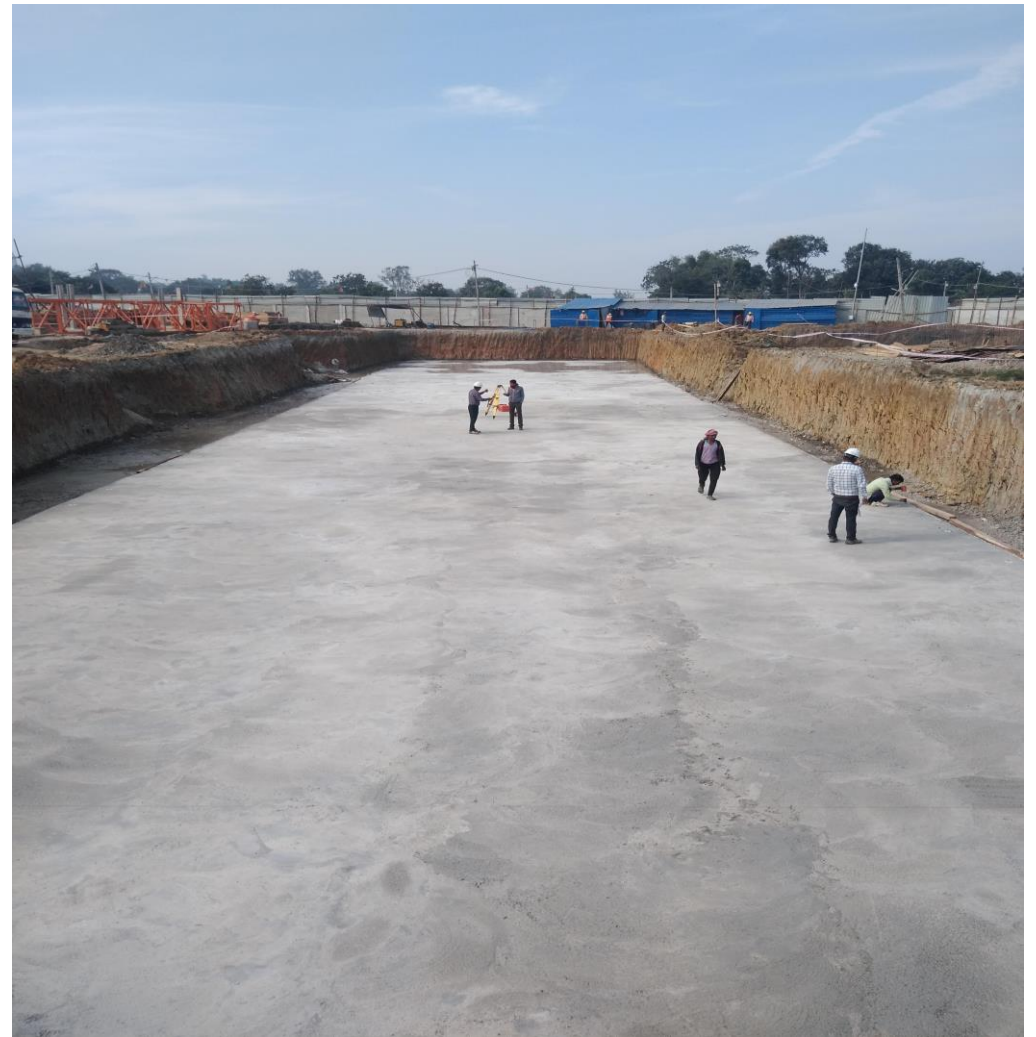


Foundation

- Conventional as per geo-technical investigations, bearing capacity, soil strata, water table, etc.
- Raft foundation with RCC shear wall upto plinth level.
- Grade slab at plinth level.



FOUNDATION



- The foundation work starts with the PCC of 100 mm thickness (M10 Grade)

FOUNDATION



- All building blocks have Raft foundation with 700 mm thick M-30 Concrete.

