



Ministry of Housing and Urban Affairs  
Government of India



# LIGHT HOUSE PROJECT AT INDORE

GHTC-India Category:

**Prefabricated Sandwich Panel System**

Technology:

**Prefabricated Sandwich Panel System with pre-engineered steel structural system**

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GLOBAL  
HOUSING  
TECHNOLOGY  
CHALLENGE INDIA

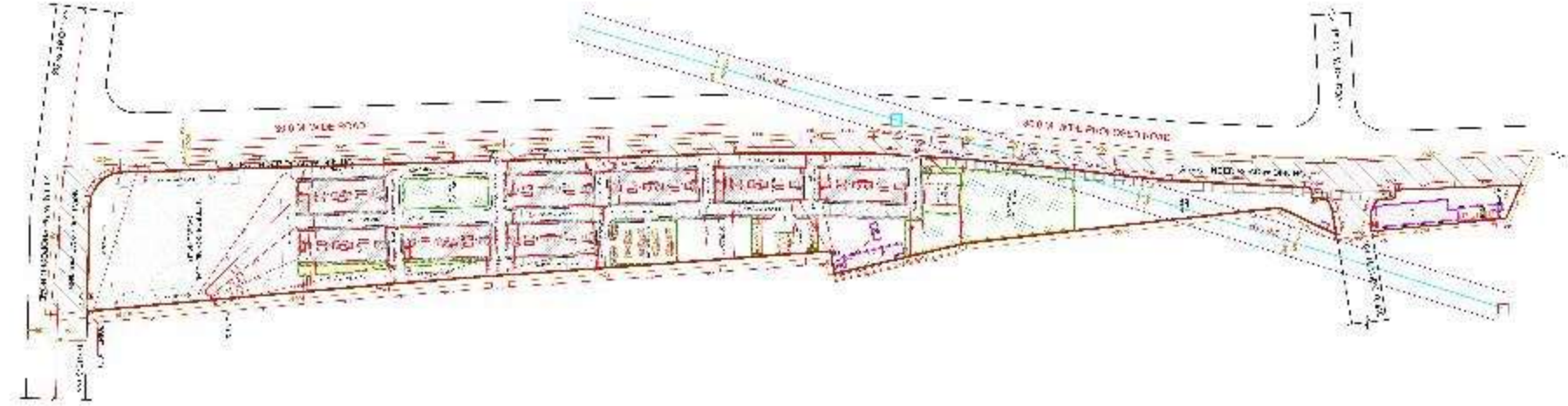
## Global Housing Technology Challenge - India (GHTC-I)

<b><i>Broad Category</i></b>	<b><i>Technologies (Nos.)</i></b>
<b><i>Precast Concrete Construction System - 3D Precast volumetric</i></b>	4
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<b><i>Monolithic Concrete Construction</i></b>	9
<b><i>Stay In Place Formwork System</i></b>	8
<b>Total</b>	54

# Summary of Six Light House Projects (LHPs)

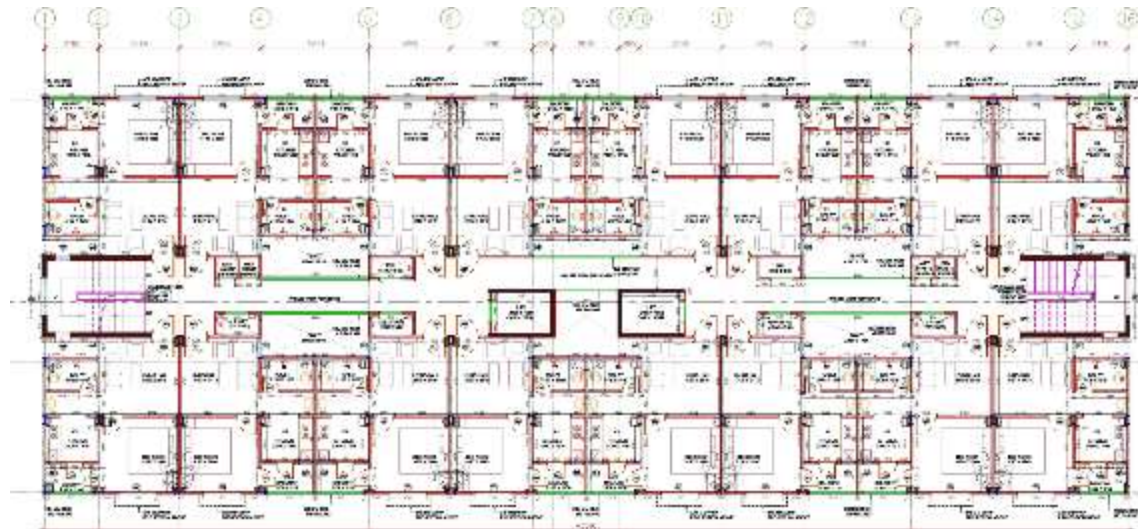
LHP Location			Chennai (Tamil Nadu)	Rajkot (Gujarat)	Indore (Madhya Pradesh)	Ranchi (Jharkhand)	Agartala (Tripura)	Lucknow (Uttar Pradesh)
Sl. No	Particulars	Units						
1	Name of Technology	Name	Precast Concrete Construction System- Precast Components	Monolithic Concrete Construction using Tunnel Formwork	Prefabricated Sandwich Panel System	Precast Concrete Construction System – 3D Volumetric	Light Gauge Steel Frame System (LGSF) with Pre-Engineered Steel Structural System	Stay in Place Formwork System
2	No. of Houses	No.	1,152	1,144	1,024	1,008	1,000	1,040
3	No. of Floors	No.	G+5	S+13	S+8	G+8	G+6	G+13
4	Plot Area	Sqm	33,596	39,599	41,920	31,160	24,000	20,000
5	Per House Carpet Area	Sqm	26.58	39.77	29.04	29.85	30.00	34.50
6	Project Cost	INR (in Cr)	116.27	118.90	128.00	134.00	162.50	130.90
7	Per House cost (with infrastructure)	INR (in Lakh)	10.09	10.39	12.50	13.29	16.25	12.58

- Total Plot area is 41920 Sqm.
- Ground coverage of the project is 15% and FAR achieved is 1.3.
- Proposed organized green space is 10.05%.
- The project also includes a community hall of 169.52 Sqm.



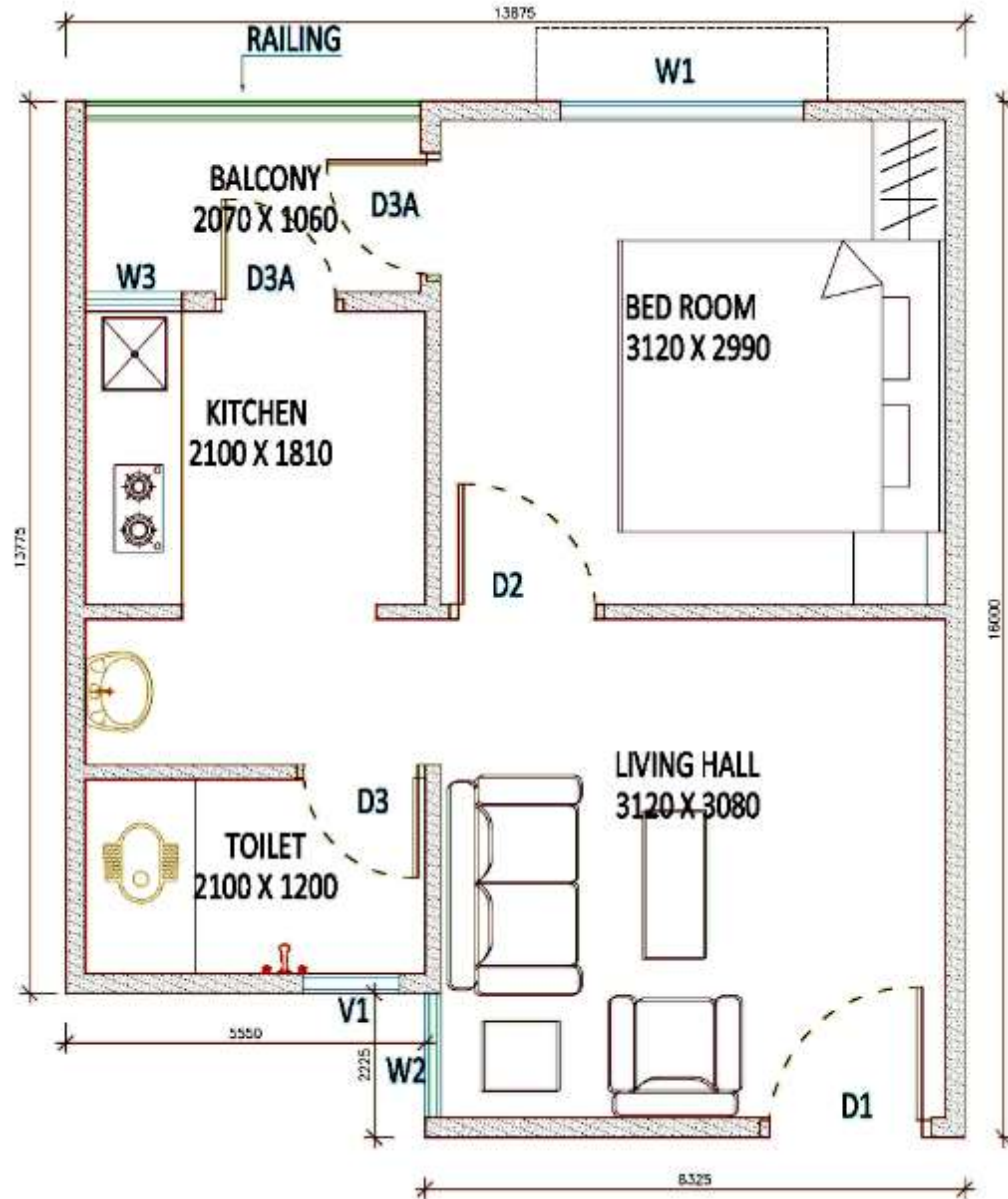
- There are 8 blocks in Stilt + 8 configuration with 1024 houses along with basic and social infrastructure.

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 living, one bed room, a kitchen, a toilet and a balcony. The carpet area of each unit is 29.04 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

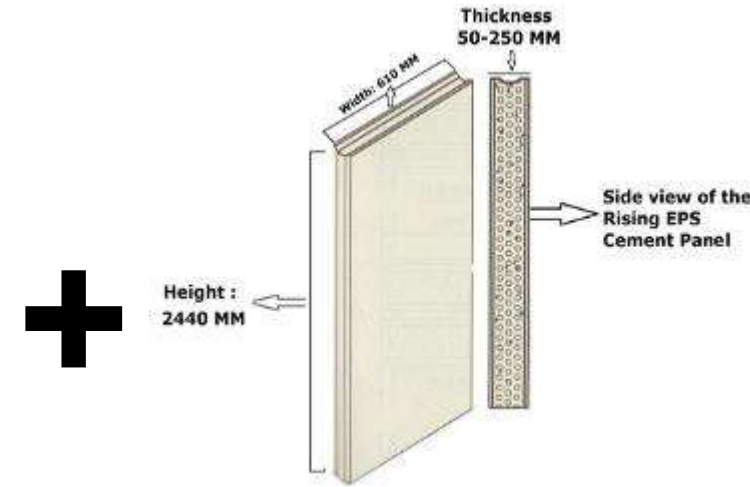


## Technology being Used

### Steel Frame Structure



### Prefabricated Sandwich System



The Sandwich Panel System are factory made wall panels replacing conventional brick/block & mortar walling construction and can be used as non-load bearing as well as load bearing applications.

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

# Structural Elements

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





### Foundation

- Conventional as per geo-technical investigations, bearing capacity, soil strata, water table, etc.
- Combined and Isolated RCC footing with RCC column up to plinth height.
- RCC shear walls for staircase and lift wells on RCC Raft foundation and water proofing with kota stone.
- Base plate and Anchor bolts of varying sizes and diameter as per structural design for erecting Pre-Engineered Steel structure.
- RCC plinth beam and grade slab at plinth level.



