PART D: DBR - Design Basis Report

Construction of 134 Residential Flats(2 Towers), DMD Bungalow, Office Building and Club house for SBI Enclave, Lingampally Post, Hyderabad in EPC Mode

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Executive Summary

The *" Construction of 134 Residential Flats, 1 DMD Bungalow and Office for SBI Enclave, at Lingampally post, Gachibowli, Hyderabad"* is conceived as a modern, sustainable campus spread across 4.7 acres. The master plan seamlessly integrates residential and institutional components within a thoughtfully designed and vibrant environment. Guided by a vision to provide a high-quality living and working ecosystem for SBI employees, the development prioritizes community engagement, environmental sustainability, and architectural excellence.

The project encompassing a total built-up area of **90,593 square meters. The Site** features a dynamic mix of iconic high-rise structures, including:

- The residential tower of up to **B+S+27 storeys** housing DGM flats,
- The residential tower of **B+S + 21 storeys** for GM and CGM flats,
- **2B+S+20-storey office building** (**Sub-structure designed for 30 floors)** for the AO Cyberabad & LHO Hyderabad, AML CFT, PRM Cell & SBI Internal Audit Department
- An exclusive **bungalow for the Deputy Managing Director**, and
- A **clubhouse**, complemented by expansive landscaped green spaces.
- Extensive **landscaped areas** designed for Jogging track, Amphitheatre and community recreation.

This site is supported by a robust infrastructure framework that includes **double basement parking** and a **stilt floor**, ensuring efficient and seamless movement for both vehicles and pedestrians. The planning emphasizes functionality, comfort, and a strong connection to the natural environment. The master plan is organized around a clear spatial hierarchy that enhances **functionality, privacy, and accessibility**, fostering a cohesive and vibrant living environment for the SBI community. All buildings within the development shall be designed to meet the standards of the **IGBC platinum rating and Net Zero Energy Building,** ensuring the highest standards of environmental performance and sustainability.

The design strategy is firmly anchored in *climate-responsive* architecture and *context-sensitive* urbanism. The orientation, massing, and facade articulation of buildings are meticulously calibrated to enhance natural ventilation and daylight access, while effectively minimizing thermal gain. Architectural elements such as vertical fins and solar-shading devices not only establish a distinctive visual language but also function as passive cooling mechanisms—reinforcing the project's deep commitment to sustainable design principles. Utility and service provisions are seamlessly integrated into the overall development. The design includes comprehensive systems for power distribution, water supply, rainwater harvesting, sewage treatment, fire safety, and waste management, ensuring a high degree of operational resilience and self-sufficiency. Critical infrastructure such as basement layouts, circulation networks, emergency access routes, and service cores are carefully coordinated to ensure efficiency, safety, and uninterrupted functionality. Central courtyards, green buffers, and distributed pocket parks are strategically placed to soften the built form and foster social interaction.

The overall architectural language embodies modern elegance, characterized by clean vertical lines, articulated massing, and a refined, neutral material palette. Design innovations such as **double-height recreational decks**, and **terrace greens** not only enhance visual interest but also underscore the project's aspirational and contemporary identity. Monolithic/Shear wall system shall be implemented for the structural works of the residential towers to ensure enhanced construction speed, uniformity, and surface finish.

Upon completion, the development is poised to become a catalytic urban intervention, significantly enriching the liveability, connectivity, and character of the Gachibowli neighbourhood. By setting a new benchmark for integrated residential and institutional environments, the project will contribute

meaningfully to Hyderabad's evolving architectural narrative—offering State Bank of India a resilient, prestigious, and future-ready campus that reflects its institutional values and long-term vision.

1 CHAPTER 1: Project Overview

1.1 Introduction

The Architectural Design Basis `Report (DBR) articulates the conceptual vision, planning strategies, and technical parameters that inform and shape the project's-built environment. Serving as a comprehensive roadmap, the report encapsulates a deep understanding of the client's objectives, site context, and broader urban development imperatives, establishing a coherent framework to guide all subsequent phases of design and construction.

The State Bank of India's Local Head Office (LHO) Hyderabad envisioned a resilient, future-ready campus that seamlessly integrates high-quality residential accommodation for officers across various hierarchies with a state-of-the-art institutional office facility. Core requirements articulated by the client include:

- **134 residential units** strategically distributed across personnel grades,
- **Dedicated office spaces** designed for institutional efficiency,
- **Recreational and community amenities**,
- A **comprehensive service infrastructure**, and
- A built environment that fosters **community interaction**, **privacy**, and **operational excellence**.

The design methodology presented in the DBR is grounded in a thorough evaluation of key parameters, including **site topography**, **climatic conditions**, **urban connectivity**, **regulatory guidelines**, and **user-centric functionality**. The report covers:

- **Site analysis and contextual appreciation**,
- **Regulatory compliance**, including building height, zoning, and parking norms,
- **Master planning** and spatial organization,
- Detailed descriptions of individual **project components**,
- **Circulation and access strategies**, and
- Integrated **sustainability measures**.

Each section is structured to move from macro-level planning to micro-level detailing, ensuring that the architectural vision is rigorously aligned with structural, mechanical, electrical, plumbing, and life-safety systems. The overarching design philosophy is holistic, climate-responsive, and user-focused—aiming to deliver a cohesive, sustainable, and high-performance campus. The project aspires not only to meet the immediate functional needs of the SBI community but also to set a new benchmark in institutional and residential architecture within the context of Hyderabad's rapidly evolving urban fabric.

1.2 Site appreciation and analysis

1.2.1 Location

Hyderabad, the capital city of Telangana, is a prominent urban centre in southern India, renowned for its historical significance, cultural heritage, and rapid urban growth driven by the IT and service industries. The project site lies within the **Greater Hyderabad Municipal Corporation**, which encompasses the core city as well as its surrounding suburban and peripheral areas, offering excellent connectivity and access to key infrastructure and amenities. This makes it an ideal location for residential development aimed at providing modern, comfortable living spaces within a well-connected urban environment. As per the 2011 census, the Hyderabad Metropolitan Region had a

population exceeding 7.7 million, underlining the city's importance as a major residential and commercial destination in India.

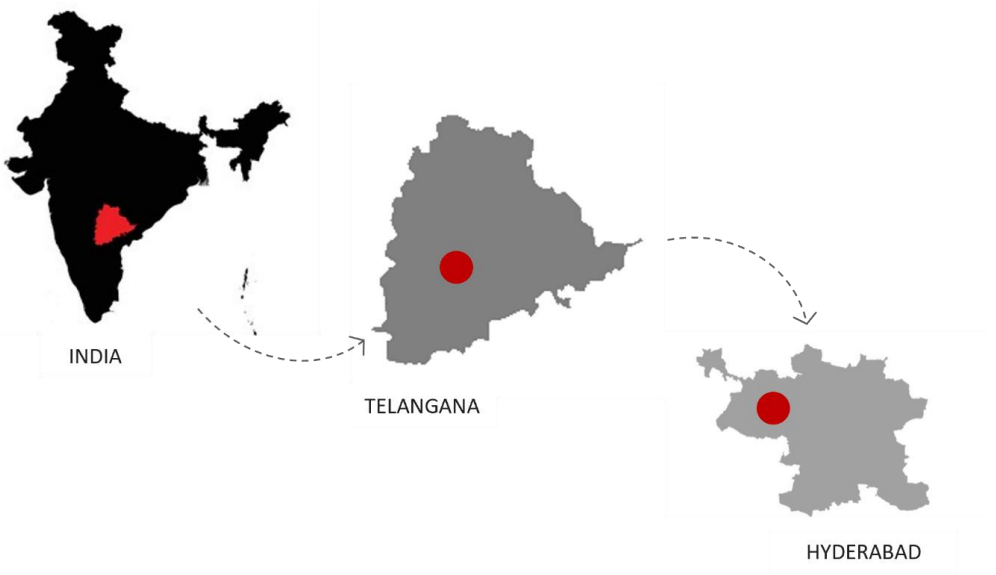


Figure 1 Location map

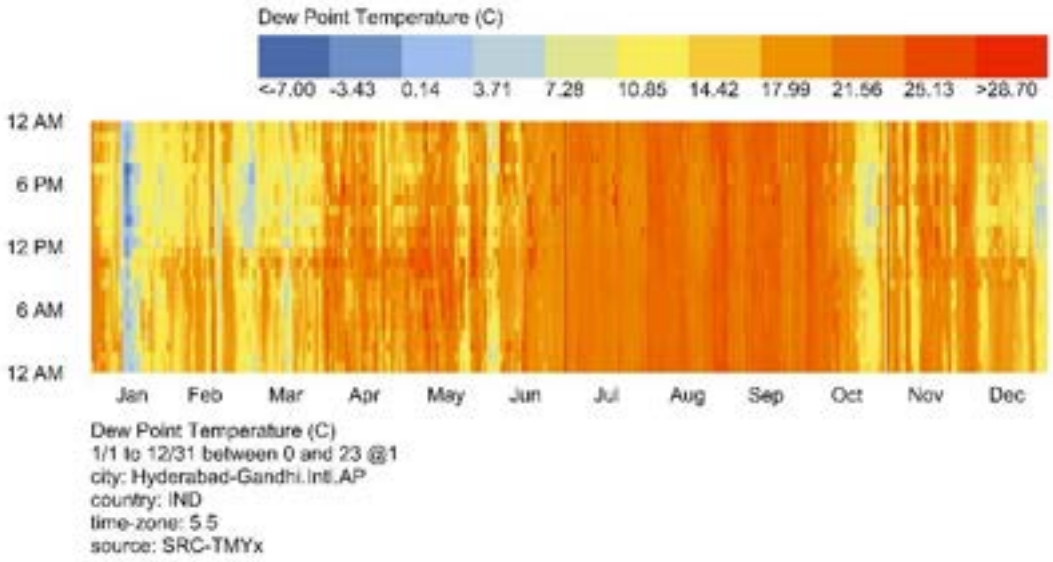
1.2.2 Topography of Hyderabad

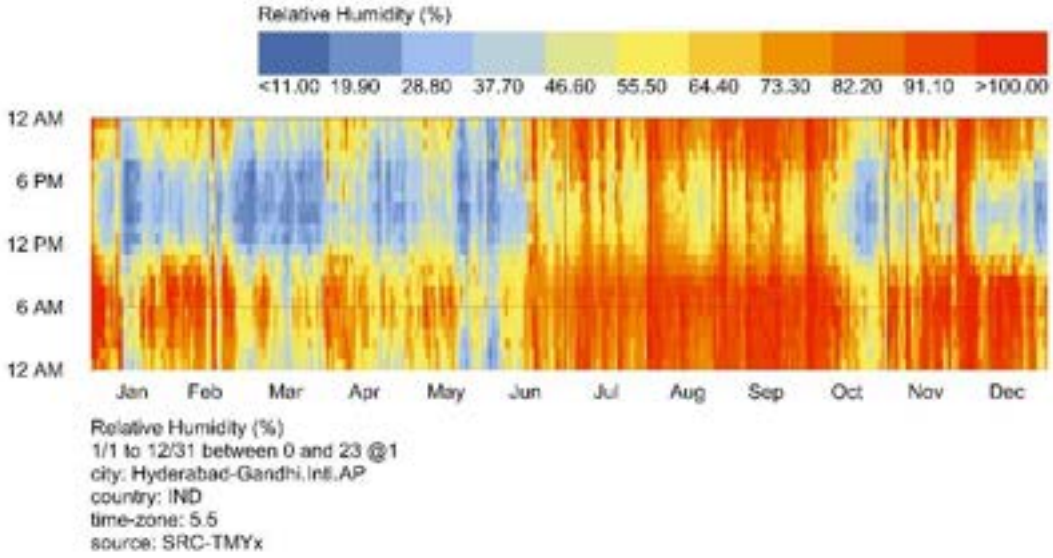
Hyderabad is in southern India on the Deccan Plateau at 17.38°N 78.48°E, with an average elevation of 542 m (1,778 ft) above sea level. The surface geology consists of ancient Archaean granite and gneiss formations, offering high structural stability for foundation systems. The soil profile is largely sandy loam with occasional weathered rock, facilitating moderate infiltration and natural drainage. The region falls under the jurisdiction of the Greater Hyderabad Municipal Corporation (GHMC). It is classified as Seismic Zone II under BIS IS 1893:2016, indicating low seismic hazard, but is prone to urban flooding, particularly during heavy monsoon rains due to poor drainage and loss of natural water channels.

1.2.3 Climate of Hyderabad

- **Temperature**: Hyderabad experiences a semi-arid climate marked by high temperatures, low to moderate humidity outside the monsoon, and a distinct wet season. Analysis based on data from SRC-TMYx (Hyderabad-Gandhi International Airport) reveals the following:
  - **Dry Bulb Temperature:** Ranges from below 13°C in winter (Dec–Jan) to over 42°C during peak summer (April–May). The period from March to June sees prolonged high temperatures above 35°C, indicating significant cooling requirements.
  - **Relative Humidity**: Varies sharply throughout the year—from as low as 11% in summer to over 90% during the monsoon (July–September). The transitional months show rapid changes in humidity levels.
  - **Dew Point Temperature**: Follows the humidity pattern, with values below 0°C in winter and peaking above 25°C during the monsoon. This highlights substantial seasonal moisture fluctuations.

This data underscores the need for adaptive building design in Hyderabad that addresses high summer heat, variable humidity, and seasonal transitions to ensure occupant comfort and energy efficiency.





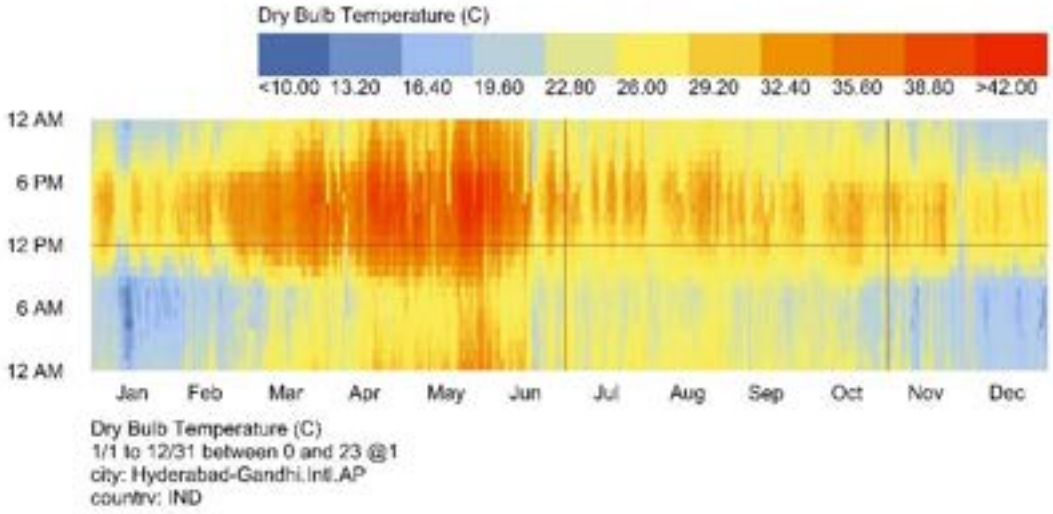


Figure 2 Temperature & Relative Humidity

Signature of the Bidder with Seal

- **Wind rose**: The wind rose analysis for Hyderabad shows that winds predominantly come from the west and northwest for most of the year, shifting to the southwest during the monsoon (June–September). Stronger winds (above 5 m/s) are observed during monsoon months, while calmer conditions prevail in winter (December–February). Wind speeds mostly range between 1 to 5 m/s. These patterns suggest that buildings should be oriented to capture southwest and westerly breezes for natural ventilation. Shading and wind protection are essential during monsoon and hot seasons to balance comfort and weather exposure.

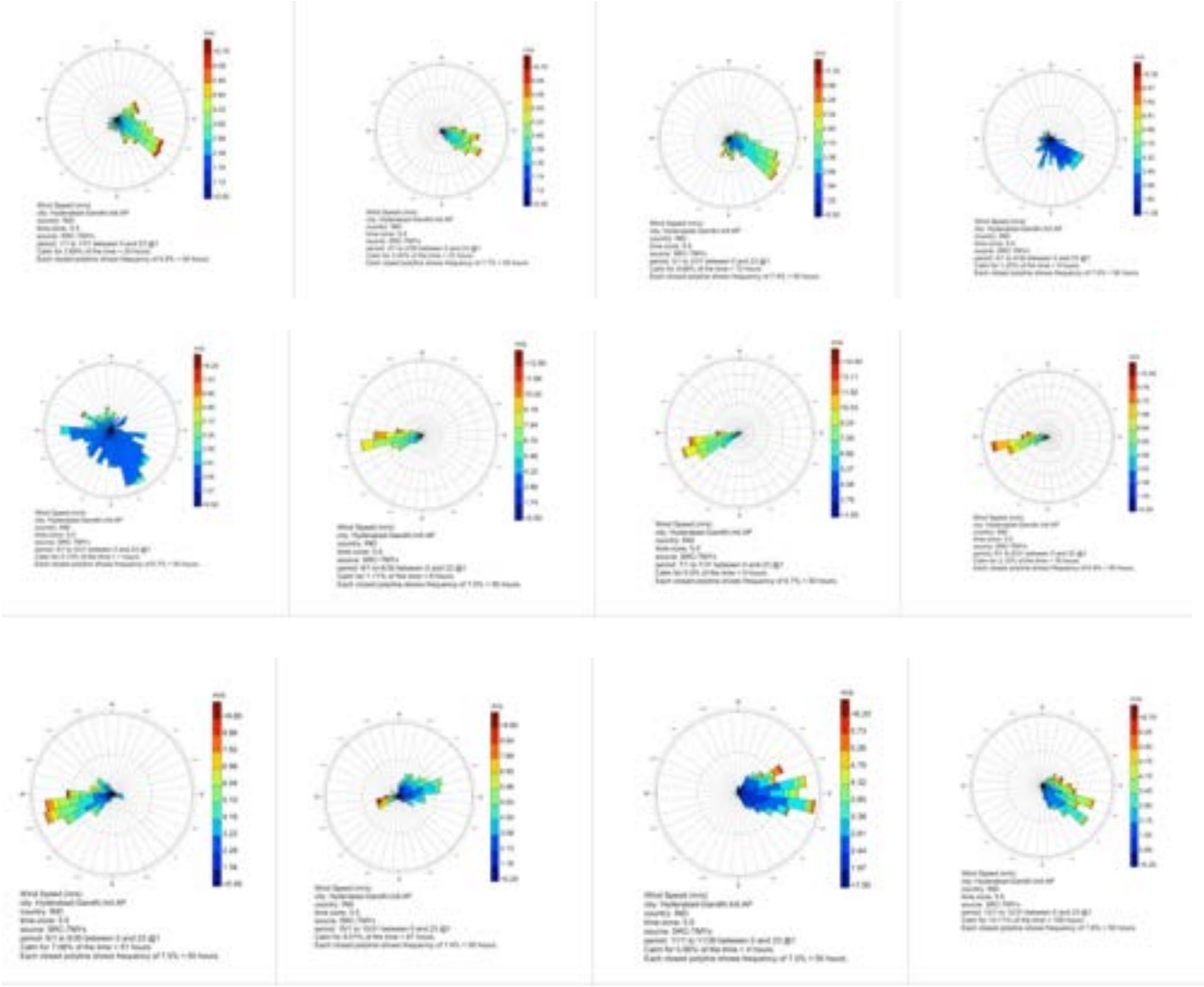


Figure 3 Wind rose

1.2.4 Proposed Site:

The proposed project site is located within the SBI Enclave in Gachibowli, Hyderabad, Telangana. Geographically, the site is positioned at coordinates **17°27'43.5"N latitude and 78°20'15.2"E longitude**. It lies within the administrative boundaries of the Gachibowli region, a prominent and rapidly developing hub of the Information Technology Investment Region (ITIR). Strategically situated along the northern edge of Gachibowli, the site enjoys proximity to major urban amenities and institutional landmarks. The site benefits from the well-developed social and physical infrastructure of the Gachibowli region, a recognized IT and commercial district of Hyderabad. The site is directly accessible from the main road network and is in close vicinity to:

- University of Hyderabad, located southwest of the site and known for its expansive green campus and academic prominence.

- Gachibowli Stadium, a multi-purpose sports complex that anchors recreational and sports activities in the area.

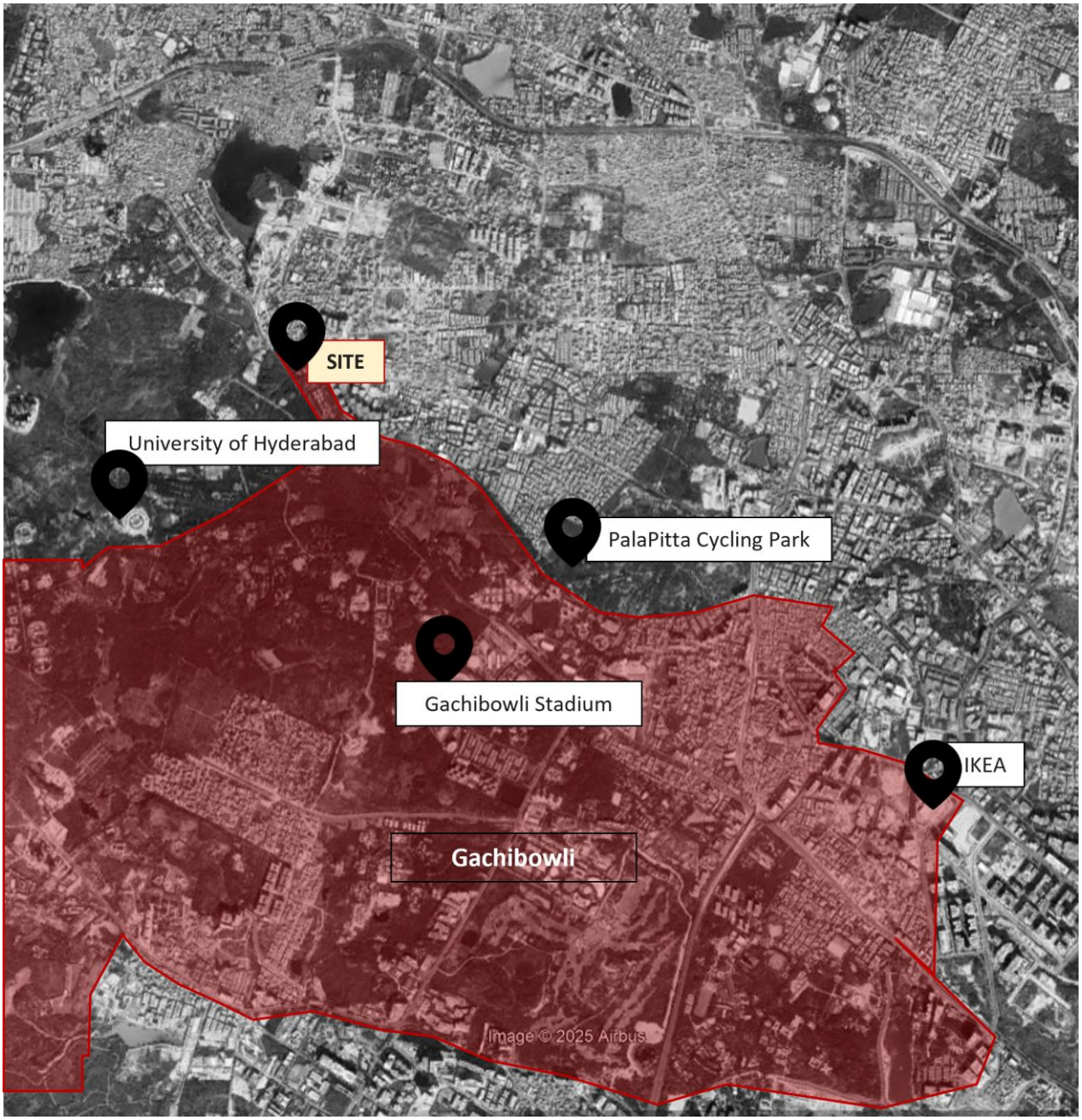


Figure 4 Neighborhood context

1.2.5 Connectivity & Circulation

The proposed residential project enjoys excellent connectivity due to its strategic location near Gachibowli, Hyderabad, along the Old Mumbai Highway. In terms of air travel, the site is approximately 19.7 km from Begumpet Airport and 28.9 km from Rajiv Gandhi International Airport, Shamshabad. For rail connectivity, the site is well-connected with Lingampalli Railway Station located just 4 km away, offering easy access to local and regional train services. Secunderabad Railway Station, one of the major rail hubs in the city, is situated at a distance of 22.7 km from the site. In terms of metro accessibility, the Raidurgam Metro Station is located approximately 7.4 km from the project site, providing an efficient and rapid transit option for daily commuting and intercity travel.

Terminals	Distance (kms)
Rajiv Gandhi International Airport	28.9
Begumpet Airport	21.5
Lingampalli Railway Station	4
Secunderabad Railway Station	22.7
Raidurgam Metro station	7.4

Table 1 Major Terminals distance from the site

1.2.6 Neighborhood Context:

The SBI Campus in Gachibowli is strategically located in a rapidly urbanizing and highly sought-after neighborhood in Hyderabad. Surrounded by several high-rise residential and commercial developments, the area has emerged as a prominent hub for both residential living and institutional infrastructure. Within close proximity to the campus are major residential complexes such as

- SMR Vinay Iconia (3B+35 floors),
- Aparna Luxor Park (B+22 floors),
- Sumadhura Horizon (2B+S+18 floors),
- Aparna Serene Park (B+20 floors)
- The Regent by Auro Realty (3B+39)

These premium high-rise projects indicate a dense and vertically growing urban fabric, catering to professionals and families working in the IT and financial sectors of the city.

Figure 5 Residential townships in the neighborhood

1.2.7 Environmental & Social Aspects

- The western side of the site is largely covered by green land—offering potential views and environmental buffering.
- The proximity to premier institutions like the University of Hyderabad and Epistemo Vikas Leadership School ensures quality educational access for residents. Nearby sports facilities, including cricket academies and the G.M.C. Balayogi Stadium, promote an active and balanced lifestyle, enhancing the overall appeal of the proposed development.
- The residential zones to the east are dense and well-developed, suggesting a mature urban neighborhood with access to services, schools, retail, and healthcare.

1.2.8 Development Potential

- The surrounding area is rapidly urbanizing, with a mix of ongoing and completed high-rise developments.
- Proximity to IT parks, financial hubs, and ORR (Outer Ring Road) ensures high demand and ease of commuting.

The SBI Complex in Gachibowli is poised for strategic expansion with two dedicated sites earmarked for **new development**. These developments aim to balance residential, administrative, and recreational needs of SBI employees while enhancing the overall campus environment.

1.2.9 Proposed Site in SBI Enclave

Within the **45-acre SBI Enclave**, the proposed **4.7-acre site** is situated in the eastern corner of the site, is envisioned as a mixed-use institutional enclave, featuring high-rise residential towers for senior staff, including Deputy General Manager (DGM) flats, General Manager (GM) and Chief General Manager (CGM) flats, an exclusive bungalow for the Deputy Managing Director (DMD), a modern office building to support administrative and operational functions, and a clubhouse offering a range of amenities. Designed to promote convenience and a sense of community, this development provides contemporary living spaces for SBI employees and their families within walking distance of their workplace. The residential towers are oriented to capture panoramic views and are surrounded by green open spaces, contributing to an enhanced quality of life. The road widening of the Old Mumbai Highway, designated as a 45-meter-wide road, is currently underway adjacent to the site. The entire widening activity falls within the boundary of the SBI Enclave property.

Figure 6 SBI Enclave

Signature of the Bidder with Seal

Figure 7 Image showing Site Boundary and the Road widening

Two approach roads are to be developed within the IAD campus. Each road shall be 9 meters wide and will provide direct connectivity from the main road to the proposed project site. The design and construction of these roads shall comply with relevant standards and local authority guidelines. **The EPC contractor shall ensure proper integration with the existing campus infrastructure, including provisions for drainage, utility crossings, and the construction of the compound wall in IAD campus.** External Boundary Wall work at proposed site (4.7 Acres) and IAD campus abutting at the south of the site with Main Gates & Security Cabins (only for 3 Entry/Exits earmarked on Masjid Bunda Road). The redevelopment of two existing internal roads/driveways (total 200m long) connecting the project site (4.7 Acres) to the Old Mumbai Highway at the south via the existing IAD campus is also part of this tender scope to be executed by the EPC contractor.

Figure 8 Map showing proposed two roads to the site

Figure 9 Site plan with two proposed roads

Signature of the Bidder with Seal

1.2.10 Demolition of AO Cyberabad:

The existing AO Cyberabad building situated within the boundaries of the proposed project site shall be demolished in its entirety. This demolition is essential to clear the area for the construction of the new proposed building. The EPC contractor shall be responsible for obtaining necessary permissions from local authorities, ensuring safe disconnection of all utilities, and executing the demolition in accordance with applicable safety standards, environmental regulations, and guidelines prescribed by statutory bodies. All demolition debris shall be carefully handled, segregated, and either disposed of in approved landfills or processed for reuse/recycling as per waste management norms.

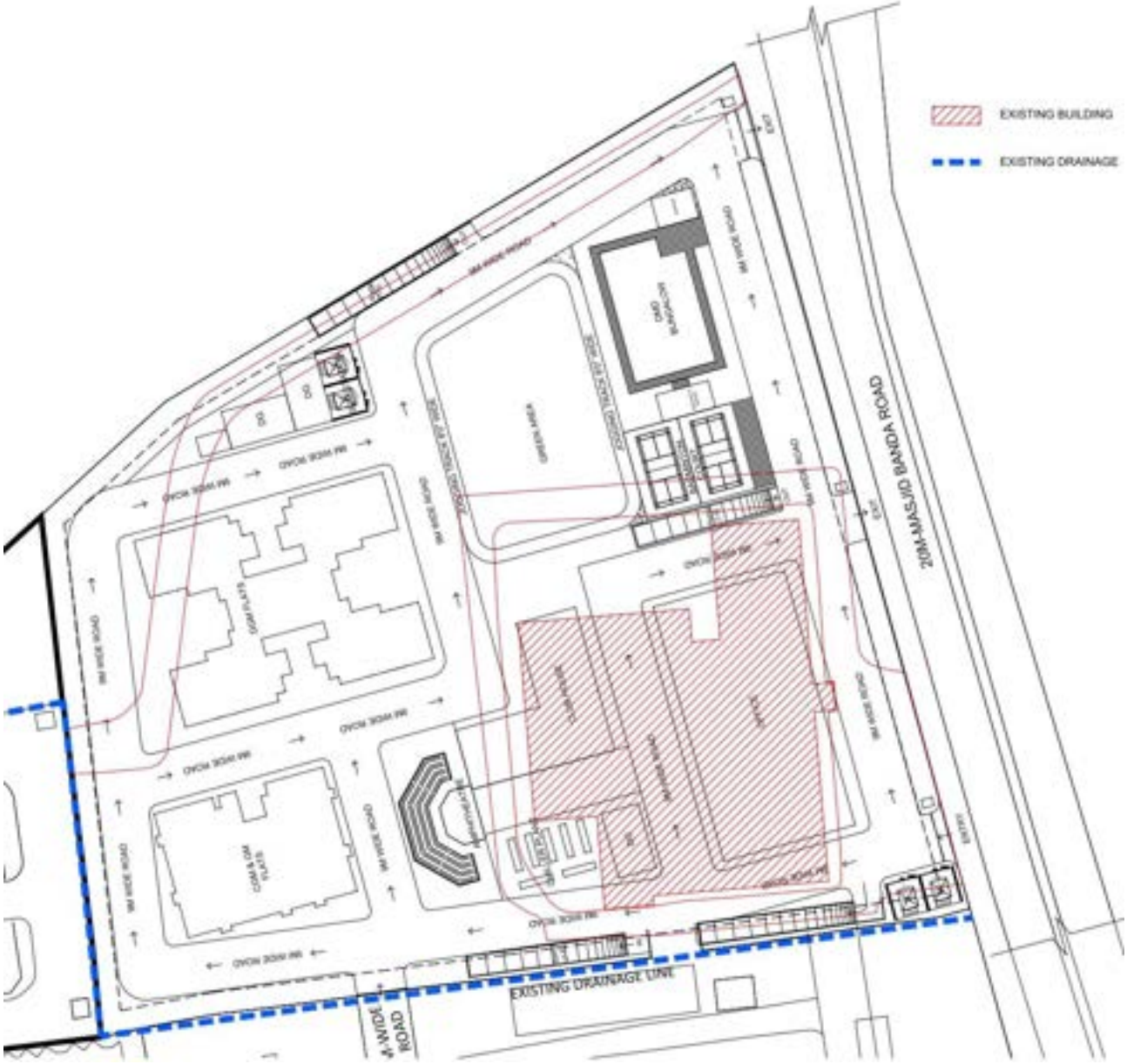


Figure 10 Site plan showing Existing building and drainage

2 STATUTORY REGULATIONS:

2.1 Height Restrictions

2.1.1 Indian Air Force, IAF:

As per the **Colour Coded Zoning Map** issued for Begumpet/Shamshabad Airport by the Indian Air Force, the proposed site is located within the Orange Zone, as indicated in the map. This zoning classification outlines the permissible top elevations for buildings and structures within this airspace corridor. The Site is marked on the map with an AMSL of 592 meters. The permissible top elevation for that zone is 675 meters AMSL, allowing a maximum building height of 83 meters.