FOUNDATION



- Shear wall of M30 Grade Concrete are being cast upto plinth height over already laid cured raft.

Erection



- Erection of Components

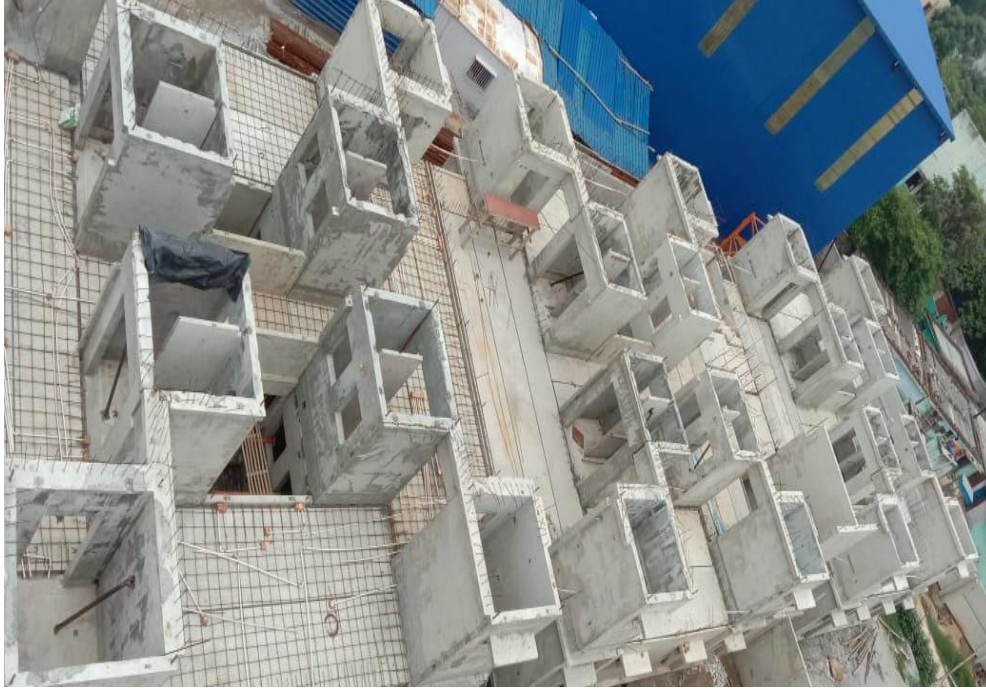
Erection



Erection

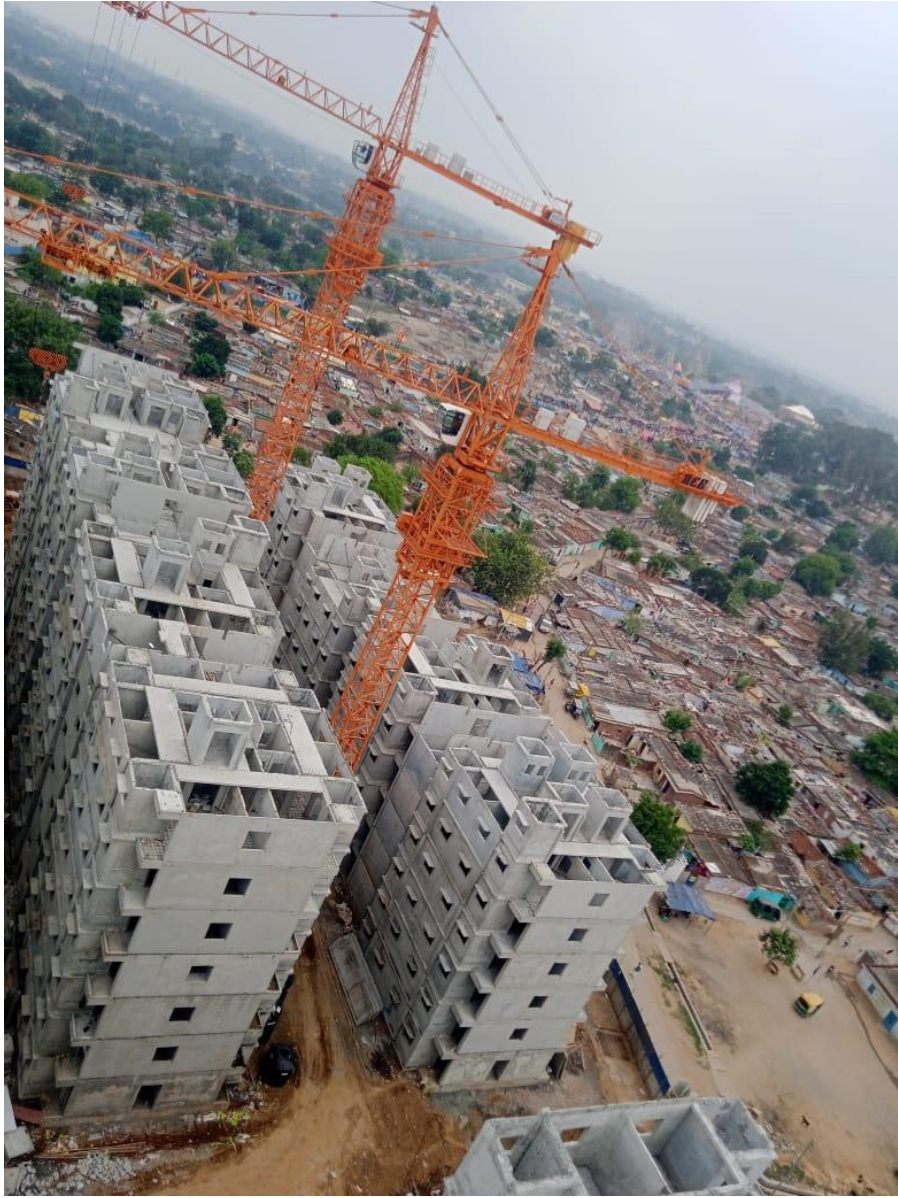


Construction Phase



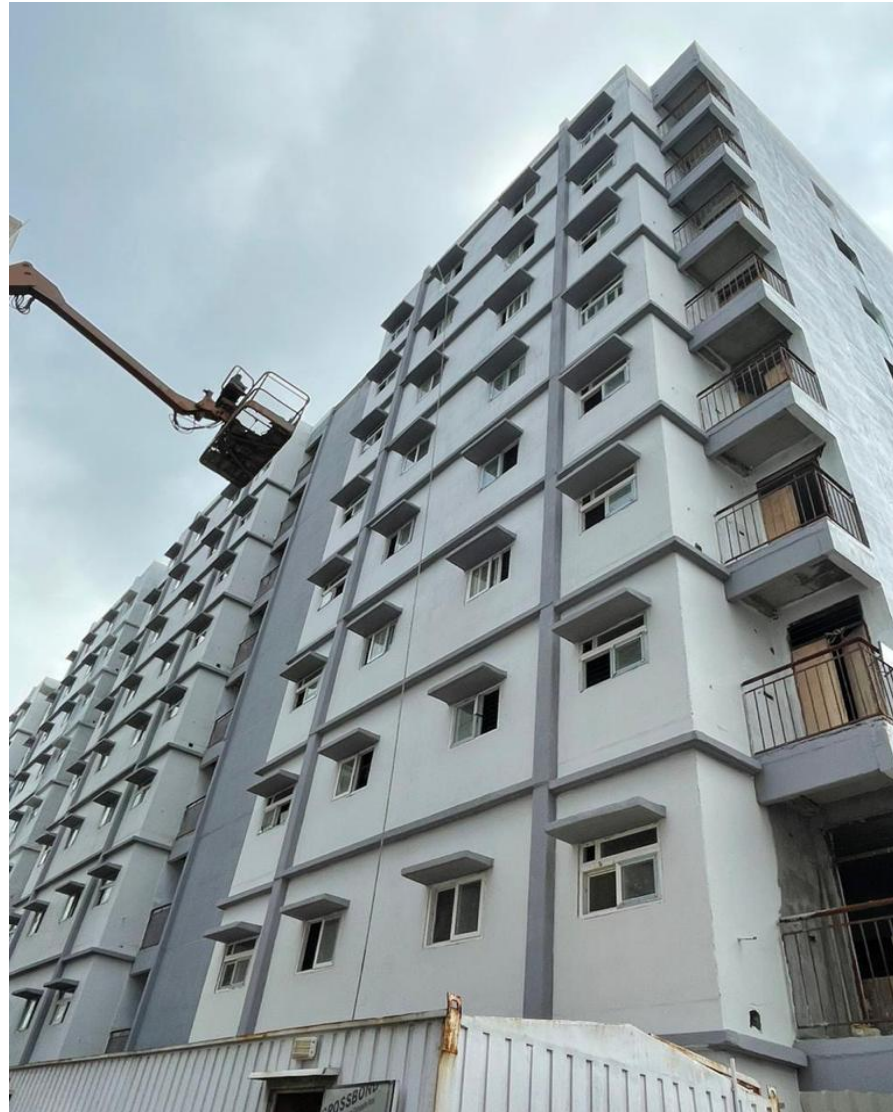
Construction Phase







Current Status



Current Status



Current Status