## Structural system

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





## Floor/ Roof Slab

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



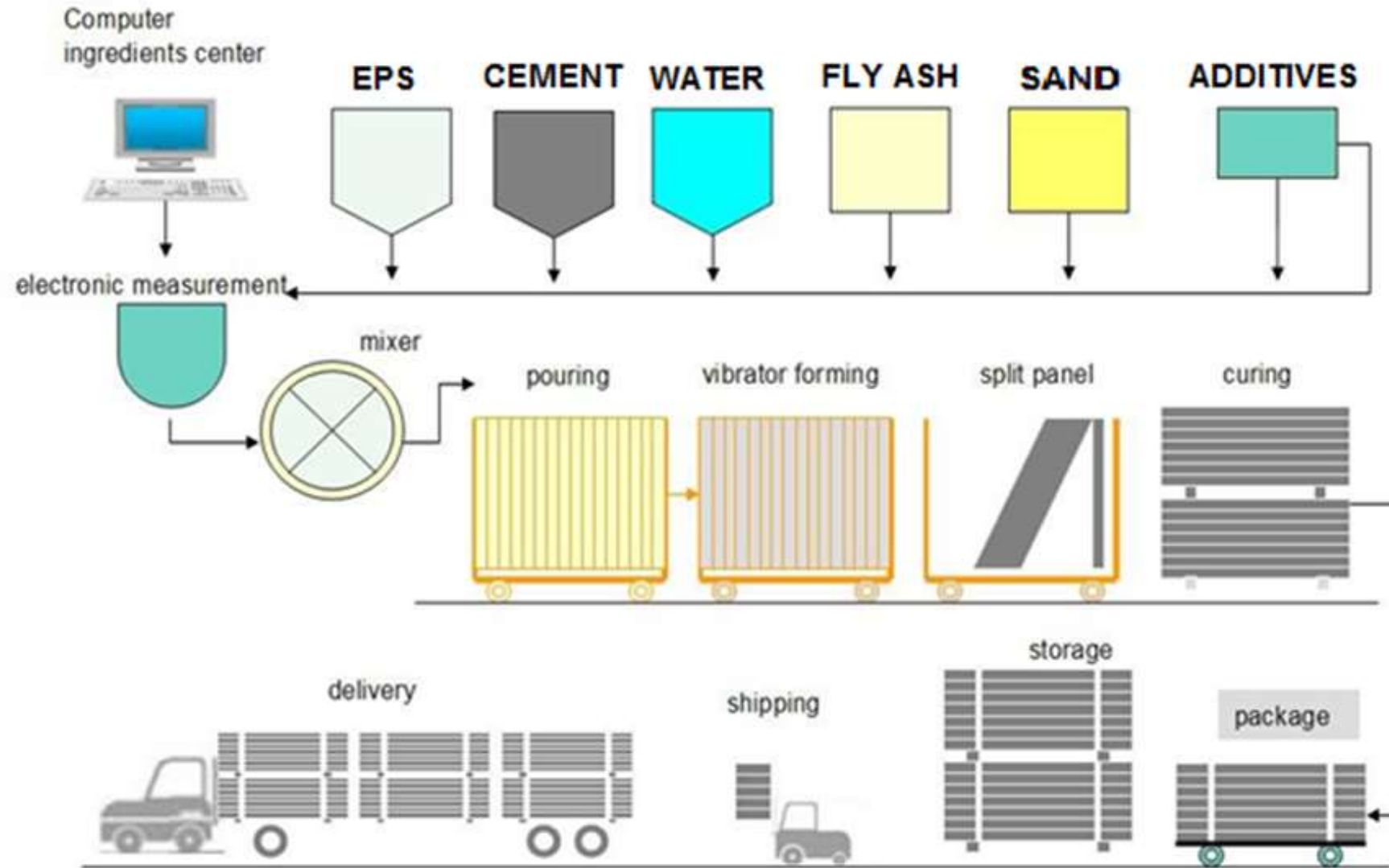
## Wall Panels – Prefabricated Sandwich Panel System

- The panels are made of fibre cement / calcium silicate boards on both sides with infill core of light weight concrete made of EPS granule balls, cement, sand, flyash, adhesive and other bonding material.
- The core material in slurry state is pushed under pressure into the preset moulds.
- Once set, the panels are moved for curing and transported to the site.





## Prefabricated Sandwich Panel System



- Flow Diagram of manufacturing plant for production of Prefabricated sandwich panel



## **Prefabricated Sandwich Panel System**



- Photos of manufacturing plant



### ■ **Typical Wall Panel Dimensions**

Length	2440 mm (may be increased upto 3000 mm)
Width	610 mm (may be altered as per requirement but should not be too wide since handling of the panels become difficult)
Thickness	50-250 mm. Dimensions

- In LHP at Indore, the height of panel is 3.0 mtr., width is 610 mm.
- The thickness of panels being used is 120 mm for external walls and 90 mm internal walls.
- The additional cladding at L and T joints are required with 60 mm thick panels to encase the steel structure.



## **Prefabricated Sandwich Panel System**

### **Density and weight of Core and Wall Panels**

(Size of Wall Panel : 3000 x 610 mm.)

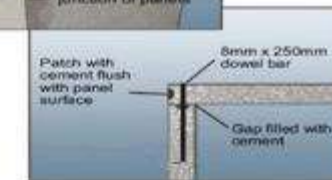
S No.	Thickness of Wall Panel (mm)	Density of Core (Kg/m <sup>3</sup> )	Density of Wall Panel (Kg/m <sup>3</sup> )	Weight of wall Panel (Kgs)
1.	60	580	670	74
2.	90	570	635	105
3.	120	560	615	135

## Prefabricated Sandwich Panel System

- The panels have tongue and groove joints for construction of a building.
- U Type channels are used to hold the panels with the structure. Addition clip should be welded with steel columns and beams to hold U channel firmly with the columns / beams and floors. The thickness of the panel shall determine the size of U channel.
- Two panels are jointed with steel dowel bars at angel of 45 degree
- Joints between two panels are filled with exterior grade superfine ready-mix plaster and finished with putty after placing anti crack fibre tape to give uniform smooth surface ready for paint.



Typical L & T joints with panels



Lock the Panels with each other with the help of steel bar from back

Lock the Panels with each other with the help of steel bar from head



### **Advantages**

- The system is dry walling system, brings speed in construction, water conservation (no use of water for curing of walling components at site).
- The sandwich panels have light weight material as core material, which brings resource efficiency, better thermal insulation, acoustics & energy efficiency
- Being light in weight, results in lower dead load of building & foundation size.



### Essential Requirements

- The Joints of panels with each other need to be perfectly locked by materials such as cement, glue, dowel bars, exterior grade superfine ready-mix plaster etc. & mechanism such as leveling of panels etc. shall be perfect.
- Cutting / chiseling of panels for openings such as doors, windows, service conduits etc. required little training & special tools/ machines are required.
- The panels if used as floors / roofs, shall require screed concrete of minimum 50 mm thickness with nominal reinforcement/ GI wire mesh for monolithic action to avoid leakage though panel joints.
- Erection of panels shall be under supervision of trained staff.



Being first time mass scale field implementation of new technology  
the Light House Project at Indore is on  
**Design & Build Basis**

Agency:  
**M/s KPR Projectcon Pvt. Ltd., Nasik**

Technology Provider:  
**M/s Rising Japan Infra Pvt. Ltd., New Delhi**

# Design Basis

- Structural Frame as RC Steel Hybrid structure
  - Sub-structure up to the plinth level in RCC
  - Superstructure is using HR Steel built-up I sections with lift and staircase wells in RCC Shear wall
- Safe Bearing capacity: 40 T/m<sup>2</sup>, depth of foundation 2.0 m.
- Isolated and combined RCC foundation as per IS1080-1985
- Raft foundation as per IS:2950 (Part-1)-1981 (reaffirmed 2008)
- Wind speed: High damage risk zone with basic wind speed ( $V_b=47\text{m/sec}$ )
- Design wind speed:

$$V_z = V_b \cdot k_1 \cdot k_2 \cdot k_3 \cdot k_4$$

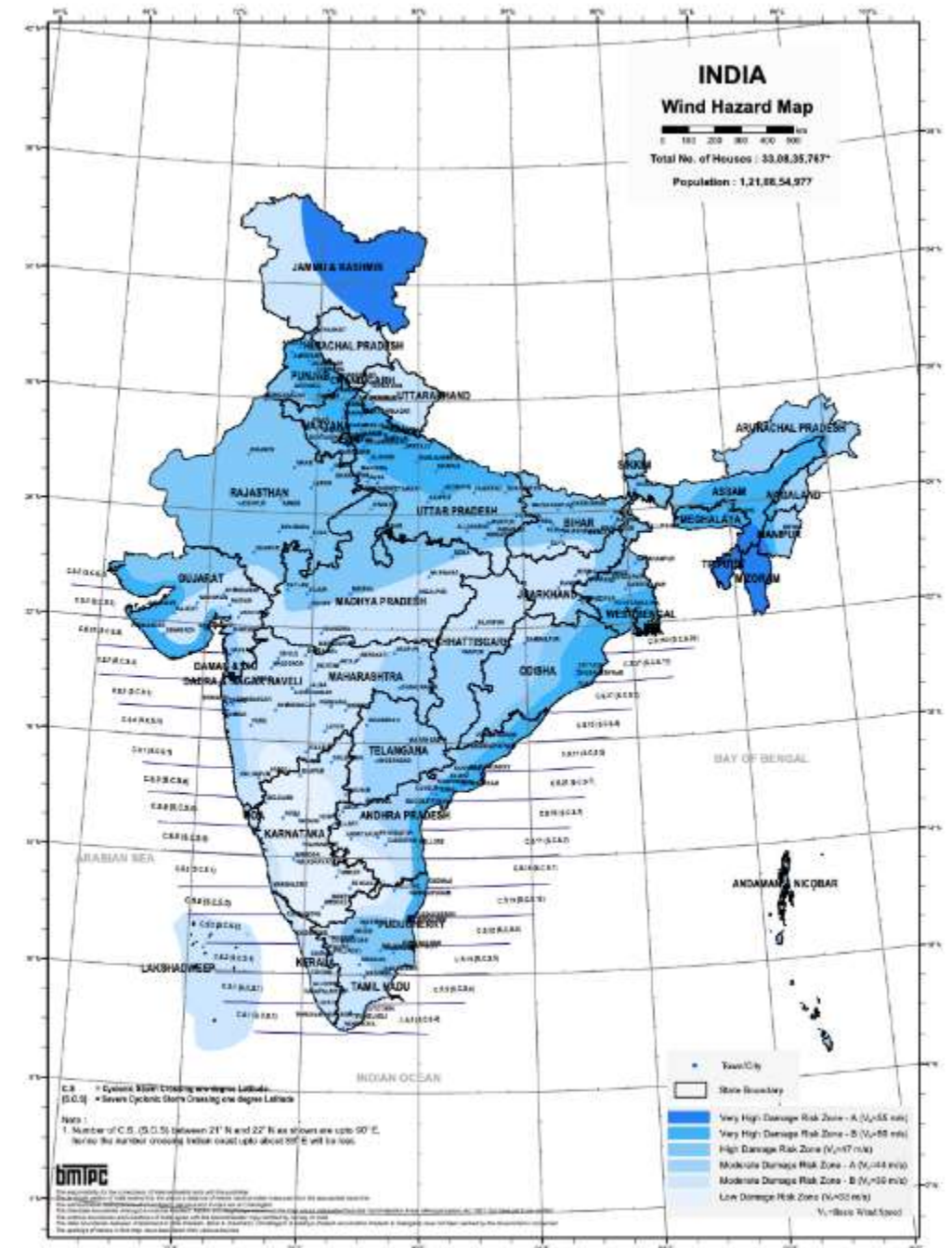
$k_1$  (Risk Coefficient)=1

$k_2$  (Size factor)=as per height

$k_3$  (topography factor)=1

$k_4$  (importance factor)=1

- Wind Pressure ( $P_z$ ) =  $0.6 \cdot V_z^2$
- Wind pressure is converted into design wind pressure and then distributed at each storey as wind force.





# Design Basis

- Earthquake : Zone-III as per Seismic Zoning Map of India IS: 1893 (Part-1):2016

- Designed as dual system with ductile RC structural walls and few special moment frames in structural steel in both direction, as per Table 9 (iii) (c) of IS 1893 (Part I): 2016.
- Zone factor 0.16 (As per Table 3-IS:1893-2016), Importance factor 1.2 (As per Table 8-IS:1893-2016), Response Reduction Factor 4 (As per Table iii)c-IS:1893-2016) and Damping Ratio 5%.