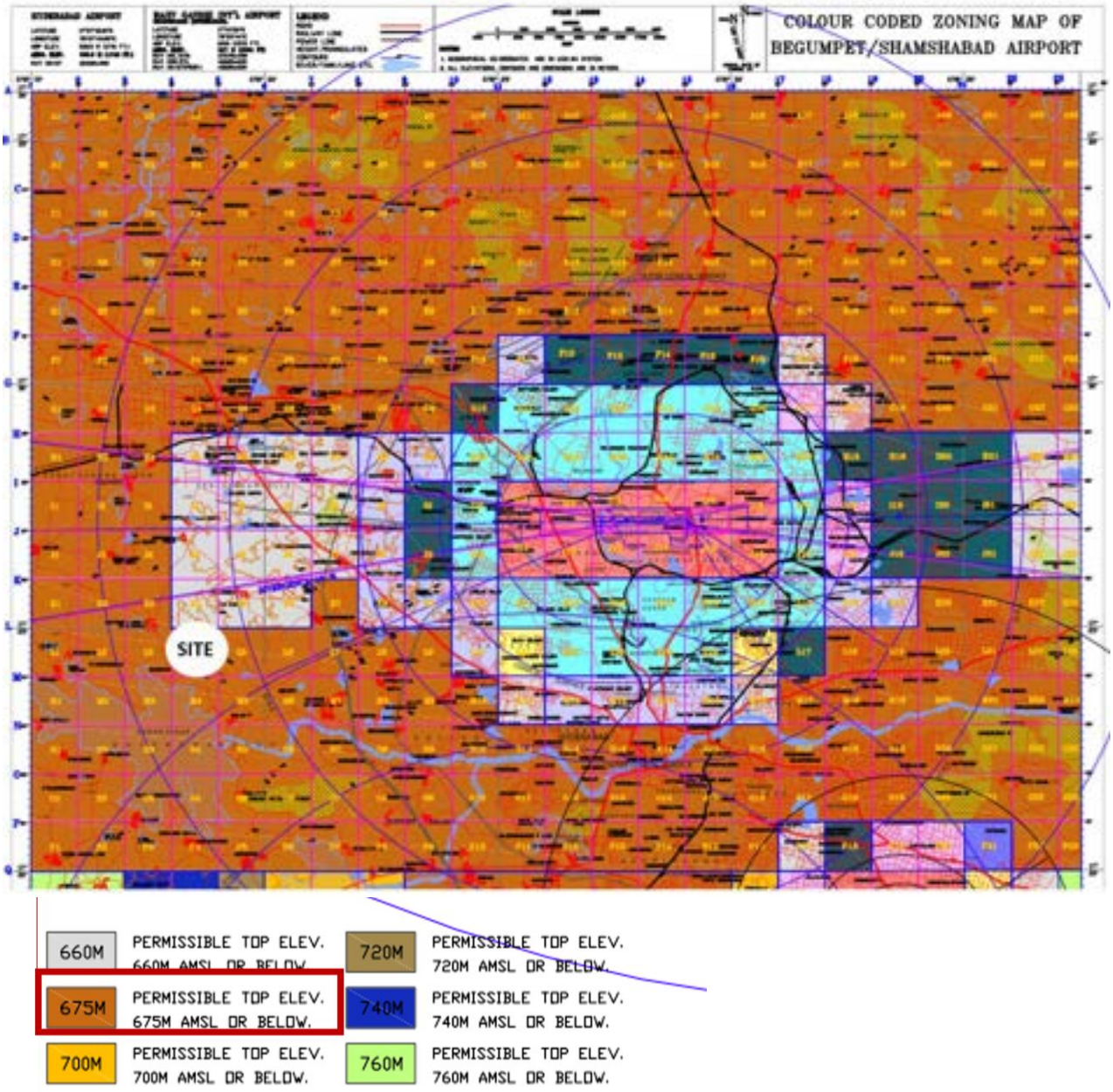


Figure 11 Permissible Top Elevation as per IAF Color coded map

2.1.2 Airport Authority of India – AAI:

As per the **Airports Authority of India (AAI) NOCAS** which streamline and manage applications for height clearances of buildings and structures near airports and air navigation routes across India. As per the site coordinates input provided on the AAI, the elevation details are as follow:

- Approximate Permissible Top Elevation: 680.7 meters AMSL (Above Mean Sea Level)
- Site Elevation (AMSL): 592 meters

Based on these values, the maximum permissible building height at the site is:
680.7 m – 592 m = 88.7 meters. The proposed building heights fall within the permissible limit of 88.7 meters. It will be the responsibility of the selected EPC contractor to cross-verify and ensure compliance with the applicable height restrictions by obtaining confirmation from NOCAS

Figure 12 Permissible top elevation as per AAI

2.2 Telangana Building bye laws:

2.2.1 Parking Requirements:

The parking standards have been derived from the Hyderabad Building Bye-laws, allocating 33% for residential areas and 43% for office spaces. Of this, 3% is designated specifically for visitor parking.

(m)Road requirements:

- 9m to 18m for main internal approach roads;
- 9m for other internal roads and also for looped roads.
- 8m for cul-de-sacs roads (with a minimum radius 9m.) between 50-100m length.

Sl. No.	Category of building/ activity	Parking area to be provided as percentage of total built up area					
		HMDA Area		All Municipal Corporations & UDA Areas		Municipalities/ N.Ps/ G.Ps. other than UDA Areas	
		GHMC	Municipalities/ N.Ps/ G.Ps. in HMDA Area	All Municipal Corporations	Municipalities/ N.Ps/ G.Ps. in UDA Areas	Selection & Special Grade Municipalities	Other Municipalities/ N.Ps/ G.Ps.
1	2	3	4	5	6	7	8
1	Multiplexes	60	50	60	50	60	50
2	Shopping Malls (above 4000 sq.m), Information Technology Enabling Services Complexes	60	50	50	40	40	30
3	Hotels, Restaurants, Lodges, Cinema halls, Business buildings, Other Commercial buildings, Kalyana Mandapams, Offices, & High-Rise Buildings / Complexes of Non Residential Category	40	30	30	25	25	25
4	Residential Apartment Complexes, Hospitals, Institutional buildings, Industrial buildings, Schools, Colleges, Other Educational Buildings & Godowns & Others	30	20	20	20	20	20

Table 2 Parking requirements as per Telangana Building Bye Laws

(b) The parking spaces may be provided in

(i) Basements or cellars (one or more) / multi-level (allowed for plots 750sq.m and above only) or

(ii) Stilt floor or in upper floors (at any level) or

(iii) The Open space over and above the setbacks i.e. after leaving the setbacks to be left around the building with adequate vehicular access, aisle, drives, ramps required for maneuvering of vehicles, or

(iv) Common pool parking area (in the case of Group Housing Scheme / Cluster Housing / Row Housing Schemes).

(v) Any of the above or all the above or combination of the above.

(vi) Wherever Mechanical system and car lifts are proposed enabling two tier parking, the required parking is computed accordingly.

(c) The other aspects for providing parking spaces are:

(i) Misuse of the area specified for parking of vehicles for any other use shall be summarily demolished / removed by the Enforcement Authority.

(ii) The parking spaces should be efficiently designed and clearly marked and provided with adequate access, aisle, drives and ramps required for maneuvering of vehicles.

(iii) Cellar floor shall be used only for parking and not for any habitation purpose. There shall be ventilation to cellars with not less than 2.5% of each cellar floor area.

Figure 13 Permissible top elevation as per AAI

2.3 NBC, National Building Codes:

The NBC standards ensure structural safety, fire and life safety, building services, accessibility, and energy efficiency. All structural designs shall comply with NBC Part 6, including relevant IS codes. Fire and life safety measures, including refuge areas, fire exits, and firefighting systems, shall be designed as per NBC Part 4. Provisions for universal accessibility, ventilation, lighting, and sanitation shall follow the guidelines specified in Parts 3 and 9.

Electrical systems and lifts, designs shall be in accordance with NBC Parts 8 and 5. Additionally, parking, setback distances, open space requirements, and occupancy classifications must be in compliance with local bye-laws and NBC norms.

The EPC Contractor shall ensure full compliance with all applicable NBC parts throughout design and execution stages, incorporating all necessary approvals from statutory bodies.

Table 3 Occupant Load
(*Clauses* 4.3 *and* 4.4.2.1)

Sl No.	Group of Occupancy	Occupant Load Factor (m^2/person) (*see* Note 1)
(1)	(2)	(3)
i)	Group A: Residential	12.50
ii)	Group B: Educational	4.00
iii)	Group C: Institutional (*see* Note 2):	
	a) Indoor patients area	15.00
	b) Outdoor patients area	10.0
iv)	Group D: Assembly:	
	a) Concentrated use without fixed seating	0.65
	b) Less concentrated use without fixed seating (*see* Note 3)	1.40
	c) Fixed seating	*see* Note 4
	d) Dining areas and restaurants with seating and table	1.80
v)	Group F: Mercantile:	
	a) Street floor and sales basement	3.00
	b) Upper sales floor	6.00
	c) Storage/warehouse, receiving and the like	20.00
vi)	Group E: Business	10.00
vii)	Group G: Industrial	10.00
viii)	Group H: Storage (*see* Note 5)	30.00
ix)	Group J: Hazardous	10.00

Table 3 Occupant Load

3 ARCHITECTURAL DESIGN

3.1 Master Planning Architecture Concept:

The master plan is designed with a thoughtful approach to spatial hierarchy, accessibility, landscape integration, and user-centric zoning. This spatial anchor promotes community interaction, improves ventilation, and enhances aesthetics. The layout ensures efficient zoning, balancing residential, recreational, and service areas while integrating strong internal circulation and future-ready infrastructure.

- **Zoning & Hierarchy:** The site is zoned effectively with residential blocks, office, clubhouse, and utility spaces like a substation, each placed strategically to optimize accessibility and privacy. The DGM Flats and GM & AGM Flats are in the northwestern zone of the site, taking advantage of a more private and quieter area. This placement ensures separation from the active public frontage along the main road.
- **Circulation & Connectivity:** A network of 30' wide internal roads ensure smooth vehicular flow. Entry and exit points are planned separately for seamless movement and safety, with dedicated basement access ramps minimizing surface congestion.
- **Community Focus:** The open space and the placement of the clubhouse at a strategic junction serve as focal points, encouraging social interaction and creating a strong community character.
- **Environmentally Conscious Design:** Buildings are oriented to **maximize natural daylight** and promote ventilation, thereby reducing energy consumption and enhancing occupant comfort.
- **Safety and Segregation:** Separate pathways and ramp accesses ensure **segregation of service vehicles**, resident entries, and emergency routes, promoting safety and operational efficiency.
- **Infrastructure and Utilities:** All essential utilities, including a **substation**, chiller plants, and pump room are integrated within the plan, ensuring self-sufficiency and uninterrupted services to the residents.
- **Futureproofing:** The layout accommodates scope for future expansion or infrastructural upgrades without disturbing the functional fabric of the site.
- **Harmonious Development:** The landscaping, road alignments, and building setbacks create a harmonious urban form, contributing to a clean, organized, and livable environment.
- **Emergency evacuation zone**: The central open space (Sign Avenue Plaza) acts as a safe congregation point during emergencies. Residents from all blocks can quickly evacuate toward this non-combustible open zone, away from vertical fire sources.
- **Firefighting access & maneuvering**: The plaza and surrounding open areas allow fire trucks and emergency vehicles to access the building periphery. Wide internal roads (30 feet wide) ensure proper turning radius and staging space for firefighting equipment
- A dedicated boundary wall shall be constructed around the office building to clearly demarcate and separate it from the adjoining residential complexes. Additionally, appropriate fencing shall be provided around the DG set and chiller plant to ensure safety, security, and restricted access.

Figure 14 Site Plan for the proposed construction of residential flats and office building for SBI Enclave, Hyderabad

Type of Building	No of Floors
1) DGM Flats	B+S+27 Floors
2) GM Flats and CGM Flats	B+S+21 Floors
3) DMD Bungalow	G+1
4) Clubhouse	B+G+4
5) Office	2B+S+20 Floors

Table 4 Building blocks and height

3.1.1 Emergency evacuation zone

The **open space** acts as a **safe congregation point** during emergencies. Residents from all blocks

can quickly evacuate toward this **non-combustible open zone**, away from vertical fire sources.

3.1.2 Firefighting access & maneuvering

The plaza and surrounding open areas allow **fire trucks and emergency vehicles** to access the building's periphery. Wide internal roads (30 feet wide) ensure proper **turning radius and staging space** for firefighting equipment.

3.1.3 Green integration

- **A large landscape** lies at **the heart of the layout, acting as a communal green lung that connects all residential blocks visually and** functionally.
- **Layered Green Buffers** Multiple **pocket gardens and softscape zones** around buildings break the vertical massing, ensuring **human scale** and comfort at the ground level.
- **Functional Landscape Use** These green zones are not just visual—they serve as **interactive leisure spaces**, play zones, and seating areas, fostering social life within dense urban fabric.

Name	Area (in sq ft)	Area (in %)
Plot coverage	50303	24.56%
Green/ open spaces	81965	40.02%
Roads	72545	35.42%
Site	204810	100%

Table 5 Area statement or Site

- Integrated Hard and Soft Landscaping: The central and peripheral zones feature a combination of paving (for walkways and driveways) and green patches, balancing functionality with natural aesthetics.
- A minimum of 40% of the site area shall be dedicated to green and open spaces, in line with sustainable site planning principles and to promote ecological balance and occupant well-being.
- A jogging track should be incorporated to promote health and wellness among residents. An open-air amphitheatre with a minimum seating capacity of 100 should be provided to support cultural events, gatherings, and community interactions. Additionally, a badminton court shall be included to encourage sports and active recreation, contributing to a well-rounded and inclusive living environment.
- Sustainable Green Planning: The landscape design likely supports sustainability through rainwater percolation zones, native plant selection, and minimal hardscaping—ensuring eco-friendly development within the urban fabric.

3.2 Project components

In brief, the project consists of Residential (DMD, CGM&GM, DGM), Commercial and Club House along with all necessary utility buildings/Structures like Sub-Station Building, Security Cabins,

Reticulated LPG Bank Building, Pump Room, Chiller Plant Building, HSD Yard, etc. and Site Development.

Besides these, all required MEP, and other services, Utilities, External Development, Horticulture, Landscaping, Roads including Roundabouts and Pavements, Parking, Pathways, Planters, External Boundary Wall work at proposed site (4.7 Acres), green buffer wall with necessary civil work & WPC between residential and commercial complex should be proposed and compound wall for the IAD campus abutting at the south of the site with Main Gates & Security Cabins (only for 3 Entry/Exits earmarked on Masjid Bunda Road), Water Supply, Plumbing, Storm Water Drainage, Signages (internal & external) and all related utilities as mentioned in the Design Basis Report and otherwise taking into consideration with respect to all statutory regulations as required for development and functioning of SBI Enclave are also included in the scope of work.

In Commercial and Club house building, the Electrical works except HT side (till Sub-station building), DG set, HVAC, Interior works (exclusions mentioned in finishes schedule as per DBR), CCTV, LAN/WiFi, lighting fixtures are excluded from the scope of the EPC contractor.

However, the civil works required to carry forward the above exclusions at later stage is included in this tender scope to be executed by the EPC contractor.

The designing and construction of boundary wall, Main Entrance Gate(s) etc. as per Master Plan are also in the scope of work of EPC Contractor, as per requirements.

The redevelopment of two existing internal roads/driveways (total 200m long) connecting the project site (4.7 Acres) to the Old Mumbai Highway at the south via the existing IAD campus is also part of this tender scope to be executed by the EPC contractor.

Type of Building	No of Floor	Unit Type	No of Units	Carpet Area
1) DGM FLATS	B+S+27 Floors	3BHK	104 units	2000 Sq.ft
2) GM Flats and CGM Flats	B+S+21 Floors	3BHK – GM 4BHK - CGM	GM Flats - 22 units, CGM Flats - 8 units	2500 Sq.ft - GM 3000 Sq.ft - CGM
3) DMD Bungalow	G+1	4BHK	-	4899 Sq.ft
4) Clubhouse	B+G+4	-	-	-
5) Office	2B+S+20	-	-	-

Table 6 Project components details

1. **Residential Blocks**:
    - **DGM FLATS**: B+S+27 floors of 3BHK flats .
    - **GM & CGM FLATS**: B+S+21 floors of 3BHK & 4BHK flats .

- These towers are positioned on either side along the central axis of the site, creating a formal, balanced composition. Their higher elevation signifies a vertical emphasis, likely maximizing views and daylight penetration.
- **DMD Bungalow:** An exclusive 4BHK bungalow for the Deputy Managing Director, offering scenic views of the central green belt and the badminton court.

Figure 15 Render image of DMD Bungalow

Figure 16 Render image of GM & CGM Flats

2. **Office**:
    - **Office building**: 2B+S+20 floors.
    - The proposed state-of-the-art office building is designed with two basement levels, a stilt floor, and twenty upper floors, ensuring efficient vertical zoning for various departments. Floors 1 to 8 are allocated to AO Cyberabad and LHO Hyderabad, providing a consolidated space for administrative operations. Floors 9 and 10 are designated for AML CFT, Hyderabad, while floors 11 and 12 accommodate the PRM Cell. The uppermost levels, floors 13 to 20, are dedicated to IAD Hyderabad. This organized distribution supports functional clarity, operational efficiency, and optimal space utilization across the building. The building is equipped with comprehensive amenities to meet the demands of a modern corporate environment, ensuring a comfortable, efficient, and professional workspace.

Figure 17 Render image of Office

3. **Club House**:
    - Positioned between the CGM/GM flats and office while still in proximity to the DGM flats with total building height of 18m, the club house (B+G+4) is centrally accessible yet distinct, likely housing amenities such as fitness centers, indoor games, lounges, or banquet areas. Its strategic separation from the residential blocks ensures acoustic privacy and functional zoning. The Clear height of the clubhouse building is 3.6m height.
    - The proposed cafeteria is planned to accommodate up to 50 persons, ensuring a comfortable dining experience. As part of the clubhouse amenities, a swimming pool with a minimum size of 8.6m x 6.5m is proposed. A 2-meter-wide deck space is provided around the pool to ensure safe movement and

user comfort. The design caters to recreational use while maintaining functionality and safety standards.

Figure 18 Render image of Clubhouse

4. **Substation:**
    - Located on the northern side of the site and designed as G+1, this placement ensures easy utility access while keeping infrastructure services isolated from the recreational and residential areas.
5. **Parking & Circulation**:
    - Dedicated ramp entries/exits to the basement are provided along the western and eastern sides, supporting ample underground parking and maintaining a vehicle-free surface for pedestrians. Driveways along all sides promote one-way vehicular circulation, minimizing traffic conflicts.
    - Basement parking has been strategically planned to cater to both residential and office requirements. For the residential component, approximately **122,757 sq.ft** of basement area is proposed, accounting +for **33% of the total residential built-up area**. For the office component, around **94,152 sq.ft** of basement area is proposed, representing **43% of the total office** built-up area.
    - The parking capacity has been designed to accommodate a minimum of 360 cars for the residential block and a minimum of 215 cars for the office block, ensuring adequate provision as per project requirements and applicable standards
    - To enhance safety and minimize the risk of vehicle impact, column guards shall be provided around all structural columns located within the basement and driveway areas. In addition, high-visibility reflective signages shall be strategically installed throughout the basement and along the driveways to aid in traffic guidance, improve visibility in low-light conditions, and ensure

smooth vehicular movement. The design and placement of these safety features shall comply with relevant safety codes and best practices.

- Ramps for pedestrian and vehicular access with code-compliant slopes. Ramp shelters with MS structure and tensile fabric roofing, designed for weather resistance and architectural integration. Handrails and non-slip finish for universal accessibility to be provided for the ramp.

6. Entrance Gate:

- A total of three entrance gates (motorised sliding gate with grand arch) are proposed along the Masjid Banda Road frontage. Of these, one gate is designated as the main entrance to the office block, while the remaining two serve as exit points for both the office and residential complexes. Additionally, two entrance gates (without motorised sliding gate and arch) are proposed along the Old Mumbai Highway side, establishing a direct connection between the IAD Campus and the project site. These access points have been strategically planned to ensure efficient traffic circulation and separation of vehicular movement for different functional zones.
- The site includes three guard rooms—one positioned at the entry point and two at the exit. All guard rooms are strategically located adjacent to the 20m-wide Masjid Banda Road. Their placement ensures effective monitoring of vehicular and pedestrian movement for enhanced security.
- The boundary wall design shall incorporate integrated security elements to ensure controlled access and perimeter safety. These provisions may include guard posts, surveillance infrastructure (such as CCTV mounting points), anti-climb features, and restricted entry mechanisms at designated gate locations. The design shall align with the overall security strategy of the site, providing a secure and defined perimeter around the residential, office, and utility zones

The Contractor shall prepare schematic drawings with concept (without deviating from the PMC's Concept), 3D models (designs) and Good for Construction (GFC) drawings for all relevant disciplines, including but not limited to Architecture, Structural, and MEP services, site development, etc for review and approval by the Bank/PMC prior to commencement of the corresponding works.

It shall be the Contractor's responsibility to ensure that all drawings and documents requiring prior approval are submitted sufficiently in advance to avoid any delay in project execution.

AREA STATEMENT OF SBI IAD CAMPUS				
PHASE 1 (DMD , 8 CGM + 22 GM S+21 FLOORS , 104 DGM (S + 27 FLOORS) ,RECREATIONAL AREA, CLUB HOUSE, OFFICE (S + 20 FLOORS) & SUBSTATION in Sq.ft			CAR PARKING REQUIRED FROM THE TOTAL BUILT UP AREA - RESIDENTIAL 33 % & OFFICE 43 %	
			REQUIRED	PROVIDED
	RESIDENTIAL			
1	DGM FLAT &GM & CGM FLATS	426530	140755	
	STILT FLOOR	19050		19050
	HEAD ROOM	1491		
	RECREATIONAL AREA	12337		
	DMD	6933		
	OFFICE			
2	OFFICE AREA	249311	107204	
	STILT FLOOR	12501		12501
	HEAD ROOM	1218		
3	CLUB HOUSE AREA	24232		
4	BASEMENT AREA	216909		216909 (122757 sq.ft Overall one Basement + 94152 sq.ft Office Area 2 Basement)
5	SUBSTATION AREA	4629		
6	TOTAL BUILT UP AREA IN SQ.FT	975141	247959	248460

Table 7 Area statement for the proposed project

AREA STATEMENT												
S.No.	Description	DGM FLATS (28+5+27)	GM & CGM FLATS (28+1+21)		RECREATIONAL AREA		DMD/ BUNGALOW (G+1)	CLUB HOUSE (G+4)	BASEMENT (RESIDENTIAL - DGM, GM &	OFFICE (S+20)	BASEMENT (OFFICE - DOUBLE	SUBSTATION (G+1)
			GM FLATS (1+11)	CGM FLATS	DGM FLATS	GM & CGM FLATS						
1	No. of Towers	1	1	1			1	1	1	1		
2	No. of Floors	27	11	8			2	5		20		
3	Units Per Floor	4	2	1								
4	Total No. of units	104	22	8	1	1						
5	Carpet Area	2301	2500	3004			4312					
6	Servant Carpet Area	114	117	117								
7	Plinth Area	2476	2957	3514	4952	2957	6708					4629
8	Common Area	509	598	1219	1036	1293						
9	Super built up area	2985	3555	4733								
10	Floor Plate Area	11960	7110	4733				5000	122757	12501	94152	
11	16th Floor (Car Parking & Lift Lobby)	11960	7110							12501		
12	Headroom / Lift	838		853			225	196		1218		
13	Built up Area	310440	78210	37680				21836		249311		
14	Total Built up area	321278	85130	38533	6988	5349	6933	26232	122757	263030	94152	4629
							975141					SQ.FT.
	Grand Total Area for Phase - 1						90593					SQ.M.

Table 8 Detailed area statement

The architectural layout, positioning, and schematic arrangement of services, as indicated in the current design, are minimum indicative, representing a baseline framework. During the detailed design stage, the EPC contractor shall carry out a comprehensive assessment to finalize spatial and capacity requirements. Any improvement or upgrades deemed necessary shall be implemented with the concurrence of the Engineer-In-Charge, ensuring alignment with overall functional and operational objectives.

3.3 Concept planning & aesthetics

3.3.1 Concept planning

The buildings are designed around the central landscape, featuring high-rise residential towers arranged around a central landscaped space. The spatial arrangement creates a socially inclusive, environmentally responsive, and functionally efficient living environment.

3.3.2 Design philosophy and spatial planning

- **Functional Zoning:** The layout organizes the site into distinct areas-residential, recreational, and services, which improves functionality and ensures a comfortable user experience.
- **Hierarchy of Built Forms:**
    - **DGM Flats (B+S+27 floors) and GM & CGM Flats (B+S+21 floors)** form the vertical anchors on either side of the central plaza.
    - **Office (2B+S+20 floors)** Positioned prominently at the forefront of the site, the office building serves as a signature landmark for the campus
    - **Clubhouse (G+4)** acts as a recreational hub, while the **Substation (G+1)** is located along the periphery for efficient servicing without disrupting residential life.
- **Efficient Land Use:** The use of **vertical density** (up to 27 floors) allows for generous open spaces at ground level, including green walkways, social courts, and communal areas.
- **Typology & Occupancy:**
    - 104 units of **3 BHK** (Carpet Area ~2000 sq.ft) for DGM.
    - 22 units of **3 BHK** (Carpet Area ~2500 sq.ft) for GM.
    - 8 units of **4 BHK** (Carpet Area ~3000 sq.ft) for CGM
    - 1 unit of **4BHK** (Carpet Area ~ 4899 sq.ft) for DMD.
    - The residential buildings comprise 1 basement and a stilt level to optimize parking and service areas, while the office block is designed with 2 basements and a stilt level to accommodate enhanced parking and utility requirements.
- **Double-Height Recreational Spaces:** Both towers incorporate **double-height recreational areas** at intermediate levels for fitness and leisure, offering a panoramic view.
- Emphasize energy efficiency, water conservation and green building strategies through sustainable construction methodology and techniques, including rainwater harvesting and the use of eco-friendly materials and practices.
- The design shall ensure **universal accessibility**, in compliance with the latest National Building Code (NBC), and guidelines for **barrier-free environments**. All public areas, entrances, toilets, circulation spaces, and vertical transportation shall be designed to be accessible and user-friendly for persons with disabilities, the elderly, and individuals with limited mobility.

3.3.3 Aesthetics & Innovations

The facade of all the buildings should be designed by the contractor based on the concept design provided by the PMC and the same shall be approved by the Bank/PMC. The design embodies a modern urban style, seamlessly integrated with climate-conscious features and refined functionality:

- **Vertical Fins & Sun-Shading Elements:** Integrated into façades to minimize solar heat gain while enhancing vertical articulation and skyline identity.

Figure 19 Render image of DGM Flats

- The vertical fins in the residential tower façade are Aluminium powder coated fins that serve both functional and aesthetic purposes. They provide effective solar shading, especially on east and west facades, while allowing diffused light and ventilation to enhance indoor comfort and privacy. Architecturally, the fins add vertical articulation and help define the building's skyline identity. Installed using stainless steel anchors,

these components offer quick assembly and design flexibility with finishes ranging from textured to painted surfaces. Integrated with balconies and windows, the fins improve energy performance in line with IGBC/green building guidelines.

- **Office & Club House facade:** The office building facade features a well-balanced design with a minimum of 25% solid wall coverage which shall be cladded with GFRC/HPL panels, ensuring durability, shading, and privacy where required. The remaining facade is articulated with high-performance glazing (Double Glazed Unitized System) and open elements to enhance daylight, views, and energy efficiency. while planter bands enhance the microclimate and soften the elevation. The material palette includes terracotta-colored finishes, performance glazing, and textured surfaces for a contemporary and climate-responsive appearance.
- **DMD Bungalow:** The façade of the DMD residence should comprise of GFRC/HPL panels along with WPC wall and soffit panelling. The feature wall in the façade should also comprise a dry cladding of natural (leather or rough finish) stones slabs. The design including facade for the DMD residence also should be submitted for approval of Bank/PMC.
- **Material Palette:** Neutral-toned façade materials, perforated screens, and glass elements are used to express lightness and modernity, while being low-maintenance and durable.
- **Visual Harmony:** The residential towers are proportioned and spaced to ensure skyline variation yet visual cohesion. The **Clubhouse**—with its sculptural volumes and terraces—adds a civic identity to the complex.
- **Climate-Responsive Massing:** Building orientation and window-to-wall ratios are optimized for day lighting, cross-ventilation, and energy efficiency, aligned with green building norms.
- **Architectural Amenities:** Balconies, extended ledges, roof gardens, and semi-open decks encourage interaction and connect residents with the outdoors, even in a vertical living environment.
- Each residential unit shall be designed as an independent dwelling with **no common or shared walls** between adjoining units, ensuring enhanced privacy, structural integrity, and acoustic separation for all occupants.
- **Green Pockets & Courtyards** between towers for heat reduction and ecological balance.
- **Rainwater harvesting, solar-ready rooftops, and segregated waste zones** planned within the service core.
- **Hard-soft landscape integration** around the central plaza fosters ecological performance and social recreation.
- The proposed buildings within the SBI Enclave shall be designed and constructed in compliance with **IGBC Platinum and Net Zero-Energy Building certification**. In terms of **Net Zero-Energy**, the design emphasizes passive architectural strategies, energy-efficient lighting and Pumps, and on-site renewable energy generation through rooftop solar photovoltaic panels, ensuring that the total energy demand is met through clean sources.

3.4 Design Consideration

Excavation, foundation and plinth in all types of Soil, Hard Rock and Anti termite treatment as per CPWD Specification & design criteria. Clearing jungle including uprooting of rank vegetation, grass, brush wood, trees and saplings etc. Earth work in surface excavation including getting out and disposal of excavated earth in all kinds of soil including bailing and pumping of water, strutting etc.

Anti-termite treatment as per necessity of ground shall be carried out as per relevant IS Codes / CPWD specifications

Structural / Non-Structural Grade slab as per the necessity at site/design requirement and as per the functional requirement of supported flooring shall be designed & provided accordingly.

Damp proof course shall be provided wherever as per CPWD specification.

Basement shall be designed as an integral part of superstructure and integrated with foundation system with suitable waterproofing system and measures for collection, pumping and disposal of water. Any extended basement beyond footprint of the Superstructure shall be designed and integrated with foundation system and its roof slab designed to carry all loads including fire tender load as required

Drainage and Plinth protection along the perimeter of the buildings shall be provided as per CPWD specifications or as per functional requirement.

Overall, the SBI Enclave will serve as a model for environmentally responsible development by integrating sustainable strategies that reduce resource consumption, lower operational costs, and enhance the health and well-being of its occupants.

3.4.1 Design Adherence:

The Contractor shall strictly adhere to the approved architectural concept and facade design; Minor modifications to internal floor plans may be considered prior to the commencement of construction, but only upon receipt of written instructions from the Bank/PMC.

Any proposed change in building orientation based on climatic or environmental analysis must be supported with detailed justification and shall be subject to prior written approval from the Bank/PMC.

3.4.2 Construction Methodology:

The EPC Contractor shall incorporate an integrated approach to structural system design, MEP coordination, and adopt fast-track construction techniques. These aspects must be reflected in the Contractor’s pricing, scheduling, and execution methodology.

3.4.3 Facade Works (Residential):

The facade system for residential buildings shall be executed using RCC components along with Aluminium fins as approved by the Bank/PMC. All elements shall be properly anchored

and installed in full compliance with applicable IS codes, structural design requirements, and best engineering practices.

3.4.4 Sustainable Design Scope under EPC Contractor:

- The proposed buildings are to be constructed in compliance with IGBC Net Zero-Energy Building standards as part of the EPC contractor's scope of work.
- The project aims to achieve green building certification under IGBC, adhering to criteria for energy efficiency, water conservation, material selection, and indoor environmental quality. Meeting these standards supports the building's sustainability objectives while also qualifying for potential incentives or rebates.

3.4.5 Design and Execution Compliance Requirements

All works associated with the proposed project shall be designed and executed in full compliance with the relevant ISO standards, NBC, GHMC, applicable national and local codes, and statutory authority guidelines. The EPC Contractor shall be solely responsible for ensuring that all deliverables are completed in a fully functional, service-ready condition, without any compromise on performance, safety, or quality. The examples provided herein represent the minimum benchmark of the level of detail and quality expected.

Illustrative Example: Road Works and Associated Infrastructure

To outline the expected level of detail and execution, the following components serve as representative examples for road works. All items shall be implemented in accordance with relevant codes and guidelines such as GHMC regulations, IRC codes, ITDP standards, and other applicable statutory or technical standards.

Internal Roads

- Road design and geometry as per IRC norms
- Cement Concrete (CC) Road finish for durability and low maintenance
- Proper camber, shoulders, and gradient
- Kerb stones and saucer drains
- Rainwater drainage system, stormwater inlets
- Underground utility ducts and service corridors
- Pedestrian crossings, tactile paving, road marking
- Speed tables, speed breakers, wheel stoppers
- Street lighting, bollards, boom barriers, signboards

Ramps and Shelter Structures

- Ramps designed for both pedestrian and vehicular access with compliant slopes per NBC standards.
- Ramp leading to basement shelters with MS structural framing and tensile fabric roofing, ensuring weather resistance and architectural harmony.
- Mild steel handrails and non-slip surface finishes to support universal accessibility and safety.

Podium Landscaping and Tree Plantation

- Installation of geotextile membranes and drainage layers above the basement slab to manage water flow.
- Topsoil thickness for softscape areas minimum 450 mm on the podium deck.
- Tree planter boxes with a minimum internal depth of 1.2 m and diameter of 1.0 m, integrated with waterproofing and drainage.
- All landscape features and softscape areas shall be supported by appropriate irrigation, drainage, and waterproofing systems.

Note:

The above-listed elements are not exhaustive and are intended to convey the expected standard of quality, completeness, and integration. When a specific item is mentioned in the scope, it shall not be interpreted as a bare minimum of only that item. Rather, it includes all associated components and ancillary works. The EPC Contractor shall ensure that all such comprehensive and integrated components are factored into their design, execution, and pricing. It is the EPC Contractor's obligation to ensure that all design and construction works comprehensively cover the scope, meet statutory requirements, and result in a fully code-compliant, functional, and integrated development.

All project deliverables must align with the client's expectations of performance, safety, operational readiness, and long-term sustainability.

3.5 Specifications of finishes

The EPC contractor must complete a mockup/model flat including all fixtures, fittings, finishes, etc for each type (DGM, GM, and CGM) for approval of the Bank/PMC before starting the finishing works for residential buildings.