Current Status



Light House Project (LHP) at Agartala, Tripura

(Technology: Light Gauge Steel Structural System & Pre-Engineered Steel Structural System)

No. of Dwelling Units : 1000 Nos. (G+6)

No. of Block / Tower : 7 Blocks

Units in each Block / Tower : A(112), B(154), C(118), D(168),
E(168), F(168) & G(112)



- Total Plot area is 24168 Sqm.
- Ground coverage of the project is 29% and FAR achieved is 2.43
- Proposed organized green space is 31%.
- The project also includes Anganwadi, Health Centre and community hall of 480 Sqm, 700 Sqm and 500 Sqm respectively in G+1 configuration

Typical floor plan

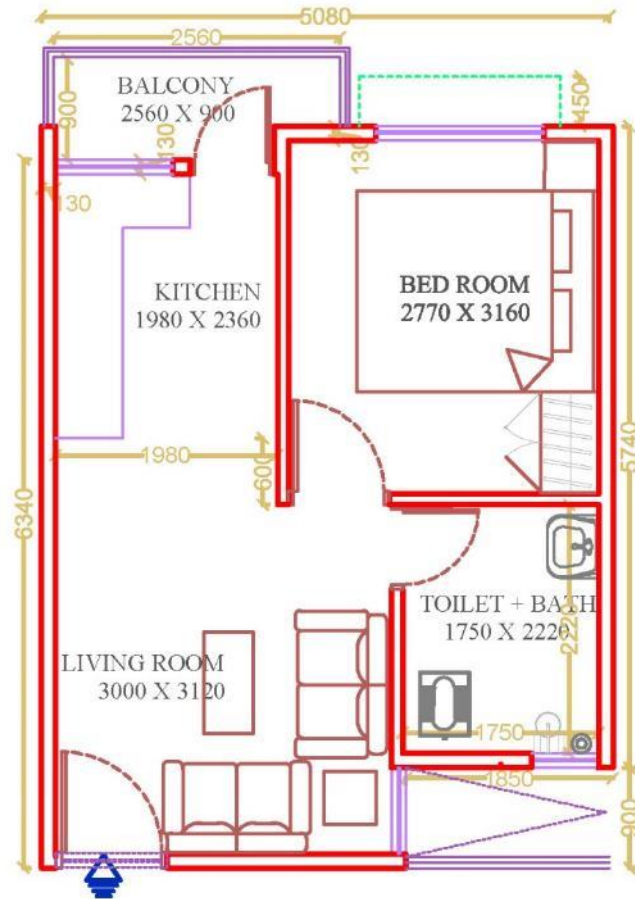


- 16 dwelling units each in A & G Block; 22 Units in B Block; 18 Units in C Block and 24 units each in D,E & F per floor with a provision of lifts and staircase.