- Design Horizontal Seismic Coefficient ( $A_h$ )

$$A_h = (Z/2) \cdot (S_a/g) \cdot (I/R)$$

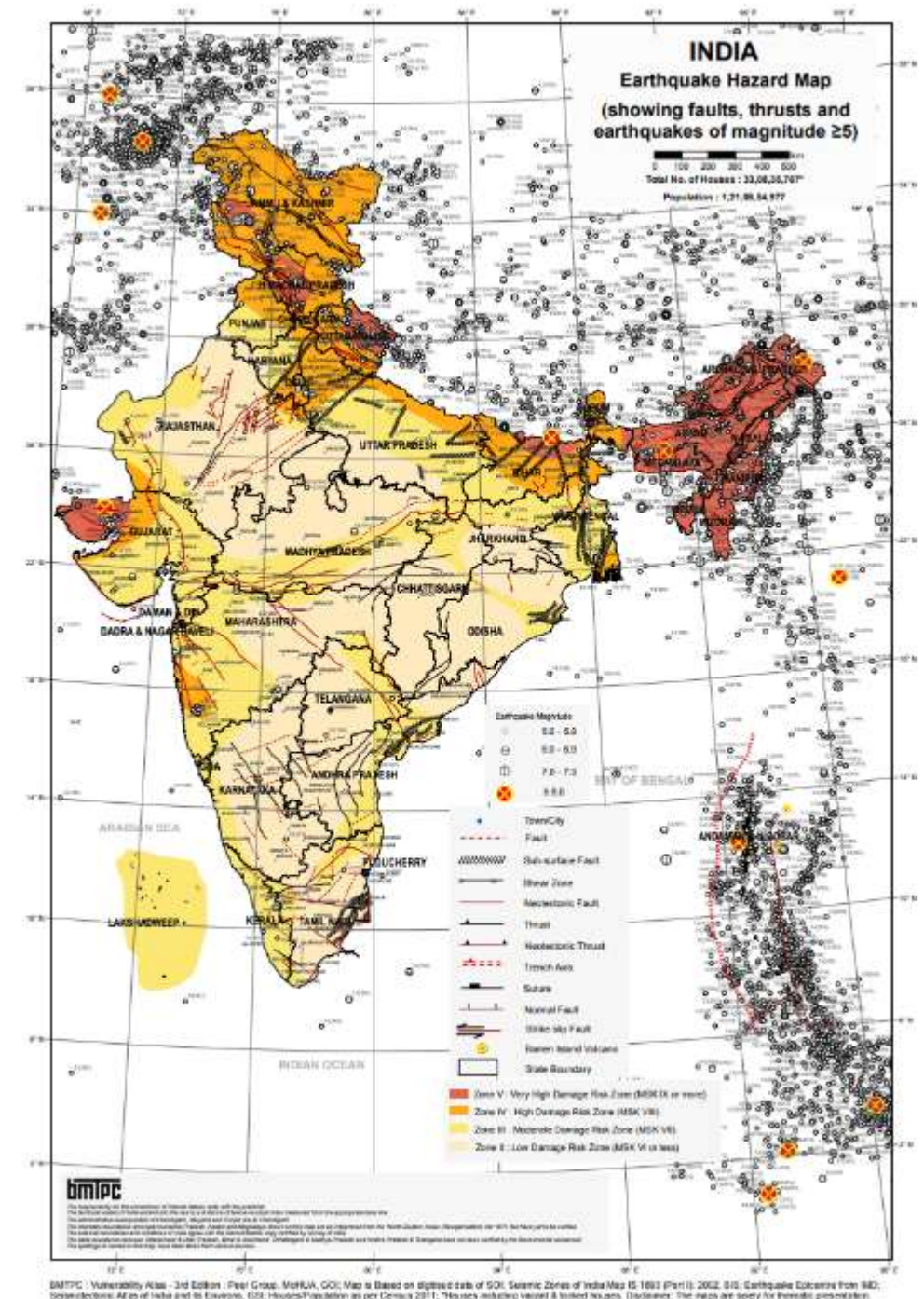
$S_a/g$  is design acceleration coefficient for different soil types corresponding to natural period (T) of building

- Design Lateral Force ( $V_B$ )

$$V_B = A_h \cdot W$$

W is seismic weight of building

- Linear dynamic analysis has been done to obtain the design lateral forces
- Steel columns as pinned at top of RC pedestal / plinth beam and some columns – beams frames as rigid joint frames to cater lateral loads in addition to gravity loads and other as pinned jointed frames to cater gravity loads only.
- Rigid diaphragms in horizontal direction at floor levels as per Cl.7.6.4 of IS:1893(Part-1):2016.
- Design has been carried out as per IS 456-2000, IS 800-2007 and NBC-2016.



# Design Standards

## Loads

<b>Is:875 (part-1)-1987 (reaffirmed 2018)</b>	Code of practice for design loads (other than earthquake)for buildings and structures part 1 dead loads - unit weights of building material and stored materials (incorporating is:1911-1967)
<b>Is 875 : part 2 : 1987 (reaffirmed 2018)</b>	Code of practice for design loads (other than earthquake) for buildings and structures: part 2 imposed loads
<b>Is 875 : part 3 : 2015</b>	Design loads (other than earthquake) for buildings and structures - code of practice - part 3 wind loads
<b>Is 1893: part 1 : 2016</b>	Criteria for earthquake resistant design of structures - part 1 : general provisions and buildings



# Design Standards

## Structural Steel

<b>Is 800 : 2007 (reaffirmed 2017)</b>	General construction in steel - code of practice
<b>Is 801 : 1975 (reaffirmed 2016)</b>	Code of practice for use of cold formed light gauge steel structural members in general building construction
<b>Is 806 : 1968 (reaffirmed 2017)</b>	Code of practice for use of steel tubes in general building construction
<b>Is 808 : 1989 (reaffirmed 2014)</b>	Dimensions for hot rolled steel beam, column, channel and angle sections
<b>Is 813 : 1986</b>	Scheme of symbols for welding
<b>18: 816-1969 ( REAFFIRMED 1969)</b>	CODE OF PRACTICE FOR USE OF METAL ARC WELDING FOR GENERAL CONSTRUCTION IN MILD STEEL
<b>Is 1161:2014</b>	Steel tubes for structural purposes
<b>Is 2062:2011</b>	Hot rolled medium and high tensile structural steel
<b>Is 4000 : 1992 (reaffirmed 2017)</b>	Code of practice for high strength bolts in steel structures
<b>Is 4923:2017</b>	Hollow steel sections for structural use — specification (second revision)
<b>Is 11384 : 1985 (reaffirmed 2017)</b>	Code of practice for composite construction in structural steel and concrete

# Design Standards

## RCC

<b>Is 456 : 2000 (reaffirmed 2016)</b>	Plain and reinforced concrete - code of practice
<b>Is 3370 : part 1 : 2009 (reaffirmed 2019)</b>	Concrete structures for storage of liquids - code of practice - part 1 : general requirements
<b>Is 3370 : part 2 : 2009 (reaffirmed 2019)</b>	Concrete structures for storage of liquids - code of practice - part 2 : reinforced concrete structures
<b>Is 4326 : 2013 (reaffirmed 2018)</b>	Earthquake resistant design and construction of buildings - code of practice
<b>Is 5525 : 1969 (reaffirmed 2018)</b>	Recommendations for detailing of reinforcement in reinforced concrete works
<b>Is 1786 : 2008 (reaffirmed 2018)</b>	High strength deformed steel bars and wires for concrete reinforcement - specification
<b>Is 10262 : 2019</b>	Concrete mix proportioning-guidelines
<b>Is 13920 : 2016</b>	Ductile detailing of reinforced concrete structures subjected to seismic forces - code of practice

# Design Standards

## Foundation

<b>Is 1080 : 1985</b> <b>(reaffirmed 2016)</b>	Code of practice for design and construction of shallow foundations on soils (other than raft, ring and shell)
<b>Is 1904 : 1986</b> <b>(reaffirmed 2015)</b>	Code of practice for design and construction of foundations in soils: general requirements
<b>Is 2950 : part 1 : 1981</b> <b>(reaffirmed 2018)</b>	Code of practice for design and construction of raft foundations - part 1 : design
<b>Is 2974 : part 5 : 1987</b> <b>(reaffirmed 2018)</b>	Code of practice for design and construction of machine foundations part 5 foundations for impact machines other than hammers (forging and stamping press, pig breakers, drop crusher and jolter)
<b>Is 8009 : part 2 : 1980</b> <b>(reaffirmed 2015)</b>	Code of practice for calculation of settlement of foundations: part 2 deep foundations subjected to symmetrical static vertical loading

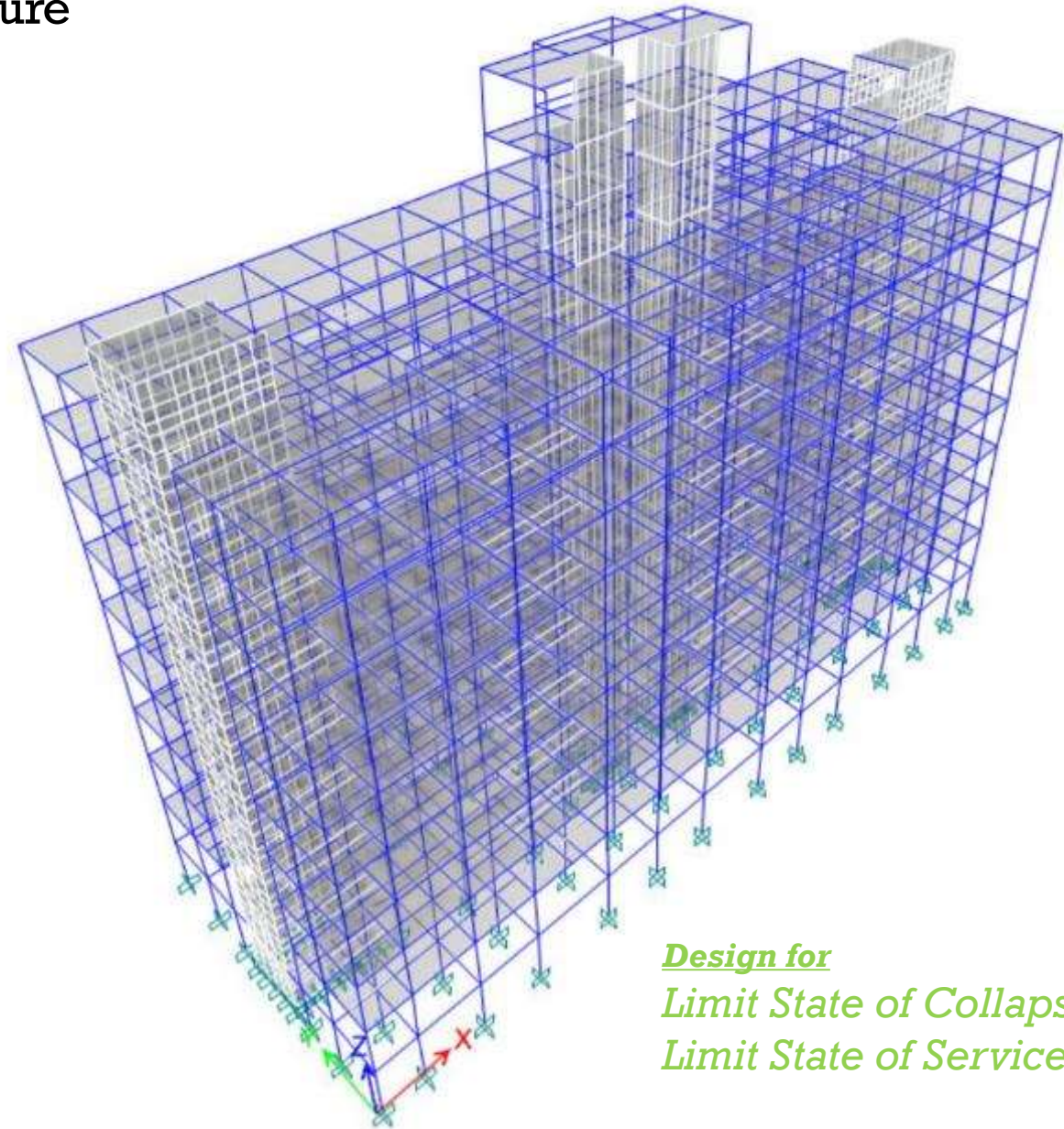
# STRUCTURAL ANALYSIS & DESIGN

- 3D Model of typical tower with PEB Structure

- Load Combinations :

- 1.5 (DL+LL)
- 1.2 (DL+LL $\pm$ EL/WL)
- 1.5 (DL $\pm$ EL/WL)
- 0.9DL  $\pm$ 1.5EL/WL

*(EL/WL implies Earthquake/Wind Load in +X, -X, +Y, and -Y, directions . Lateral forces shall be considered acting from all directions but one at a time.)*



- Steel structural system can be easily modeled in the CAD software such as STAADPRO, ETABS, SAFE, SAP, ABACAS and others for detailed structural analysis.
- 2D/ 3D Static and dynamic linear and non-linear analysis can be carried out using these softwares.
- The softwares can also be used for structural design as per Indian Standards.
- AUTOCAD for drawings