3.5.1 DGM Flats:

S. NO.	DESCRIPTIONS	WALL FINISHES	FLOORING	CEILING FINISHES
A	STILT/GROUND FLOOR			
1.	Stilt Parking	Acrylic Emulsion Paint with POP Punning	75 mm thick VDF using M-30 Grade with Groove and parking marking	True Ceiling with Acrylic Emulsion Paint Finish Including POP Punning
2.	Entrance Ramp	Granite (18 mm thick) upto 150 mm height	Leather Finish Granite (18 mm thick) Basic Rate: 1850 /Sqm. (18 mm thick)	True Ceiling with Acrylic Emulsion Paint Finish Including POP Punning
3.	Entrance Lobby	Granite (18 mm thick) upto 1500 mm height	Matching Granite (18 mm thick) Basic Rate: 1850 / Sq.m	Designer Gypsum False ceiling with Paint Finish
4.	Lift Lobby	Italian marble with V-Groove upto false ceiling (only in Lift	Matching Granite (18 mm thick) Basic Rate:	Designer Gypsum False

		Fascia wall) + Acrylic Emulsion Paint with POP Punning. Granite Cladding in opposite walls upto 1500mm.	1850 /Sqm. (18 mm thick)	ceiling with Paint Finish
5.	Corridor	100 mm height skirting + Acrylic Emulsion Paint with POP Punning	Flamed Granite (18 mm thick) Basic Rate: 1850 /Sqm(18 mm thick)	True Ceiling with Acrylic Emulsion Paint Finish Including POP Punning
6.	Service Room	Vitrified tile (300x600 mm) upto 2400 mm height + Acrylic Emulsion Paint with POP Punning	Double Charged Vitrified Tile 600X600 mm	True Ceiling with Acrylic Emulsion Paint Finish Including POP Punning
7.	Driver's Rest Room	Acrylic Emulsion Paint with POP Punning	Double Charged Vitrified Tile 600X600 mm	True Ceiling with Acrylic Emulsion Paint Finish Including POP Punning
8.	Driver's Toilet	Vitrified tile (300x600 mm) upto 2400 mm height + Acrylic Emulsion Paint with POP Punning	Ceramic Anti-skid Tile 300X300 mm with waterproofing with water absorption less than 0.08% with joints finished with matching grout.	PVC False Ceiling 600 x 600mm
B	First & Typical Floor			
1	Living Area/Dining /Passage/ Foyer	100 mm height skirting + Acrylic Emulsion Paint with POP Punning	Double Charged Vitrified Tile 600x1200 mm	Designer Gypsum False ceiling with Paint Finish
2	Kitchen	Digital printed or screen printed Vitrified tile of (300x600 mm) upto 2400 mm height + Acrylic Emulsion Paint with POP Punning	Double Charged Vitrified Anti-skid Tile 600X600 mm with water absorption less than 0.08% with joints finished with matching grout.	True Ceiling with Acrylic Emulsion Paint Finish Including POP Punning
4	Master Bedroom/Bedrooom/ Study Room	100 mm height skirting + Acrylic Emulsion Paint with POP Punning	Double Charged Vitrified Tile 800mm x800 mm	Gypsum box paneling to conceal the sprinkler pipes. Gypsum boxing (1 feet wide) on all four sides of the room for lighting.
5	Toilet	Vitrified tile (300x600 mm) upto 2400 mm height + Acrylic Emulsion Paint	Double Charged Vitrified Anti-skid Tile 600X600 mm with water proofing with water absorption less	PVC False Ceiling 600 x 600mm

			than 0.08% with joints finished with matching grout.	
6	Utility	100 mm height skirting + Vitrified/ceramic tile (300x600 mm) upto 1200 mm height + Acrylic Emulsion Paint	Double Charged Vitrified Anti-skid Tile 600X600 mm with waterproofing with water absorption less than 0.08% with joints finished with matching grout.	True Ceiling with Acrylic Emulsion Paint Finish Including POP Punning
9	Servant Room	100 mm height skirting + Acrylic Emulsion Paint with POP Punning	Double Charged Vitrified Tile 600x600 mm	True Ceiling with Acrylic Emulsion Paint Finish Including POP Punning
10	Balcony	100 mm height skirting + Acrylic Emulsion Paint	Wooden finish Vitrified Anti-skid Tile 1200X150 mm waterproofing with water absorption less than 0.08% with joints finished with matching grout.	True Ceiling with Acrylic Emulsion Paint Finish
11	Open Terrace (As Applicable)	100 mm height skirting with painting	Heat Reflective Tile 300x300 mm with water proofing	
12	Lift Lobby	Italian marble with V-Groove upto 2400 mm height (only in Lift Fascia wall) + Acrylic Emulsion Paint with POP Punning	Matching Granite (18 mm thick) Basic Rate: 1850 / Sq.m	Designer Gypsum False ceiling with Paint Finish
13	Staircase	100 mm height skirting + Acrylic Emulsion Paint with POP Punning	Tread –Leather Finish Granite with round nosing Riser -Polished Granite, Basic Rate: 1850 /Sqm (18 mm thick)	True Ceiling with Acrylic Emulsion Paint Finish Including POP Punning

Table 9 Finishes schedule table for DGM Flats

JOINERY FINISHES SCHEDULE

S. No	Location / Door Type	Door Shutter Material	Finish	Frame Material & Finish	Hardware Set
01	Main Entrance Door	35mm Flush Door Shutter	4mm Thick Veneer finish on both sides,	Teakwood	- Premium Brass Finish, Mortise Handle Set, Tower Bolt (Brass), Hydraulic Door Closer,

			Basic rate of veneer is Rs.2500/- per Sqm		Brass Hinges, Brass Door Stopper, Brass Door Eye Viewer, 7 lever Mortise Lock with computerised key, Door phone unit (Audio + Video)
02	Bedroom Doors	35mm Flush Door Shutter	1mm thick Laminate finish with design basic rate of laminate is Rs. 1000/- per Sqm.	2nd Class Teak wood frame	SS. Mortise door lock Handle set with 7 lever locking mechanism set (Master Bedroom), Magnetic Door Stopper, SS Hinges, Tower Bolt (SS),
03	Toilet Doors	35mm Flush Door Shutter	1mm thick water proof Laminate finish both sides, basic rate of laminate is Rs. 1000/- per Sqm	Granite stone frame	- SS Mortise Handle set, SS Hinges. Basic Latch Lock.
04	Utility Door	35mm thick UPVC Door	As per the approved design and colour	Integrated UPVC Frame	- SS Mortise Handle & Hinges, Basic Latch Lock.
05	Servant Room Door	35mm Flush Door Shutter	1mm thick Laminate finish with design basic rate of laminate is Rs. 1000/- per Sqm.	2nd Class Teak wood frame	SS. Mortise door lock Handle set with 7 lever locking mechanism set, Magnetic Door Stopper, SS Hinges, Tower Bolt (SS),
06	Balcony Doors	35mm thick UPVC three track Sliding Door	as per approved design and colour	Integrated UPVC Frame	- UPVC Sliding Hardware, Sliding Lock Set, Anti-lift Lock.
07	Toilet Ventilators	UPVC	as per approved design and colour	UPVC Frame	- Handle Operated Openable Panel, SS Friction Stay, Concealed Hinges
08	Toilet Casement window	UPVC	as per approved design and	UPVC Frame	Casement Handle, SS Friction Stay, Concealed Hinges

			colour		
09	Windows (All rooms)	UPVC Sliding 3Track	White / Grey Finish + Glass with MS grill	UPVC Frame	- Sliding Lock Set, Casement Handle
10	Fire rated Door (2hr fire rated)	GI sheet with Rockwool mineral wool core	Powder-coated	GI Sheet, Powder Coated	Fire Rated Mortise Lock with lever handles, Fire Rated Hinges, Automatic Door Closer (Fire Rated), Panic Bar, Smoke seal / intumescent strip, Vision panel, Kick plate

Table 10 Joinnery schedule for DGM Flats

Note:

1. Windows Shutters should be 3-Track Sliding UPVC Shutters with SS wire Mosquito Mesh & toughened Glass as per design. Window grills shall be provided as per the approved design or drawing.SS curtain Rods to be provided in Windows & doors.
2. Granite window jamb is provided with a nosing.
3. All Railing to be in Stainless Steel - 316 Grade.
4. All tiles will be laid with spacers on walls and floors and filled with Epoxy Grouting.
5. Aluminium reinforced PVC wall guard & SS Corner Guard to be provided as per design requirements.
6. A staircase and corridor railing to be provided in stainless steel (S.S.), as per design, with a height of 1.0 meter.
7. Balcony railings shall be finished with stainless steel (S.S.) and 12mm toughened glass, with a height of 1.2 meters from finished floor level (FFL), as per the architectural elevation.
8. The overhead tank shall be provided with an extendable staircase made of MS with corrosive resistance paint for durability.
9. All the brick wall and RCC wall surfaces shall be done with POP punning before applying paint over the surfaces.
10. Wardrobes and modular kitchen components are excluded from the scope of work. Kitchen platform with Granite is to be provided as per the design

EXTERNAL FINISHES:

11. Texture finish with elastomeric water proof paint.
12. All Elements to be in Compliance with Energy Conservation Building Code.
13. Building Facade Lighting as per Required lux level.
14. The exterior finish shall be completed with paint in combination with architectural elevation/facade design, as per drawings.

The items and specifications mentioned above are minimum requirements and subject to improvement. During the detailed design and engineering stage, the EPC Contractor shall undertake a comprehensive assessment to finalize the detailed requirements. Any improvement or enhancements shall be made in alignment with statutory norms and project objectives.

3.6 Electrical Installations:

3.6.1 Electrical point requirements for the DGM flat:

Figure 20 DGM Flats unit plan with Electrical installation

FOR ELECTRICAL INSTALLATION		
DGM Flats		
S.No.	**DESCRIPTION**	**QUANTITY**
1	Power Plug points (2 no of 16A 6Pins socket and 2 no of 16A Switches)	1 - Dining, 1 - Living, 1 in each Bedroom, 3 in Kitchen, 2 in Utility, 1 - Study
2	Light Plug points (2 no of 6A 3Pins socket and 2 no of 6A Switches)	4 - each Bedroom, 2 - Kitchen, 9 - Living & Dining, 1 - store, 2 - each balcony, 4 - Study Room, 1 - each Toilet, 2 - Servant room, 2 in utility
3	Bracket Lights (with normal fittings including LED lamp-10W LED)	1 - Store, 1 - Each toilet, 1 - Utility, 2 - each bedroom, 1 - living

4	BLDC Ceiling fan 1200 mm with regulator	1 - Living room, 1 - Dining room, 1 - each bedroom, 1 - study, 1 - Servant room, 1 –Kitchen
5	Call bell points with face recognition	1
6	Exhaust fan 300 mm	1 - each Toilet & Kitchen
7	AC Points (with MCB connected socket outlet with wiring)	1 - each room except kitchen & toilet, 2 – Living & Dining
8	Geyser point (with MCB connected socket outlet with wiring)	1 - kitchen, 1 - each toilet
9	EDB/MCB point (3 phase) with ACCL load upto 3KW	1
10	LPDB (EB Power 3 PH)	1
11	Cable TV point	1 -Living room, 1 - each bedroom,1 - Servant room
12	Telephone point as per the approval of competent authority	1 -Living room, 1 - each bedroom,1 - Servant room.
13	Modular switches	yes
14	Wall light (Decorative 18 W)	1- Foyer, 1 -Living room, 1 - Dining room, 1 - each bedroom, 1 - each balcony, 1 - Servant room,
15	Recess mounted light (15 W)	6 - Living & Dining,
16	Spotlight (6 W)	4 in each bedroom, 4 in Study Room, 2 in Passage
17	Light Surface Mounted (15 W)	2 - Kitchen, 2 - Study area, 1 - each toilet, 1 – Store Room, 2 - each balcony
18	Foot lamp 3watts	1-in each bed room,1- in study room, 1- in servent room
19	LED tube light 18W 4feet Batton	1 -Informal Living room, 1 - Dining room, 1 - Kitchen, 1 - Study area, 1 in each bedroom, 1 - Servant room
20	Chandelier (Basic Price Rs 20,000)	1 -Living room
21	Mirror light	1 in each Toilet
22	Internet cable	1 - Each bedroom, 1- Living Room
23	DB for Data & Telephone	1

Table 11 DGM Flats Electrical Installation requirements

In case of any discrepancy between the data presented in the drawings and the table, the quantities and specifications provided in the table shall be treated as the minimum indicative requirement, subject to enhancement. During the detailed design stage, the EPC contractor shall review the data comprehensively and implement any necessary improvements

3.7 Sanitary finishes schedule for DMD,CGM GM & DGM Flats:

Indicative Sanitary Fittings					
Sl. No	**Description**	**DMD**	**CGM**	**GM**	**DGM**
		Reference Model	Reference Model	Reference Model	Reference Model
1	EWC (Wall Hung + concealed Flush tank)	SKU: 75708IN-SS-0	SKU: 6321IN-SS-0	SKU: 18133IN-2SS-0	SKU: 20217IN-S-0
2	Wash Basin (Counter Top)	K-90011T-0	K-5373IN-0	K-2660IN-1-0	K-2661IN-0
3	Basin Bottle Trap	K-75823IN-CP	K-75823IN-CP	K-7314IN-CP	K-7314IN-CP
4	Basin Mixer (Hot & cold)	K-72337IN-4ND-CP	K-72312IN-4ND-CP	K-20071IN-4-CP	K-72326IN-4-CP
5	Wall Mixer	99925IN-4FP-CP	K-23496IN-4-CP	K-72290IN-4FP-CP	K-26045IN-4FP-CP
6	Hand Shower	K-28694IN-CP	K-24717IN-CP	K-72421IN-CP	K-16359IN-A-CP
7	Overhead Shower	K-24470IN-CP	K-27731IN-CP	K-73040IN-CL-CP	K-73038IN-CL-CP
8	Mirror	K-26051IN-CPL	K-26052IN-CPL	K-26052IN-BGL	K-26052IN-BLL
9	Faucet (General)	K-97345IN-4-CP	K-25758IN-4ND-CP	K-25757IN-4ND-CP	K-23475IN-4ND-CP
10	Floor Drain	K-75422IN-CP	K-75422IN-CP	K-7275IN-CP	K-7275IN-CP
11	Exhaust Fan	Plastic / SS finish , with White Colour with backdraft damper & grill - Crompton Briskair Neo Exhaust Fan			
12	Kitchen Sink double Bowl & Double drain board	K-8206IN-CM3	K-8204IN-CM3	K-8204IN-CM7	K-8204IN-CM1
13	Bib Tap	K-16094IN-4-CP	K-16094IN-4-CP	K-25432IN-4-CP	K-25432IN-4-CP
14	Soap Dispenser	K-5487T-2-CP	K-5487T-2-CP	K-10712D-CP	K-10712D-CP
15	Towel Rail / Towel Bar	K-97495T-CP	K-97495T-CP	K-25065IN-CP	K-5630IN-CP
16	Towel Rack	K-97497T-CP	K-97497T-CP	K-25066IN-CP	K-17529T-CP
17	Toilet Paper Holder	K-97502T-CP	K-97502T-CP	K-5633IN-CP	K-5632IN-CP
18	Angle Valve	K-80154IN-4AV-CP	K-80158IN-9AV-CP	K-25431IN-4-CP	K-33978IN-4-CP
19	Bidet Shower (Health Faucet)	K-77364IN-CP	K-77364IN-CP	K-97258IN-CP	K-12927IN-CP
20	Water Heater (Geyser)	Instant or storage type ,Crompton 15 L Storage Water Geyser (ARNO NEO ASWH3015,White)			
21	Towel ring	K-97498T-CP	K-97498T-CP	K-25067IN-CP	K-5631IN-CP
22	Shower Enclosure	K-709066IN-CP	K-709065IN-CP		NIL
Note: All reference models mentioned above are from Kohler brand.					

General Notes

- All items must be water-saving compliant where applicable.
- Sanitary fixtures must conform to IS/ASTM/EN standards.
- Submit samples for approval before procurement.
- Installation to be per manufacturer's specifications and coordinated with MEP services.

The data provided above shall be considered as the minimum indicative requirement. The specific brands mentioned, are intended solely for benchmarking purposes and are not mandatory recommendations. Other makes mentioned in technical specification (Part-E) may be proposed, provided they meet or exceed the specified benchmark in terms of quality, performance, and technical compliance.

The above list of Sanitary fittings are indicative only. Additional equipment may be identified during the detailed design phase. FAT shall include verification of safety features, protection coordination, control logic, and compliance with statutory and project specifications. The Employer/Consultant shall be notified in advance to witness the FAT as required.

3.7.1 GM/CGM Flats:

S. NO.	DESCRIPTIONS	WALL FINISHES	FLOORING	CEILING FINISHES
A	Stilt/Ground Floor			
1	Stilt Parking	Acrylic Emulsion Paint with POP Punning	75 mm thick VDF using M- 30 Grade with Groove Groove and parking marking	True Ceiling with Acrylic Emulsion Paint Finish Including POP Punning
2	Entrance Lobby	Italian Marble Slab thickness: 16 mm – 18 mm. upto 1500 mm height	Italian Marble Slab thickness: 16 mm – 18 mm. Slab size: 8′ x 5′ and above. Basic Rate: Rs. 5400 /Sqm.	Designer Gypsum False ceiling with Paint Finish
3	Entrance Ramp	Granite(18 mm thick) upto 1500 mm height	Leather Finish Granite (18 mm thick) Basic Rate: 1600 /Sqm. (18 mm thick)	True Ceiling with Acrylic Emulsion Paint Finish Including POP Punning
4	Lift Lobby	Italian marble with V-Groove upto false ceiling height (only in Lift Fascia wall) + Acrylic Emulsion Paint with POP Punning. Granite cladding	Italian Marble Slab thickness: 16 mm – 18 mm. Slab size: 8′ x 5′ and above. Basic Rate: Rs. 5400 /Sqm.	Designer Gypsum False ceiling with Paint Finish

		upto 1500mm on the opposite walls.		
B	First & Typical Floor			
1	Bedroom /Master Bedroom/ Study Room	100 mm height skirting + Acrylic Emulsion Paint with POP Punning	Double charged vitrified tiles 800x800mm	Gypsum boxing to conceal the sprinkler pipes. Gypsum boxing (1 feet wide) on all four sides of the room for lighting.
2	Living Area/Dining/Foyer	100 mm height skirting + Acrylic Emulsion Paint with POP Punning	Double charged vitrified tiles 600x1200 mm	Designer Gypsum False ceiling with Paint Finish
4	Servant/Store	100 mm height skirting + Acrylic Emulsion Paint with POP Punning	Double charged vitrified tiles 600x600mm	True Ceiling with Acrylic Emulsion Paint Finish Including POP Punning
5	Kitchen	Digital printed Vitrified/ceramic tile (300x600 mm) floor to full height + Acrylic Emulsion Paint with POP Punning	Double Charged Vitrified Anti-skid Tile 600X600 mm with water absorption less than 0.08% with joints finished with matching grout.	True Ceiling with Acrylic Emulsion Paint Finish Including POP Punning
7	Toilet	Vitrified tile (300x600 mm) up to 2400 mm height + Acrylic Emulsion Paint	Double Charged Vitrified Anti-skid Tile 600X600 mm with waterproofing with water absorption less than 0.08% with joints finished with matching grout.	PVC False Ceiling 600 x 600mm
8	Utility	100 mm height skirting+ Vitrified/ceramic tile (300x600 mm) upto 1200 mm height + Acrylic Emulsion Paint	Double Charged Vitrified Anti-skid Tile 600X600 mm with waterproofing with water absorption less than 0.08% with joints finished with matching grout.	True Ceiling with Acrylic Emulsion Paint Finish
9	Balcony	100 mm height skirting + Acrylic Emulsion Paint with POP Punning	Wooden finish Vitrified Anti-skid Tile 1200X150 mm with waterproofing with water absorption less than 0.08% with	True Ceiling with Acrylic Emulsion Paint Finish

			joints finished with matching grout.	
11	Staircase	100 mm height skirting + Acrylic Emulsion Paint with POP Punning	Tread- Leather finished Granite with round nosing (Basic Rate: 1600 /Sqm), Riser-polished Granite, Basic Rate: 1850 /Sqm(18 mm thick)	True Ceiling with Acrylic Emulsion Paint Finish Including POP Punning
12	Lift Lobby	Italian marble with V-Groove upto 2400 mm height (only in Lift Fascia wall) + Acrylic Emulsion Paint with POP Punning.	Matching Granite (18 mm thick) Basic Rate: 1850 / Sq.m (18 mm thick)	Designer Gypsum False ceiling with Paint Finish

Table 12 Finishes schedule for GM/CGM Flats

Joinery finishes schedule for GM& CGM:

S. No	Location / Door Type	Door Shutter Material	Finish	Frame Material & Finish	Hardware Set
01	Main Entrance Door	35mm Flush Door Shutter	4mm Thick Veneer finish on both sides, Basic rate of veneer is Rs.2500/- per Sqm	Teakwood	- Premium Brass Finish, Mortise Handle Set, Tower Bolt (Brass), Hydraulic Door Closer, Brass Hinges, Brass Door Stopper, Brass Door Eye Viewer, 7 lever Mortise Lock with computerised key, Door phone unit (Audio + Video)
02	Bedroom Doors	35mm Flush Door Shutter	4mm Thick Veneer finish on both sides, Basic rate of veneer is Rs.2500/- per Sqm	2nd Class Teak wood frame	SS. Mortise door lock Handle set with 7 lever locking mechanism set (Master Bedroom) , Magnetic Door Stopper, SS Hinges, Tower Bolt (SS),
03	Toilet Doors	35mm Flush Door Shutter	1mm thick water proof Laminate finish both sides, basic rate of laminate is Rs.	Granite Frame	- SS Mortise Handle set, SS Hinges. Basic Latch Lock.

			1000/- per Sqm		
04	Utility Door	35mm thick UPVC Door	As per the approved design and colour	Integrated UPVC Frame	- SS Mortise Handle & Hinges, Basic Latch Lock.
05	Servant Room Door	35mm Flush Door Shutter	1mm thick Laminate finish with design basic rate of laminate is Rs. 1000/- per Sqm.	2nd Class Teak wood frame	SS. Mortise door lock Handle set with 7 lever locking mechanism set, Magnetic Door Stopper, SS Hinges, Tower Bolt (SS),
06	Balcony Doors	35mm thick UPVC three track Sliding Door	as per approved design and colour	Integrated UPVC Frame	- UPVC Sliding Hardware, Sliding Lock Set, Anti-lift Lock.
07	Toilet Ventilators	UPVC	as per approved design and colour	UPVC Frame	- Handle Operated Openable Panel, SS Friction Stay, Concealed Hinges
08	Toilet Casement window	UPVC	as per approved design and colour	UPVC Frame	Casement Handle, SS Friction Stay, Concealed Hinges
09	Windows (All rooms)	UPVC Sliding 3Track	White / Grey Finish + Glass 0with MS grill	UPVC Frame	- Sliding Lock Set, Casement Handle
10	Fire rated Door (2hr fire rated)	GI sheet with Rockwool mineral wool core	Powder-coated	GI Sheet, Powder Coated	Fire Rated Mortise Lock with lever handles, Fire Rated Hinges, Automatic Door Closer (Fire Rated), Panic Bar, Smoke seal / intumescent strip, Vision panel, Kick plate

Table 13 Joinery schedule for GM/CGM Flats

Note:

1. Windows Shutters should be 3-Track Sliding UPVC Shutters with SS wire Mosquito Mesh & toughened Glass as per design. Window grills shall be provided as per the approved design or drawing. SS curtain Rods to be provided in Windows & doors.
2. Granite window jamb is provided with a nosing.
3. All Railing to be in Stainless Steel - 316 Grade.
4. All tiles will be laid with spacers on walls and floors and filled with Epoxy Grouting.
5. Aluminium reinforced PVC wall guard & SS Corner Guard to be provided as per design requirements.
6. A staircase and corridor railing to be provided in stainless steel (S.S.), as per design, with a height of 1.0 meter.
7. Balcony railings shall be finished with stainless steel (S.S.) and 12mm toughened glass, with a height of 1.2 meters from finished floor level (FFL), as per the architectural elevation.
8. The overhead tank shall be provided with an extendable staircase made of MS with corrosive resistance paint for durability.
9. All the brick wall and RCC wall surfaces shall be done with POP punning before applying paint over the surfaces.
10. Mild Steel (MS) doors shall be provided for all access points to the lift machine room and head room as per approved designs.
11. Wardrobes and modular kitchen components are excluded from the scope of work. Kitchen platform with Granite is to be provided as per the design

EXTERNAL FINISHES:

12. Texture finish with elastomeric water proof paint.
13. All Elements to be in Compliance with Energy Conservation Building Code.
14. Building Facade Lighting as per Required LUX Level.
15. The exterior finish shall be completed with paint in combination with architectural elevation/facade design, as per drawings.

The items and specifications mentioned above are minimum requirements and subject to improvement. During the detailed design and engineering stage, the EPC Contractor shall undertake a comprehensive assessment to finalize the detailed requirements. Any improvement or enhancements shall be made in alignment with statutory norms and project objectives.

3.7.2 Electrical point requirements for the GM flat:

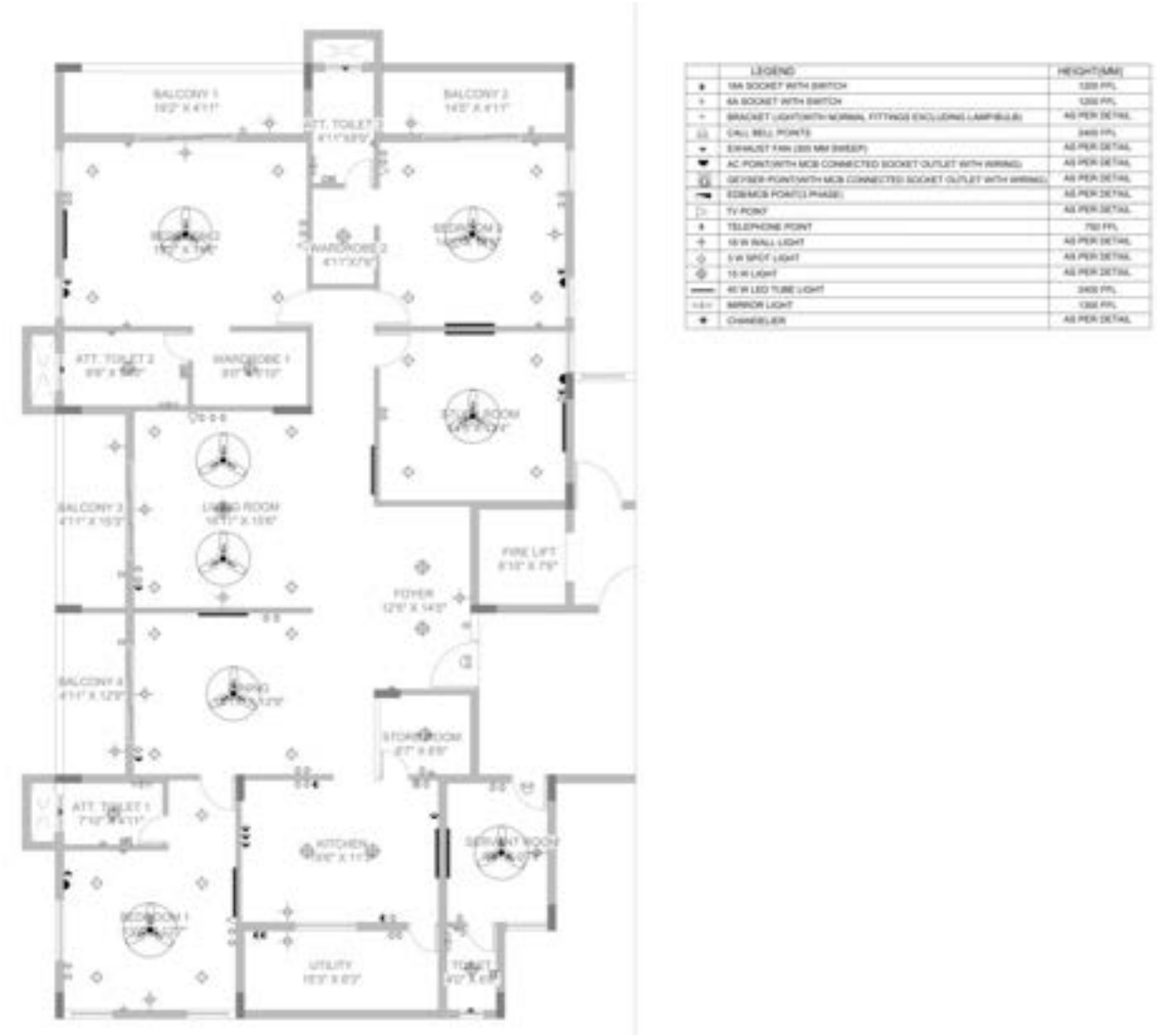


Figure 21 GM Flats Unit Plan with Electrical installations

FOR ELECTRICAL INSTALLATION		
GM Flats		
S.No.	**DESCRIPTION**	**QUANTITY**
1	Power Plug points (2 no of 16A 6Pins socket and 2 no of 16A Switches)	1 - Dining, 1 - Living, 1 in each bedroom, 6 in kitchen, 2 in utility, 1 - Study
2	Light Plug points (2 no of 6A 3Pins socket and 2 no of 6A Switches)	4- each Bedroom, 4 - kitchen, 11 - Living & Dining, 1 - store, 2 - each balcony, 4 - Study Room, 1 -each toilet, 3 -servant room, 2- Utility
3	Bracket Lights (with normal fittings including LED lamp – 10W LED)	1 - Store, 1 - Each toilet, 1 - Utility, 2 - each bedroom, 1 – living, 1-Dining
4	BLDC Ceiling fan-1200mm with regulator	2 - Living room, 1 - Dining room, 1 - each bedroom, 1 - study, 1 -servant room, 1-Kitchen
5	Call bell points with face recognition	1

6	Exhaust fan-300mm	1 - each toilet & kitchen
7	AC Points (with MCB connected socket outlet with wiring)	1 - each room except kitchen & toilet, 1-Living, 1-Dining
8	Geyser point (with MCB connected socket outlet with wiring)	1 - kitchen, 1 - each toilet
9	EDB/MCB point (3 phase) with ACCL load upto 3KW	1
10	LPDB (EB Power 3 PH)	1
11	Cable TV point	1 -Living room, 1 - each bedroom,1 - Servant room.
12	Telephone point as per the approval of competent authority	1 -Living room, 1 - each bedroom,1 - Servant room.
13	Modular switches	yes
14	Wall light (Decorative 18 W)	1- Foyer , 2 -Living room, 1 - Dining room, 1 - each bedroom, 1 - each balcony, 1 - Servant room, 1 - Utility
15	Recess mounted Light (15W)	8 – Living & Dining
16	Spot light (6 W)	4 in each bedroom,4 - Study area, 2 in passsage
17	Light Surface Mounted (15 W)	2 -Foyer, 2 - Kitchen, 2 – Study area, 1 - each toilet, 1 in each Wardrobe area, 1 - Store Room, 2 in each balcony
18	LED tube light (18W) 4 feet Batton	2 -Living room, 1 - Dining room, 1 - Kitchen, 1 - Study area, 1 in each bedroom, 1 - Servant room,
19	Foor lamp 3w	1-each bed room, 1-study room,1-servant room
20	Chandelier (Basic Price Rs 20,000)	1 -Living room
21	Mirror light	1 in eachToilet
22	Internet cable	1 - Each bedroom, 1- Living Room
23	DB for Data & Telephone	1

Table 14 Electrical installation for GM Flats

In case of any discrepancy between the data presented in the drawings and the table, the quantities and specifications provided in the table shall be treated as the minimum indicative requirement, subject to enhancement. During the detailed design stage, the EPC contractor shall review the data comprehensively and implement any necessary improvements

3.7.3 Electrical point requirements for the CGM flat:

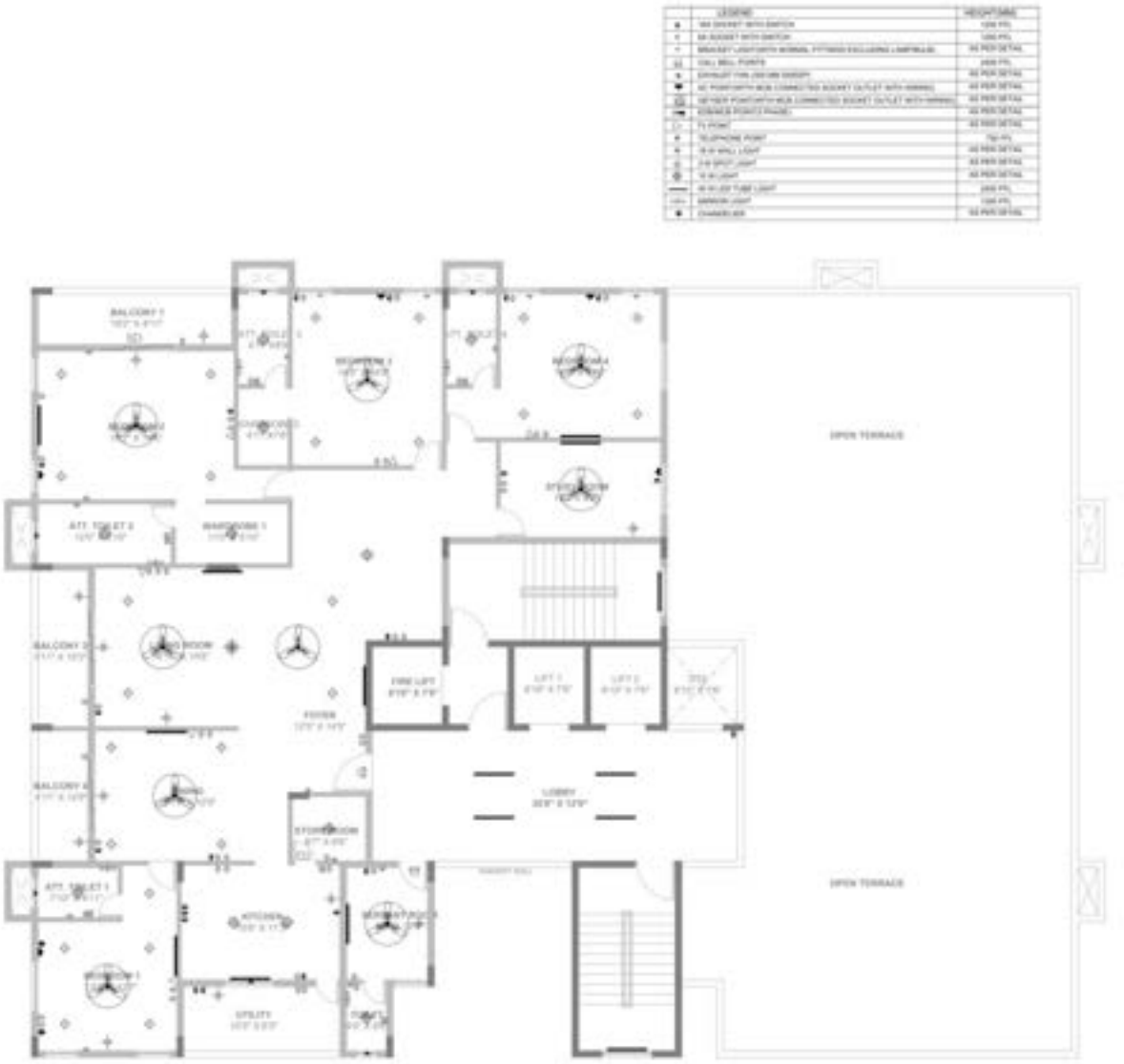


Figure 22 CGM Flats unit plan with Electrical Installations

FOR ELECTRICAL INSTALLATION		
CGM Flats		
S.No.	**DESCRIPTION**	**QUANTITY**
1	Power Plug points (2 no of 16A 6Pins socket and 2 no of 16A Switches)	2 - Dining, 2 - Living, 2 in each bedroom, 5 in kitchen, 2 in utility, 2 - Study ,1 - Servant room
2	Light Plug points (2 no of 6A 3Pins socket and 2 no of 6A Switches)	4- each Bedroom, 3 - kitchen, 11 - Living & Dining, 2- Foyer, 1 - store, 2 - each balcony, 4 - Study Room, 1 -each toilet, 2 -servant room, 2 in utility.
3	Bracket Lights (with normal fittings including LED lamp 10W)	1 - Store, 1 - Each toilet, 1 - Utility, 2 - each bedroom, 1 - living
4	BLDC Ceiling fan 1200 mm with regulator	2 - Living room, 1 - Dining room, 1 - each bedroom, 1 - study, 1 -servant room, 1 - Kitchen