- There are 7 blocks in Ground + 6 configuration with 1000 houses along with basic and social infrastructure.

▪ Typical Dwelling Unit plan



TYPICAL UNIT PLAN
(SCALE - 1:20)

Each dwelling unit consists of one living, one bed room, a kitchen, a toilet and a balcony. The carpet area of each unit is 30.03 Sq.mt. The sizes of individual rooms & service areas conform to NBC norms.

Other special features:

- Green rating as per GRIHA
- Use of renewable resources:
 - Rain water harvesting
 - Solar lighting
- Solid waste management
- STP with recycling of waste water
- Fire fighting services as per NBC norms

Prevalent Construction Systems

Load bearing Structure



RCC Framed Structure

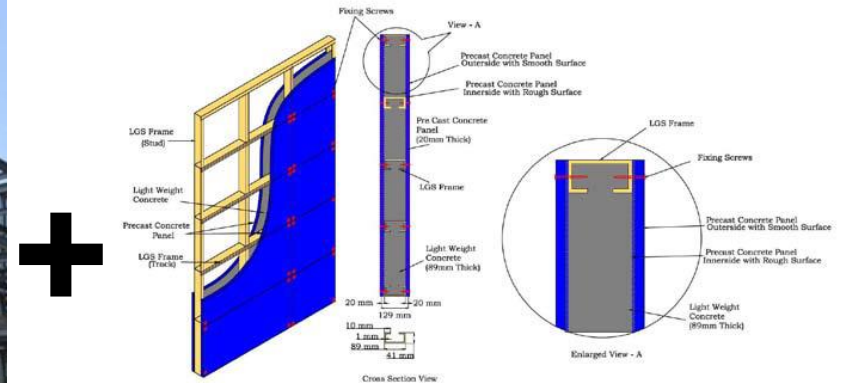


Technology being Used

Steel Frame Structure



Light Gauge Steel Framed Walling System

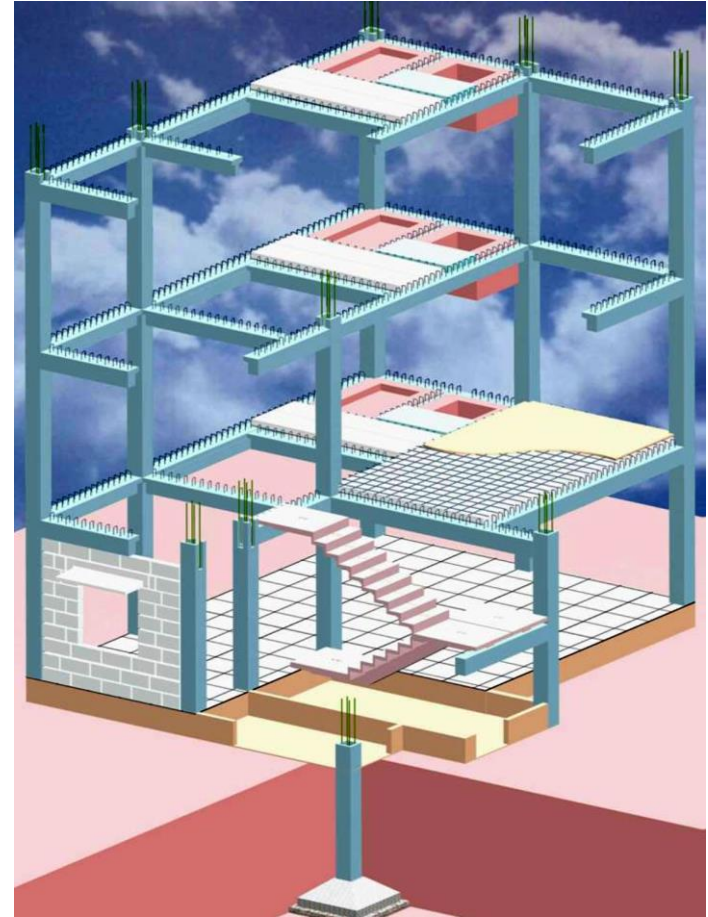


Light Gauge Steel Framed System (LGSF) is based on factory made galvanised light gauge steel components. The components/sections are produced by cold forming method and assembled as panels at site forming structural or non structural steel framework of a building of varying sizes of wall and floor.