*Design for  
Limit State of Collapse  
Limit State of Serviceability*

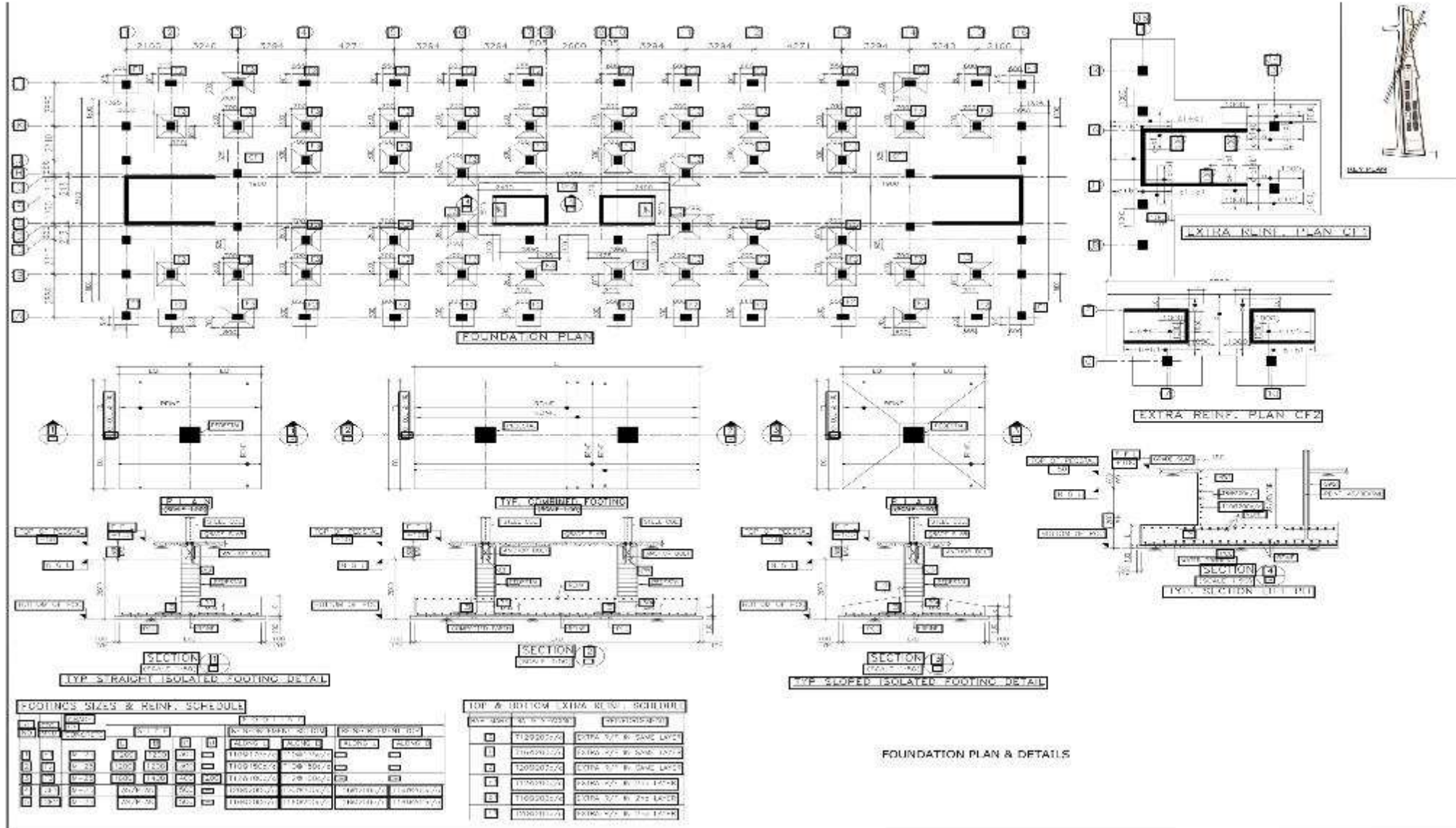
# Construction Sequence

- Sub-Structure: Foundation
- Super-structure: Structural system  
Floors  
Wall Panels
- MEP: Plumbing & Electrical
- Finishing

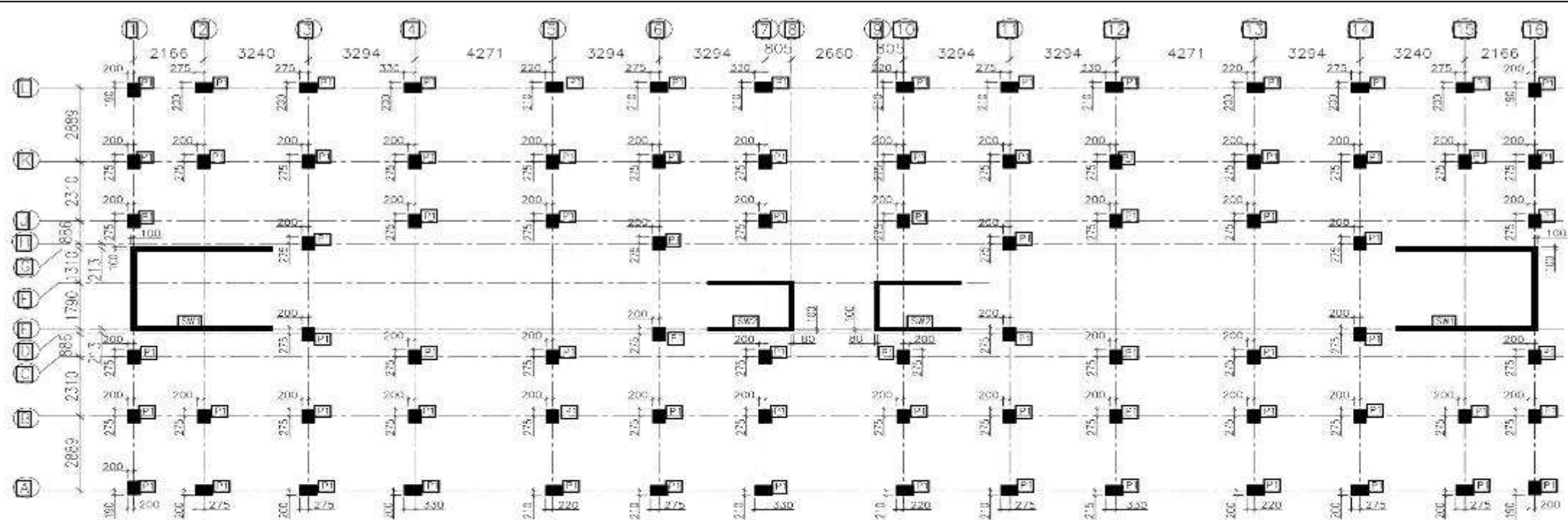


# Structural Drawings

# FOUNDATION



## Structural Drawings

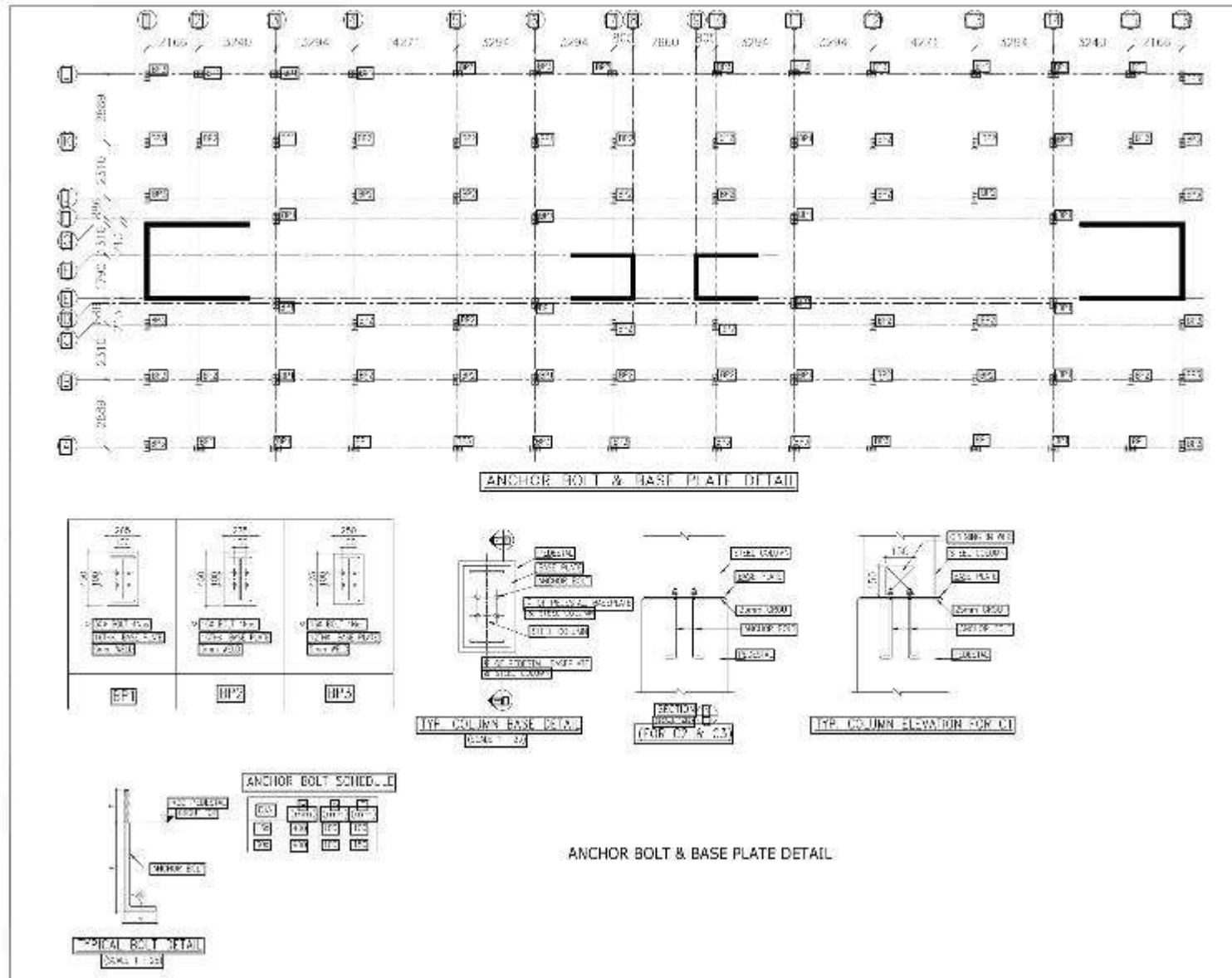


FOUNDATION TO -50mm LVL	SIZE	(400x550)
	MAIN REINF	4-11b(a)+ 10-112
	TIES SET	4/SETS (a+x+y+z)
	TIES SET	1
	CONC. MIX	M25
PEDESTAL MKD		