5	Call bell with face recognition	1
6	Exhaust fan 300 mm	1 - each toilet & kitchen
7	AC Points (with MCB connected socket outlet with wiring)	1 - each room except kitchen & toilet, 2-Living, 1-Dining
8	Geyser point (with MCB connected socket outlet with wiring)	1 - kitchen, 1 - each toilet
9	LPDB/MCB point (3 phase EB & DG)	1
10	ATS Panel to be provided From 14th to 21st Floor	1 in each floor from 14th Floor onwards
11	Cable TV point	1 -Living room, 1 - each bedroom,1 - Servant room.
12	Telephone point as per the approval of competent authority	1 -Living room, 1 - each bedroom,1 - Servant room.
13	Modular switches	yes
14	Wall light (Decorative 18 W)	1 – Foyer, 2 -Living room, 1 - Dining room, 1 - each bedroom, 1 - each balcony, 1 - Servant room, 1 - Utility, 1 - Study area,
15	Recess Mounted Light (15W)	10 – Living & Dining
16	Spot light (6 W)	6 in each bedroom, 4 in Study room, 2 - passage
17	Light Surface Mounted (15 W)	2 - Kitchen, 2 – Study Area, 1 - each toilet, 1 in each Wardrobe area, 1 - Store Room, 1 - Servant room, 1 – Passage, 2 – each balcony
18	Foot lamp 3watts	1-each bed room,1-study room,1-servent room
19	LED tube light 18w 4 feet Batton	2 -Living room, 1 - Dining room, 1 - Kitchen, 1 - Study area, 2 in each bedroom, 1 - Servant room,
20	Chandelier (Basic Price Rs 20,000)	3
21	Mirror light	1 in eachToilet
22	Internet cable	1 - Each bedroom, 1- Living Room
23	DB for Data & Telephone	1

Table 15 Electrical Installation for CGM Flats

3.7.4 DMD Bungalow:

S. NO.	DESCRIPTIONS	WALL FINISHES	FLOORING	CEILING FINISHES
B	First & Typical Floor			
1	Bedroom/ Master Bedroom	100 mm height skirting + Acrylic Emulsion Paint with POP Punning	Italian Marble Slab thickness: 16 mm – 18 mm. Slab size: 8′ x 5′ and above. Basic Rate: Rs. 5400 /Sqm	Designer Gypsum False ceiling with Paint Finish

2	Living/ Dining Area/ Foyer	100 mm height skirting + Acrylic Emulsion Paint with POP Punning	Italian Marble Slab thickness: 16 mm – 18 mm. Slab size: 8′ x 5′ and above. Basic Rate: Rs. 5400/Sqm.	Designer Gypsum False ceiling with Paint Finish
5	Kitchen	100 mm height skirting + Vitrified/ceramic tile (300x600 mm) floor to full height+ Acrylic Emulsion Paint with POP Punning	Double Charged Vitrified Anti-skid Tile 600X600 mm with water absorption less than 0.08% with joints finished with matching grout.	True Ceiling with Acrylic Emulsion Paint Finish Including POP Punning
6	Toilet	Vitrified designer tile (600 x 1200 mm) up to 2400 mm height + Acrylic Emulsion Paint	Double Charged Vitrified Anti-skid Tile 600x1200 mm with waterproofing with water absorption less than 0.08% with joints finished with matching grout.	PVC False Ceiling 600 x 600mm
7	Utility	100 mm height skirting+ Vitrified/ceramic tile (300x600 mm) upto 1200 mm height + Acrylic Emulsion Paint	Double Charged Vitrified Anti-skid Tile 600X600 mm with waterproofing with water absorption less than 0.08% with joints finished with matching grout.	True Ceiling with Acrylic Emulsion Paint Finish Including POP Punning
9	Entrance Lobby	Italian Marble Slab thickness: 16 mm – 18 mm. upto 1500 mm height	Italian Marble Slab thickness: 16 mm – 18 mm. Slab size: 8′ x 5′ and above. Basic Rate: Rs. 5400/Sqm.	True Ceiling with Acrylic Emulsion Paint Finish Including POP Punning
10	Staircase	100 mm height skirting + Acrylic Emulsion Paint with POP Punning	Polished Finish Hard wooden flooring	True Ceiling with Acrylic Emulsion Paint Finish Including POP Punning
11	Gym	100 mm height skirting + Acrylic Emulsion Paint with POP Punning	EPDM (Ethylene Propylene Diene Monomer) Synthetic Rubber Flooring 20mm Thick	Designer gypsum False ceiling with Paint Finish
12	Balcony	100 mm height skirting + Acrylic Emulsion Paint	Wooden finish Vitrified Anti-skid Tile 1200X150 mm with waterproofing with water absorption less than 0.08% with joints finished with matching grout.	True Ceiling with Acrylic Emulsion Paint Finish
13	Informal Living	100 mm height skirting + Acrylic Emulsion Paint with POP Punning	Double charged vitrified tiles 600x600mm	Designer gypsum False ceiling with Paint Finish

Table 16 Finishes schedule for DMD Bungalow

JOINERY FINISHES SCHEDULE

Table 17 Joinery finishes schedule for DMD Bungalow

S. No	Location / Door Type	Door Shutter Material	Finish	Frame Material & Finish	Hardware Set
01	Main Entrance Door	Designer Solid Teakwood	Matt Finish/Semi-gloss	Teakwood with Finish	- Premium Brass Finish, Mortise Handle Set, Tower Bolt (Brass), Hydraulic Door Closer, Brass Hinges, Brass Door Stopper, Brass Door Eye Viewer, Digital Lock, Door phone unit (Audio + Video)
02	Bedroom Doors	Flush Door Hardwood	4mm Thick Veneer finish on both sides, Basic rate of veneer is Rs.2500/- per Sqm	Hardwood with matching veneer	SS. Mortise door lock Handle set with 7 lever locking mechanism set, Magnetic Door Stopper, SS Hinges, Tower Bolt (SS),
03	Toilet Doors	35mm Flush Door Shutter	1mm thick water proof Laminate finish both sides, basic rate of laminate is Rs. 1000/- per Sqm	Granite Frame	- SS Mortise Handle set, SS Hinges. Basic Latch Lock.
04	Utility Door	UPVC Door	As per the approved design and colour	Integrated UPVC Frame	- SS Mortise Handle & Hinges, Basic Latch Lock.
05	Servant Room Door	Flush Door Hardwood	Laminate Finish (Matte)	Hardwood Frame with Laminate	- SS Mortise Handle & Hinges, Tower Bolt, Stopper.
06	Balcony Doors	UPVC Door	as per approved design and colour	Integrated UPVC Frame	- UPVC Sliding Hardware, Sliding Lock Set, Anti-lift Lock.
07	Toilet Ventilators	UPVC	as per approved design and colour	UPVC Frame	- Handle Operated Openable Panel, SS Friction Stay, Concealed Hinges
08	Windows (All rooms)	UPVC Sliding / Casement	White / Grey Finish + Glass with MS Grill	UPVC Frame	- Sliding Lock Set, Casement Handle

Note:

1. Windows Shutters should be 3-Track Sliding UPVC Shutters with SS wire Mosquito Mesh & toughened Glass as per design. Window grills shall be provided as per the approved design or drawing.SS curtain Rods to be provided in Windows & doors.
2. Granite window jamb is provided with a nosing.
3. All Railing to be in Stainless Steel - 316 Grade.
4. All tiles will be laid with spacers on walls and floors and filled with Epoxy Grouting.
5. Aluminium reinforced PVC wall guard & SS Corner Guard to be provided as per design requirements.
6. A staircase and corridor railing to be provided in stainless steel (S.S.), as per design, with a height of 1.0 meter.
7. Balcony railings shall be finished with stainless steel (S.S.) and 12mm toughened glass, with a height of 1.2 meters from finished floor level (FFL), as per the architectural elevation.
8. The overhead tank shall be provided with an extendable staircase made of MS with corrosive resistance paint for durability.
9. All the brick wall and RCC wall surfaces shall be done with POP punning before applying paint over the surfaces.
10. Mild Steel (MS) doors shall be provided for all access points to the lift machine room and head room as per approved designs.
11. Wardrobes and modular kitchen components are excluded from the scope of work. Kitchen platform with Granite is to be provided as per the design

EXTERNAL FINISHES:

12. Texture finish with elastomeric water proof paint.
13. All Elements to be in Compliance with Energy Conservation Building Code.
14. Building Facade Lighting as per Required LUX Level.
15. The exterior finish shall be completed with paint in combination with architectural elevation design, as per drawings.

The items and specifications mentioned above are minimum requirements and subject to improvement. During the detailed design and engineering stage, the EPC Contractor shall undertake a comprehensive assessment to finalize the detailed requirements. Any improvement or enhancements shall be made in alignment with statutory norms and project objectives.

3.7.5 Electrical point requirements for the DMD flat:

Figure 23 DMD Bungalow Floor plans with Electrical Installations

FOR ELECTRICAL INSTALLATION		
DMD BUNGLOW		
S.No.	**DESCRIPTION**	**QUANTITY**
1	Power Plug points (2 no of 16A 6Pins socket and 2 no of 16A Switches)	5 - Living & Dining ,2-Informal living, 3-Gym, 2 in each bedroom, 5 in kitchen, 3 in utility, 1-Passage
2	Light Plug points (2 no of 6A 3Pins socket and 2 no of 6A Switches)	2-Foyer , 4- Informal living, 14 - Living & Dining, 4- each Bedroom, 2 - kitchen,5-living (first floor) 1 - store, 4 - balcony, 1 -each toilet, 3-Gym, 5- Passage, 3 in utility,
3	Bracket Lights (with normal fittings including LED lamp 10W)	1 - Store, 1 - Each toilet, 1 - Utlity, 2 - each bedroom, 1 - living

4	BLDC Ceiling fan-1200mm with regulator	4 - Living room, 1 - Dining room, 1 - each bedroom, 1- Informal living ,1- gym,1- servant room, 1 - Kitchen
5	Call bell points with face recognition	2
6	Exhaust fan 300mm	1 - each toilet & kitchen
7	AC Points (with MCB connected socket outlet with wiring)	1 - each room except kitchen & toilet, 2 – Living, 1 - Dining
8	Geyser point (with MCB connected socket outlet with wiring)	1 - kitchen, 1 - each toilet
9	LPDB/MCB point (3 phase EB & DG)	1
10	ATS Panel to be provided	1
11	Cable TV point	1 -Living room, 1 - each bedroom,1 - Servant room.
12	Telephone point as per the approval of competent authority	1 -Living room, 1 - each bedroom,1 - Servant room.
13	Modular switches	yes
14	Wall light (Decorative 18 W)	1- Foyer, 1- Informal area, 2 -Living room, 1 - Dining room, 1 - each bedroom, 2- balcony, 1 - Utility, 2- passage ,1- gym.2- open terrace
15	Recess mounted light (15W)	12 – Living, 4 – Informal living, 4 - Dining
16	Spot light (6 W)	8 in each bedroom, 5- Passage
17	Light Surface Mounted (15 W)	2-Foyer, 3 - Kitchen, 2 - each toilet, 2 in each Wardrobe area, 1 - Store Room, 1 - Gym, 1- Passage
18	LED tube light 18W 4feet Batton	1- Informal living, 5 -Living room, 1 - Dining room, 2 - Kitchen, 2 in each bedroom, 2- Gym, 2- Passage, 1 – Servant Room
19	Foot lamp 3w	1 in each bed room, 1-servent room
20	Chandelier (Basic Price Rs 20,000)	6
21	Mirror light	1 in each Toilet
22	Internet cable	1 - Each bedroom, 1- Living Room
23	DB for Data & Telephone	1

Table 18 DMD Bungalow electrical installations requirement

In case of any discrepancy between the data presented in the drawings and the table, the quantities and specifications provided in the table shall be treated as the minimum indicative requirement, subject to enhancement. During the detailed design stage, the EPC contractor shall review the data comprehensively and implement any necessary improvements

3.7.6 Sub station

S. NO.	DESCRIPTIONS	WALL FINISHES	FLOORING	CEILING FINISHES
1	Panel Room	Acrylic Emulsion Paint with Putty	75 mm thick VDF using M- 30 Grade with Groove	True Ceiling with Acrylic Emulsion Paint Finish

				Including Putty
2	Staff Room	100 mm height skirting + Acrylic Emulsion Paint with Putty	Double charged Vitrified Tile 600x600 mm	True Ceiling with Acrylic Emulsion Paint Finish Including Putty
3	Toilet	Vitrified tile (300x600 mm) up to 2400 mm height + Acrylic Emulsion Paint with Putty	ceramic Anti-skid Tile 600X600 mm with waterproofing with water absorption less than 0.08% with joints finished with matching grout.	PVC False ceiling (600x600mm)

Table 19 Finishes Schedule for Substation

3.7.7 Recreational Area

S. NO.	DESCRIPTIONS	WALL FINISHES	FLOORING	CEILING FINISHES
1	Recreational Area	100 mm height skirting + Acrylic Emulsion Paint with Putty	EPDM (Ethylene Propylene Diene Monomer) Synthetic Rubber Flooring 20mm Thick & Double Charged Vitrified Anti-skid Tile 600X600 mm	Designer Gypsum False ceiling with Paint Finish

Table 20 Finishes Schedule for Recreational area

3.7.8 Club house

S.NO.	DESCRIPTIONS	WALL FINISHES	FLOORING	CEILING FINISHES
A	Ground Floor - Clubhouse			
1	Entrance Ramp	Granite (18 mm thick) upto 150 mm height	Leather Finish Granite (18 mm thick) Basic Rate: Rs. 1850 /Sqm	True Ceiling with Acrylic Emulsion Paint Finish Including POP Punning
2	Entrance Lobby	Italian Marble Slab thickness: 16 mm – 18 mm. upto false ceiling height. Basic Rate: Rs. 5400 /Sqm	Italian Marble Slab thickness: 16 mm – 18 mm. Slab size: 8′ x 5′ and above. Basic Rate: Rs. 5400 /Sqm	True Ceiling with Acrylic Emulsion Paint Finish Including POP Punning
3	Corridor	100 mm height skirting + Acrylic Emulsion Paint with POP Punning	Flamed Granite (18 mm thick) Basic Rate: 1850 / Sqm.	Gypsum False ceiling with Paint Finish

4	Staircase	100 mm height skirting + Acrylic Emulsion Paint with POP Punning	Tread- Leather finished Granite with round nosing (Basic Rate: 1850 /Sqm), Riser-polished Granite, Basic Rate: 1850 /Sqm(18 mm thick)	True Ceiling with Acrylic Emulsion Paint Finish Including POP Punning
5	Cafeteria	100 mm height skirting+ Acrylic Emulsion Paint with POP Punning	Double Charged Vitrified Matt Finished Tile 800X800 mm	Designer gypsum False ceiling with Paint Finish
6	Serving Counter	Granite (18 mm thick)upto 1200 mm height	Polished Granite (18 mm thick)	Designer gypsum False ceiling with Paint Finish
7	Kitchen	100 mm height skirting + Vitrified/ceramic tile (300x600 mm) upto 2400 mm height + Acrylic Emulsion Paint with POP Punning	Double Charged Vitrified Anti-Skid Tile 600X600 mm with water absorption less than 0.08% with joints finished with matching grout.	True Ceiling with Acrylic Emulsion Paint Finish Including POP Punning
8	Swimming Pool	Glass Mosaic Tiles	Glass Mosaic Tiles, Swimming Pool Top Floor Area WPC Deck Flooring	WPC False Ceiling
9	Lift Lobby	Italian marble with V-Groove upto false ceiling height (only in Lift Fascia wall) + Acrylic Emulsion Paint with POP Punning. Granite cladding on the opposite walls	Matching Granite (18 mm thick) Basic Rate: 1850 /Sqm. (18 mm thick)	Designer gypsum False ceiling with Paint Finish
10	Male Toilet	Vitrified tile (600x 1200 mm) upto 2400 mm height + Acrylic Emulsion Paint with POP Punning	Double Charged Vitrified Anti-skid Tile 600X600 mm with waterproofing with water absorption less than 0.08% with joints finished with matching grout.	PVC False ceiling (600x600mm)
11	Female Toilet	Vitrified tile (600x1200 mm) upto 2400 mm height + Acrylic Emulsion Paint with POP Punning	Double Charged Vitrified Anti-skid Tile 600X600 mm with waterproofing with water absorption less than 0.08% with joints finished with matching grout.	PVC False ceiling (600x600mm)
12	Male/Female Locker Room	100 mm height skirting +Acrylic Emulsion Paint with POP Punning	Double Charged Vitrified Anti-skid Tile 600X600 mm with water absorption less than 0.08% with joints finished with matching grout.	True Ceiling with Acrylic Emulsion Paint Finish Including

				POP Punning
B	First Floor - Clubhouse			
1	Lift Lobby	Italian marble with V-Groove upto false ceiling height (only in Lift Fascia wall) + Acrylic Emulsion Paint with POP Punning. Granite cladding on the opposite walls.	Matching Granite (18 mm thick) Basic Rate: 1850 /Sqm. (18 mm thick)	Designer Gypsum False ceiling with Paint Finish
2	Corridor	100 mm height skirting + Acrylic Emulsion Paint with POP Punning	Flamed Granite (18 mm thick) Basic Rate: 1850 / Sqm. (18 mm thick)	Gypsum False ceiling with Paint Finish
4	Gym	100 mm height skirting +Acrylic Emulsion Paint with POP Punning	EPDM (Ethylene Propylene Diene Monomer) Synthetic Rubber Flooring 20mm Thick	Designer gypsum False ceiling with Paint Finish
5	Play area	100 mm height skirting + Acrylic Emulsion Paint with POP Punning	Vinyl Sports Flooring-7 mm Thick	True Ceiling with Acrylic Emulsion Paint Finish Including POP Punning
6	Male Toilet	Vitrified tile (600x 1200 mm) upto 2400 mm height + Acrylic Emulsion Paint with POP Punning	Double Charged Vitrified Anti-skid Tile 600X600 mm with waterproofing with water absorption less than 0.08% with joints finished with matching grout.	PVC False ceiling (600x600mm)
7	Female Toilet	Vitrified tile (600x 1200 mm) upto 2400 mm height + Acrylic Emulsion Paint with POP Punning	Double Charged Vitrified Anti-skid Tile 600X600 mm with waterproofing with water absorption less than 0.08% with joints finished with matching grout.	PVC False ceiling (600x600mm)
C	Second Floor - Clubhouse			
1	Lift Lobby	Italian marble with V-Groove upto false ceiling height (only in Lift Fascia wall) + Acrylic Emulsion Paint with POP Punning. Granite cladding on the opposite walls.	Matching Granite (18 mm thick) Basic Rate: 1850 /Sqm. (18 mm thick)	Designer Gypsum False ceiling with Paint Finish
2	Corridor	100 mm height skirting + Acrylic Emulsion Paint with POP Punning	Flamed Granite (18 mm thick) Basic Rate: 1850 / Sqm. (18 mm thick)	Gypsum False ceiling with Paint Finish

3	Staircase	100 mm height skirting + Acrylic Emulsion Paint with POP Punning	Tread- Leather finished Granite with round nosing (Basic Rate: 1600 /Sqm), Riser-polished Granite, Basic Rate: 1850 /Sqm(18 mm thick)	True Ceiling with Acrylic Emulsion Paint Finish Including POP Punning
4	Kids play area	100 mm height skirting + Acrylic Emulsion Paint with POP Punning	Vinyl Sports Flooring- 7 mm Thick	True Ceiling with Acrylic Emulsion Paint Finish Including POP Punning
5	Badminton Court	100 mm height skirting + Acrylic Emulsion Paint with POP Punning	Hard Wooden Flooring- 20 mm Thick with wooden rafters as per standards	True Ceiling with Acrylic Emulsion Paint Finish Including POP Punning
6	Aerobic room	100 mm height skirting +Acrylic Emulsion Paint with POP Punning	EPDM (Ethylene Propylene Diene Monomer) Synthetic Rubber Flooring 20mm Thick	Designer Gypsum False ceiling with Paint Finish
7	Male Toilet	Vitrified tile (600x 1200 mm) upto 2400 mm height + Acrylic Emulsion Paint with POP Punning	Double Charged Vitrified Anti-skid Tile 600X600 mm with waterproofing with water absorption less than 0.08% with joints finished with matching grout.	PVC False ceiling (600x600mm)
8	Female Toilet	Vitrified tile (600x 1200 mm) upto 2400 mm height + Acrylic Emulsion Paint with POP Punning	Double Charged Vitrified Anti-skid Tile 600X600 mm with waterproofing with water absorption less than 0.08% with joints finished with matching grout.	PVC False ceiling (600x600mm)
D	Third Floor - Clubhouse			
1	Lift Lobby	Italian marble with V-Groove upto false ceiling height (only in Lift Fascia wall) + Acrylic Emulsion Paint with POP Punning. Granite cladding on the opposite walls.	Matching Granite (18 mm thick) Basic Rate: 1850 /Sqm. (18 mm thick)	Designer Gypsum False ceiling with Paint Finish
2	Corridor	100 mm height skirting + Acrylic Emulsion Paint with POP Punning	Flamed Granite (18 mm thick) Basic Rate: 1850 / Sqm. (18 mm thick)	Gypsum False ceiling with Paint Finish

3	Staircase	100 mm height skirting + Acrylic Emulsion Paint with POP Punning	Tread- Leather finished Granite with round nosing (Basic Rate: 1600 /Sqm), Riser-polished Granite, Basic Rate: 1850 /Sqm(18 mm thick)	True Ceiling with Acrylic Emulsion Paint Finish Including POP Punning
4	Kids library	100 mm height skirting +Acrylic Emulsion Paint with POP Punning	Double Charged Vitrified Tile 600X600 mm	Designer gypsum False ceiling with Paint Finish
5	Play station	100 mm height skirting + Acrylic Emulsion Paint with POP Punning	Double Charged Vitrified Anti-skid Tile 600X600 mm with waterproofing	Designer gypsum False ceiling with Paint Finish
6	Male Toilet	Vitrified tile (600x 1200 mm) upto 2400 mm height + Acrylic Emulsion Paint with POP Punning	Double Charged Vitrified Anti-skid Tile 600X600 mm with waterproofing with water absorption less than 0.08% with joints finished with matching grout.	PVC False ceiling (600x600mm)
7	Female Toilet	Vitrified tile (600x 1200 mm) upto 2400 mm height + Acrylic Emulsion Paint with POP Punning	Double Charged Vitrified Anti-skid Tile 600X600 mm with waterproofing with water absorption less than 0.08% with joints finished with matching grout.	PVC False ceiling (600x600mm)
E	Fourth Floor - Clubhouse			
1	Lift Lobby	Italian marble with V-Groove upto false ceiling height (only in Lift Fascia wall) + Acrylic Emulsion Paint with POP Punning. Granite cladding on the opposite walls.	Matching Granite (18 mm thick) Basic Rate: 1850 /Sqm. (18 mm thick)	Designer Gypsum False ceiling with Paint Finish
2	Corridor	100 mm height skirting + Acrylic Emulsion Paint with POP Punning	Flamed Granite (18 mm thick) Basic Rate: 1850 / Sqm. (18 mm thick)	Gypsum False ceiling with Paint Finish
3	Staircase	100 mm height skirting + Acrylic Emulsion Paint with POP Punning	Tread- Leather finished Granite with round nosing (Basic Rate: 1600 /Sqm), Riser-polished Granite, Basic Rate: 1850 /Sqm(18 mm thick)	True Ceiling with Acrylic Emulsion Paint Finish Including POP Punning

4	Party Hall	100 mm height skirting +Acrylic Emulsion Paint with POP Punning	Double Charged Vitrified Tile 600X600 mm	Designer gypsum False ceiling with Paint Finish
5	Balcony/semi party hall	100 mm height skirting + Acrylic Emulsion Paint with POP Punning	Wooden finish Vitrified Anti-skid Tile 1200X150 mm with waterproofing with water absorption less than 0.08% with joints finished with matching grout.	Designer gypsum False ceiling with Paint Finish
6	Kitchen	100 mm height skirting + Vitrified/ceramic tile (300x600 mm) upto 2400 mm height + Acrylic Emulsion Paint with POP Punning	Double Charged Vitrified Anti-skid Tile 600X600 mm with water absorption less than 0.08% with joints finished with matching grout.	True Ceiling with Acrylic Emulsion Paint Finish Including POP Punning
7	Male Toilet	Vitrified tile (600x 1200 mm) upto 2400 mm height + Acrylic Emulsion Paint with POP Punning	Double Charged Vitrified Anti-skid Tile 600X600 mm with waterproofing with water absorption less than 0.08% with joints finished with matching grout.	PVC False ceiling (600x600mm)
8	Female Toilet	Vitrified tile (600x 1200 mm) upto 2400 mm height + Acrylic Emulsion Paint with POP Punning	Double Charged Vitrified Anti-skid Tile 600X600 mm with waterproofing with water absorption less than 0.08% with joints finished with matching grout.	PVC False ceiling (600x600mm)

Table 21 Finishes schedule for Clubhouse

Note:

1. Windows Shutters should be 3-Track Sliding UPVC Shutters with SS wire Mosquito Mesh & toughened Glass as per design. Window grills shall be provided as per the approved design or drawing.
2. Granite window jamb is provided with a nosing.
3. All Railing to be in Stainless Steel - 316 Grade.
4. All tiles will be laid with spacers on walls and floors and filled with Epoxy Grouting.
5. Aluminium reinforced PVC wall guard & SS Corner Guard to be provided as per design requirements.
6. A staircase and corridor railing to be provided in stainless steel (S.S.), as per design, with a height of 1.0 meter.
7. Balcony railings shall be finished with stainless steel (S.S.) and 12mm toughened glass, with a height of 1.2 meters from finished floor level (FFL), as per the architectural elevation.
8. The overhead tank shall be provided with an extendable staircase made of MS with corrosive resistance paint for durability.

9. All the brick wall and RCC wall surfaces shall be done with POP punning before applying paint over the surfaces.
10. Mild Steel (MS) doors shall be provided for all access points to the lift machine room and head room as per approved designs.
11. Wardrobes and modular kitchen components are excluded from the scope of work. Kitchen platform with Granite is to be provided as per the design.
12. The provisions for differently abled toilet should also be considered for design and execution in the club house.

EXTERNAL FINISHES:

13. Texture finish with elastomeric water proof paint.
14. All Elements to be in Compliance with Energy Conservation Building Code.
15. Building Facade Lighting as per Required LUX Level.
16. The exterior finish shall be completed with paint in combination with architectural elevation design, as per drawings.

The items and specifications mentioned above are minimum requirement and subject to improvement. During the detailed design and engineering stage, the EPC Contractor shall undertake a comprehensive assessment to finalize the detailed requirements. Any improvement or enhancements shall be made in alignment with statutory norms and project objectives.

3.8 Sanitary finishes schedule for Clubhouse:

S. No	Fixture Description	Material	Finish	Colour	Mounting Type	Remarks	REF. Model	Location
01	EWC	Vitreous China	Glazed Ceramic	White/Black	Wall hung wall mounted concealed flush tank with wrought iron chairs	Dual flush concealed cistern	K-26998IN-0	One in each Toilet
02	Wash Basin	Vitreous China	Glazed Ceramic	White/Black	Countertop /Wall	With overflow	K-26269IN-0	One in each Toilet
03	Basin Bottle Trap	Brass / PVC	Chrome-plated	Silver	Exposed	Decorative finish	K-75823IN-CP	One in each Toilet
04	Basin Mixer	Brass	Chrome-plated	Silver	Deck-mounted	Single lever(Hot & Cold)	K-23482IN-4-CP	One in each Toilet
05	Wall Mixer	Brass	Chrome-plated	Silver	Wall-mounted	With provision for hand shower	K-23496IN-4-CP	One in each Toilet
07	Overhea	Stainless	Chrome /	Silver	Ceiling/Wal	Rain	K-	One in

	d Shower	Steel	Matte SS		l mounted	type shower head	73037IN-CL-CP	each Toilet
08	Mirror	Float Glass	Bevelled Edge	Clear	Wall-mounted	6mm thick, moisture-resistant backing	K-26052IN-CPL	One in each Toilet
09	Faucet (General)	Brass	Chrome-plated	Silver	Deck / Wall Mounted	Quarter-turn or sensor type	18656IN-ND	One in each Toilet
10	Floor Drain	Stainless Steel	Brushed SS	Silver	Floor-mounted	Removable grating, 100mm diameter	K-75422IN-CP	One in each Toilet
11	Exhaust Fan	Plastic / SS	White / SS	White	Wall / Ceiling	With backdraft damper & grill	SKU SKYBD 15	One in each Toilet
12	Urinal with Flush Valve	Vitreous China	Glazed Ceramic	White	Wall-mounted	Infrared sensor flush	K-26475IN-ER-0	One in each public Toilet
14	Bib Tap	Brass	Chrome-plated	Silver	Wall-mounted	Heavy-duty use	K-5680IN-4ND-CP	One in each Toilet
15	Soap Dispenser	ABS / SS	Chrome / Matte	Silver	Wall-mounted	Manual or sensor-operated	K-10712D-CP	One in each Toilet & Dining wash basin
16	Towel Rail / Towel Bar	Stainless Steel	Brushed / Polished	Silver	Wall-mounted	Length 600mm / 900mm	K-5630IN-CP	One in each Toilet
	Towel Rack	Stainless Steel	Brushed / Polished	Silver	Wall-mounted	Length 600mm	K-25066IN-CP	One in each Toilet
17	Toilet Paper Holder	Stainless Steel	Chrome-plated	Silver	Wall-mounted	With cover or open type	K-25071IN-CP	One in each Toilet
18	Angle Valve	Brass	Chrome-plated	Silver	Wall-mounted	Quarter-turn, used for WC and basins	K-76389IN-9-CP	One in each Toilet
19	Concealed Cistern Frame	Steel / Plastic	Powder Coated	Varies	Wall-mounted	For wall-hung WC, height adjustable	K-20084IN-M-NP	-

 Signature of the Bidder with Seal

20	Bidet Shower (Health Faucet)	ABS / Brass	Chrome-plated	Silver	Wall-mounted	With flexible hose & holder	12927IN-CP	One in each Toilet
21	Water Heater (Geyser)	Steel / ABS	Powder-coated	White	Wall-mounted	Instant or storage type	INP-WHT-5.5KW	One in each Toilet
22	Towel ring	Stainless Steel	Brushed / Polished	Silver	Wall-mounted		K-5631IN-AF	One in each Toilet

Table 22 Sanitary finishes schedule for Clubhouse

General Notes

- All reference models mentioned above are from Kohler brand.
- All items must be water-saving compliant where applicable.
- Sanitary fixtures must conform to IS/ASTM/EN standards.
- Submit samples for approval before procurement.
- Installation to be per manufacturer's specifications and coordinated with MEP services.

The data provided above shall be considered as the minimum indicative requirement. The specific brands mentioned, are intended solely for benchmarking purposes and are not mandatory recommendations. Other specified makes or alternative models may be proposed, provided they meet or exceed the specified benchmark in terms of quality, performance, and technical compliance.

The above list of Sanitary fittings are indicative only. Additional equipment may be identified during the detailed design phase. FAT shall include verification of safety features, protection coordination, control logic, and compliance with statutory and project specifications. The Employer/Consultant shall be notified in advance to witness the FAT as required.