In order to meet structural requirements, Hybrid system comprising of **Light Gauge Steel Frame System with Pre-Engineered Steel Structural System** has been adopted in the present project.

Structural Elements

- Foundation
- Structural System
- Floor/ Roof Slab
- Wall Panels

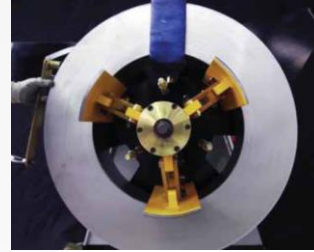


Wall Panels – Light Gauge Steel Frame System

- LGSF is a “C” cross-section made of galvanised light gauge steel with built in notch, dimpling, slots, service holes etc. and produced by computerized cold roll forming machine.
- These frames are assembled using self driven metal screws to form into LGSF wall and roof structures of a building.
- Provisions for doors, windows, ventilators and other cut outs as required are incorporated in the LGSF.
- Cement concrete panels are fixed on both side of the wall and then filled with light weight concrete.
- Cement fibre board as an alternative to the above panels are used for cladding with infill of rockwool.



Receiving GI Coils, Inspection and Store



Loading the coils in Decoiler

Loading NC files and Operation of computerized Roll forming machine.



Production of frames, Marketing & Labeling

Inspection of frames.

Packing of frames wall wise Marking & Labeling

Dispatch to construction site.



- Flow Diagram of manufacturing plant for fabrication of Light Gauge Steel Frame System

Light Gauge Steel Frame System



- Photos of manufacturing plant

Light Gauge Steel Frame System

■ Wall Frame...contd.

- Core of wall panels
 - The concrete used for infill wall is light weight and free flow.
 - The density shall be 1500-1800 Kg/m³ after adding/mixing foam or EPS beads as per the design mix. The light weight concrete shall be of grade M5 to M10 as required.
 - The light weight concrete shall be mixed and used at site.



Wall Panels

- Typical view of LGSF panels and steel frame construction



MEP

- The plumbing and electrical services are incorporated before laying of light weight concrete between the panels



Foundation

- Pile Foundation (Bored Cast-in-situ Concrete Piles) as per geo-technical investigations, bearing capacity, soil strata, water table, etc.
- RCC Raft on the Piles and then RCC pedestal on the Raft
- Anchor bolts and Base plate of varying sizes and diameter as per structural design for erecting Pre-Engineered Steel Structure.
- RCC plinth beam and grade slab at plinth level.
- RCC shear walls for staircases and lift on RCC raft and water proofing with kota stone.