TIES SCHEDULE	
TIE GROUP	
ZONE-A	OUTER TS@100c/c
	INNER TS@100c/c
ZONE-B	OUTER TS@200c/c
	INNER TS@200c/c

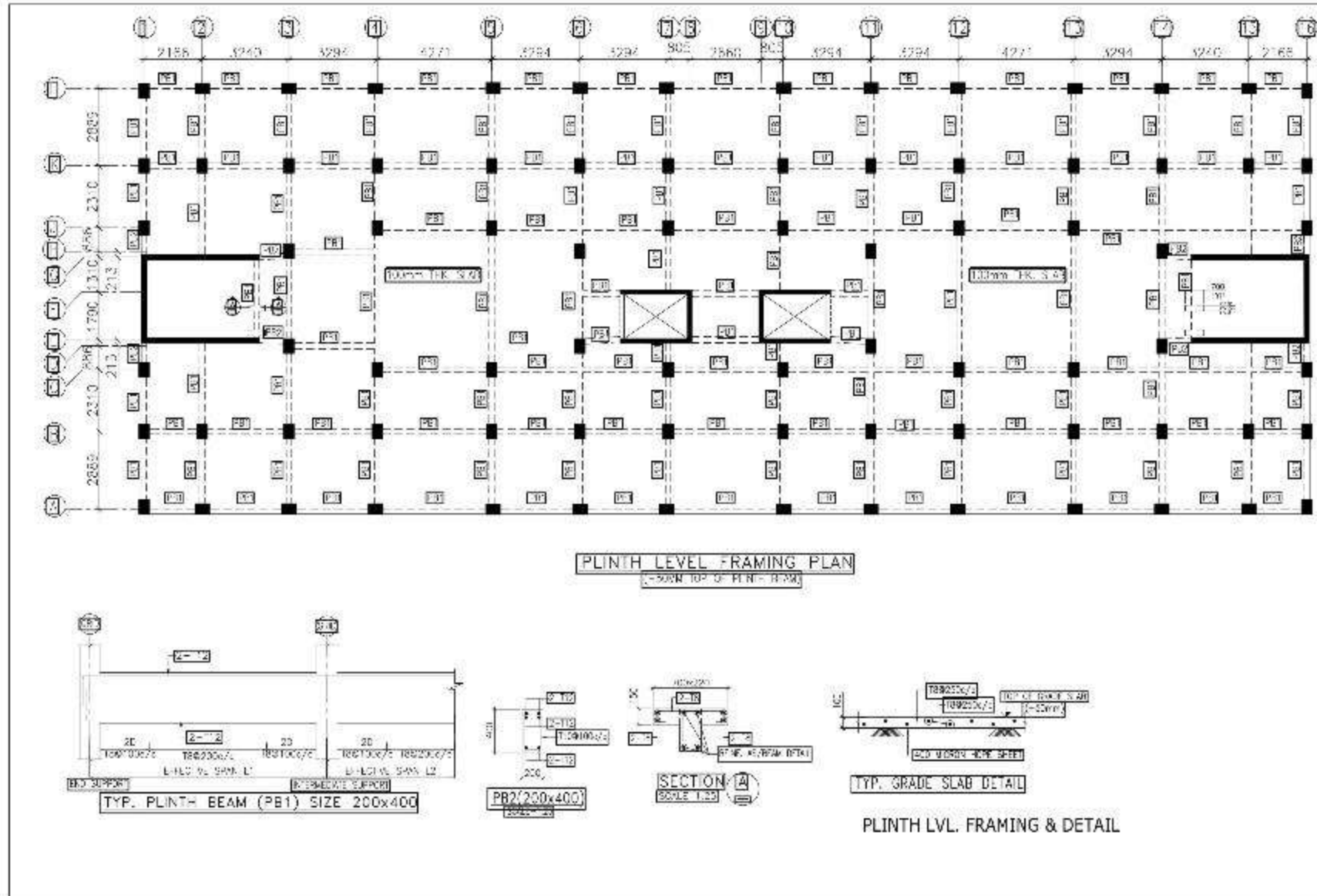
PEDESTAL LAYOUT & SCHEDULE

## Structural Drawings





## Structural Drawings



# FOUNDATION

## Concrete & Reinforcement Steel Specifications

Item	Concrete Grade
Isolated and combined RCC footing, Raft foundation, Plinth beam, Grade slab, Column up to Plinth level Shear walls, Water tank, Sewage Treatment Plant (STP)	M25

- Mix design for concrete and all Concrete work shall conform to IS 456-2000 & Liquid retaining structures shall conform to IS 3370:2009
- Reinforcement Steels being used is TMT bars of Fe 500 as per IS 1786-2008.

## Concrete mix design M25 (SGSIT, INDORE)

- Cement : Sand : Coarse Aggregate : 1:2.2:3.5 by weight
- Water Cement Ratio W/C : 0.45 by weight
- Aggregate Cement Ratio A/C : 5.7:1 by weight
- % Coarse Aggregate in Total Coarse Aggregate : 50% (20 mm)  
50% (10 mm)
- Consumption of Cement : 350 Kg per cum of concrete
- Consumption of Plasticizer : 1% by weight of cement
- Type of Cement : JK Cement (PPC)
- Type of Sand : Crushed Stone Sand
- Type of Aggregate : Angular
- Type of Plasticizer : Endura Flowcon 642

# Batching Plant



To bring resource efficiency, optimization of building materials and for quality control, a computerized batching plant has been established at site.



# Concrete Testing



Quality control and quality assurance is essential for a project and therefore a quality control lab has been established at site for testing of raw materials and finished products.



# FOUNDATION



- The project starts with layout and excavation.
- After the layout at site, the excavation of each block is done using mechanical excavators up to the required depth of foundation which is 2.0 m for each block.



# FOUNDATION



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



# FOUNDATION



- Reinforcement and shuttering for Isolated and combined footings



# FOUNDATION



- All building blocks has isolated & combined footings as per the structural design with M25 Concrete. The raft foundation with thickness of 500 mm has been constructed around staircase and lift well. All lift and staircase wells are provided with kota stone for water proofing



# FOUNDATION



- Columns of M25 Grade Concrete are being cast upto plinth height over already laid cured footing



# FOUNDATION



- Back filling with soil and water in layers of 200 mm with proper compaction.



# FOUNDATION



- Fixing of anchor bolts with templates over which factory made built up columns with base plate will be erected.



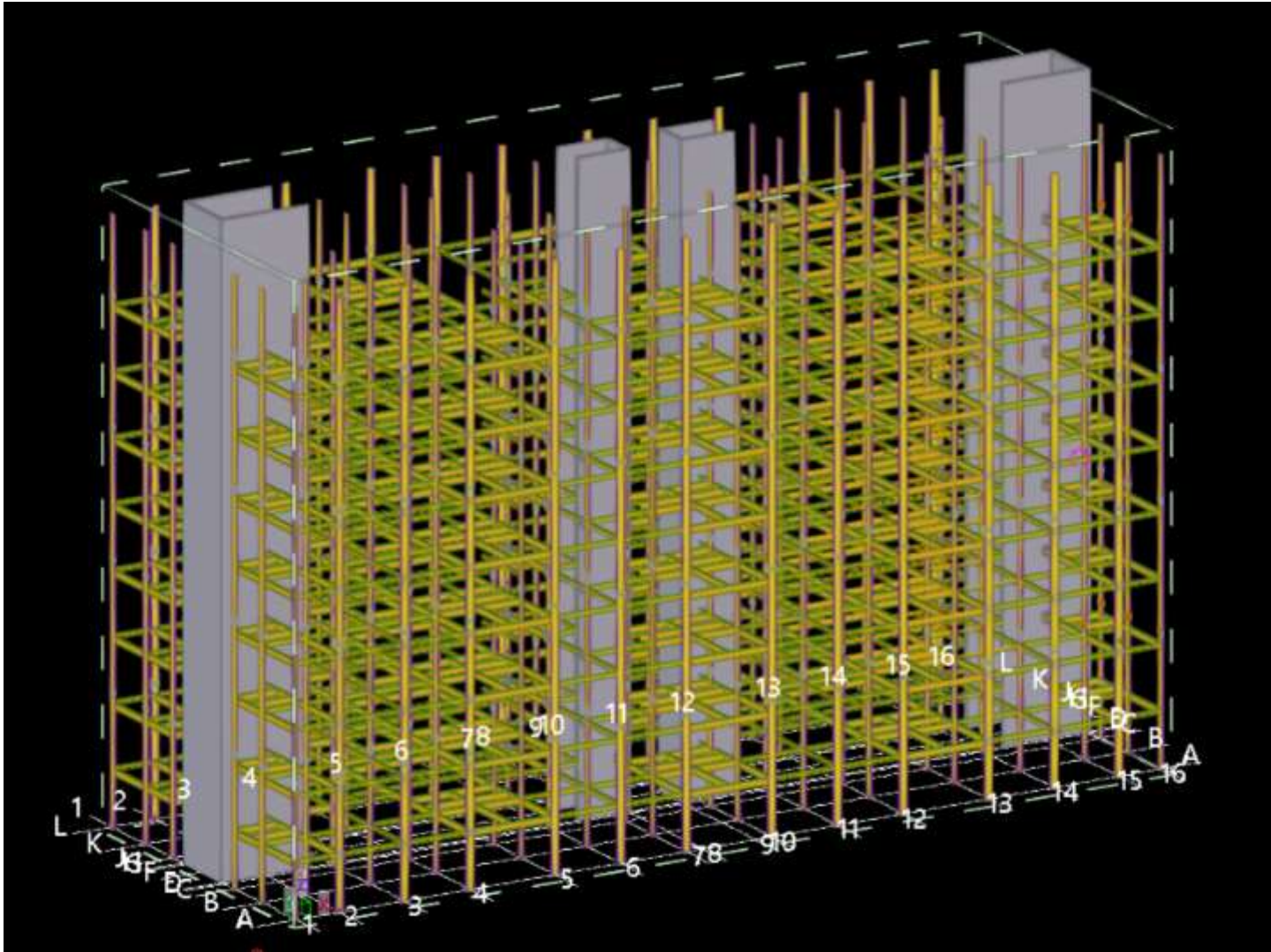
# FOUNDATION



- Plinth beam shuttering work along with reinforcement cage



# STRUCTURAL SYSTEM

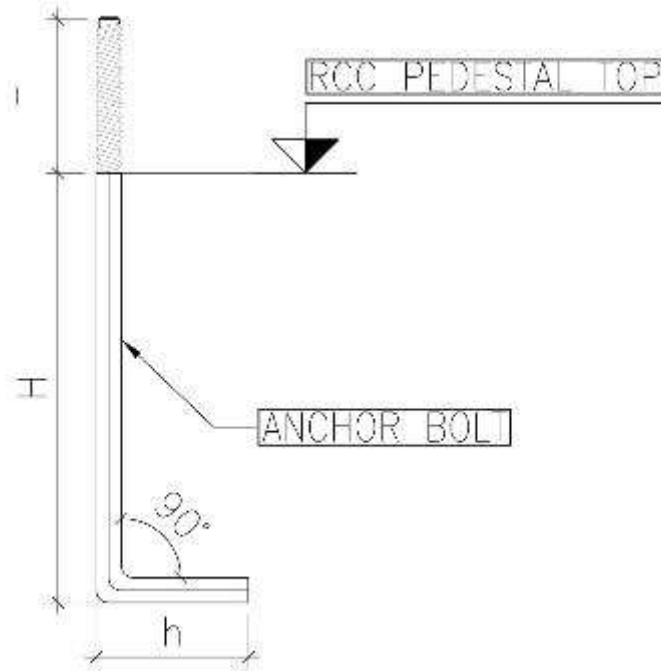


In the present lecture, the structural system and other details are being explained through drawings, sketches and text.

The work on super-structure is yet to start and actual on-ground picture will be covered subsequently.

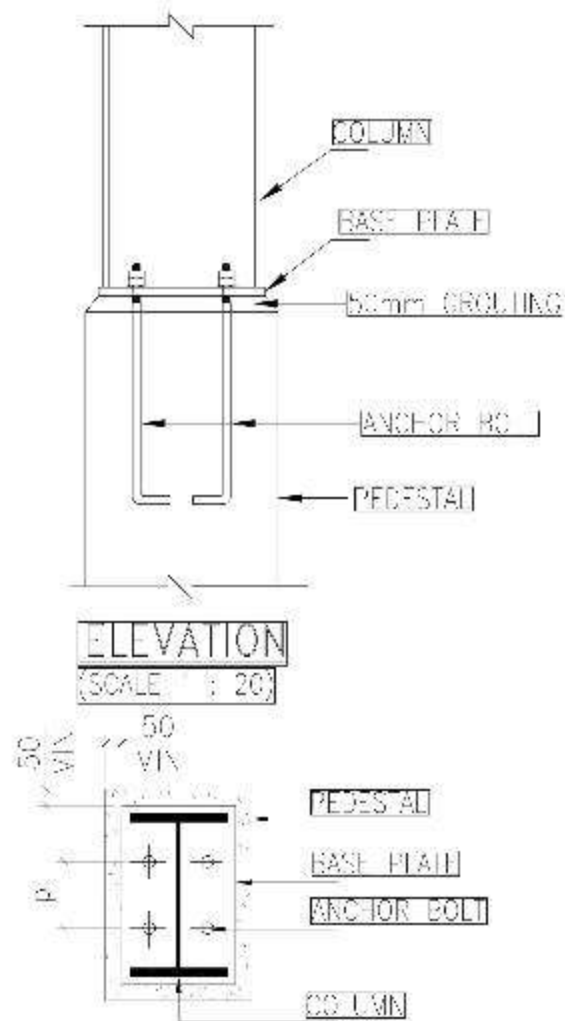
# STRUCTURAL SYSTEM

- Connection details of built up steel column at plinth level (Stilt) with foundation (plinth beam)



a) Typical anchor bolt detail

Anchor bolt is inserted below plinth level upto height H and projected above plinth up to height T



b) Typical base plate detail

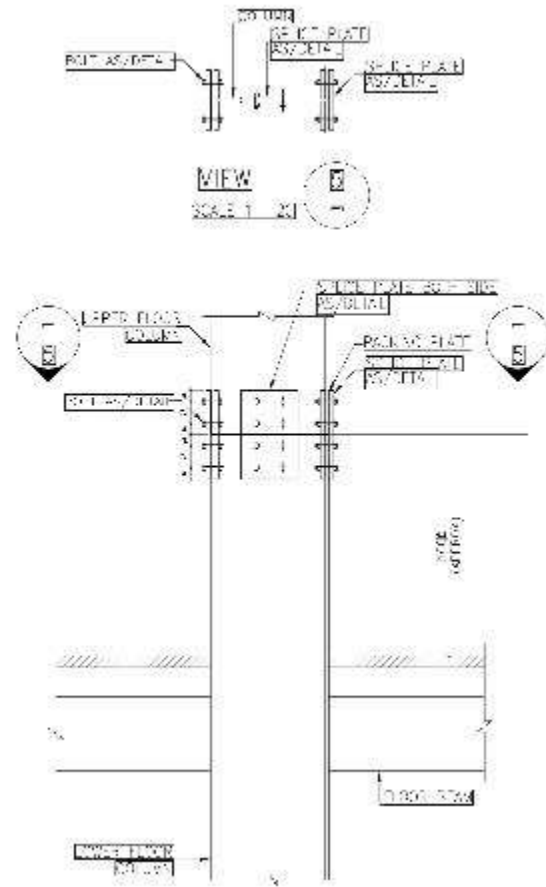
The built up steel I column is being fixed with anchor bolts and base plate