3.8.1 Office

S.NO.	DESCRIPTIONS	WALL FINISHES	FLOORING	CEILING FINISHES
A	Stilt/Ground Floor			
1	Stilt Parking	Acrylic Emulsion Paint with POP Punning	75 mm thick VDF using M- 30 Grade with Groove	True Ceiling with Acrylic Emulsion Paint Finish Including POP Punning
2	Lift Lobby	Italian marble with V-Groov upto the false ceiling	Italian Marble (16-18 mm thick) Basic Rate Rs.5400 per Sq.m	Plastered True Ceiling
3	Entrance Ramp	Granite (18 mm thick) upto 150 mm height	Leather finish Granite (18 mm thick)	True Ceiling with Acrylic Emulsion Paint Finish

				Including POP Punning
4	Electrical Room	100 mm height skirting + Acrylic Emulsion Paint	NIL	True Ceiling with Acrylic Emulsion Paint Finish
5	Staircase	100 mm height skirting + Acrylic Emulsion Paint with POP Punning	Tread- Leather finished Granite with round nosing (Basic Rate: 1600 /Sqm), Riser-polished Granite, Basic Rate: 1850 /Sqm(18 mm thick)	True Ceiling with Acrylic Emulsion Paint Finish Including POP Punning
6	Entrance Lobby	NIL	NIL	NIL
B	First Floor/ Typical floors			
1.	Office Workspace	NIL	NIL	NIL
2.	Male/Female Toilet	Vitrified tile (600x1200 mm) up to 2400 mm height + Acrylic Emulsion Paint with POP Punning. Modular cubicles for toilet partition with necessary fixtures.	Double Charged Vitrified Anti-skid Tile 600X600 mm with waterproofing with water absorption less than 0.08% with joints finished with matching grout.	PVC False Ceiling Tile (600x600mm)
3.	Electrical Room & LV Room	100 mm height skirting + Acrylic Emulsion Paint	NIL	True Ceiling with Acrylic Emulsion Paint Finish
4.	Staircase	100 mm height skirting + Acrylic Emulsion Paint with POP Punning	Tread- Leather finished Granite with round nosing (Basic Rate: 1600 /Sqm), Riser-polished Granite, Basic Rate: 1850 /Sqm(18 mm thick)	True Ceiling with Acrylic Emulsion Paint Finish Including POP Punning
5.	Lift Lobby (All Floors)	Italian marble with V-Groove upto false ceiling height	Italian Marble (16-18 mm thick) Basic Rate: Rs. 5400 per Sq.m	Designer Gypsum False ceiling with Paint Finish
6.	Refuge Balcony	100 mm height skirting + Acrylic Emulsion Paint	NIL	WPC/HPL Soffit Panel (False Ceiling)
7.	Electrical/AHU/Staircase/ELV - Fire rated Door (2hr fire rated)	GI sheet with Rockwool/ mineral wool core	Powder-coated	Fire Rated Mortise Lock with lever handles, Fire Rated Hinges, Automatic Door Closer (Fire Rated), Panic

				Bar, Smoke seal / intumescent strip, Vision panel, Kick plate
8.	Toilet Door	Flush door with both side waterproof laminates (1mm thick) Basic Rate: Rs.1000 per Sq.m		SS Mortise Handle set, SS Hinges. Basic Latch Lock.

Table 23 Finishes schedule for Office

3.8.2 Basement-1&2

Table 24 Finishes schedule for Basement

S. NO.	DESCRIPTIONS	WALL FINISHES	FLOORING	CEILING FINISHES
1	Parking	Plastered with Acrylic Emulsion Paint	75 mm thick VDF using M- 30 Grade with Groove	True Ceiling (Plastered) with Acrylic Emulsion Paint Finish
2	Pump Room	Plastered Acrylic Emulsion Paint	75 mm thick VDF using M- 30 Grade with Groove	True Ceiling (Plastered) with Acrylic Emulsion Paint Finish

Note:

1. Windows Shutters should be 3-Track Sliding UPVC Shutters with SS wire Mosquito Mesh & toughened Glass as per design. Window grills shall be provided as per the approved design or drawing.
2. Granite window jamb shall be provided with a nosing.
3. All Railing to be in Stainless Steel - 316 Grade.
4. All tiles will be laid with spacers on wall and floors and filled with Epoxy Grouting.
5. Aluminium reinforced PVC wall guard & SS Corner Guard to be provided as per design requirements.
6. Staircase and balcony railing to be provided in stainless steel (S.S.), as per design, with a height of 1.0 meter.
7. Refuge Balcony railings shall be finished with stainless steel (S.S.) and toughened glass, with a height of 1.2 meters from finished floor level (FFL), as per the architectural elevation.
8. The overhead tank shall be provided with an extendable staircase made of MS for durability and corrosion resistance.
9. All the brick wall and RCC wall surfaces shall be done with POP punning before applying paint over the surfaces.
10. The provisions for differently abled toilet should also be considered for design and execution in the office.

EXTERNAL FINISHES:

11. Textured with Elastomeric Weatherproof Paint.
12. All Elements to be in Compliance with Energy Conservation Building Code.
13. Building Façade Lighting as per Required LUX Level.
14. Exterior finish shall be completed with paint in combination with architectural elevation / façade design, as per drawings.

The items and specifications mentioned above are minimum requirements and subject to improvement. During the detailed design and engineering stage, the EPC Contractor shall undertake a comprehensive assessment to finalize the detailed requirements. Any improvement or enhancements shall be made in alignment with statutory norms and project objectives.

3.9 Sanitary finishes schedule for Office:

S. No	Fixture Description	Material	Finish	Colour	Mounting Type	Remarks	REF. Model	Location
1.	EWC	Vitreous China	Glazed Ceramic	White/Black	Wall hung wall mounted concealed flush tank with Wrought iron chairs	Dual flush concealed cistern	K-26998IN-0	As per Drawing
2.	Wash Basin	Vitreous China	Glazed Ceramic	White/Black	Countertop/ Wall	With overflow	K-26269IN-0	
3.	Basin Bottle Trap	Brass / PVC	Chrome-plated	Silver	Exposed	Decorative finish	K-75823IN-CP	
4.	Long Body Bib cock	Brass	Chrome-plated	Silver	Deck-mounted	Single lever	K-20070IN-4 CP	
5.	Mirror	Float Glass	Bevelled Edge	Clear	Wall-mounted	6mm thick, moisture-resistant backing	K-26052IN-CPL	
6.	Faucet (General)	Brass	Chrome-plated	Silver	Deck / Wall Mounted	Quarter-turn or sensor type	18656IN-ND	
7.	Floor Drain	Stainless Steel	Brushed SS	Silver	Floor-mounted	Removable grating, 100mm diameter	K-75422IN-CP	
8.	Urinal with Flush	Vitreous China	Glazed Ceramic	White	Wall-mounted	Infrared sensor flush	K-26475IN-ER-0	

	Valve with Separator							
9.	Soap Dispenser	ABS / SS	Chrome / Matte	Silver	Wall-mounted	Manual or sensor-operated	K-10712D-CP	
10.	Toilet Paper Holder	Stainless Steel	Chrome-plated	Silver	Wall-mounted	With cover or open type	K-25071IN-CP	
11.	Angle Valve	Brass	Chrome-plated	Silver	Wall-mounted	Quarter-turn, used for WC and basins	K-76389IN-9-CP	
12.	Bidet Shower (Health Faucet)	ABS / Brass	Chrome-plated	Silver	Wall-mounted	With flexible hose & holder	12927IN-CP	

Table 25 Sanitary finishes schedule for Office

General Notes

- All reference models mentioned above are from Kohler brand.
- All items must be water-saving compliant where applicable.
- Sanitary fixtures must conform to IS/ASTM/EN standards.
- Submit samples for approval before procurement.
- Installation to be per manufacturer's specifications and coordinated with MEP services.

The data provided above shall be considered as the minimum indicative requirement. The specific brands mentioned, are intended solely for benchmarking purposes and are not mandatory recommendations. Other makes specified in the technical specification may be proposed, provided they meet or exceed the specified benchmark in terms of quality, performance, and technical compliance.

The above list of Sanitary fittings are indicative only. Additional items/equipment/fixtures/fittings may be identified during the detailed design phase and the EPC contractor has to execute the same. FAT shall include verification of safety features, protection coordination, control logic, and compliance with statutory and project specifications. The Employer/Consultant shall be notified in advance to witness the FAT as required.

4 STRUCTURAL DESIGN BASIS REPORT

4.1 Introduction

The structure is designed for Residential Flats & Clubhouse, at Hyderabad. This report covers minimum design specifications, which will form the overall design philosophy to be adopted in the structural design of the project. The Structural Design Basis Report (DBR) is prepared in reference with the relevant IS Codes and Architectural drawings. 3D wire frame models of the building are generated and analyzed for various loads and load combinations using ETABS design software. The loads and load combinations were considered as per relevant IS codes. The RCC Building consists of

S.No	Block Name	Total Height (m)	Floor Height Clear (m)	No of Floors
1	Office	78.75	3.6	2B+ S + 20+(10 Future floors)
2	CGM & GM flats	74.1	3.2	B + S + 21
3	DGM flats	94.2	3.2	B + S + 27
4	Club house	18.75	3.6	B + G + 4

4.2 Site details

4.2.1 Project Location

The proposed project is located at Hyderabad.

4.2.2 Soil Data

Geo technical investigation is done and the report is enclosed as Annexure-1 (Geo-Technical Report)

The soil investigation report provided as part of the tender documents is for reference and bidding purposes only.

Any confirmatory soil testing or additional geotechnical investigations deemed necessary for design and execution shall be carried out by the EPC Contractor at their own cost, within the quoted contract price, and in full compliance with relevant IS codes and standards.

4.3 Structural system

4.3.1 Foundation

For this kind of proposed structure and sub soil condition raft foundation is the suitable foundation to adopt.
Depth of foundation should be, the embedded depth of the building shall be at least 1/15 of height of building for raft foundation and 1/20 of the height of building for pile and piled raft

foundation (excluding pile length)
Since chlorides and sulphates are well within the permissible limits, no special steel or cement is required for the construction. (As per geotechnical report)

4.3.2 Super-Structure

The structural system for residential towers should be designed as per Monolithic/Shear wall technology. The brick masonry shall be considered for kitchen and toilet internal walls (for ease of plumbing pipeline installations). The structural system for office building should be designed as per PT (Post Tensioned) flat slab and shear wall (along with columns) technology. The functional requirements of the building are tabulated below:

Basement

S.No.	Description	Floor to Ceiling Height(m)	Floor Functional Requirement
1	Basement-1	3.6	Car Parking
2	Basement-2	3.6	Car Parking

Office

S.No.	Description	Floor to RCC Ceiling Height(m)	Floor Functional Requirement
1	Stilt Floor	3.6	Car Parking
2	Typical floor (20+10 future)	3.6	Office room & Toilet
4	Terrace floor	3.3	Solar Panel & Outdoor Equipment

DGM flats

S.No.	Description	Floor to RCC Ceiling Height (m)	Floor Functional Requirement
1	Stilt Floor	3.2	Car Parking
2	Typical floor	3.2	Rooms, Kitchen, Balcony, Corridor & Toilet, Recreational Area
3	Terrace floor	3	Solar Panel & Outdoor Equipment

Note: A double height recreational floor should be considered by the EPC contractor as per the concept Architectural drawings.

CGM & GM flats

S.No.	Description	Floor to RCC Ceiling Height (m)	Floor Functional Requirement
1	Stilt Floor	3.2	Car Parking
2	Typical floor	3.2	Rooms, Kitchen, Balcony, Corridor & Toilet, Recreational Area
3	Terrace floor	3	Solar Panel & Outdoor Equipment

Note: A double height recreational floor should be considered by the EPC contractor as per the concept Architectural drawings.

Club House

S.No.	Description	Floor Height Clear (m)	Floor Functional Requirement
1	Ground floor	3.6	Cafeteria, Locker room, Swimming pool & Toilet
2	First Floor	3.6	Gym, Play area & Toilet
3	Second floor	3.6	Play area, Corridor & Toilet
4	Third & Fourth floor	3.6	Hall, Balcony & Toilet
5	Terrace floor	3.3	Solar Panel & Outdoor Equipment

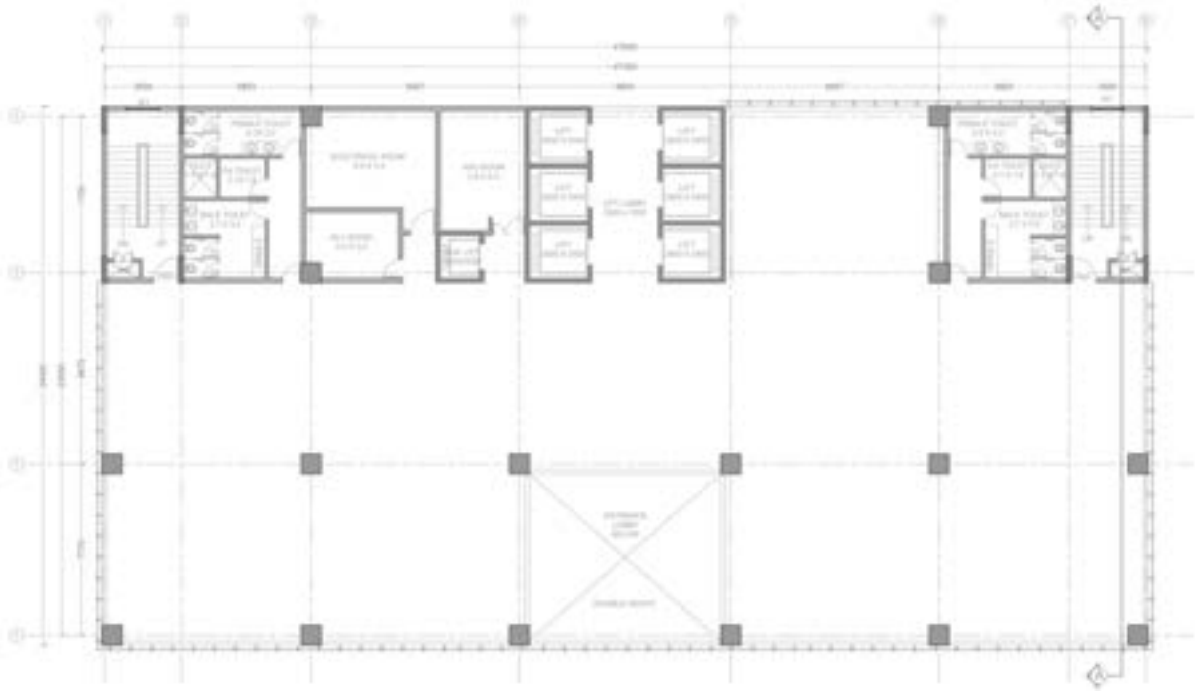
Note: Double height should be considered by the EPC contractor as per the concept Architectural drawings where ever mentioned in the concept architectural drawing.

The gravity floor system consists of reinforced concrete structural system. The floor system will be supported on reinforced concrete Columns.

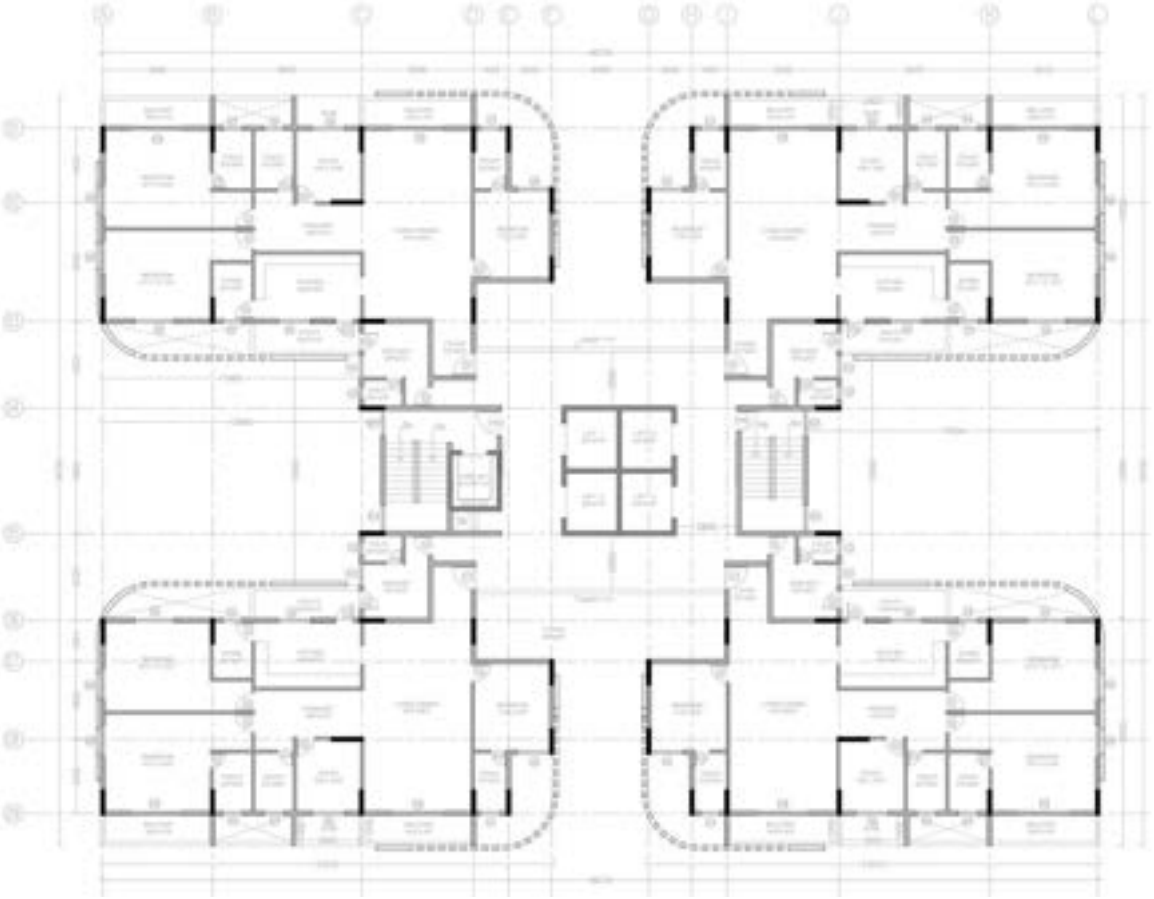
4.3.3 Structure layout

The RCC Building Typical Floor Layout is as follows.

Office



DGM Flats



CGM & GM Flats

Clubhouse

4.4 Design codes and standards

Design Loads Other than Earthquake loads	
IS 875 (Part-1): 1987 Reaffirmed Year: 2018	Code of Practice for Design Loads (Other than Earthquake) For Buildings and Structures -Dead Loads
IS 875 (Part-2): 1987 Reaffirmed Year: 2018	Code of Practice for Design Loads (Other than Earthquake) For Buildings and Structures- Imposed Loads
IS 875 (Part-3): 2015 Reaffirmed Year: 2020	Code of Practice for Design Loads (Other than Earthquake) For Buildings and Structures- Wind Loads
IS 875 (Part-5): 1987 Reaffirmed Year: 2018	Code of Practice for Design Loads (Other than Earthquake) For Buildings and Structures- Special Loads and Combinations
Design for Earthquake Loads	
IS 1893 – 2016 (Part – 1) Reaffirmed Year: 2021	Earthquake Resistant Design Structures
IS 13920 – 2016 Reaffirmed Year: 2021	Ductile Detailing of Reinforced Concrete
IS 4326 – 2013 Reaffirmed Year: 2018	Earthquake Resistant Design and Construction of Buildings
Design of Concrete Structures	
IS 456: 2000 Reaffirmed Year: 2021	Code of Practice for Plain and Reinforced Concrete
SP 20: 1991	Handbook on Masonry Design and Construction
SP 23: 1982	Handbook on Concrete Mixes
SP 34: 1987	Handbook on Concrete Reinforcement and Detailing
IS 1904: 2021	Code of practice for General requirements for design and construction of foundations in soils
IS 2950: 1981 Reaffirmed Year: 2018	Code of practice for design and construction of raft foundations: Part 1 design
IS 2062: 2011 Reaffirmed Year: 2021	Steel for General Structural Purposes
IS 1786:2008 Reaffirmed Year: 2023	High strength deformed steel bars and wires for concrete reinforcement

IS 3370: 2021	Specifications for Liquid Containing Structures
IS 383: 2016 Reaffirmed Year: 2021	Specification for Coarse and Fine Aggregates from Natural Sources for Concrete
IS 269: 2015 Reaffirmed Year: 2020	Ordinary Portland Cement – Specification
IS 1489: 2015 Reaffirmed Year: 2020	Portland Pozzolana Cement – Specification
IS 9103: 1999 Reaffirmed Year: 2018	Concrete Admixtures - Specification
IS 2185(Part 1):2005 Reaffirmed Year: 2020	Concrete masonry units - Specification: Part 1 hollow and solid concrete blocks
IS 6041:1985 Reaffirmed Year: 2020	Code of Practice for construction of Autoclaved Cellular Concrete block masonry
Design of Structural Steel Construction	
IS 800: 2007 Reaffirmed Year: 2022	Code of Practice for Construction in Steel
IS 11384: 2022	Code of Practice for Composite Construction in Structural Steel and Concrete
IS 816: 1969 Reaffirmed Year: 2019	Code of Practice for Use of Metal Arc Welding for General Construction in Mild Steel
Design of Tall Concrete Buildings	
IS 16700: 2023	Criteria for Structural Safety of Tall buildings
Design of Prestressed Concrete	
IS 1343: 2012	Code of Practice for Prestressed Concrete

4.5 Construction materials

4.5.1 Concrete

Concrete mix design grades of specified cube strength to satisfy codal norms, will be adopted as per design requirement of the structure. The following grade of concrete is used in the design of RCC Building

S. No.	Element	Concrete Grade
1	Foundation and Retaining Wall	M30 TO M50

2	Beams (PT & Conventional)	M30 TO M50
3	Column & Shear wall	M30 TO M50
4	Slab (PT & Conventional)	M30 TO M50
5	PCC	M10/M15

Minimum cement content, water cement ratio etc. shall conform to IS 456:2000 provisions for durability and strength criteria.

4.5.2 Cement

Chemical and physical requirements for Ordinary Portland Cement of Grade 43, Grade 53 and Portland Pozzolana Cement shall be in accordance with IS 8112, IS 12269, IS 1489 (Part1) respectively.

4.5.3 Aggregate

Fine aggregate:

Fine aggregate shall be clean, hard and durable and shall be natural sand, crushed gravel sand or crushed rock sand complying with IS 383. The material shall pass through a 4.75 mm IS sieve, and the grading shall be in accordance with IS 383.

Coarse aggregate:

Coarse aggregate shall be clean hard and durable crushed rock, crushed gravel or natural gravel.

It shall be graded aggregate of nominal size 20 mm and 12 mm in accordance with IS 383.

4.5.4 Admixtures and additives

Admixtures of approved quality shall be mixed with concrete conforming to IS 9103. Self-compacting agents shall be used to enhance the performance of concrete in both fresh and hardened state.

4.5.5 Water

Water used for mixing and curing shall be clean and free from injurious quantities of alkalis, acids, oils, salts, sugar, organic materials, vegetable growth or other substance that may be deleterious to bricks, stone, concrete or steel and shall comply with the requirements of IS 456:2000. The pH value of water shall be not less than 6.

4.5.6 Reinforcement

For design of concrete elements, High Yield Strength Deformed (HYSD) having yield strength of 500 MPa and minimum percentage elongation of 14.5% shall be used. It shall conform to IS 1786:2008.

4.5.7 Post-tensioning tendons

Permissible tensile stresses in flexural member are 1860 MPa as per IS 1343. Minimum Bonded reinforcement shall be provided in all prestressed flexural members is as per IS1343 (k = 0.002/m)

General Assumptions for PT slab and Beam design

- Strength design of prestressed member for flexure and axial loads shall be based on assumptions given in IS1343.
- Design moment strength of flexural members shall be computed by the strength design method of the code IS1343.
- Serviceability Design Requirements are as per IS1343.
- Deflection of prestressed flexural members shall be calculated in accordance with IS1343.
- Permissible tensile stresses in flexural member are as per IS 1343.
- Minimum Bonded reinforcement shall be provided in all prestressed flexural members is as per IS1343.

4.6 Design loads

The building is analysed for following basic load cases: -

- Dead Load (DL)
- Superimposed dead load (SDL)
- Live load (LL)
- Seismic load (EQ/Spec)
- Wind load (WL)

4.6.1 Dead Loads (DL)

The dead loads considered as per IS: 875 (Part 1)-1987

Self-weight of plain cement concrete	24 kN/m^3
Self-weight of reinforced cement concrete	25 kN/m^3
Self-weight of mortar	20 kN/m^3

4.6.2 Superimposed Dead Loads (SDL)

Load on Typical floor Slab (Residential Area)		
Thickness of the floor finish mortar & plastering	75mm	1.5 kN/m^2
Thickness of the floor tiles	25mm	0.5 kN/m^2

Total		2 kN/m^2
Load on Typical floor Slab (Toilet Area)		
Thickness of the filling	250mm	5.0 kN/m^2
Thickness of the floor tiles and finishes	25mm	0.5 kN/m^2
Total		3.0 kN/m^2
AAC Wall on Typical Floor Beam		
200mm Thick wall	2.85m ht	5.244 kN/m
100mm Thick wall	3.15m ht	3.276 kN/m
200mm Thick wall	3.7m ht	6.808 kN/m
100mm Thick wall	4.0m ht	4.160 kN/m
Brick Wall		
230mm Thick wall	2.85m ht	14.82 kN/m
115mm Thick wall	3.15m ht	9.135 kN/m

4.6.3 Live Load.

The Live load considered as per IS:875 (Part 2)-1987

Room (Residence)	2 kN/m^2
Toilet	2 kN/m^2
Corridor, Balcony	3 kN/m^2
Staircase	3 kN/m^2
Conference Hall, Play Area	5 kN/m^2
Room (Commercial)	5 kN/m^2
EB Room	7.5 kN/m^2
Terrace Floor	5 kN/m^2

Live Load Reduction (IS 875 (Part-2): 1987- Clause 3.2.1 & Clause 3.2.1.1)

For floor supporting structural members, following reductions is assumed in total imposed

loads on floors in designing columns, load bearing walls, piers, their supports and foundations:

No of Floors (including roof)	Reduction in Live load (%)
1	0
2	10
3	20
4	30

No reduction shall be made for any plant or machinery which is specifically allowed for, or in buildings for storage purposes, warehouses and garages. However, for other buildings where the floor is designed for an imposed floor load of 5.0 kN/m2 or more, the reductions shown above shall be taken, provided that the loading assumed is not less than it would have been if all the floors had been designed for 5.0 kN/m2 with no reductions.

In case if the reduced load in the lower floor is lesser than the reduced load in the upper floor, then reduced load of the upper floor will be adopted.

4.6.4 Seismic Loads

The following parameters are adopted for calculating seismic load as per IS 1893:2016.

Seismic Zone	
Zone factor (Z)	0.1
Seismic importance factor (I)	1.5 (for Office Building); 1.2 (for Residential Building)
Response reduction factor (R)	5.0 / 4.0 (3.0 for only low rise building)
Approx. fundamental time period (Ta)	Time period as per code
Soil type for estimating (Sa/g)	Type I as per IS 1893
Damping	5%
Mass participation	90%
Modal combination	CQC

Seismic weight	DL + SDL + 0.25 LL_1 (<3KPa) DL + SDL + 0.5 LL_1 (>3KPa)
Storey drift limitation	h_{story} / 250
Initial scale factor for Response spectrum to enhance the base shear	Ig/2R (In ETABS 'I/2R' is self-calculated, hence only 'g' to be applied)
Vertical earthquake shall be considered as per IS 1893 (Part 1):2016	

Percentage of Imposed Load to Calculate Seismic Weight		
S.No.	Imposed Uniformity Distributed Floor Loads	Percentage of Imposed Load
1.	Up to and including 3.0 kN/m^2	25
2.	Above 3.0 kN/m^2	50

Note:

1. It shall be ensured that the first three modes together contribute at least 65 % mass participation factor in each principal plan direction.
2. Response spectrum Analysis is performed, the Static design base shear (VB) shall be compared with Dynamic design base shear (VBT) is calculated using a fundamental time period Ta. If VB is less than VBT, all force quantities are multiplied by Scale factor.

4.6.5 Wind Loads

The following parameters are used for calculating wind load as per IS 875 Part 3-2015.

Basic wind speed, V_b	44 m/s
k1(probability factor)	1.07
Terrain category	Category 2
k2 = Factors to obtain Design Wind Speed Variation with Height in Different Terrains	Up to 10m – 1.00 10m to 15m – 1.05 15m to 20m – 1.07 20m to 30m – 1.12 30m to 50m – 1.17 50m to 100m – 1.24
k3 (Topography factor)	1.0
k4(Importance factor for cyclonic region)	1.0

Design wind velocity, V_z (m/s)	V_b x k1 x k2 x k3 x k4 Up to 10m – 47.08 10m to 15m – 49.4 15m to 20m – 50.4 20m to 30m – 52.7 30m to 50m – 55.1 50m to 100m – 58.4
Wind pressure at height z, P_z (kN/m^2)	0.6 x V_z^2 Up to 10m – 1.33 10m to 15m – 1.47 15m to 20m – 1.52 20m to 30m – 1.67 30m to 50m – 1.82 50m to 100m – 2.04
Wind lateral deflection limit	H/500
Design wind pressure, P_d	P_z x K_d x K_a x K_c > 0.7P_z
Where, K_d	Wind directionality factor
K_a	Area averaging factor
K_c	Combination factor

4.7 Load combinations

The following load combinations are used to design the structural elements.

S. No.	Load Combination	Load Factors					
		DL	LL	WLX	WLY	Scaled	
						SpecX	SpecY
1.	1.5 (DL+LL)	1.5	1.5	-	-	-	-
2.	1.2 (DL+LL±SpecX)	1.2	1.2	-	-	±1.2	-
3.	1.2 (DL+LL±SpecY)	1.2	1.2	-	-	-	± 1.2
4.	1.5 (DL ± SpecX)	1.5	-	-	-	±1.5	-
5.	1.5 (DL ± SpecY)	1.5	-	-	-	-	± 1.5
6.	0.9 DL ± 1.5(SpecX)	0.9	-	-	-	±1.5	-
7.	0.9 DL ± 1.5(SpecY)	0.9	-	-	-	-	± 1.5
8.	1.2 (DL+LL ± WLX)	1.2	1.2	±1.2	-	-	-
9.	1.2 (DL + LL ± WLY)	1.2	1.2	-	±1.2	-	-

10.	1.5 (DL ± WLX)	1.5	-	±1.5	-	-	-
11.	1.5 (DL ± WLY)	1.5	-	-	±1.5	-	-
12.	0.9 DL ± 1.5WLX	0.9	-	±1.5	-	-	-
13.	0.9 DL ± 1.5 WLY	0.9	-	-	±1.5	-	-

4.7.1 Serviceability Load Combinations

S. No.	Load Combination	Load Factors					
		DL	LL	WLX	WLY	SpecX	SpecY
1.	1.0 (DL + LL)	1.0	1.0	-	-	-	-
2.	1.0DL+0.8LL±0.8SpecX	1.0	0.8	-	-	± 0.8	-
3.	1.0DL+0.8LL±0.8SpecY	1.0	1.0	-	-	-	± 0.8
4.	1.0 (DL ± SpecX)	1.0	-	-	-	± 1.0	-
5.	1.0 (DL ± SpecY)	1.0	-	-	-	-	± 1.0
6.	1.0 (DL ± WLX)	1.0	-	± 1.0	-	-	-
7.	1.0 (DL ± WLY)	1.0	-	-	± 1.0	-	-
8.	1.0 DL + 0.8 LL ± 0.8 WLX	1.0	0.8	± 0.8	-	-	-
9.	1.0 DL + 0.8 LL ± 0.8 WLY	1.0	0.8	-	± 0.8	-	-

D.L.: Dead Load (Includes SDL); L. L: Live Load
WL: Wind Load; Spec/EQ: Seismic Load,
Suffixes X, Y and Z in the above table indicate the direction in which the force is applied.
All members will be designed for the largest value of the design forces obtained due to positive as well as negative values of reversible combination of forces (Earthquake and wind).

4.8 Lateral drift and member stiffness modifiers

The maximum inter-storey lateral drift under lateral load shall not exceed the following values:

Drift by	Load Combination	Limitation
Seismic Load	DL + 0.8 LL ± 0.8 Spec Spec shall be unscaled	H=storey /250
Wind Load	DL + 0.8 LL ± 0.8 WL	H /500 at Terrace

(The wind load used in the combinations is with return period of 100 years).

Cracked sectional properties of the concrete elements for Wind and Seismic drift (From IS 16700:2017) and stiffness modifiers to be considered in ETABS analysis shall be as follows:

Structural Element	lodel as	Factored Loads		tiffness Modifiers
		Area	Moment of Inertia	
Columns	ine	1.0 A_g	0.70 I_g	M22, M33
Walls	hell	1.0 A_g	0.70 I_g	M11, M12, M22
Beams	ine	1.0 A_g	0.35 I_g	M22, M33
Slab	hell	1.0 A_g	0.25 I_g	M11, M12, M22

Since the shear capacity of concrete is low, torsional effect can be redistributed to the adjoining members in flexure by assigning a torsion modifier of 0.01 to all the line elements (except a beam supporting a cantilever without back span which will be in pure torsion)

4.9 Service ability criteria

4.9.1 Durability and fire resistance

Concrete cover requirement for a fire rating of 2 hours for Shear wall/Columns, beams and slabs shall be as follows:

S. No.	Element	Cover Adopted (mm)
a	Foundation	**50**
b	Column	**40**
c	Beams & RC walls	**30**
d	Slabs	**25**

Minimum dimensions of reinforced concrete members for fire 2hr resistance shall be as follows:

S. No.	Element	Minimum thickness (mm) (Fire Criteria)	Minimum reinforcement
1	Columns	300	0.8 % of cross section area

2	Floor Slabs	125	0.12% of cross section area
3	Floor Beams	230	0.17 % of c/s area for Non-Ductile beams

Minimum water cement ratio and minimum cement content shall confirm to IS 456:2000 provisions of durability and strength.

4.9.2 Deflection control

• Short term deflection due to SDL+ Live load	<L /350 or 20 mm whichever is less
• Long term deflection	< L /250

Creep coefficients shall be taken as:

7 days	2.2
• Shrinkage coefficient	0.0003

As per IS 16700-2023 maximum Lateral drifts value

• Total drift at the topmost usable floor	<H /500
• For a single storey the drift limit	< hi /400
• For design earthquake force, the maximum inter-story drift	< hi /250

- hi - Inter-storey height of i th floor in the building
- H - Building height from its base to roof level

4.9.3 Crack width control

Underground rooms, retaining walls, all water retaining structures, including UGT, STP, overhead water tanks shall be designed as per IS 456 & IS 3370, with allowable crack width for moderate exposure.
In addition, water proofing of such structures to be carried out using appropriate technology.

4.10 Analysis

The structure was analysed for the different load combinations as mentioned above, and the capacity of the structural elements such as columns, beams and slabs were checked for the maximum forces obtained from ETABS design software.

4.10.1 Gravity Loads

Gravity loads develop by virtue of self-weight of the structure and superimposed loads due to occupancy, architectural features, services, etc. Resistance to gravity loads shall be provided by concrete slabs supported by a network of beams. Beams will transfer the loads to vertical elements like columns and walls.

4.10.2 Lateral Loads

Lateral loads on the structure develop primarily due to wind and seismic activity. Resistance to lateral loads shall be provided by reinforced concrete ductile shear walls/Columns
Design of shear walls and columns will incorporate ductile reinforcement detailing in accordance with IS 13920:2016.
Design for seismic loads shall be based on response spectrum analysis of the three-dimensional model of the structures as per IS 1893: 2016. Design for wind loads shall be based on IS 875:2015-PART -III.
Retaining walls and all other sub-structure members shall be designed based on the soil parameters specified in geo-technical report, with the aid of in-house design spreadsheets.