Foundation



Reinforcement and casting of stub-columns on raft

Foundation



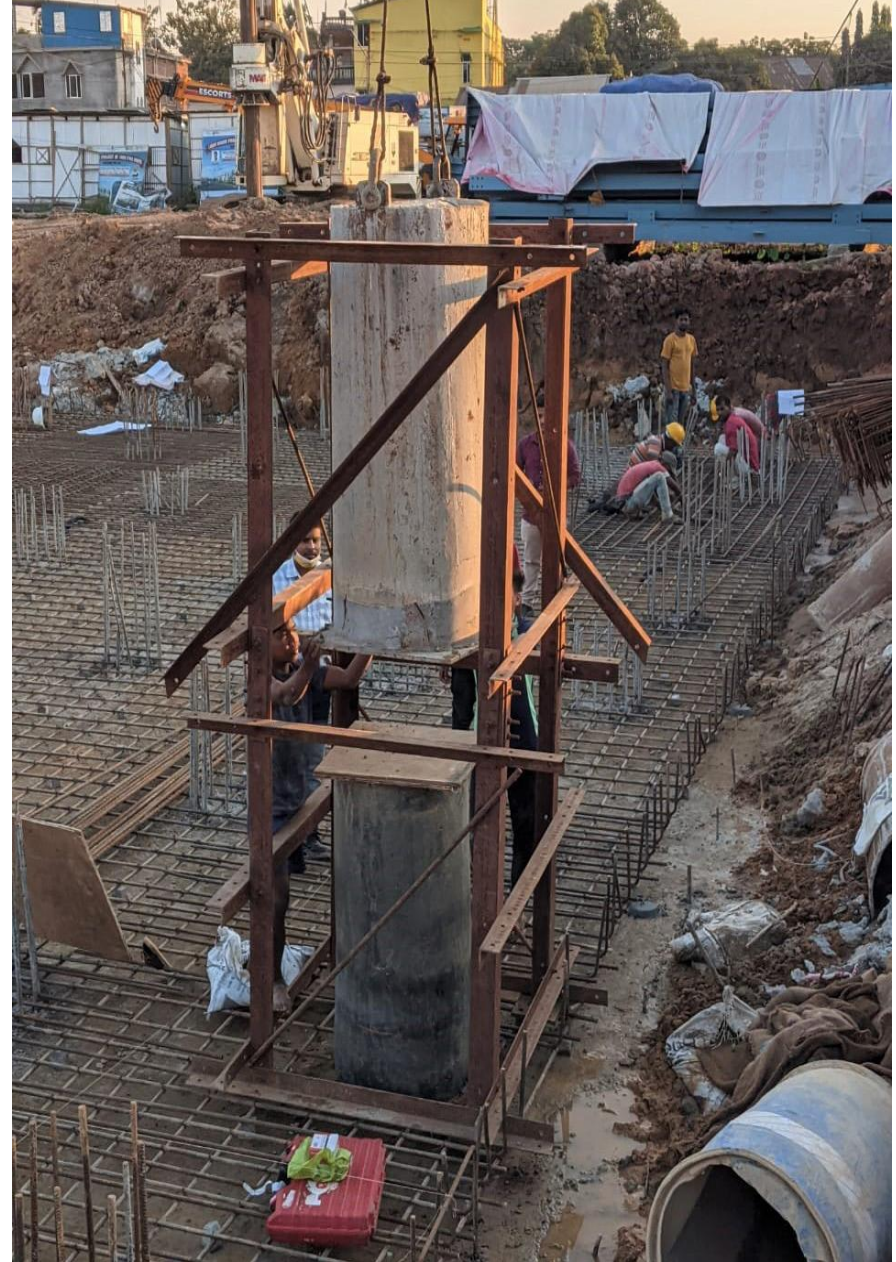
Reinforcement for plinth beam and placing of templates for starting of PEB structure

Foundation



Fixing of foundation bolts for base plates

Dynamic Load Test



Structural system

- Pre-Engineered Building (PEB) system comprising of built-up fabricated I-sections for beams and columns



STRUCTURAL SYSTEM



Erection of steel columns & beams

STRUCTURAL SYSTEM



Erection of steel columns & beams

STRUCTURAL SYSTEM



Erection of LGSF wall panels







ECOPRO FIBER CEMENT BOARD TYPE-A CRT-3 MADE IN INDIA 2440X

Floor/ Roof Slab

- The floor/ roof is deck slab which comprises of deck sheet, reinforcement with concrete screed





Placing of deck slab and reinforcement



Screed concrete on deck slab



Current Status



Current Status



Let us be part of India's growth story of
Reform, Perform & Transform



You can reach us at ska@bmtpc.org; info@bmtpc.org;



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“Creating Enabling Environment for Affordable Housing for All”