Dia (mm)	H (mm)	h (mm)	T (mm)
16	400	100	100
30	900	100	150

Anchor bolt schedule

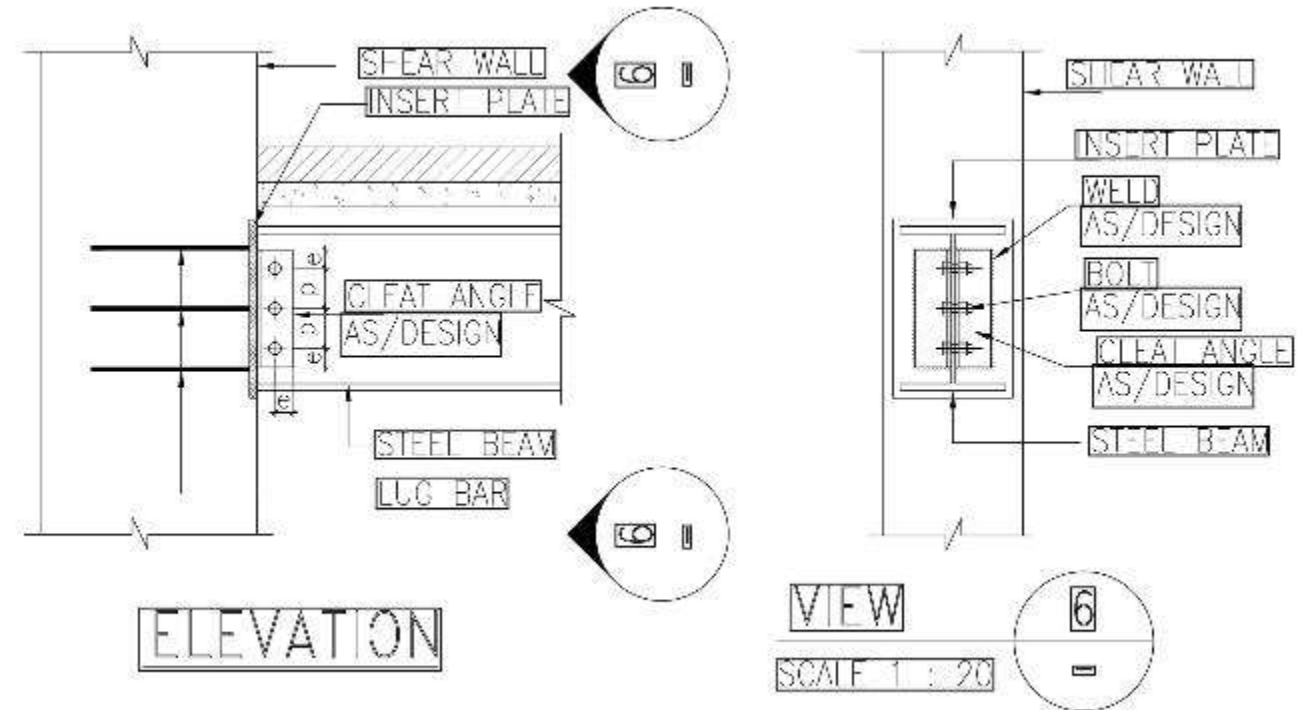
# STRUCTURAL SYSTEM

## ■ Column-Column Connections



a) Column Splice detail

Columns are being spliced through nut & bolts connection along with plates both in web and flange portion



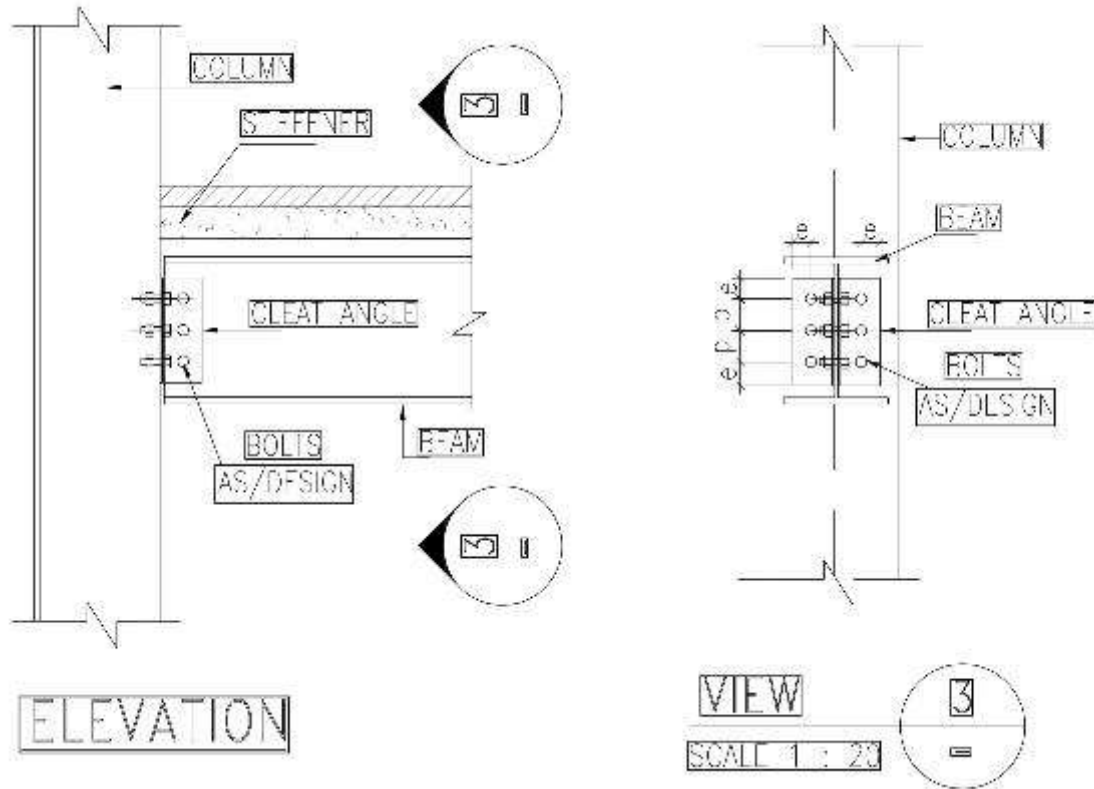
b) Shear wall to steel beam connection

Insert plate along with lug bar are cast during the casting of shear walls and steel beam is connected to the wall with bolted connection through insert plate



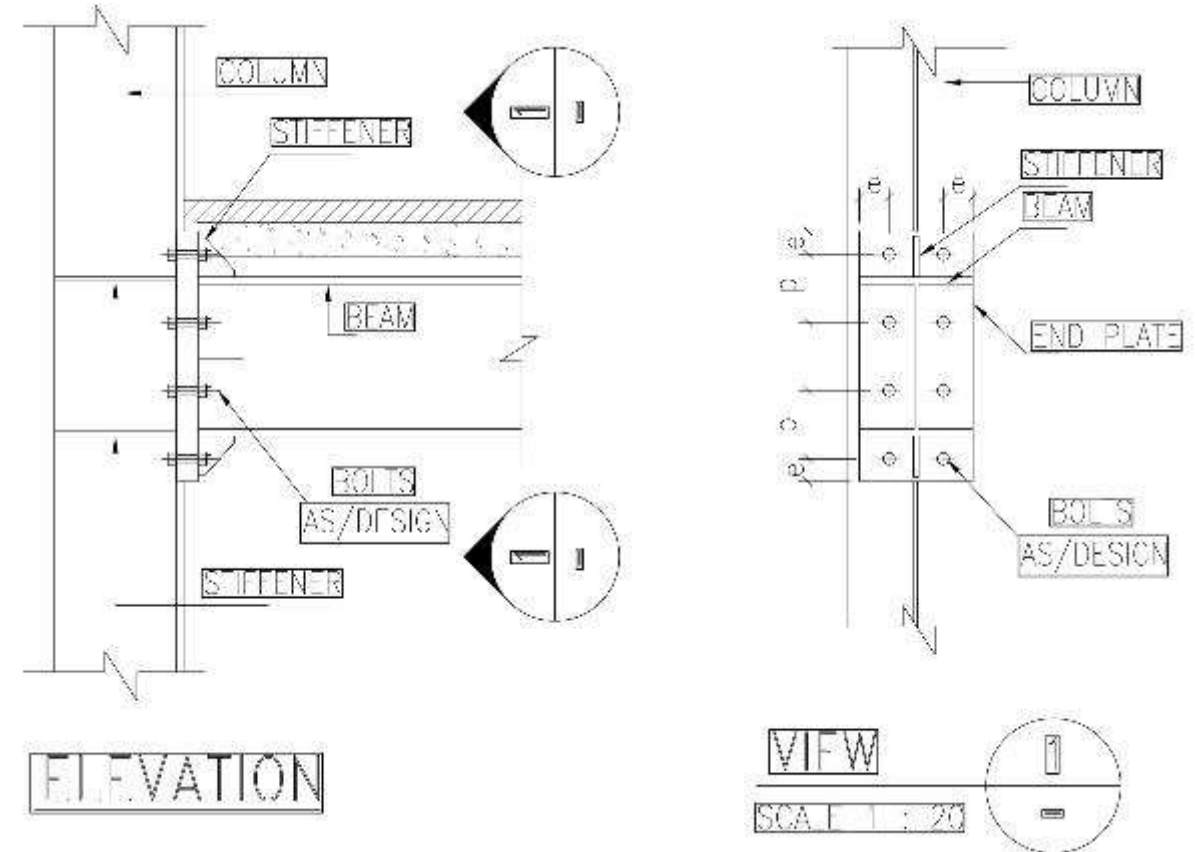
# STRUCTURAL SYSTEM

- Typical beam column shear and moment connections



a) Typical beam to column flange shear connection

Steel beam is being connected to the column through cleat angle connected to the web portion of beam



b) Typical beam to column flange moment connection

The steel beam is being connected to column through plates on flange & web portion

# STRUCTURAL SYSTEM

## Structural Steel Material Specifications & other important considerations

- Fabrication and erection of structural steel Built-up I Section shall conform to the Section 17 of IS 800-2007 & IS 7205-1974.
- Tolerance for fabrication of steel structures shall conform to IS 7215 & tolerance for erection of steel structures shall conform to IS 12843.
- All material quality, testing, surface condition, protective treatment and other specifications shall comply with section 17 of IS 800-2007, IS 2062-2011
- All rolled/plate fabricated sections/connections plates shall be of yield strength of 345 MPa confirming to IS 2062-2011.
- All connection plates and base shall be of yield strength of 345MPa confirming to IS 2062-2011.
- Anchor/holding down bolts shall be of grade 4.6 FY=250MPa, MS black steel confirming to IS 5624-1993.
- High strength bolts shall be grade 8.8 in accordance with IS 1367-part III. Hole size shall be as following :
  - For bolts upto 24mm diameter -2mm greater than the bolt diameter
  - For bolts greater than 24mm diameter -3mm greater than the bolt diameter.