4.11 Design

The steel reinforcements in the foundation, columns, shear walls; beams and slabs are calculated for maximum forces obtained from the static and dynamic analyses for the critical load combinations.

4.11.1 Design of Sub Structure

Isolated foundation was recommended in the soil test report for this RCC building. The maximum axial load and moments acting on each column/shear wall were obtained from ETABS output. Based on the soil test report, the foundation was designed for the maximum axial load and moments by using SAFE design software.

4.11.2 Design of Super Structure

All structural members shall be designed following the guidelines of the codes mentioned in section 4.0. Structural design will be in conformance to the stability criteria prescribed in codes IS 456:2000 and IS16700:2023.

4.11.3 Design of Columns

Columns were designed for the maximum axial load and moments obtained from the analyses for the critical load combinations. The area of steel reinforcements obtained for columns from ETABS output were checked manually.

4.11.4 Design of Shear wall

Shear wall designed to resist lateral forces like wind and seismic loads. It acts as a vertical cantilever, transferring these forces to the foundation. Shear walls help prevent lateral sway and damage to buildings, making them particularly important in areas prone to earthquakes. The area of steel reinforcements obtained for shear walls from ETABS output were checked manually.

4.11.5 Design of Beams

Beams were designed for the maximum moments and shear forces obtained from analyses for the critical load combinations. The area of steel reinforcements obtained for beams from

ETABS output were checked manually.

4.11.6 Design of Slabs and Staircase

All slabs and staircase were designed as per IS 456:2000 with the aid of in-house design spreadsheets.
All other structural elements and Retaining walls shall be designed based on the soil parameters specified in geo-technical report, with the aid of in-house design spreadsheets.

4.12 Conclusion

The design basis outlined in this document is based on currently available data issued by the client and architect and it covers all the codal norms for the geometry and usage of the structure. It will need to be updated if design objectives or assumptions are revised. 3D wire frame models of the building are generated and analyzed for various loads and load combinations using ETABS design software & BIM.

This design brief report deals with Rapid construction methodology like Aluminium formwork However Contractors shall explore other Rapid construction methodology like Precast Construction methodology may also be used for rapid construction, and corresponding Indian standard code for same shall be adopted.

All other guidelines or specific details will be given along with the working drawing and general drawing. Any perceived non-conformance with the project standards or expectations should be brought to our attention as early as possible.

5 ELECTRICAL DESIGN BASIS REPORT:

The scheme covers the complete Electrification of the proposed Construction of Residential flats and office building for SBI Enclave, Hyderabad. Design, Planning, Supply, Installation, Testing and Commissioning of following E&M Works/ Services with ultra-modern and state of the art best industry standards and practices, as per CPWD Specifications, Govt. Building Bylaws, Local Fire
Service, NBC 2016, ECBC 2017, CPCB, relevant IS Codes, Indian Electricity Rules and Acts all amended up to date. The electrical systems, including power supply, metering, and energy infrastructure, shall conform to the norms and safety standards established by the **Central Electricity Authority (CEA)**. The EPC Contractor shall ensure that all installations and design parameters meet these regulatory requirements to obtain statutory approvals and ensure sustainable development, to get IGBC Platinum and Net Zero Rating for the campus

1. CPWD General Specifications for Electrical Works Part I Internal - 2023.
2. CPWD General Specifications for Electrical Works Part II (External) 2023.
3. CPWD General Specifications for Electrical Works (Part-III-Lifts & Escalators) - 2003.
4. CPWD General Specifications for Electrical Works Part IV Sub Station – 2013.
5. CPWD General Specifications for Electrical Works Part V Wet Riser & Sprinkler System– 2020.
6. CPWD General Specifications for Electrical Works Part VI Fire Detection and Alarm System – 2018.
7. CPWD General Specifications for Electrical Works Part VII D.G. Sets - 2013.
8. CPWD General Specifications for Electrical Works Part VIII Gas Based Fire Extinguishing System – 2013.
9. CPWD General Specifications for Heating, Ventilation & Air-Conditioning (HVAC) - 2017 and amendments up to date.

a) The rating and capacity of equipment indicated herein below are minimum to be provided.
b) However during detailed designing, if required and found necessary, the capacity / rating of the equipment may be upgraded.
c) Adequate measures shall be considered in design and detailed Engineering for safety of men & material for all services during construction, testing, commissioning, operation & maintenance.

5.1 Codes and standards

	IEC: 62271 - 1	High-voltage switch gear and control gear - Common specifications.
	IEC: 62271 - 100	High-voltage switch gear and control gear - Alternating current circuit-breakers
	IEC: 62271 - 200	High-voltage switchgear and control gear - AC metal enclosed switchgear and control gear for rated voltages above 1 kV and up to and including 52 kV.
	IEC: 600441-1	Current Transformers

	IEC: 600441-2	Voltage Transformers
	IEC: 60529	Classification of degrees of protection provided by enclosures
	IEC: 60038	Standard Voltage
	IEC: 60255	Measuring relays and protection equipment - Part 24: Common format for transient data exchange (COMTRADE) for power systems.
	ANSI IEEE C 37/20	Switch gear assemblies including metal enclosed bus.

Low Voltage Switchgear -Standards & Codes

Updated and current Indian Standard Specifications and Codes of Practice will apply to the equipment and the work covered by the scope of this contract.
Low Voltage Switchgear Assemblies IEC61 439-1 & 2
Low Voltage switchgear & control gear IEC 60 947 /IS 13947: 1993
Part I: General rules
Part II: Circuit Breakers
Part III: Switches, disconnectors, switch disconnectors and fuse combination units
Part IV: Contactors and Motor starters
Part V: Control circuit devices and switching elements
Degree of Protection of Enclosures for low voltage switchgear: IEC60529 /IS 2147: 1962
Internal arc – IEC 61641

CABLES - CODES OF PRACTICE GUIDE		
1.	IS 694: 1990 IEC 60227 - 1 to 5 : 1979	PVC insulated cables for working voltages up to and including 1100 V
2.	IS 694 : 2010	Polyvinyl chloride insulated sheathed and unsheathed cables with rigid and flexible conductor for rated voltages up to and including 450/750 V: Part general requirements (fourth revision)
3.	IS: 7098: 1988 (Part-I)	XLPE insulated (heavy duty) electric cables. For working Voltages up to and including 1100 V (third revision)
4.	IS 4288 : 1988	PVC insulated (heavy duty) electric cables with solid aluminium conductors for voltages up to and 1100 V (second revision)

IMPORTANT INDIAN STANDARDS CODES OF PRACTICE GUIDE		
Sl.No.	Standard	Title
1	IS 732:1989	Code of practice for electrical wiring installations (third revision)
2	IS 4648:1968	Guide for electrical layout in residential buildings
3	IS 8061:1976	Code of practice for design, installation and maintenance of service lines upto and including 650 V
4	IS 8884:1978	Code of practice for the installation of electric bells and call systems
5	IS 5578:1984/ IEC 60391 (1972) IS 11353:1985/ IEC 60445 (1973)	Guide for marking of insulated conductors (first revision)
6	IS 11353:1985/ IEC 60445 (1973)	Guide for uniform system of marking and identification of conductors and apparatus terminals
7	IS 13234:1991/ IEC 60909: 1988	Guide for short circuit current calculations in three-phase ac systems (superseding IS 5728)
8	IS 7752 (Part 1):1975	Guide for improvement of power factor
9	IS 3646 (Part 2):1966	Code of practice for interior illumination: Part 2 Schedule of illumination and glare index
10	IS 3646 (Part 3):1968	Code of practice for interior illumination: Part 3 Calculation of coefficients of utilization by the BZ method
11	IS 10118 (Part 1):1982	Code of practice for selection, installation and maintenance of switchgear and controlgear : Part 1 General
12	IS 10118 (Part 2):1982	Code of practice for selection, installation and maintenance of Switchgear and control gear : Part 2 Selection
13	IS 10118 (Part 3):1982	Code of practice for selection, installation and maintenance of switchgear and control gear : Part 3 Installation
14	IS 10118 (Part 4):1982	Code of practice for selection, installation and maintenance of switchgear and control gear : Part 4 Main
15	IS 4146:1983	Application guide for voltage transformers (first revision)

16	IS 4201:1983	Application guide for current transformers (first revision)
17	IS 5547:1983	Application guide for capacitor voltage transformers (first revision)
18	IS 2309:1989	Code of practice for protection of buildings and allied structures against lightning (second revision)
19	IS 3043:1987	Code of practice for earthing
20	IS 5216 (Part 1):1982	Recommendations on safety procedures and practices in electrical work: Part 1 General (first revision)
21	IS 5216 (Part 1):1982	Recommendations on safety procedures and practices in electrical work: Part 2 Life saving techniques (first revision)

ELECTRIC FANS CODES OF PRACTICE GUIDE		
Sl.No	Standard	Title
1	IS 555:1979	Electric table type fans and regulators (third revision)
2	IS 1169:1967	Electric pedestal type fans and regulators (first revision)
3	IS 374:1979	Electric ceiling type fans and regulators (third revision)
4	IS 2997:1964	Air circulator type electric fans and regulators
5	IEC: 60665 (1981) IS 2312:1967	Propeller type AC ventilating fans (first revision), Draft Standard issued in wide circulation
6	IS 3588:1987	Electric axial flow fans (first revision)
7	IS 3963:1987	Roof extractor units (first revision)
8	IS 4283:1981	Hot air fans (first revision)
9	IS 6272:1987	Industrial cooling fans (man coolers) (first revision)
10	IS 4894:1987	Centrifugal fans (first revision)
11	IS 11037:1984	Electronic type fan regulators
12	IS 12155:1987	General and safety requirements for fans and regulators for household and similar purposes

LOW VOLTAGE SWITCH GEAR AND CONTROL GEAR CODES OF PRACTICE GUIDE		
Sl. No.	Standard	Title
1	IS 4237:1982	General requirements for switchgear and control gear for voltages not exceeding 1000 volts ac or 1200 volts dc: (first revision) [superseded by IS 13947 (Part 1:1993)]
2	IS 6875 (Part 1):1973	Control switches (switching devices for control and auxiliary circuits including contactor relays) for voltages up to and including 1000 V a.c. & 1200 V d.c: Part 1 General requirements [superseded by

		IS 13947 (Part 5/Section 1)]
3	IS 6875 (Part 2):1973	Control switches (switching devices for control and auxiliary circuits including contactor relays) for voltages up to and including 1000 V a.c and 1200 V d.c: Part 2 Push-buttons and related control switches [superseded by IS 13947 (Part 5/Section 1)]
4	IS 6875 (Part 3):1989	Control switches (switching devices for control and auxiliary circuits including contactor relays) for voltages up to and including 1000 V a.c and 1200 V d.c: Part 3 Rotary control switches [superseded by IS 13947 (Part 5/Section 1)]
5	IS 10027:2000	Composite units of air-break switches and rewirable type fuses for voltages not exceeding 650 volt ac - Specification (first revision)
6	IS 4064 (Part 1):1978	Air-break switches, air break disconnectors, air-break switch disconnectors and fuses combination units for voltages not exceeding 1000 V ac or 1200 V dc: Part 1 General requirements
7	IS 2675:1983	Enclosed Distribution Fuse Boards and Cut Outs for voltages not exceeding 1000 V A.C. or 1200 V D.C.: Circuit-breakers for over current protection for household and similar installations (second revision)
8	IS 8828:1996	Miniature circuit breaker boards for voltage upto and including 1000 V A.c
9	IS 13032:1991	Residual current operated circuit-breakers for household and similar uses: Part 1: Circuit-breakers without integral over current protection
10	IS 12640 (Part 2):2007	Residual current operated circuit-breakers for household and similar uses: Part 2: Circuit breakers with integral over current protection
11	IS 2959:1985	Contactors for voltages not exceeding 1000 V a.c (second revision) [superseded by IS 13947 (Part 4 Section 1)]
12	IS 13314:1992	Specification for control transformers for switchgear and control gear for voltages not exceeding 1000 Volt AC
13	IS 5039:1983	Distribution pillars for voltages not exceeding 1000 volts (first revision)
14	IS 8623 (Part 1):1993 / IEC60439-1 (1985)/IS 8623 (Part 1):1985	Specification for low voltage switchgear and control gear assemblies: Part 1 Requirements for type-tested and partially type tested assemblies (first revision)
15	IS 8623 (Part 2):1993/IEC60439-2 (1987)	Specification for low voltage switchgear and control gear assemblies: Part 2 Particular requirements for busbar trunking systems
16	IS 8544 (Part 1):1977	Motor starters for voltages not exceeding 1000 V: Part 1 Direct-on-line starters [superseded by IS 13947 (Part 4 Section 1)]
18	IS 8544 (Part 2):1977	Motor starters for voltages not exceeding 1000 V: Part 2 Star-delta starters [superseded by IS 13947 (Part 4/Section 1):1993]
19	IS 8544 (Part 3/Sec 1):1979	Motor starters for voltages not exceeding 1000 V:

		Part 3 Rheostatic motor starters, Section 1 General requirements [superseded by IS 13947]
20	IS 8544 (Part 4):1979	Motor starters for voltages not exceeding 1000 V: Part 4 Reduced voltage ac starters: two step auto-transformer starters [superseded by IS 13947 (Part 4/Section 1):1993]

Sl. No.	Standard	Title
1	IS 694:1990 / IEC 60227-1 to 5 (1979)	PVC Insulated cables for working voltages up to and including 1100 V
2	IS 694:2010	Polyvinyl chloride insulated sheathed and unsheathed cables with rigid and flexible conductor for rated voltages up to and including 450/750 V : Part 1 General requirements (fourth revision)
3	IS 1554 (Part 1):1988 / IEC 60502 (1983)	PVC insulated (heavy duty) electric cables: Part 2 For working voltages up to and including 1100 V (Third revision)
4	IS 3961 (Part 1):1967	Recommended current ratings for cables: Part 1 Paper insulated lead sheathed cables
5	IS 4288:1988	PVC insulated (heavy duty) electric cables with solid aluminium conductors for voltages up to and including 1100 V (second revision)
6	IS 4289 (Part 1):1984 / IEC 60245-5	Flexible cables for lifts and other flexible connections: Part 1 Elastomer insulated cables (first revision)

ELECTRIC WIRING ACCESSORIES CODES OF PRACTICE GUIDE		
Sl. No.	Standard	Title
1	IS 9537 (Part 1):1980 / IEC 60614-1 (1978)	Conduits for electrical installations: Part 1 General Requirements
2	IS 9537 (Part 2):1981	Conduits for electrical installations: Part 2 Rigid steel conduits (superseding IS:1653)
3	IS 3480:1966	Flexible steel conduits for electrical wiring
4	IS 2667:1988	Fittings for rigid steel conduits for electrical wiring (first revision) [Superseded by IS 14768 (Part 2): 2003]
5	IS 3837:1976	Accessories for rigid steel conduits for electrical wiring (first revision)
6	IS 9537 (Part 4):1983	Conduits for electrical installations: Part 4 Pliable self-recovering conduits of insulating material
7	IS 9537 (Part 5):2000 / IEC 60614-2-3	Conduits for electrical installations: Part 5 Pliable conduits of insulating material
8	IS 3419:1989	Fittings for rigid non-metallic conduits (second revision)
9	IS 14772:2000 / IEC 60670-1:1998	Enclosures for accessories for household and similar fixed electrical installations [Superseding IS 5133 (Part 1 and 2)]
10	IS 2412:1975	Link clips for electrical wiring (first revision)
11	IS 371:1999	Ceiling roses (third revision)

12	IS 3854:1997 / IEC 669-1:1998	Switches for domestic and similar purposes (second revision)
13	IS 4615:1968	Switch-socket outlets (non-interlocking type) (Withdrawn)
14	IS 4160:2005 / IEC 60884-1:2002	Interlocking switch socket outlets - Specification (first revision)
15	IS 1293:2005 / IEC 60884-1:2002	Plugs and socket outlets of rated

ELECTRICAL LAMPS AND THEIR AUXILIARIES CODES OF PRACTICE GUIDE		
Sl. No.	Standard	Title
1	IS 418:2004 / IEC 60064 (1993)	Tungsten filament lamps for domestic and similar general lighting purposes (fourth revision)
2	IS 2418 (Part 1):1977 / IEC 81 (1974)	Tubular fluorescent lamps for general lighting service: Part 1 Requirements and tests (first revision)
3	IS 9900 (Part 1):1981 / IEC 188 (1974)	High pressure mercury vapour lamps: Part 1 Requirements and test [Superseding IS 2183 and IS 7023]
4	IS 9974 (Part 1):1981 / IEC 662 (1980)	High pressure sodium vapour lamps: Part 1 General requirements and tests
5	IS 12586:2005 / IEC 61184 (1997)	Bayonet lamp holders (fourth revision)
6	IS 3323:1980 / IEC 600402 (1972)	Bi-pin lamp holders for tubular fluorescent lamps (first revision)
7	IS 3324:1982 / IEC 400 (1972)	Holders for starters for tubular fluorescent lamps (first revision)
8	IS 2215:2006 / IEC 60155 (1993)	Starters for fluorescent lamps (third revision)
9	IS 1534 (Part 1):1977 / IEC 32 (1973)	Ballasts for fluorescent lamps: Part 1 For switch start circuits (second revision)
10	IS 1569:1976 / IEC 566	Capacitors for use in tubular fluorescent lamps
11	IS 6616:1982	

LIGHT FITTINGS AND LUMINAIRES CODES OF PRACTICE GUIDE		
Sl. No	Standard	Title
1	IS 1913 (Part 1):1978	General and safety requirements for luminaires: Part 1 Tubular fluorescent lamps (second revision)
2	IS 10322 (Part 1):1982 / IEC 598-1 (1979)	Luminaires: Part 1 General requirements
3	IS 10322 (Part 2):1982 / IEC 598-2 (1979)	Luminaires: Part 2 Constructional Requirements
4	IS 10322 (Part 5 / Sec. 2):2012	Luminaires: Part 5 Particular requirements, Section 2 Recessed luminaires (First Revision)
5	IS 10322 (Part 5 / Sec. 3):2012 / IEC 60598-2-3 (1979)	Luminaires: Part 5 Particular requirements, Section 3 Luminaires for road and street lighting (First revision)
6	IS 10322 (Part 5 / Sec. 4):1987 / IEC 60598-2-4:1979	Luminaires: Part 5 Particular requirements, Section 4 Portable general purpose

7	IS 10322 (Part 5 / Sec. 5):1987	Luminaires: Part 5 Particular requirements, Section 5
8	IEC 60598-2-5	Flood lights [Superseding IS 1947]
9	IS 3287:1965	Industrial lighting fittings with plastic reflectors
10	IS 1777:1978	Industrial luminaires with metal reflectors (first revision)
11	IS 2206 (Part 1):1984	Flameproof electric lighting fittings: Part 1 Well-glass and bulkhead types (first revision)
12	IS 3528:1966	Waterproof electric lighting fittings
13	IS 3553:1966	Watertight electric lighting fittings
14	IS 8030:1976 / IEC 162 (1972)	Luminaires for hospitals
15	IS 7537:1974	Road traffic signals
16	IS 9583:1981 / IEC 598-2-22:1980	Emergency lighting units

ELECTRICAL APPLIANCES -CODES OF PRACTICE GUIDE		
Sl. No.	Standard	Title
1	IS 302 (Part 1):2008 / IEC 60335-1	Safety of household and similar electrical appliances: Part 1 General requirements (sixth revision)
2	IS 2268:1994	Electric call bells and buzzers for indoor use (second revision)
3	IS 3412:1994	Electric water boilers (second revision)

ELECTRICAL INSTRUMENTSCODES OF PRACTICE GUIDE		
Sl. No.	Standard	Title
1	IS 6236:1971 / IEC 60258 (1968)	Direct recording electrical measuring instruments
2	IS 1248 (Part 1):2003 / IEC 600 51-1 (1997)	Direct acting indicating analogue electrical measuring instruments and their accessories: Part 1 General requirements (fourth revision)
3	IS 1248 (Part 2):2003 / IEC 600 51-2 (1984)	Direct acting indicating analogue electrical measuring instruments and their accessories: Part 2 Ammeters and voltmeters (third revision)
4	IS 1248 (Part 3):2003 / IEC 600 51-3 (1984)	Direct acting indicating analogue electrical measuring instruments and their accessories: Part 3 Watt meters and varmeters (third revision)
5	IS 1248 (Part 4):2003 / IEC 600 51-4 (1986)	Direct acting indicating analogue electrical measuring instruments and their accessories: Part 4 Frequency meters (third revision)
6	IS 1248 (Part 5):2003 / IEC 600 51-5 (1984)	Direct acting indicating analogue electrical measuring instruments and their accessories: Part 5 Phase meters, power factor meters and synchroscope (third revision)
7	IS 722 (Part 1):1998	AC electricity meters: General requirement and tests
8	IS 722 (Part 2):1977	AC electricity meters: Part 2 Single-phase whole current watt-hour meters, Class 2 (first revision)

9	IS 722 (Part 3):1988	AC electricity meters: Part 3 Three-phase whole current and transformer operated and single-phase transformer operated watt-hour meters
10	IS 722 (Part 5):1980	AC electricity meters: Part 5 Volt-ampere hour meters for restricted power factor range, Class 3.5 (first revision)
11	IS 722 (Part 7/Sec1):1987	AC electricity meters: Part 7 Volt-ampere hour meters for full power factor range, Section 1 General requirements (first revision)
12	IS 722 (Part 8):1972	AC electricity meters: Part 8 Single-phase 2-wire whole current watt-hour meter (class 1.0)
13	IS 722 (Part 9):1972	AC electricity meters: Part 9 Three-phase whole current and transformer operated watt-hour meters and single-phase two-wire transformer
14	IS 8530:1977 / IEC 62011:2001	Maximum demand indicators (class 1)
15	IS 2992:1987	Insulation resistance testers, hand operated (magneto generator type) (second revision)

INSTRUMENT TRANSFORMERS CODES OF PRACTICE GUIDE		
Sl. No.	Standard	Title
1	IS 2705 (Part 1):1992 / IEC 60185 (1966)	Current transformers: Part 1 General requirements (second revision)
2	IS 2705 (Part 2):1992 / IEC 60185 (1966)	Current transformers: Part 2 Measuring current transformers (second revision)
3	IS 2705 (Part 3):1992 / IEC 60185 (1966)	Current transformers: Part 3 Protective current transformers (second revision)
4	IS 2705 (Part 4):1992 / IEC 60185 (1966)	Current transformers: Part 4 Protective current transformers for special purpose applications (second revision)
5	IS 6949:1973	Summation current transformers

FUSES CODES OF PRACTICE GUIDE		
Sl.No	Standard	Title
1	IS 9224 (Part 1):1979	Low voltage fuses: Part 1 General requirements [superseded by IS 13703 (Part 1):1993]
2	IS 9224 (Part 2):1979	Low voltage fuses: Part 2 Supplementary requirements for fuses for industrial applications (superseding IS 2208) [superseded by IS 13703 (Part 2/Section 1):1993]
3	IS 2086:1993	Carriers and bases used in rewritable type electric fuses for voltages up to 650 V (third revision) [Superseding IS 8724]
4	IS 9926:1981	Fuse wires used in rewritable type electric fuses up to 650 volts
5	IS 8187:1976 / IEC	D-type fuses

MISCELLANEOUS CODES OF PRACTICE GUIDE		
Sl.No	Standard	Title
1	IS 2551:1982	Danger notice plates (first revision)

2	IS 2448 (Part 1):1963	Adhesive insulating tapes for electrical purposes: Part 1 Tapes with cotton textile substrates

ELECTROTECHNICAL VOCABULARY - CODES OF PRACTICE GUIDE		
Sl.No	Standard	Title
1	IS 1885 (Part 1):1961	Electro-technical vocabulary: Part 1 Fundamental Definitions
2	IS 1885 (Part 9):1992 / IEC 60050 (446):1983	Electro-technical Vocabulary: Part 9 Electrical relays (second revision)
3	IS 1885 (Part 11):1966	Electro-technical vocabulary: Part 11 Electrical Measurements
4	IS 1885 (Part 16/Sec 1):1968	Electro-technical vocabulary: Part 16 Lighting, Section 1 General aspects
5	IS 1885 (Part 16/Sec 2):1968	Electro-technical vocabulary: Part 16 Lighting, Section 2 General illumination, lighting fittings and lighting for traffic and signalling
6	IS 1885 (Part 16/Sec 3):1967	Electro-technical vocabulary: Part 16 Lighting, Section 3 Lamps and auxiliary apparatus
7	IS 1885 (Part 17):1979	Electro-technical vocabulary: Part 17 Switchgear and control gear (first revision)
8	IS 1885 (Part 32):1993 / IEC 60050 (461):1984	Electro-technical Vocabulary: Part 32 Electric cables (first revision)

SAFETY CODES OF PRACTICE GUIDE		
Sl.No	Standard	Title
1	IS 4770:1991	Rubber Gloves for electrical purposes
2	IS 5424:1969	Rubber mats for electrical purpose (Superseded by IS 15652:2006)

5.2 Scope of work for Residential

Electrical & Allied Services' required for proposed Construction of Residential flats and office building for SBI Enclave covers Electric Sub Stations(two different substations one for office premises and other for residential premises), D.G Set work, Internal Electrical Installations, HT/ LT Panels, Distribution Boards, External Electrical Installations, 33/0.433 KV HT and LT Cables, Road/Compound Lighting, Solar Lighting Poles, Centralized UPS system, Internal & External Electrical Distribution work. It shall also include IP-based Telephones System,CCTV system, Fire Alarm System, Public Address System, Building Management System, and Lifts, suitable copper pipes with nitrile rubber and drainpipe as per manufacturer's requirement, and cabling between DB to AC points, DB to Geyser points and DB to power points, the construction of suitable trench for cable to LT panel room, all cables to be laid underground trench etc.

Suitable size shafts, cutouts, Niche etc. shall be provided to facilitate installation of Rising mains, Pipes, Cable trays, ducts, Pneumatic Tube System etc. in all floor slabs of building for various service areas, as required.

All Services like electrical power, telephone points, LAN/Data points, UPS points, raw/ soft/ hot water supply, drainage, plumbing,, ducting etc. shall be provided as required in the complex.

Scope of work for commercial building;

Electrical & Allied Services' required for proposed Construction of office building covers Electric Sub Stations, HT/ LT Panels upto Substation yard, External Electrical Installations, 33/0.433 KV HT and LT Cables, Road/Compound Lighting, Solar Lighting Poles, Fire Alarm System, and lifts. It shall also include the construction of suitable trench for cable to LT panel room, all cables to be laid underground trench.

Suitable size shafts, cutouts, Niche etc. shall be provided to facilitate installation of Rising mains, Pipes, Cable trays, ducts, Pneumatic Tube System etc. in all floor slabs of building for various service areas, as required.

5.3 Electrical power requirement

The Electrical Load requirement has been calculated on the basis of covered area of the building as per Guidelines of substation and power distribution system of building 2019 considering lighting, power load and HVAC load for residential and commercial.

Load for the Central Air Conditioning Plant, Services, Lifts, Pumps, UPS, Fire Fighting, External Lightning, STP, WTP etc. has also been taken into account.

5.4 Source of Supply:

The electric supply on 33 kV for meeting electrical load requirements of Residential and commercial building from the TGSPDCL (from two different feeders, if one feeder fails another feeder shall be capable to feed Full Load). The EPC contractor shall arrange power supply from the nearest substation to the site. The demand notice issued by TGSPDCL will be reimbursed upon submission of supporting documents.

5.5 Electric sub-stations:

Electric substation shall be established to meet the electric load requirement of Residential + Commercial including services as required. The projected peak load demand of substation for residential building is 2973 KVA and commercial building is 3655 KVA. To meet this load requirement the capacity of the substation shall be 2 X 2500 KVA for commercial building, 2X2000 KVA for residential buildings. The transformers will be Oil Type Transformers with On Load Tap Changer (with AVR) Remote Tap Change Controller (RTCC).

Capacity of ESS and DG sets loads shall be as per table below:-

HT RMU(VCB based) - 4 way RMU (2 in & 2 out)-2no

- 4 Way RMU(1 in & 3 out)- 2no

S. No.	Building	Transformer Capacity	DG Set Capacity
1	Residential	2 X 2000 KVA	1 X 1000 KVA & 1 X 200KVA
2	Commercial	2 X 2500 KVA	Will be procured by Bank later on

Table 26 Capacity of Transformer and DG

The substation shall be complete with 33KV panel board, Transformers, APFC panel, DG AMF Panel (residential only), Auto Change over panel (EB & DG Supply), DCDB and other equipment as required and shall have necessary provisions and space to augment its capacity for future.

CONSTRUCTION OF RESIDENTIAL FLATS, CLUB HOUSES & OFFICE BUILDING FOR SBI ENCLAVE IN LINGAMPALLY POST, HYDERABAD									
POWER CALCULATION									
COMMERCIAL BUILDING									
S.No	Description	TOTAL AREA(Sq.m)	Lighting & Power Load, W/ Sq.m	HVAC W/ Sq.m	kW	DF	kW	TOTAL AREA(Sq.ft)	UNIT AREA (Sq.m)
1	Commercial	24322.93	25	0	608.07	0.9	547.27	261812.00	18242.20
2	Basement	8746.93	15		131.20	1.0	131.20	94152.00	
3	Lifts - 7 nos	7	10	-	70.00	0.8	56.00		
4	STP	-	-	-	35.00	0.8	28.00		
5	Water Supply pumps	-	-	-	50.00	0.8	40.00		
6	HVAC for Office Area	18242.20			1812.54	0.8	1450.04		
7	Ventilation Systems				200.00	0.8	160.00		
	Total Demand Load				**2906.82**		**2412.506**	**355964.00**	

Table 27 Electrical Load Calculation for Commercial Transfomer and DG

RESIDENTIAL FLATS & CLUBHOUSE									
S.No	Description	TOTAL AREA(Sq.m)	Lighting & Power Load, W/ Sq.m	HVAC W/ Sq.m	kW	DF	kW	TOTAL AREA(Sq.ft)	UNIT AREA (Sq.m)
1	Residential	43165	25	60	2100.59	0.65	1365.38	464625.00	17024.53
2	Club house	0	25	40	42.65	0.7	29.85	0.00	1066.13
3	Basement	11404.40	15		171.07	1.0	171.07	122757.00	
4	External Street lighting, Gardening light, etc.,	-	-	-	10.00	0.8	8.00		
5	Firfighting System	-	-	-	70.00	0.8	56.00		
6	Lifts - 11 nos	11	10	-	110.00	0.8	88.00		
7	STP	-	-	-	35.00	0.8	28.00		
8	Water Supply pumps	-	-	-	50.00	0.8	40.00		
9	Ventilation System				220.00	0.8	176.00		
	Total Demand Load				**2809.30**		**1962.30**	**587382.00**	

Table 28 Electrical Load calculation for Residential flats & Clubhouse Transformer and DG

CONSTRUCTION OF RESIDENTIAL FLATS, CLUB HOUSES & OFFICE BUILDING FOR SBI ENCLAVE IN LINGAMPALLY POST, HYDERABAD				
TRANSFORMER AND DG SIZING				
COMMERCIAL				
Sl. No.	Distribution transformer sizing (11kV / 415V)	Load	Unit	Remark
		Transformer		
1	Max Demad Load in kW	2413	kW	
2	Future Connection Consideration 20%	483	kW	
3	Distribution Loss 1.0%	29	kW	1.0% standard distribution loss factor
4	**Total Load Required With Loss**	**2924**	kW	
5	Power Factor	0.80		
6	Required KVA	3655	kVA	
7	**Actual Required Load in kVA**	**3655**	**kVA**	
8	**Selected Transformer in kVA**	**2500**	**kVA**	
9	**Number of transformers Considered**	**2**	**No**	
10	**Total KVA in Selected Transformer**	**5000**	**kVA**	
11	**Loading of factor**	**73%**		
Conclusion: Transformer:	2 nos of 2500 kVA			

Table 29 Transformer capacity for Commercial

Signature of the Bidder with Seal

CONSTRUCTION OF RESIDENTIAL FLATS, CLUB HOUSES & OFFICE BUILDING FOR SBI ENCLAVE IN LINGAMPALLY POST, HYDERABAD						
TRANSFORMER AND DG SIZING						
RESIDENTIAL						
Sl. No.	Distribution transformer sizing (11kV / 415V)	Load	Unit	Load	Unit	Remark
		Transformer		DG		
1	Max Demad Load in kW	1962	kW	1962	kW	
2	Future Connection Consideration 20%	392	kW	392	kW	
3	Distribution Loss 1.0%	24	kW	-	kW	1.0% standard distribution loss factor
4	**Total Load Required With Loss**	**2378**	kW	**2355**	kW	
5	Power Factor	0.80		0.80		
6	Required KVA	2973	kVA	2943	kW	
7	**Actual Required Load in kVA**	**2973**	**kVA**	**2943**	**kW**	
8	**Selected Transformer in kVA**	**2000**	**kVA**	**2000**	**kVA**	
9	**Number of transformers Considered**	**2**	**No**	**1**	**Nos**	
10	**Total KVA in Selected Transformer**	**4000**	**kVA**	**2000**	**KVA**	
11	**Loading of factor**	**74%**		**147%**		
Conclusion: Transformer: 2 nos of 2000 kVA Deisel Generator: 1 nos of 1000 kVA DG and 1 no. of 200KVA DG						

Table 30 Transformer & DG capacity for Residential

It may be noted that the loads and demands are indicative only and may vary as per actual requirements. The EPC contractor shall determine the actual electrical capacity requirements as per the applicable NBC regulations, IS codes and statutory regulations, and the calculation may be upgraded or modified as per actual load calculation.

5.6 General requirement for substations

The proposed Substations shall be outdoor Type Sub-Stations complete with 33 KV panel board with fault passage indicator, Transformers, DG Sets, Sandwich bus-ducts,
LT Switch Board, Capacitor Panels and all other accessories as required. DG Sets shall have facility for auto & manual start/stop, auto changeover, auto load management. The transformers & DG Sets shall be connected to respective LT Panels through suitable size indoor/outdoor sandwich bus ducts in the substation.

The substation will have 33 KV Panel board of suitable Nos. of feeders with minimum 1No spare feeder in each HT Panel. Adequate measures shall be considered in design and detailed Engineering for safety and interlocking shall be provided to prevent paralleling supply.