# **STRUCTURAL SYSTEM**

## **Structural Steel Material Specifications & other important considerations**

- For ordinary bolts connected parts shall be firmly drawn together if there is remaining gap which may affect the integrity of the joint, it shall be taken apart and a pack inserted.
- Welding shall be sub-merged ARC welding in accordance with IS 4353-1995
- Joints shall be prepared in accordance with IS 814-2004. Precautions shall be taken to ensure cleanliness of the connection prior to welding.
- For welding purpose use electrode 7018
- The profile metal deck shall be of grade 5350
- Provide temporary bracing or guys to provide lateral support to the structures and individual element until permanent frame is completely installed.
- Fabricated components which are stored prior to being transported or erected shall be stacked clear of the ground and arranged If possible so that water cannot accumulate. They shall be kept clean and supported in such a manner as to avoid permanent distortion.

# **STRUCTURAL SYSTEM**

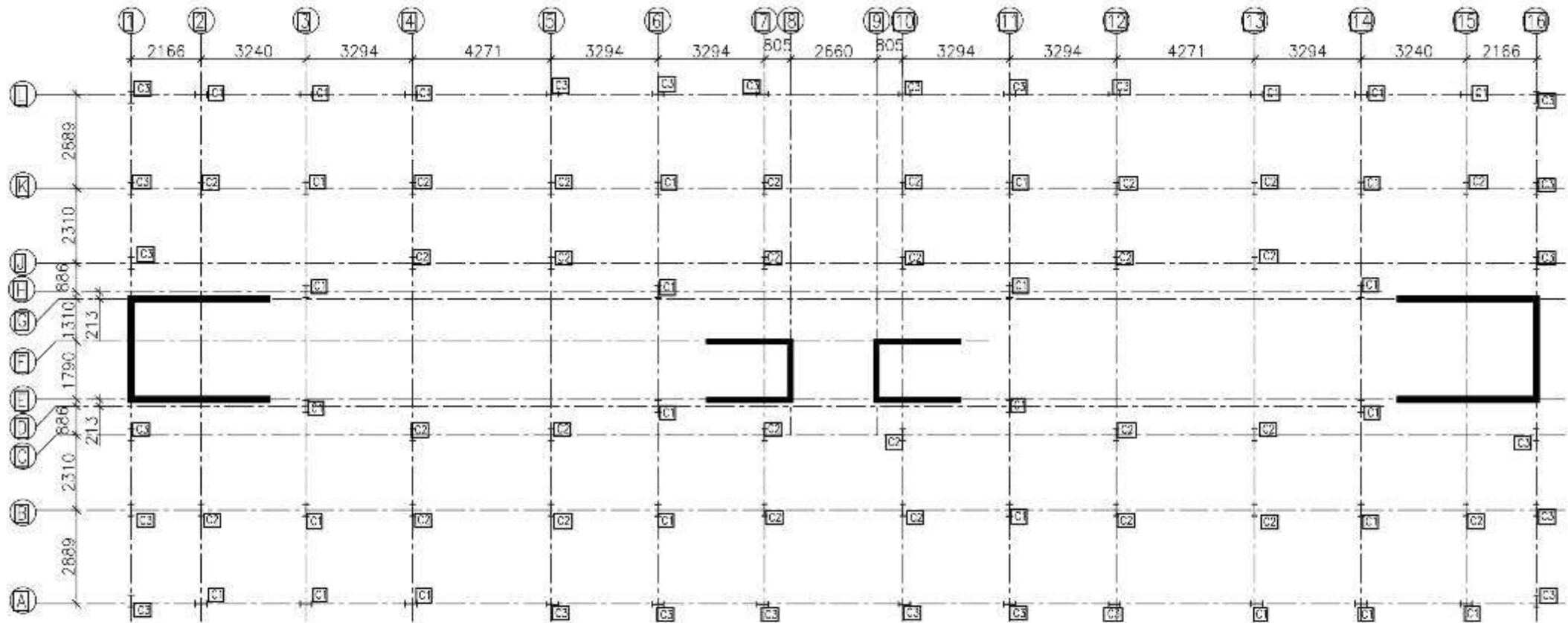
## **Structural Steel Material Specifications & other important considerations**

- Components shall be handled and stored in such a manner as to minimise the risk of surface abrasion and damage.
- Fasteners and small fittings shall be stored under cover in dry condition
- Any steel work damage during off-loading, transportation, storage or erection shall be restored to conform to the IS 7969-1975
- Grouting shall be carried out under columns plates until a sufficient portion of the structure has been aligned, level, plumbed and adequately braced.
- Immediately before grouting, the space under column base plates shall be clean and free of all extraneous matter.
- Tensioning of high strength bolt shall be done as per clause 7.2 of IS 4000-1992 using a Torque Wrench.



# STRUCTURAL SYSTEM

- Steel column layout in superstructure



STEEL COLUMN LAYOUT PLAN

STEEL COLUMN SCHEDULE

COL. MKG.	STILT TO 2ND FLOOR		2ND FLOOR TO 4TH FLOOR		4TH FLOOR TO 6TH FLOOR		6TH FLOOR TO TERMINATION	
	WEB	FLANGE	WEB	FLANGE	WEB	FLANGE	WEB	FLANGE
C1	350x10	200x18	350x10	175x16	350x8	175x16	350x8	175x16
C2	350x8	175x12	350x8	175x10	350x6	175x10	350x6	175x10
C3	350x6	175x10	350x6	175x10	350x6	175x10	350x6	175x10

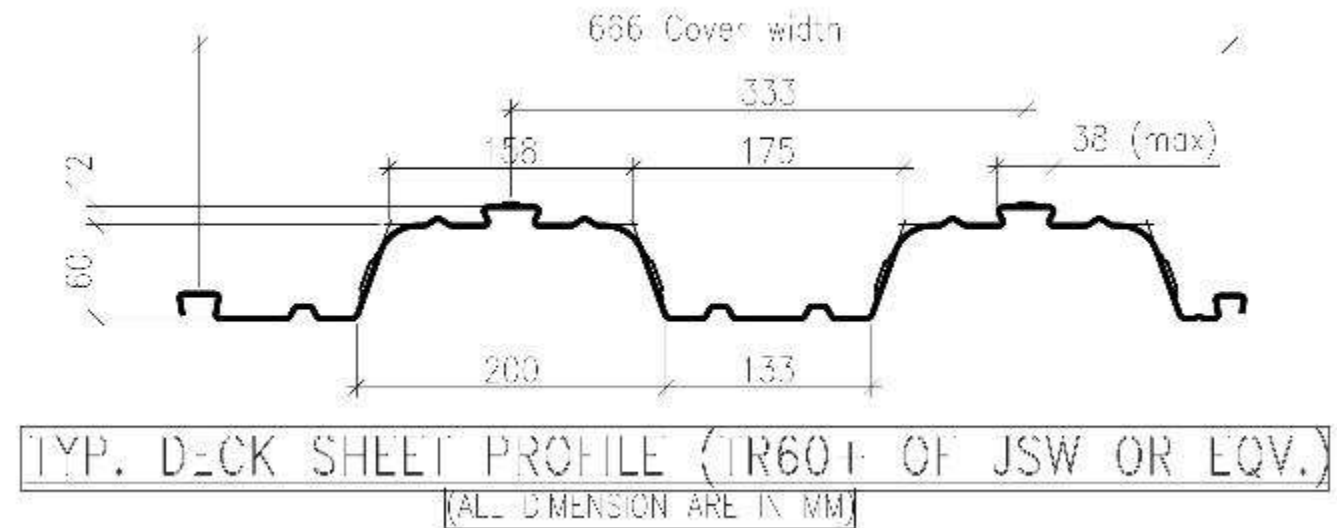


STEEL COLUMN LAYOUT PLAN

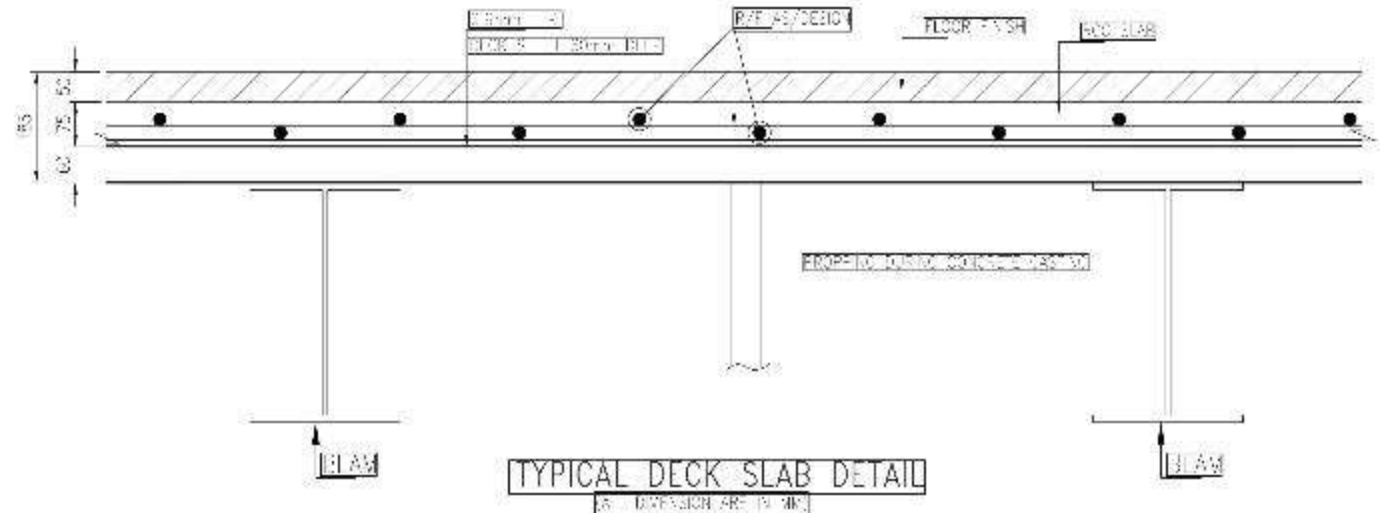
# FLOORS

## ■ Floor slab details : Deck slab

- After erection of steel beams and column (PEB Structure), steel deck sheet of thickness 0.9 mm are placed with required bearing on the beams.
- Concrete screed of 75 mm is poured on the deck sheet in M25 with reinforcement as per structural design.
- Structural design for reinforcement is as per IS 456-2000.
- Generally, nominal reinforcement is provided in concrete screed of deck slab to take care of shrinkage & cracking.