Main LT Panel in Substation and all other Electrical Panel shall be compliant to IEC-61439 and other Relevant IS Codes, ECBC /NBC norms. Panels should be compatible for monitoring and control with BMS/ SCADA System. Suitable BMS Integration Cards shall be provided to achieve BMS compatibility of HT & LT Panels. Suitable size trenches shall be provided for installation of HT/LT/ Capacitor Panels etc. and also for Laying of HT/LT Power cables & Control Cables. Substation shall comprise of all ancillary equipment like Battery Charger etc. Suitable size MS Chequered Plates, duly painted of minimum thickness 6 mm shall be provided for trenches inside the panel room as required. Hot Dip Galvanized Cable trays of suitable size shall be used as required.

All armoured HT/LT power cables, control cables, telephone cables, signal cables etc. shall be laid underground preferably along the roads & pathways at suitable depth as per CPWD specifications. Adequate no. of NP-3&4 as per IRC code, RCC Pipes/Hume pipes/DWC HDPE Pipes having suitable diameter with spare shall be laid across the roads/pathways etc.

Maximum allowable transformer losses at 50% & 100% load shall comply with ECBC norms (latest up to date). All Substations/HT/LT Panel Rooms/Floor panel Rooms shall be provided with safety equipment/items like suitable elastomeric mat (as per relevant IS codes), fire

buckets, fire extinguishers, hand gloves, danger plates (HT/LT rating), First Aid Box, Gas Masks, safety charts, framed Schematic/SLD etc. Suitable civil foundation/trenches etc. for all equipment shall be provided as per design load of respective equipment. All HT Panel shall have one spare feeder, all LT Panels shall have 20% spare outgoing feeders (minimum one) for different rating of feeders.

DG Set for Backup Supply (only for Residential)

Diesel Generator sets are proposed to be provided for back up supply in case of electricity failure. The following Loads will be on DG Back up supply:

All DG Sets shall be provided with suitable PLC relay/ PCCM controller for achieving automatic start/stop, manual load sharing between DG Sets. Additional provision for manual start/ stop of DG Sets shall also be provided. Transformer Incomer ACBs, DG Incomer ACBs and Bus Couplers shall be electro-mechanically interlocked with provision of auto and manual mode operation. Required control cabling/wiring in HT Panel, Transformers, DG Sets, and LT Panels etc. shall be provided as per requirement.

All DG Sets shall be outdoor type with hospital type silencer, acoustic enclosure as per latest CPCB, and other relevant norms & with provision of DG sets proper shading.

All DG Sets shall be latest CPCB Norms compliance, Radiator cooled type,

Exhaust Stack of the DG Sets shall be as per latest CPCB/CPWD/Local Bye-Laws standards and self supporting MS Exhaust stack structure duly synthetic enamel paint of suitable height to support the exhaust pipes with expansion bellows at required locations has to be provided. Contractor shall submit the detailed structural drawing of stack & foundation for approval with detailed design calculation considering the wind pressure & soil bearing capacity of site.

All DG sets shall have individual Day Oil tank of suitable capacity to be provided as per OEM recommendation.

Power Factor Improvement & Harmonics Suppression:
Real time Automatic power factor control panels with ultra-heavy-duty capacitors, Thyrister switched, Hybrid harmonic filters (Active & Passive) are proposed to be provided in the substations to achieve overall power factor unity from existing Power Factor, as per ECBC with operation in both Auto and Manual mode. Power factor Correction Panel shall be BMS Compatible. The capacitor panels with Hybrid Harmonic filters shall be provided in substation to achieve THD less than 3%. Connection from Main LT Panel to Capacitor Panel is to be provided through sandwich bus duct. Automatic switching off of Capacitor Panel is to be considered during Power supply availability from DG Sets.

5.7 Electrical power distribution

The Electrical Power Distribution for electric supply shall be as detailed below.
Change over wherever being used shall be done through Automatic Transfer switching. Maximum allowable transformer losses at 50% & 100% load shall comply with ECBC 2017/ latest ECBC or relevant IS or amended up to date.

All Panels with incomer's ≥630 Amps shall be Certified Tested Assembly as per IEC 61439 and as per technical specifications. All Tested Assemblies shall be smart type having switchgears (ACB, MCCB) communicating their release data over Ethernet. Main LT panel shall be provided with all accessories required for panel and all metering shall be done through HMI being connected to each breaker release mounted on the panel door to achieve better fault tolerant system.

There shall be adequate measures considered for power factor correction and harmonic mitigation by using Hybrid Type APFC Panel.

Indoor/Outdoor type Compact Copper Sandwich Bus Duct of suitable capacity shall be provided from Transformers and DG Sets to Main LT Panel, and Main LT Panel to Capacitor panel. Adequate runs of XLPE insulated armoured Aluminium conductor cables(including standby cable) shall be laid from Main LT Panel to LT Panel of buildings.

Separate distribution system shall be provided for Lighting load, Power Load. Each distribution system shall be with Electrical panels, rising mains, Floor panels, Double door MCB Type DB's, VTPN DBs etc. All TPN MCB DB's shall be PPI type.

Building shall have a LT room to receive power from the substation through armored cable and distribute power to the entire building through a Main LT Panel located in the LT room.

Building shall have suitable Nos. of rising mains for catering loads of Lighting, Power and DG Backup etc. connected to Main LT Panel, as applicable.

Each rising main shall have Tap off at every floor, feeding the floor panels with incoming & outgoing MCCBs of required capacities and numbers feeding the double door DBs/VTPN DBs.

Sub mains from floor panel to DBs shall be connected with cu armoured cable on cable tray.

The power cabling shall be sized so that the distribution losses do not exceeds 3% of the total power uses in building. Voltage drop for feeders shall not exceed 2% at design load and for branch circuit; it shall not exceed 3% at design load.

Meter Box & Energy Meters: Meter Box with smart energy meters shall be provided for each Residential units (Electrical board supply and DG supply) and all feeders (including incoming & ougoing) - Three phase, Single source Energy meter of 40/5A TPN. Separate Consumption details for Main Supply & DG Supply shall be measured.

IOT system for Energy Monitoring System with Software & required hardware shall be provided for numbers of meters. The system should also show Faulty Meter, Single phase indication.

5.8 Earthing network

Earthing with Maintenance free Chemical earthing system/GI Earthing System/Copper Earthing system, as required, shall be provided for earthing sub stations equipments, Electrical Panel boards, UPS and other Equipment /installations in each building. Earthing shall be in conformity with provisions of rule 32,61, 67 & 68 of Indian Electricity Rules 1956 & as per IS-3043 as amended up to date. Copper/GI earth strips shall be used for connecting the Electrical equipment with Earth pits as required. Earth Leakage circuit breakers shall be provided in the DBs for individual units. Separate and distinct earth stations with insulated electrode shall be provided for the following:

- HT Panels- Copper Plate Earthing
- Main LT Panels – Copper Plate Earthing
- LT Distribution Panels-GI Plate Earthing
- UPS system – Body & Neutral- Copper Plate Earthing

- EPABX & LAN Server – Copper Plate Earthing
- Transformers - Neutral & Body –Copper Plate Earthing
- DG Sets - Neutral & Body- Copper Plate Earthing
- Lifts- GI Plate Earthing
- External Lighting Poles & Pillar– GI Pipe Earthing
- Any other equipment as required

All three phase electrical installations shall be provided with double Earth connection and single phase electrical installations with one Earth connection as per latest CPWD specifications & NBC 2016.

5.9 Lightning protection system

Conventional Type Lighting protection of various buildings and blocks shall be provided as per IS/ IEC-62305-1:2010 (latest as amended), CPWD Specifications and NBC 2016 norms (in structure or on surface as per direction of Engineer In Charge). The main and most effective measure for protection of structures against physical damage is considered to be the lightning protection system (LPS). An external LPS which consists of air-termination system, down conductor system and earthing system is intended to:
a) Intercept a lightning flash to the structure (with an air-termination system),
b) Conduct the lightning current safely towards earth (using a down-conductor system), and
c) Disperse the lightning current into the earth (using an earth-termination system).

Accordingly a standard lighting protection system will be provided in all the buildings as per NBC 2016 Standards, using single prone finials, horizontal and down comer earthing strips of suitable size, terminating in the Earth Pits. Aviation Obstruction Light (AOL) shall be provided in various buildings as per Civil Aviation regulations, NBC norms & CPWD Specifications as applicable.

All Aviation Obstruction Lights shall be fed with UPS supply. Surge protection devices shall be provided in the incomers of main LT Panels of all buildings.

5.10 Internal Electrification, LV & Allied works

Following works shall be carried out in coordination with the civil work within the buildings complete in all respects as per latest IS Codes and CPWD Specifications.

- Wiring & Conduiting (MS/PVC Conduits) for internal electrification, LV & Allied works.
- LED Light fixtures, Fan (BLDC Ceiling & Wall) & Exhaust Fans.
- 6A Light Point /UPS Modular Switch & Socket Outlets.
- 16A/20A/25A/(32A-63A) 3 phase Power/UPS Modular Switch & Socket Outlets with 2/3/4 Pole
- MCB/MCCB as required.

- L.T. Cables and Sub main wiring, circuit wiring.
- Cable Tray & Raceways.
- Rising Mains / Bus Trunking
- Floor Panels, Distribution Boards & VTPN DB's.
- Corridor lighting, stilt lighting, basement lighting, stairways lighting should be designed as per latest ECBC & NBC norms.
- Staircase lighting control shall be with 2way Modular switches concealed in a suitable modular box.

5.11 Earthing

Extra Low Voltage system like Telephone/EPBAX, LAN, Fire Detection & Alarm System, CCTV System, Public Address system, Boom Barriers, Fire Suppression etc. shall be provided as per requirement.

Following points shall be generally followed for internal and external electrification of various areas:

All Internal areas like rooms, corridors, staircases, terraces, washrooms etc. of the building shall be adequately illuminated conforming to provisions stipulated in NBC 2016, ECBC and CPWD technical specifications maintaining the indicated Lux levels and Light Power Density.

The Internal Electrification work shall be carried out in recessed/surface mounted MS or PVC conduits in accordance with CPWD General Specifications for Electrical Works Part-I (Internal)-2023 and Part-II (External)-2023 with up-to-date amendments.

MS Conduits shall be surface mounted or laid on MS angle/channels with suitable hanging supports in areas wherever there is false ceiling provision. In case there is no provision for false ceiling, PVC Conduits shall be concealed in concrete during slab casting. Wiring for lighting/power shall be done in PVC Conduits in concealed and in MS conduits on surface, whereas wiring for LV works shall be generally done in PVC conduits unless stated otherwise. Provision of conduits shall be made in staircase area, lift shaft and no flase ceiling area for both residential and commercial building.

FRLSH PVC insulated Copper conductor wires will be used for points, circuit & sub-main wiring conforming to relevant IS-Codes.

Agency shall execute the work after obtaining necessary approval of the layout for internal electrification of building, common areas and staircases. The staircase lighting shall be in group control system.

Modular type switches, sockets and stepped type electronic fan regulators, bell push button along with matching mounting boxes of same make shall be used.

Colour coding of the conduits, switches, sockets shall be provided for Normal & UPS power supply as per NBC 2016.

TV outlet point wiring shall be terminated in suitable size of G.I. box along with splitter at every floor. The interconnections of all splitter boxes fixed at all floors shall be done properly with conduits to form proper distribution system with the prior approval of SBI/PMC.

LED Type Lighting fixtures with inbuilt harmonic suppression mechanism shall be provided.

Suitable size & capacity Exhaust Fans shall be provided in Residential buildings as per NBC 2016 provisions. Suitable size & capacity BLDC Ceiling Fans (White/Off White color) shall be provided in the rooms and areas of building, as required.

Separate shafts shall be provided for laying of pipes for Electrical, ELV, Mechanical and Fire Services.

Laying of RCC/DWC HDPE / Hume pipes for road crossing or in pucca portion & CC path etc. for Electric / Telephone / LAN/ street lighting cables complete with adequate number of cable chambers shall be provided by the agency.

After completing the work, necessary test results as envisaged in CPWD General Specifications Part-I (Internal)-2023 & Indian Electricity Rules 2005/NBC, shall be recorded and submitted. The results shall be within the permissible limits.
Aviation Lights (LED Type) shall also be provided as per prevalent norms & IS-Codes.

GI Raceways in floor only and on surface at other places wherever required Raceway shall be of Aluminum /PVC Raceways with accessories shall be provided on floors of various buildings as per requirements. The cover plate of raceways' junction boxes shall be stainless steel (SS 304 or SS 316).

Suitable illumination with LED light fixture shall be provided on terrace of the building.

Power Points, LAN points, UPS power point, Telephone Point (with telephone instrument as required) shall be provided in all areas as required.

Requisite size of raceways shall be provided in slabs with fillers, wherever required for drawing the wires and cables for the work stations

5.12 Lighting Design & Lighting Fixture

LED lighting fixtures shall be provided with inbuilt Harmonic suppression system in different areas of building. LED will be provided to achieve the illumination levels conforming to latest IS Code, NBC 2016, ECBC latest up to date. All LED lighting Fixture shall have luminous efficacy of more than 110 Lumens per watt. Lighting Power Density (LPD) shall be achieved for various areas as per lighting simulation requirements as per IGBC & ECBC norms.

Occupancy/Movement sensors and light dimmers shall be provided for automatic lighting control in common Toilets, cabins /common areas and other areas as required under NBC and latest ECBC norms.

Wherever Double height Ceiling area, Provision of Ceiling suspended Linear/cylindrical light fixture shall be provided.

5.13 LAN Architecture

RJ 45 data outlet points will be provided for Networking, Telephones, CCTV etc. as per requirement in rooms and other areas at various floors of building.

The Data Outlet points shall be connected to Rack with 4 pair CAT-6A wiring in Raceways, recessed/ surface conduit as required. UPS Power supply shall be provided to Network Rack& Servers wherever required.

The maximum length of the Cat 6A cable from end user point to the Edge switches shall not be more than 90 M. Beyond 90 M length Fibre Optic Cable, media converters etc. complete as required shall be used.

The Network Rack at various floors will be connected to Main rack of the building/ block with Fibre Optic Cable in redundant mode through conduit or raceways on surface/ recess.

Suitable Distribution room shall be established in each Building. There shall be proper redundant (24 X 7) cooling facility in the BMS/ Residential Server room to maintain the desired temperature, humidity & Indoor air quality for smooth operation of the System.

The Distribution switch shall be connected to Edge switches of building with optical fiber cable of suitable size in redundant cable raceway/conduit inside the building.
The laying and termination of Fibre optic cable with proper numbering/ ferruling /splicing within the campus shall be provided.

The Server shall have Firewall protection, Bandwidth management & required client Access license. The incoming Fibre cable from Service provider or connection from existing line for the proposed buildings Broadband connectivity shall be terminated in the Server room.

The Rack panel comprising of jack/Patch panels, Network switches, patch cords, power supply units, Cooling Fans, Wire managers, LIUs, Trans-receivers, Fiber patch cord etc. of building/ floors.

LAN Infrastructure at different Floors of building shall be used commonly for IPABX, BMS, Access Control System, CCTV, etc. along with LAN.

Brick masonry manholes with covers shall be provided at suitable lengths to facilitate easy wire/cable pulling.

While designing a highly available & scalable network, the primary objective is to build the network that can withstand component, link, power and any other types of failures. The network must converge around these failures healing itself without human intervention and with minimal disruption in services. It must do all of these things and remain simple enough that the average Network Admin can configure, monitor & manage the environment. All access switches, SFPs, Indoor Access Point shall be with 10 % spare quantity for Emergency purpose. Core/Distribution switches shall be in redundant mode.

5.14 EPABX System

The IP-based voice solution has been designed. The voice architecture will comprise of centralized IP PBX servers. IP-based voice telephony will be used for all voice communication between users at the campus in all blocks. The centralized IP PBX would act as primary PBX for all the IP Phones proposed at various buildings. However, varied kinds of SIP based IP are

proposed for different user set.

An entry level basic IP SIP phone with a 10/100 network is proposed for users at each Workstation, Services Room, Common Rooms etc.

A mid-range SIP IP Phone with a 10/100/1000 network is recommended for users at Senior Staff, Conference Rooms, Server Room, IT Rooms etc. in the campus.

The IP based communication solution should also have ability to handle mobility such that any user can be reached on an IP/Video Phone and on mobile phone simultaneously. The solution should be provided with multi-device license so that IP Phone user should also be able to attend the call from Mobile phone using a simple video application in case the same user is not able to answer the call on the IP Phone. The IP Phone and mobile application should ring simultaneously.

The entire solution for voice communication should be IPV4-IPV6 ready from day one. The entire voice communication solution should be from the same OEM to ensure interoperability.

The architecture should support single Server Clustering to provide scalability to offer support up to 10,000 IP devices should also provide redundancy in 1:1 ratio.

Sufficient no. of IP Telephone points with instruments & licenses shall be provided at all floors as per the requirement in all the buildings. IP based IPABX system shall be connected with existing EPABX System or as per the Client's decision in this regard. Necessary items shall also be provided to integrate with the existing system. No extra cost shall be paid in this regard.

5.15 Fire Detection / Alarm System

Standards:
IS 2189:2008,
IS 2175:1988,
IS 15908:2021,
IS/ISO 7240 series
NFPA 72
NBC 2016
CPWD Specifications

Automatic Addressable fire alarm system along with different type of Detectors, MCP, Hooter and Talk-back, PA system has been proposed in accordance with local fire norms and NBC 2016. All Detector Devices shall be provided with inbuilt isolators. (For Detectors/Device without inbuilt isolator, Fault Isolator or Isolator base to be provided with each detector/device). 2X1.5 sq mm cu armoured FS cable shall be used for Fire Alarm system and Public Address system.

All arrangements for firefighting shall be provided with as per NBC 2016/ State Fire Authorities Norms.

Audio-visual annunciation devices for indicating incidence of fire.Any other item required to the successful commissioning of the system.

Complete system should be LPCB/UL/VDS approved, Vendor has to submit project specific authorization letter issued by the OEM at time of bidding

The Cylinder must be filled in a UL/FM/PESO approved plant owned by the system OEM.

The electrical panel fire suppression system shall be complete with Direct Clean Gas storage cylinders for required capacities, extinguishing agent as specified, fire detection tubing, filling and end-of-line adaptors, pressure switches, control equipment, Clean Agent Cylinder/Valve Assembly, Cylinder Mounting Bracket and all necessary accessories to protect the Electrical panel in case of fire. The system will have an interface with Main Fire Alarm and Control Panel. In case of fire in the concerned panel, indication of Fire/discharge status should come in Main Fire Alarm and Control Panel

5.16 Public Address System:

PA system shall be provided in the building as required. Speakers in the Ceiling/Wall shall be provided in corridors, lift lobbies and other common areas as per NBC 2016/relevant IS codes.

The facility shall have an emergency voice alarm communication system. Digitally stored message sequences shall notify the building occupants that a fire or life safety condition has been reported. Message generator(s) shall be capable of automatically distributing up to eight (8) simultaneous, unique messages to appropriate audio zones within the facility based on the type and location of the initiating event

- Wall Mount Box type speaker shall be provided in the main entrance lobby and security cabin.
- Horn/Wall type speaker are suggested in the basement.
- Ceiling Type Recessed speakers in the false ceiling areas.
- The speakers shall be of same make as that of the Amplifiers and shall have a Rugged, high impact, flame retardant thermoplastic housings.
- Proper zoning is to be done considering the user requirement, critical areas & floor etc.
- System shall have the facility to make announcement on all floors simultaneously or on individual floors.
- 2X1.5 sq mm cu armoured FS cable shall be used for Public Address system.
- Audio amplifiers and tone generating equipment shall be electrically supervised for normal and abnormal conditions.
- Two-way emergency telephone communication circuits shall be supervised for open and short circuit conditions. Closed Circuit Television System (CCTV System)

5.17 CCTV Cameras

The surveillance system will be a combination of Dome /Bullet and PTZ IP cameras. The CCTV cameras will be installed at all sensitive locations like entry/exit Points, Corridors, Lift Lobbies, Staircases, parking locations, Waiting Areas, Boundaries etc.

The CCTV System shall be based on a digital network solution that enables video, data and/or audio streaming over an IP network. The proposed system should capture, store and analyse Video images. With Storage Capacity of 90 Days.

The overall Video system shall be connected via a secured LAN network and shall be built using

fibre optic & CAT6A communication cables utilizing standard TCP/IP Protocols.

The system shall be able to select any cameras to any monitors. However, the System Administrator shall be able to control the viewing rights of individual users.

The cameras will work on 24 X 7 basis and transmit quality video feeds to the CCC would capture the video feeds at minimum 25 FPS during entire duration of day. The cameras should support Tripple-Quad streaming.

The System shall have facility of PTZ Camera Live stream and fixed camera live with recording in full Camera resolution and full fps as well as in any desired combination and system shall allow recording resolution and frame rate for each camera user programmable.

The proposed cameras will be rugged and weatherproof, suitable for outdoor installation and will support day-night vision. The System shall have facility to send auto e-mail / SMS facility on predefined address/Number in case of specific user defined Alarms generated in alarm Audit file/Events file.

5.18 Video Analytics

Analytics software shall bring significant benefit to review the incidences and look for suspicious activity in both live video feeds and recorded footages.

The solution shall enable simultaneous network video recording from network, intelligent video analysis and remote access to live and recorded images from any networked computer. It shall classify objects such as cars and people and push content to the respective security personnel as required for real time analysis. The system shall also have display of timeline, customizable sitemap, live video, video playback, integrated site map, remote live view, multi-site capability, encryption, watermarking and event-based recording. All cameras should support motion detection, camera tampering.

Control Room shall be located in the Security /Control Room. The wiring inside the buildings shall be with CAT-6A cable in conduit and for Outdoor connectivity Armoured fiber Optic Cable shall be used. Optical fiber cable shall be laid underground in HDPE pipes with suitable Manholes for easy pulling and proper Maintenance. PTZ cameras can be installed on Poles with necessary mounting arrangements in external areas. The Video wall/no. of 55” LED displays shall be provided according to the no. of cameras at final execution. The video management server should have minimum 30 days storing capacity for all cameras from CCTV solution shall be server storage type with Video Management server, licences (lifetime free) and software.

5.19 UPS:

UPS units suitable for 3-phase power supply shall be provided. Suitable capacity of Centralized UPS shall be installed for LAN, CCTV and other essential loads (Basement, Stlit, BMS Room, Electrical Room, UPS Room, Stair case & Corrider Etc) as required in the various buildings. Microprocessor Based True Online Double Conversion Modular UPS with latest IGBT technology & inbuilt isolation transformer are to be provided for uninterrupted power supply for all Emergency requirements with additional standby Moduler . UPS with separate Power distribution system (comprising of distribution panels, rising mains, distribution boards etc.) shall be provided for each block with standby Moduler. The UPS System shall have minimum efficiency of 93.8 % as per ECBC. UPS shall be N+1 configuration.

The UPS System shall be for 30 Min Backup with Maintenance Free batteries and Bypass system. The system shall have the incoming and outgoing switchgear panel. The system shall

include the interconnection of UPS Input/output power supply Panels & UPS units, UPS & Batteries through flexible copper cables of suitable size. UPS shall be equipped with communication card for data monitoring on BMS System.

Sr. No.	Building	UPS Capacity in kVA
1	Residential building Basement, Stlit, BMS Room, Electrical Room, UPS Room, Stair case & Corrider Etc	100 kVA

Table 31 UPS Requirement

It may be noted that the UPS Calculation are minimum requirement only and may vary as per actual requirements. The EPC contractor shall determine the actual electrical capacity requirements as per the applicable NBC regulations, IS codes and statutory regulations and the calculation may be upgraded.

5.20 Boom barriers

Boom Barriers shall be provided at all Entry and Exit Gates. Push Button Type Control for open & Close the Boom Barrier through high Torque motors operated through 230 V AC Supply. In case of power failure, the barrier can be raised/lower manually. The Boom length shall be as per the requirement of the road Width (4.5 - 6 mtr). The Opening time varies from 3 sec. to 6 sec. The Control Unit shall be minimum IP54 protected against rough weather.

5.21 EV Charging station:

As per IGBC, EV Charging stations for 5Nos of 4 wheelers & 10Nos of two wheelers shall be provided with cabling, Charging unit etc. complete as required.

5.22 External/ compound lighting:

High efficiency LED Solar light fixtures with minimum 48hours backup shall be provided in external road Street lighting. LED Light Fixtures (Bollard/Post top) for compound/landscape lighting. The lighting control /operation for external Lighting shall be automatically controlled with digital timer control switch through outdoor type Feeder Panels.

Medium/High mast LED lights with Suitable Poles shall be provided for external lighting of large open areas, amphitheater, and miscellaneous Sports areas etc.

Road / Compound Lighting / Landscape Lighting / Facade Lighting shall be designed as per NBC & ECBC Codes. Road / compound lighting shall be provided with outdoor type light fittings (IP-65).

All Street Light/ Compound lighting Poles shall be made out of hot dip Galvanized Iron (GI) Octagonal shape. Poles shall be suitable for single / double side arms or as required. Poles shall
have a service window at the bottom comprising connector terminal & MCB. Poles can be mounted on foundation with Anchor bolts of suitable size & quantity. All the poles should be Provided with Double earthing. The height & spacing of the street light poles pole will be designed to achieve illumination Lux levels. The height & spacing of pole and illumination Lux level should be as per latest CPWD Specifications, NBC 2016 and other relevant norms.

Suitable outdoor type feeder panel with digital time controlling shall be provided for power distribution of various circuits of Street Lighting Poles/ High Mast /Bollard /Façade light etc.

5.23 Solar Power Generation System:

Direct Online Grid connected Solar Photo Voltaic Power system of following minimum capacity shall be provided in the various proposed building's roof top. The generated power will be directly connected to the Power grid/ Distribution Panel of respective Building for load sharing during day time. The average area requirement per kWp shall be 7-10 sq. Mtr on roof Top.

S.No.	Building	Solar Capacity minimum
1.	Office Building	Min. 100 kWp
2.	Residential flats	Min. 50 kWp
3.	Clubhouse	Min. 10kWp

Table 32 Solar capacity

It may be noted that the Calculation are minimum indicative only and may vary as per actual requirements. The EPC contractor shall determine the actual electrical capacity requirements as per the applicable NBC regulations, IS codes and statutory regulations.

5.24 LPG Reticulated gas system (134Nos @14.4KG= Approx 2000KG):

The EPC Contractor shall be responsible for the design, supply, installation, testing, and commissioning of a centralized LPG reticulated gas system. The system shall include an auto-changeover manifold to ensure continuous and safe gas supply at all times. A multi-stage pressure regulation system, equipped with emergency auto shut-off valves, shall be provided to enhance overall safety. The Contractor shall also install smart gas meters at each individual dwelling unit or office to enable real-time monitoring of gas consumption.The entire system shall be designed and executed in compliance with applicable safety regulations and Indian Standards (e.g., relevant IS codes). The Contractor shall ensure that each outlet is connected to individual hot plates in kitchens or pantries, as per the approved design and layout.

5.25 Construction of substation as per latest CEA norms

All panels (HT & LT) to be fabricated through OEM or OEM authorized Channel partner and CPRI approved vendor
All major electrical equipment and packaged systems shall be subject to Factory Acceptance Testing (FAT) to verify compliance with relevant IS codes, NBC Part 8 – Building Services and project-specific technical requirements.

Note: The above list of electrical equipment is minimum requirement only. Additional equipment may be identified during the detailed design phase and to be upgraded by the EPC Contractor. FAT shall include verification of electrical performance, safety features, protection coordination, control logic, and compliance with statutory and project specifications. The Employer/Consultant shall be notified in advance to witness the FAT as required.

The EPC Contractor shall ensure full coordination of electrical works with other services, including HVAC, firefighting, plumbing, BMS, civil/structural components, and interiors. Particular care shall be taken for routing of cable trays, earthing systems, and clearances from mechanical systems, ensuring seamless integration, safety, and code compliance throughout the facility.
All fixtures must be coordinated with other MEPF services to avoid clashes and ensure aesthetic alignment with ceiling elements. The finish of visible suspension components shall be as per the architect's approval and coordinated with ceiling design.

The Contractor shall submit shop drawings, mounting details, and mock-ups for approval before execution. Final installation must adhere to lighting design intent, prescribed lux levels, glare control parameters, and maintenance accessibility standards.

All electrical fixtures should be energy-efficient and selected in accordance with IGBC Green Building guidelines to support the achievement of Platinum certification.

The parameters, specifications, and information provided in the tender documents are intended to give a broad understanding of the project scope and design intent. It shall be the sole responsibility of the Contractor to carry out all necessary investigations, validations, detailing, and coordination required to deliver a fully functional, complete, and operational building. The building shall be designed and constructed fit for occupancy and use, and shall be handed over to the Client in full compliance with the latest provisions of the National Building Code (NBC) of India, all relevant Indian Standards (IS Codes), applicable statutory requirements, and the specific functional and operational requirements of the S

6 DESIGN BASIS REPORT – LIFT:

6.1 General

Passenger lifts, Fire lifts etc. shall be provided in the buildings. The installation shall be carried out as per rules & regulation of local bodies and IS Codes that governs the requirement of installation of the lift. The voltage and frequency of the supply shall subject to variation permissible under Indian Electricity Act and Rules. For better use of lifts /service Personal Occupant Requirement Terminal technology should be applied where more than 2 lifts installed in the single lift lobby.

TOTAL NO.OF LIFTS			
DGM FLATS	16 passengers	4 LIFTS	1 FIRE LIFT (2 Ton, 0.5 m/s)
GM & CGM FLATS	8 passengers	2 LIFTS	1 FIRE LIFT (2 Ton, 0.5 m/s)
OFFICE BUILDING	16 passengers	6 LIFTS	1 SERVICE LIFT (2 Ton, 0.5 m/s)
CLUB HOUSE	8 passengers	2 LIFTS	
DMD BUNGALOW	8 passengers	1 LIFT	

Table 33 Total Number of lifts

Passenger lifts shall be provided, as per details given below:

Lift Car shall be as per NBC - 2016 part 8 and OEM Standards.

Lifts shall be provided as per the Traffic Analysis of building as per NBC 2016 and relevant IS Standard.

	Lifts shall be provided as per Architectural Drawings & as per requirement of NBC-2016 & relevant IS Codes
	Note: 1.All Lifts will be Gearless type with Machine Room less. 2. All other accessories like ARD, Voice Announcement etc. will be standard type. 3. **Speed shall be considered 1.5 MPS upto G+4 floors and above it shall be minimum 2.5 MPS or more.**

Note:

1. Lift well; Car Size, Lift Pit Depth, Overhead, and Clear Entrance Width & Height dimensions shall conform to NBC 2016 or OEM Standards/ recommendations. All lifts shall be Gearless Type with Machine room & Centre Opening.

Anti-skid SS Chequered plate flooring of suitable thickness shall be provided in all the lifts.

Lifts shall be complete in all respect as per technical specifications and directions of Bank/Consultant.

7 PLUMBING DESIGN BASIS REPORT:

7.1 Water Supply, Storage & Sewerage Infrastructure

This section outlines the design criteria for the water supply, storage, and sewerage infrastructure serving the residential, office, and clubhouse facilities. The estimation of water supply and sewerage demand will be carried out in accordance with NBC 2016 guidelines, considering population-based projections and actual occupancy standards. All plumbing fixtures and fittings shall be selected to ensure water efficiency in accordance with the Indian Green Building Council (IGBC) rating system. All planning, design, and execution of water supply, sewerage, and solid waste management systems shall adhere to the latest guidelines issued by the Central Public Health and Environmental Engineering Organization (CPHEEO). The environmental aspects of air, noise, and water pollution control, waste disposal, and monitoring shall comply with the standards prescribed by the Central Pollution Control Board (CPCB).

7.2 Internal Plumbing Works

- Sanitary fixtures & C.P brass fittings
- Soil, waste & rain water piping system
- Internal water supply system with water metering for each building
- Hot water supply system using individual storage geyser system as per NBC 2016 regulations. Actual requirement shall be worked out based on user requirements at the detailed design stage.
- Disposal of soil & rainwater pipe to 1st manhole of respective sewage and stormwater network outside the SBI Enclave.
- A dual piping system shall be provided to segregate potable water supply and treated recycled water (grey water) to ensure efficient reuse for flushing and landscape irrigation, in line with sustainability and IGBC guidelines.
- Waste water from wash basins, shower area, floor traps of toilets, etc. shall be treated in grey water treatment plant (to be provided by the EPC contractor) and used for irrigation purpose.

7.3 External Water Supply System

- The Source of water supply shall be met from SBI Enclave Ring main having Supply From GHMC.
- Storage of Water with one-and-a-half-day storage for underground tank and half day for overhead tank shall be provided.
- Distribution System by transfer pumps from UGT to OHT and further distribution by hydro pneumatic system with booster pump shall be provided by the EPC contractor
- Treated Grey water shall be used only for irrigation purpose.

7.4 Sewerage System

- The sewer generated from the buildings shall be Connected into the STP.

7.5 Storm Water Drainage System

- Collection and conveyance of roof top rainwater, surface storm water around the proposed buildings and connection to the existing network outside the campus.

7.6 Garden Hydrant System

- External garden hydrant system to supply the water for horticulture purpose to all landscaping/green area around the buildings and entire site. The system shall be inclusive of irrigation pumps, piping (UPVC pipes), bib cock at the desired locations etc.

7.7 Pumps & Water Treatment Equipments

- The U.G. water tanks shall be located separately as marked in the drawings and the Plumbing & Fire Fighting plant room shall be adjacent to underground tank. The plant room has fire pumps, water supply pumps, water treatment plant and all other related equipment located there. These services shall act as a centralized system for buildings.
- Water supply pumps for Residential flats, Clubhouse and Office building. For pumping and distribution of domestic water to building blocks, the hydro pneumatic system is being proposed. The system shall be designed to take care of peak demand of water and a residual pressure at the ground floor users point shall be minimum of 1.5 kg/cm2 .
- Water supply system will be completely automatic through level controller & mechanically operated float valve. pump of required capacity shall be installed with appropriate head to supply water to OHT.
- RCC Overhead Tank of calculated capacity shall be provided on building terrace
- Pipe sizing shall be based on fixture unit calculation as per ASPE standard. However, the maximum velocity of water in water supply piping shall not exceed 2.4 m/s, whereas the limiting maximum velocity in hot water return piping shall be 1.2 m/s.
- Water meters shall be provided in identified areas for water consumption recording for efficient monitoring and assessment.
- Colour coding for flushing water supply piping shall be ensured for clear identification of the piping.