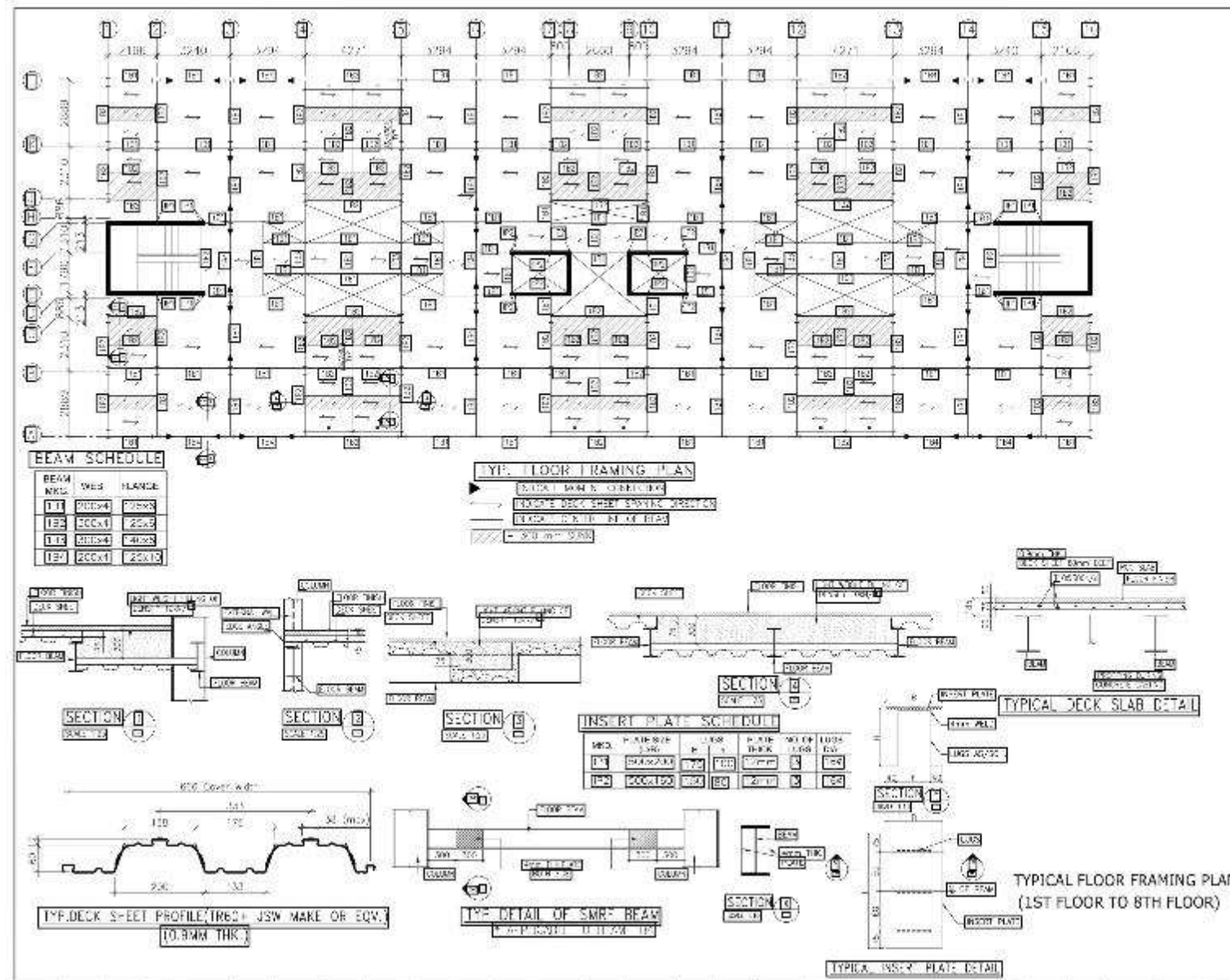


a) Typical deck sheet profile



b) typical deck slab detail

- Typical Floor Framing Plan

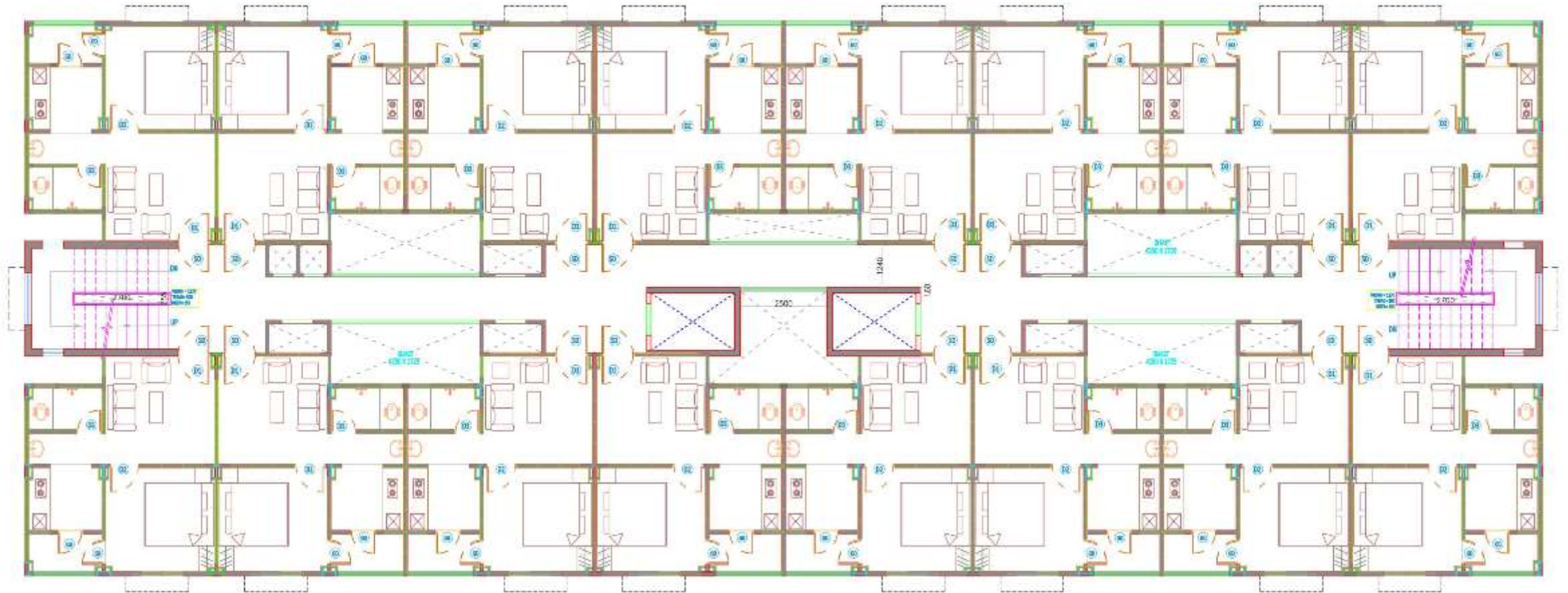




## A Typical plan of laying of panels with Steel Frame structure

# Wall Panels

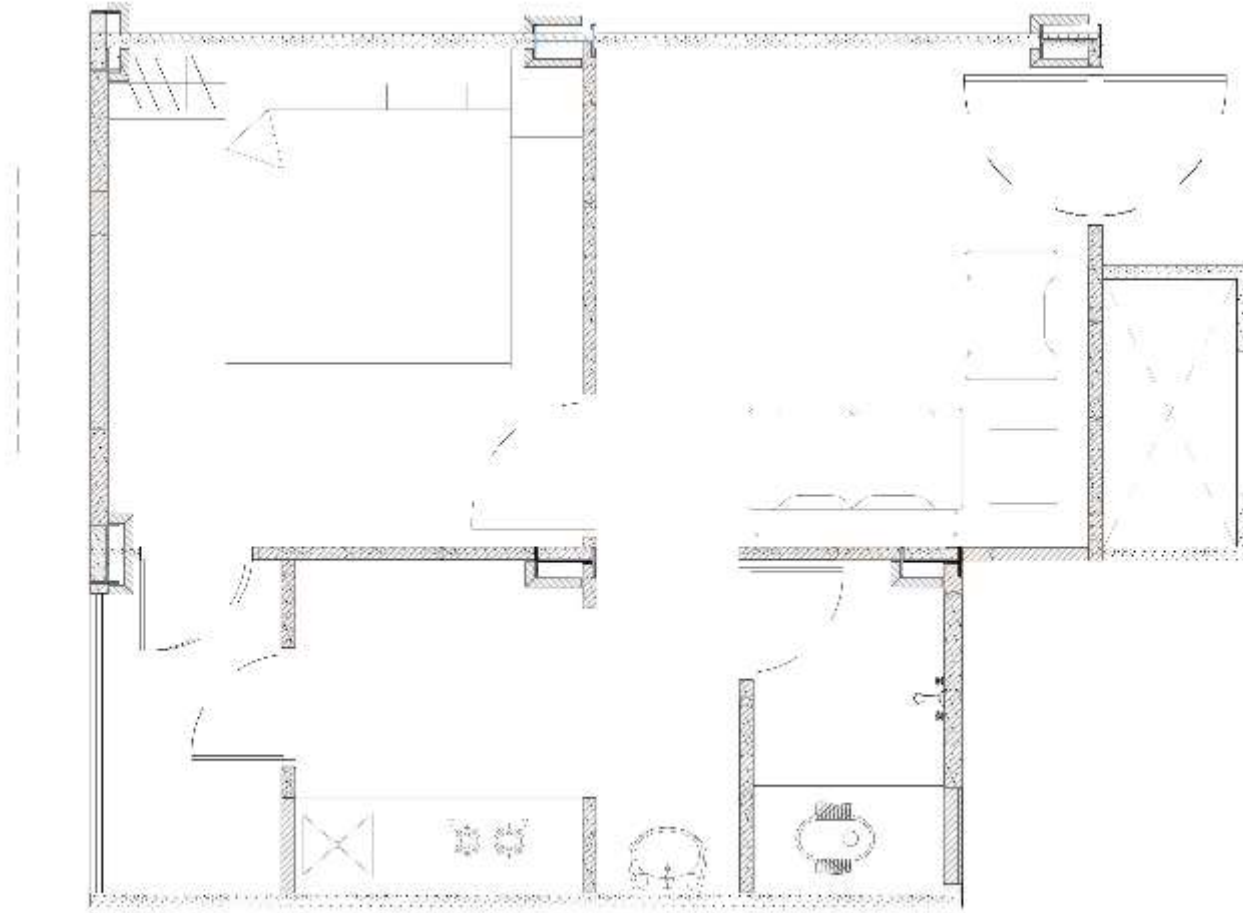
Structural integrity and monolithic behavior of wall and structural frame is achieved in this technology through dowel bars.



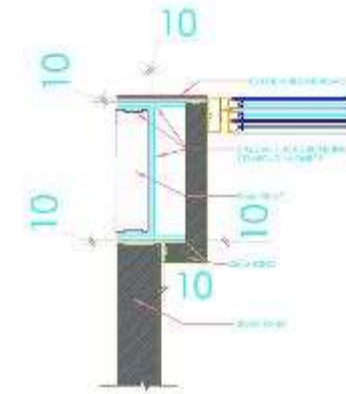
# Wall Panels

## A Typical plan of laying of panels with Steel Frame structure

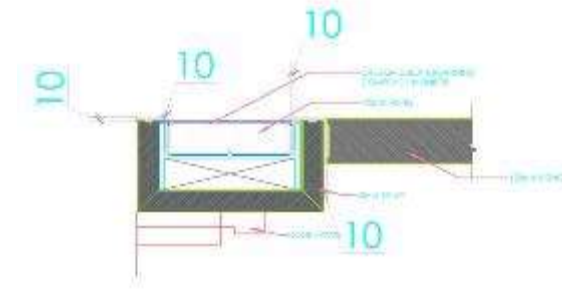
Structural integrity and monolithic behavior of wall and structural frame is achieved in this technology through dowel bars.



Corner detail



Mid Corner detail



# **WALL PANELS**

## **Construction & Installation Process with Prefabricated Sandwich Panel System in the LHP**

Construction is done in a following sequential manner:

1. Transportation of Prefabricated sandwich panels and Steel Sections as per the design to the site.
2. Erection of built up sections for structural frames on RCC foundations using cranes and connections as designed (connection details already explained)
3. Installation of decking sheets on structural frame at floor level followed by pouring of concrete screed with nominal reinforcement
4. Fixing of sandwich wall panels on floor with U channel, once the structural frame and floor is installed and aligned.
5. Erection of panels in plumb position, jointing of two panels with steel dowels at 45 degree. Fixing of panels with the steel beams and columns with the help steel dowels.
6. Filling of joints between two panels with the help of exterior grade superfine ready mix plaster.
7. Any crack fibre tape is paste on the joints with the help of putty.
8. For fixing electrical and plumbing services, grooves are made with the help of chisel , fix pipes and fittings and then filled with exterior grade superfine ready mix plaster
9. Upon installment of wall panels, flooring and ceiling, the finishing work is executed.



# Wall Panels

- Typical view of Prefabricated sandwich panels and steel frame construction



- The plumbing and electrical services are incorporated as done in conventional method of construction i.e. chasing and filling



# FINISHING ITEMS

- The finishing items include pressed steel door frame with flush shutters and PVC doors in toilets.
- uPVC frame with glazed panel and wire mesh shutter are used in windows.
- Vitrified tiles are used in flooring in rooms and kitchen.
- Anti-skid ceramic tiles are used in bath & WC.
- Kota stone flooring is used in common areas & Staircase steps.





# OTHER INFRASTRUCTURE ITEMS

- The external infrastructure includes
- Laying of Sewerage Pipe Line,
- RCC storm water drain,
- Provisions for Fire Fighting
- Bituminous Internal Road & Paver blocks for Pathway,
- Providing Lifts in building blocks,
- Landscaping of site,
- Street light with LED lights,
- Solar Street Light System,
- Sewerage Treatment Plant (STP),
- External Electrification,
- Water Supply System including underground water reservoir,
- Compound wall with Boundary Gates,
- Horticulture facilities,
- Rain Water Harvesting,
- Solid Waste Management.

- A few completed buildings with the Prefabricated sandwich Panels abroad



**PROGRESS TILL DATE**

**LHP, INDORE**





Foundation





Foundation





Casting of plinth beam





Plinth beam and shear wall casting





Erection of steel columns





Erection of steel beams





Erection of steel columns & beams





Placing of deck slab and reinforcement





Screed concrete on deck slab





Fixing of Prefabricated sandwich panels





A view of block with Prefabricated sandwich panels





Fixing of gypsum board false ceiling





A view of block with shear wall and PEB structure





View of LHP project site



Live status of LHP site can be accessed at  
<https://ghtc-india.gov.in>

**CONTACT US:**

Ministry of Housing and Urban Affairs,  
Maulana Azad Road, Nirman Bhawan,  
New Delhi - 110011

E-Mail: [ghtc-mhua@gov.in](mailto:ghtc-mhua@gov.in) /  
[ska@bmtpc.org](mailto:ska@bmtpc.org)

Call Us at: +91-11-23063266