7.8 Basic Objectives

The basic objective is to provide all sanitary engineering services and specification in relation to:

- High standards of materials and workmanship.
- Leak proof plumbing.
- Reliable and dependable engineering systems.
- Plan the system in such a way as to minimize the energy requirements.

- Create minimum nuisance or disturbance to the environment.

7.9 List of Codes and Manuals

The following codes of practice and design manuals are being referred for designing the

- Sanitary Plumbing and Fire Fighting Systems:
- National Building Code 2016, Part IX for Plumbing system.
- Hand Book on Water Supply & Drainage (with Special Emphasis on Plumbing), Bureau of Indian Standards SP-35.
- Manual on Water Supply & Treatment (Ministry of Urban Development).
- Manual on Sewerage & Sewage Treatment (Ministry of Urban Development).
- CPWD Specifications revised upto the latest amendment.
- National Building Code 2016 (Part-IV — Fire Protection)

7.10 Proposed Water Management System:-

Reduce, Re-use, Re-cycle Model has been adopted for meeting the water requirement.
The following measures shall be ensured for reducing water consumption:

- Disciplined use of water
- Installing water saving toilet fixtures and faucets and flow regulators
- Adopting water saving landscape techniques (selection of grass and plants) including irrigation

7.10.1 Water Supply System

Water requirements have been estimated on the basis of present acceptable standards, references from various sources such the National Building Code of India, Public Health Manuals, Ministry of Environment, Forests Guidelines, and CPWD Specification as well as Inputs from other services consultants involved on the projects.

7.10.2 Design for Water Supply Distribution System Pipes

For continuous water supply at adequate pressure, complete water supply system is designed with following type of pipe-lines-

CPVC Pipes for Internal plumbing

Stainless steel pipe and fittings.
All RO Drinking water supply lines and fittings used in potable water distribution system shall be of stainless steel, with required insulation to maintain the temp. of 20-22 degree at out floor, of grade 304 conforming to IS-17875. The pipes shall be housed in Shafts and Terrace Down take, thereon it shall be concealed outside the shaft upto the last tapping point for all buildings.
UPVC Pipes for External plumbing

The EPC contractor shall be responsible for ascertaining the exact quantum of RO water requirements based on the inputs provided by EIC prior to detailed design.

Waterproofing treatment

Waterproofing treatment shall be done as applicable and as required on terraces, sunken slabs, toilet slabs, lift pots, basement rafts & walls, water tanks, UG sumps, OHTs and any other liquid retaining structures. Water stops shall be provided in construction joints of liquid retaining structures.

7.11 Sanitary works

7.11.1 Sanitary Fixtures & C.P Brass Fittings

Plumbing fixtures, Chrome Fittings and accessories will be as per IS: 781-1984.
Porcelain fixtures of fairly high quality as given below.

- **WCs** - Low volume dual flushing system comprising concealed cistern are proposed as per IS: 2556.
- **Lavatory Basins** available in all size and shapes including wall hung, over or under counter types etc with infra-red sensor as per IS: 2256 (Part 7) 1995.
- Urinals, low flow shall be provided with Infra-red sensor battery operated as per IS: 2556 part.
- Faucets, bib cocks etc. low flow fixtures add description
- Accessories - Soap dispensers, toilet paper holders, hand drier, etc. shall be of Stainless Steel.
- Chrome Fittings Common toilet fittings shall be provided as per IS: 781 - 1984.

7.11.2 Soil, Waste & Lab Pipe System provision of UPVC Pipes

Above ground piping shall be designed on the basis of two pipe system as recommended in code of practice for soil and waste water.

- Soil pipes shall carry the wastes from WC's & urinals etc. Soil pipes shall connect directly to the 1st manhole outside the building.
- Internal buildings sanitary disposal system will be under the slab (By core cutting in slab and suspended at bottom) for Residential flats and office building
- Waste pipes shall carry waste water from waste appliances (Wash basins, Drinking area, Shower & Pantry/ kitchen sinks etc.). Waste pipes shall connect to Gully Traps outside the buildings and shall be further connected to the Waste (Grey) water treatment plant. The treated water shall be used for irrigation purpose

Design Parameters

- Piping system has been designed in accordance with Code of Practice for Installation of Soil & Waste Pipes
- All vertical stacks will terminate as vent pipes at terrace level.
- All Vertical Stacks in the buildings will terminate at the ground floor level and connected to the external sewer. Pipe dia. and slope will be as per connected load.

Pipe Work

- All vertical stacks/ pipes will be installed in pipe shafts provided in drawings along the external face of the buildings or in internal shafts within the building according to the architectural planning of the toilets. However no pipe /vent shall be externally visible.
- Provide clean out doors and plugs for rodding and maintenance where necessary and required.

Materials for Soil, Waste & Vent Pipe System

- Pipes used for Soil, Waste and Vent system shall be UPVC & the terminal horizontal collection pipe shall be GI pipe.

7.12 Sewerage System

- Pipes used for Sewerage disposal system shall be with UPVC pipes and conforming to manufacturer specifications from building 1st Manhole to trunk line.

Wastewater generation is estimated based on the following criteria:

- 90% of the domestic water demand
- 100% of the flushing water demand

Accordingly, the total estimated wastewater generation is 200,073 litres per day, which forms the basis for sizing the Sewage Treatment Plant (STP)

Description	Water Requirement (LPCD)		Waste Water generation (LPCD)		
	Domestic(L)	Flushing(L)	Domestic (L)	Flushing(L)	Total(L)
DGM	65520	321000	58968	321000	**91728**
CGM& GM	18900	9450	17010	9450	**26460**
CLUB HOUSE	5618	4494	5056	4494	**9550**
DMD - RESIDENCE	720	360	648	360	**1008**
COMMERCIAL (OFFICE BUILDING)	60213	48170	54191	48170	**102361**

Table 34 Waste water Generation table

Design Parameters

- Flow of Sewage = 80% of daily water requirement.
- Peak Flow = 3 x Average Flow.
- Sub Soil Infiltration = 25% of Average Flow.
- Max. Velocity of flow in pipes = 7.5 m/sec. flowing half full
- Min. Velocity of flow in pipes = 2.0 m/sec.

Flow conditions in pipe

- Pipes upto 250 mm dia = 0.50 full running.
- Pipes from 400-900 mm dia = 0.67 full running.

Min. depth for sewers

- For branches = 1 M.
- For lateral, main & trunk sewers = 1.5 M./ as per required gradient

Type of Distribution

- Sewer flow shall be by gravity up to the final disposal point. The external sewer shall be connected into the Existing sewage Network.
- An inspection chamber shall be provided at the junction where the building's internal sewer line connects to the external/main sewage line, in accordance with CPHEEO norms and IS 4111.

7.13 Storm Water Drainage

7.13.1 Planning of Storm Water Drainage System

- The rainwater from the terraces, open surface areas, as per design, shall be collected in the clay brick masonry chambers with RCC pipe collection chambers and shall be ultimately connected to the main storm-water drainage system. All Rain Water Pipes to be routed through shafts provided in drawing & no such pipe should be visible externally.
- The network of storm water system shall be mostly catch basins and RCC (NP3) pipe network, as per requirements.
- All paved/road/green areas, the run off shall directly connect to the main storm water drains,
- All construction specifications with respect to the manhole sizes etc. will be respected and followed and as per CPWD specification.
- The complete storm water drainage system shall be designed with RCC pipes, clay brick masonry chambers and manholes etc.

7.14 Irrigation system for lawns and gardens

- Gardens and lawns shall be irrigated in combination with Garden Hydrant System, drip irrigation and Sprinkler Irrigation System.

7.14.1 Garden Hydrant System, Network System

- It is proposed to provide a separate and independent captive garden hydrant system to supply water for horticultural operations to all landscaped areas.
- The distribution grid for garden mains will be by a separate grid of UPVC pipe pressure pipes and connected to a separate pumping set obtaining it’s water supply from GWTP.
- The Main Distribution grid shall be with UPVC with pipes conforming to specifications.

- Garden hydrant points will be of 25 mm outlets with suitable distance centre to centre distance as per site condition.
- The garden hydrant pumping system is proposed to be planned so that the grid is sized to cater for a maximum of 6 outlets operated at the same time.

7.15 RO WATER SUPPLY

- Internal potable water distribution shall consist of a piping system that shall supply domestic potable water to all necessary sanitary fixtures, and all mechanical make-up water needs, except water closets and urinals. Potable water supply shall also include central RO plant (of minimum capacity of 2000LPH) water supply to drinking water points within the Building Complex and water supply pipe from RO plant to water coolers in Office building shall be SS pipe 304 grades with press fit technology as per JIS 3448.

7.16 List of IS Codes for Reference of Plumbing Design

S. No	ISI No.	Description
	I.S : 1536 : 1989	Specification for centrifugally cast (spun) iron pressure pipes for water, gas and sewage (3rd Rev.) (Amendment 2)
	I.S : 1538 : 1993	Specification for cast iron fittings for Pressure Pipes for water, gas and sewage (3rd Rev.)
	I.S : 3114 : 1994	Code of Practice for laying of C.I. pipes (2nd Rev.)
	I.S. : 782 : 1978	Specification for caulking lead (3rd Rev.)
	I.S. : l239 (Part 2):1992	Specification for mild steel tubes; tubular & other wrought steel fittings: Part 2 Mild steel tubular and other wrought steel pipe fittings (4th Rev.) (Amendment 1)
	I.S. : 1879 : 1987	Specification for malleable cast iron pipe fittings (2nd Rev.) (Amendment 5)
	I.S. : 4984 : 1995	High density polyethylene pipe for water supplies (4th Rev.) (Amendment 1)
	I.S. : 783 : 1985	Code of practice for laying of concrete pipes (1stRev.) (Amendment 1)
	I.S. : 4127 : 1983	Code of practice for laying of Glazed Stoneware pipes (1st rev.)
	I.S : 780 : 1984	Specification for sluice valve for water works purposes (6th rev)(50 to 300 mm size)(Amendment 3

	I.S : 651 : 1992	Specification for salt glazed stoneware pipes and Fittings (5th rev.) (Amendment 1)
	I.S. : 456 : 1978	Code of practice for plain and reinforced concrete (3rd Rev.) (Amendment 2)
	I.S. : 12820 : 1989	Code of practice for dimensional requirements of rubber gaskets for mechanical joints and push on joints for use with cast iron pipes and fittings for carrying water, gas & sewage.
	I.S. : 1172 : 1993	Code of basic requirements for water supply, drainage & sanitation (4th Rev.)
	I.S. : 1200 (Part-16) 1979	Code of practice for methods or measurements of building and Civil Engineering works: Part 16 Laying of water and sewer lines including appurtenant items (3rd Rev.)
	I.S. : 1200 (Part-19) 1981	Code of practice for methods or measurements of building and Civil Engineering works: Part 19 Water supply, plumbing and drains (3rd Rev.)
	I.S : 1729 : 1979	Specification for sand cast iron spigot and socket soil, waste and ventilating pipes, fittings and accessories (1st rev.) (Amendment 4)
	I.S : 1742 : 1983	Code of practice for building drainage (2nd Rev.)
	I.S : 3989 : 1984	Centrifugally cast (spun) iron spigot and socket soil, waste and ventilating pipes, fittings and accessories (2nd rev.) (Amendment 2)
	I.S : 778 : 1984	Copper alloy gate, globe and check valves for water works purposes (4th rev.) (Amendment 2)
	I.S : 13095 : 1991	Butterfly valves for general purposes
	I.S : 5312(part1) : 1984	Swing check type Reflux valve (non-return valve): Part 1 Single door pattern (1st Rev.) (Amendment 1)
	I.S : 5312(part2) : 1986	Swing check type Reflux valve (non-return valve): Part 2 Multi door pattern

	I.S : 1239(part1) : 1990	M. S. tubes, tubular and other wrought steel fittings: Part 1 Mild steel tube (5th Rev.)
	I.S : 1879 : 1987	Malleable Cast Iron pipe fittings (2nd rev.) (Amendment 5)
	I.S : 651 : 1992	Salt glazed Stoneware pipes & fittings (5th Rev.) (Amendment 1)
	I.S : 458 : 1988	Precast Concrete pipes (with or without reinforcement) (3rd rev.) (Amendment 2
	I.S : 1726 : 1991	C.I. Manhole covers & frames (3rd rev.)
	I.S : 1916 : 1989 I.S : 12592 (part1) : 1988	Steel cylinder pipe with concrete lining and coating (1st rev.) Pre-cast concrete manhole covers and frames: Part 1 Covers (Amendment 3)
	I.S : 12592 (part2) : 1991	Pre-cast concrete manhole covers and frames: Part 2 Frames
	I.S : 6392 : 1971	Steel pipe flanges (Amendment 1)
	I.S : 6418 : 1971	C.I & malleable flanges for general Engg. Purposes.
	I.S : 4985 : 1988	Unplasticized PVC pipes for potable water supplies (2nd Rev) (Amendment 2)
	I.S : 7181 : 1986	Horizontally cast double flanged pipes for water, gas and sewage.(1st Rev.) (Amendment 1)
	I.S : 210 : 1993	Grey iron casting. (4th Rev.)
	I.S : 4985 : 1988	Unplasticized PVC pipes for potable water supply
	I.S: 7558-1974	Code of practice for domestic hot water installation.
	I.S: 2064-1973	Code of practice for selection, installation and maintenance of Sanitary appliances
	I.S: 2065-1983	Code of practices for watersupply in building
	I.S: 2183 (Part I)-1987	Code of practice for Plumbing in multistoried building
	I.S: 8329-2000	Code of practice for Ductile iron class K9 pipes for water supply system
	I.S: 15905-2011	Code of practice for Hubless centrifugal cast (Span) iron pipes epoxy coated in sides and out side
	IS 15778:2007	Chlorinated polyvinyl chloride (cpvc) pipes for potable hot and cold water distribution supplies — specification

	IS 15225:2002	Chlorinated Polyvinyl Chloride Compounds Used for Pipes and Fittings

7.17 Source Of Water Supply

The Source of water supply shall be met from SBI Enclave Ring main having Supply From GHMC.

7.18 Pumps

It is proposed to provide all type of pumps like domestic water supply pumps, & Plant Room Sump Pump etc. catering to All Buildings comprising of Residential flats, Clubhouse and office building.

Basic Objectives

It is proposed to provide all sanitary engineering services and specification which are:

- High standards of materials and workmanship.
- Provide leak proof plumbing.
- Reliable and dependable engineering systems.
- Provide adequate safety and means to egress easily in case of fire.
- To plan the system in such a way as to minimize the energy requirements.
- To create minimum nuisance and disturbance to the environment

7.19 Water Supply System

Water requirements has been estimated on the basis of present acceptable standards, References from various sources such the National Building 2016 Code of India, Public Health Manuals, Ministry of Environment, Forests Guidelines, and CPWD Specifications etc.

7.20 Water Demand Projection

As per the estimated population and water demand norms discussed above, Total water demand has been estimated as detailed below.

Description	**Residential**	**Office and Clubhouses**
Water requirement break-up	**Domestic use**: 90 LPCD **Flushing use**: 45 LPCD	**Domestic use**: 25 LPCD **Flushing use**: 20 LPCD
Total water requirement	**135** LPCD	**45** LPCD

It may be noted that the loads and demands are minimum indicative only and may vary as per actual requirements. The EPC contractor shall determine the actual water requirements as per the applicable NBC regulations, IS codes and statutory regulations. It is proposed that all the Underground Tanks shall be construct with service block & the top surface shall be 150mm above adjoining FGL or FRL & usable for parking

7.21 Water Storage

7.21.1 Under Ground/Overhead Water Storage:-

- It is proposed to have underground storage of water equal to minimum one and a half day requirement in case of Raw/Domestic and minimum half day storage for Irrigation Water Tank.
- The underground water storage tank shall be provided at the location marked on the plan as per design specified in rules with baffle wall and fire brigade collecting breaching. The design shall be got approved from EIC prior to execution.
- The Over Head Tanks at Terrace level shall be half day capacity.
- Overhead water tank design shall be got approved from EIC prior to erection. The tank shall be connected to the wet riser through booster pump through non return valve and gate valve.
- Campus Water collected in underground storage reservoirs with fire fighting storage capacity. It is proposed to provide adequate static Storage for fire fighting as per the norms of National Building Code 2016 and Local Fire Services.
- To prevent the stagnation of the water in the static storage tank, water would be made to circulate through overflow into the storage chamber for the domestic requirement.
- Over flow from fire water tank will fill the Domestic water tank.

S. No	Description	Domestic Water	Fire Tank
1	DGM	147 KL	210KL
2	CGM& GM	43 KL	210 KL
3	CLUB HOUSE	15 KL	160 KL
4	DMD - RESIDENCE	2.16 KL	
5	COMMERCIAL (OFFICE BUILDING)	163 KL	220 KL

Table 35 Tank capacity for all the blocks

- The Tank Detail - The Tank Details & capacity given in the above table are indicative only. During detailed designing, if required and found necessary, the capacity / rating of the equipment may be upgraded subject to concurrence of Engineer-In-Charge.

Description	Water Demand as per norms (LPCD)		Water Requirement (LPCD)			Volume of the UG sump
	Domestic (L)	Flushing (L)	Domestic(L)	Flushing(L)	Total(L)	Volume of the UG Sump (Cu.m)
DGM	90	45	65520	321000	98280	147
CGM& GM	90	45	18900	9450	28350	43
CLUB HOUSE	25	20	5618	4494	10112	15

DMD - RESIDENCE	90	45	720	360	1080	1.62
COMMERCIAL (OFFICE BUILDING)	25	20	60213	48170	108383	163

Table 36 Volume of UG Sump

Description	Water Demand as per norms (LPCD)		Water Requirement (LPCD)			Volume of the OHT
	Domestic (L)	Flushing (L)	Domestic(L)	Flushing(L)	Total(L)	Total Volume of the OHT (Cu.m)
DGM	90	45	65520	321000	98280	0
CGM& GM	90	45	18900	9450	28350	0
CLUB HOUSE	25	20	5618	4494	10112	5
DMD - RESIDENCE	90	45	720	360	1080	0.54
OFFICE	25	20	60213	48170	108383	0

Table 37 Volume of OHT

Details & capacity given in the above table are minimum requirement only. During detailed designing, if required and found necessary, the capacity / rating of the equipment may be upgraded subject to concurrence of Engineer-In-Charge.

Sizing of Pumps:-

- The Flow Rate of Pumps shall be suitably selected to meet each building's water demand & of Sufficient Head depending upon Building Height, Pipe Friction losses, Bends etc. and other relevant Site Conditions. One Standby Pump to be considered in each & every variant. The Pumps shall be sized so as to ensure approximately 2 hours of operation time to fill the overhead tanks (For Clubhouse & DMD Bungalow). Hydropneumatic pumps should also be designed based on relevant standards. (DGM Flats, GM &CGM Flats & Office).

7.22 Population and Area Data

The calculation is based on the built-up areas and corresponding unit types across multiple blocks, including residential towers (comprising 3BHK and 4BHK units), office spaces, and clubhouse facilities. The total population considered is derived using unit-wise occupancy standards.

- **DGM Flats**: The total built-up area is **28,734 sq.m**, comprising **104 units**. With an occupancy of **7 persons per unit**, the total population is **728**.
- **CGM & GM Flats**: These have a combined total built-up area of **11,031 sq.m** with **30 units**, each housing **7 occupants**, resulting in a total population of **210**.
- **DMD Residence**: The population considered is **8 persons**.
- **Clubhouse and Office Building**: The clubhouse has a built-up area of **2,247 sq.m** and the office space covers **24,085 sq.m**. Based on the standard occupant load of **1 person per 10**

sq.m, the estimated populations are **225** and **2,409** respectively

Table 3 Occupant Load
(Clauses 4.3 and 4.4.2.1)

Sl No.	Group of Occupancy	Occupant Load Factor (m^2/person) (see Note 1)
(1)	(2)	(3)
i)	Group A: Residential	12.50
ii)	Group B: Educational	4.00
iii)	Group C: Institutional (see Note 2):	
	a) Indoor patients area	15.00
	b) Outdoor patients area	10.0
iv)	Group D: Assembly:	
	a) Concentrated use without fixed seating	0.65
	b) Less concentrated use without fixed seating (see Note 3)	1.40
	c) Fixed seating	see Note 4
	d) Dining areas and restaurants with seating and table	1.80
v)	Group F: Mercantile:	
	a) Street floor and sales basement	3.00
	b) Upper sales floor	6.00
	c) Storage/warehouse, receiving and the like	20.00
vi)	Group E: Business	10.00
vii)	Group G: Industrial	10.00
viii)	Group H: Storage (see Note 5)	30.00
ix)	Group J: Hazardous	10.00

NOTES

1 Gross area shall be the floor area as defined in **2.35**. All factors expressed are in gross area unless marked net.

2 Occupant load in dormitory portions of homes for the aged, orphanages, insane asylums, etc, where sleeping accommodation is provided, shall be calculated at not less than 7.5 m^2 gross floor area/person.

3 These shall include gymnasium, table tennis room, billiard room and other gaming rooms, library, swimming pool and like.

4 In case of assembly occupancy having fixed seats, the occupant load shall be determined by multiplying the number of seats by 1.2.

5 Car parking areas under occupancy other than storage shall also be 30 m^2 per person.

Figure 24 Occupant Load

4.1.1 *Water Supply for Residences*

A minimum of 70 to 100 litre per head per day may be considered adequate for domestic needs of urban communities, apart from non-domestic needs as flushing requirements (which varies based on type of building occupancy). As a general rule the following rates per capita per day may be considered for domestic and non-domestic needs:

a) For communities with population up to 20 000:
   1) Water supply through stand post: 40 lphd (*Min*)
   2) Water supply through house service connection: 70 to 100 lphd

b) For communities with: population 20 000 to 100 000 together with full flushing system: 100 to 135 lphd

Figure 25 Water Supply Requirements as per NBC

These values comply with NBC 2016 standards. The total daily water requirement for all zones sums up to **222,315 litres/day**.

Table 1 Water Requirements for Buildings Other than Residences
(Clause 4.1.2)

Sl No.	Type of Building	Domestic Per Day litre	Flushing Per Day litre	Total Consumption Per Day litre
(1)	(2)	(3)	(4)	(5)
i)	Factories including canteen where bath rooms are required to be provided	30 per head	15 per head	45 per head
ii)	Factories including canteen where no bath rooms are required to be provided	20 per head	10 per head	30 per head
iii)	Hospital (excluding laundry and kitchen) (*see* Note 2):			
	a) Number of beds not exceeding 100	230 per head	110 per head	340 per head
	b) Number of beds exceeding 100	300 per head	150 per head	450 per head
	c) Out patient department (OPD)	10 per head	5 per head	15 per head
iv)	Nurses' homes and medical quarters	90 per head	45 per head	135 per head
v)	Hostels	90 per head	45 per head	135 per head
vi)	Hotel (up to 3 star) excluding laundry, kitchen, staff and water bodies	120 per head	60 per head	180 per head
vii)	Hotel (4 star and above) excluding laundry, kitchen, staff and water bodies	260 per head	60 per head	320 per head
viii)	Offices (including canteen)	25 per head	20 per head	45 per head
ix)	Restaurants and food court including water requirement for kitchen:			
	a) Restaurants	55 per seat	15 per seat	70 per seat
	b) Food court	25 per seat	10 per seat	35 per seat
x)	Clubhouse	25 per head	20 per head	45 per head
xi)	Stadiums	4 per head	6 per head	10 per head
xii)	Cinemas, concert halls and theatres and multiplex	5 per seat	10 per seat	15 per seat
xiii)	Schools/Educational institutions:			
	a) Without boarding facilities	25 per head	20 per head	45 per head
	b) With boarding facilities	90 per head	45 per head	135 per head
xiv)	Shopping and retail (mall)			
	a) Staff	25 per head	20 per head	45 per head
	b) Visitors	5 per head	10 per head	15 per head
xv)	Traffic terminal stations (*see* Notes 3 and 4)			
	a) Airports	40 per head	30 per head	70 per head
	b) Railway stations (Junctions) with bathing facility	40 per head	30 per head	70 per head
	c) Railway stations (Junctions) without bathing facility	30 per head	15 per head	45 per head
	d) Railway Stations (Intermediate) with bathing facility	25 per head	20 per head	45 per head
	e) Railway Stations (Intermediate) without bathing facility	15 per head	10 per head	25 per head
	f) Interstate bus terminals	25 per head	20 per head	45 per head
	g) Intrastate Bus Terminals/Metro Stations	10 per head	5 per head	15 per head

NOTES

1 For calculating water demand for visitors, consumption of 15 litre per head per day may be taken.

2 The water demand includes requirement of patients, attendants, visitors and staff. Additional water demand for kitchen, laundry and clinical water shall be computed as per actual requirements.

3 The number of persons shall be determined by average number of passengers handled by stations, with due considerations given to the staff and vendors who are using these facilities.

4 Consideration should be given for seasonal average peak requirements.

5 The hospitals may be categorized as Category A (25 to 50 beds), Category B (51 to 100 beds), Category C (101 to 300 beds), Category D (301 to 500) and Category E (501 to 750 beds).

Figure 26 Water requirements

7.22.1 Tentative Allocation of Water Transfer Pumps

The pumps mentioned below against each group of building shall be installed on commencement of respective building construction.

Category (in terms of Stories of Building)	Building catering to	Pumping Sets
B+S+27	DGM Flats	1 Pumping Set of suitable capacity including 1 no. Standby
B+S+21	GM & CGM Flats	1 Pumping Set of suitable capacity including 1 no. Standby
G+1	DMD Bungalow	1 Pumping Set of suitable capacity including 1 no. Standby
G+4	Clubhouse	1 Pumping Set of suitable capacity including 1 no. Standby
2B+S+20	Office	1 Pumping Set of suitable capacity including 1 no. Standby

Table 38 Pump set details for the buildings in site

The Pump Details, Layout scheme, Position and Application of Pumps given in the above table is minimum indicative only. During detailed designing, if required and found necessary, the EPC contractor shall do the detailed design to determine the capacity / rating of the equipment which may/may not require to be upgraded/ revised subject to concurrence of Engineer-In-Charge.

General Notes

- All items must be water-saving compliant where applicable.
- Sanitary fixtures must conform to IS/ASTM/EN standards.
- Submit samples for approval before procurement.
- Installation to be per manufacturer’s specifications and coordinated with MEP services.

The data provided above shall be considered as the minimum indicative requirement. The specific brands mentioned, are intended solely for benchmarking purposes and are not mandatory recommendations. Equivalent makes or alternative models may be proposed, provided they meet or exceed the specified benchmark in terms of quality, performance, and technical compliance.

The above list of Sanitary fittings are indicative only. Additional equipment may be identified during the detailed design phase. FAT shall include verification of safety features, protection coordination, control logic, and compliance with statutory and project specifications. The Employer/Consultant shall be notified in advance to witness the FAT as required.

7.23 General Responsibilities of the EPC Contractor

All major plumbing equipment and packaged systems shall be subject to Factory Acceptance Testing (FAT) to verify conformance with relevant IS codes, CPHEEO Manual, NBC Part 9 – Plumbing Services, and project-specific technical requirements. All planning, design, and execution

of water supply, sewerage, and solid waste management systems shall adhere to the latest guidelines issued by the Central Public Health and Environmental Engineering Organisation (CPHEEO). The environmental aspects of air, noise, and water pollution control, waste disposal, and monitoring shall comply with the standards prescribed by the Central Pollution Control Board (CPCB).The indicative list of equipment (but not limited to) requiring FAT includes:

Pumping Systems

- Hydro-pneumatic/booster pump sets
- Transfer pumps (domestic, flushing, treated water, etc.)
- Sump and dewatering pumps

Water Treatment Units

- Reverse Osmosis (RO) plants
- Softening and Filtration units

Sewage Treatment Plant Equipment

- STP packaged units
- Blowers, dosing systems, and sludge pumps

Water Meters and Flowmeters (electromagnetic or ultrasonic)
Prefabricated Tanks (HDPE/GRP/FRP, if applicable)
UV Disinfection Units and Dosing Systems
Control Panels for Plumbing Systems

Note: The list above is indicative. Additional items may be identified during the design stage. FAT shall include checks for hydraulic performance, control logic, safety features, and compliance with design and statutory standards by the EPC Contractor. The Employer/Consultant shall be notified in advance to witness factory testing, wherever required.

1. Testing, Commissioning & Certification: All systems shall be tested as per manufacturer's instructions and relevant IS codes. Functional tests shall be conducted in the presence of the Employer/Engineer's Representative and Fire Officer. Compliance certificates shall be obtained from certified agencies or local fire authority.

2. Documentation & Training: Contractor shall submit shop drawings, wiring diagrams, O&M manuals, test reports, and warranty certificates. On-site training shall be provided for the facility management team.

The Contractor shall coordinate the Water Curtain provision with all other services including structural works, HVAC ducts, electrical cabling, access control, and interior design to ensure seamless integration and code compliance.

8 FIRE FIGHTING INSTALLATION

8.1 Introduction to Fire Fighting Installations

This report has been framed to cover the engineering and technical details for providing Fire-fighting System in Residential flats, Clubhouse and Office building in SBI Enclave. The broad details provisions are given below: -

1. Wet Riser and Down-comer System with Hydrants
2. Automatic Sprinkler System
3. Portable Fire Extinguishers
4. Hydrant and Jockey Pumps
5. Sprinkler Pump
6. Diesel Engine Driven Fire Pump
7. Underground Tank and Overhead Tanks
8. Clean Agent Extinguishing System
9. Fire Sealant
10. Fire Signages
11. Panel Protection System
12. Water curtain system

8.2 List of Codes and Manuals

- Relevant IS codes published by Bureau of Indian Standards.
- National Building code 2016 Part IV for fire Protection System
- Pumps, Valves and Accessories shall be as per IS Standards
- CPWD General Specifications for Electrical Works-Part V (Wet Riser & Sprinkler System-2021).
- IS: 3844-1989-Code of practice for installation and maintenance of internal fire hydrants and hose reels on premises.
- IS: 13039-2011-Code of practice for external hydrant system provision and maintenance.
- IS: 2190-2010-Code of practice for selection, and maintenance of first aid fire extinguishers.
- IS: 15105:2021-Design & Installation of Fixed Automatic Sprinkler.
- IS 15493:2004, Clean Agent Extinguishing Systems — Design and Installation — Code of Practice IS 6382:1984 - Specification for Total Flooding System using Carbon Dioxide
- IS 16018:2012-Gaseous Fire Extinguishing Systems — Physical Properties and System Design of FK-5-1-12 (Novec 1230)

8.3 System description

The Fire Fighting System shall consist of Diesel Engine Standby Pump, Electrical Driven Fire Hydrant pump, Sprinkler Electrical pump & Jockey pump, Fire hydrant (Internal & External), Air Vessel, associated instruments, cabling, piping, valves, control panel etc. has been provided as per NBC -2016 requirement. Jockey pump shall maintain pressure in all water lines for Hydrants & Sprinklers fully charged under pressure for fully Automatic operation in case of fire.

Residential block - DGM Flats

Description	As per NBC 2016	Proposal
Wet Riser	Required	Proposed
Fire Extinguishers	Required	Proposed
Hose Reel	Required	Proposed
Yard Hydrant	Required	Proposed
Down Comer	Not Required	Not Proposed
Landing Valve	Required	Proposed
Automatic Sprinkler System	Required	Proposed
Manual Fire Alarm System	Required	Not Proposed
Automatic Fire Detection & Alarm	Required	Proposed
UG Fire Tank	200 KL	200 KL
Overhead Tank	10 KL	10 KL
Electrical motor driven Fire Pump	2 Nos. 2850 LPM	2 Nos. 2850 LPM
Diesel engine driven Fire Pump Jockey Pump Terrace Pump	As per NBC	As per NBC

Residential block – CGM & GM Flats

Description	As per NBC 2016	Proposal
Wet Riser	Required	Proposed
Fire Extinguishers	Required	Proposed
Hose Reel	Required	Proposed
Yard Hydrant	Required	Proposed
Down Comer	Not Required	Not Required
Landing Valve	Required	Proposed
Automatic Sprinkler System	Required	Proposed
Manual Fire Alarm System	Required	Not Proposed
Automatic Fire Detection & Alarm	Required	Proposed
UG Fire Tank	200 KL	200 KL
Overhead Tank	10 KL	10 KL
Electrical motor driven Fire Pump	2 Nos. 2850 LPM	2 Nos. 2850 LPM
Diesel engine driven Fire Pump	As per NBC	As per NBC

Jockey Pump Terrace Pump		

DMD Bungalow

Description	As per NBC 2016	Proposal
Wet Riser	Not Required	Not Proposed
Fire Extinguishers	Not Required	Not Proposed
Hose Reel	Not Required	Not Proposed
Yard Hydrant	Not Required	Not Proposed
Down Comer	Not Required	Proposed
Landing Valve	Not Required	Not Proposed
Automatic Sprinkler System	Not Required	Not Proposed
Manual Fire Alarm System	Not Required	Not Proposed
Automatic Fire Detection & Alarm	Not Required	Not Proposed
UG Fire Tank	-	-
Overhead Tank	-	-
Electrical motor driven Fire Pump	Not Required	Not Required
Diesel engine driven Fire Pump Jockey Pump Terrace Pump	As per NBC	As per NBC

Clubhouse

Description	As per NBC 2016	Proposal
Wet Riser	Required	Proposed
Fire Extinguishers	Required	Proposed
Hose Reel	Required	Proposed
Yard Hydrant	Required	Proposed
Down Comer	Not Required	Not Proposed
Landing Valve	Required	Proposed
Automatic Sprinkler System	Required	Proposed
Manual Fire Alarm System	Required	Not Proposed
Automatic Fire Detection & Alarm	Required	Proposed
UG Fire Tank	150 KL	150 KL
Overhead Tank	10 KL	10 KL
Electrical motor driven Fire Pump	Not Required	Not Required
Diesel engine driven Fire Pump Jockey Pump Terrace Pump	As per NBC	As per NBC

Commercial – Office building

Description	As per NBC 2016	Proposal
Wet Riser	Required	Proposed
Fire Extinguishers	Required	Proposed
Hose Reel	Required	Proposed
Yard Hydrant	Required	Proposed
Down Comer	Not Required	Not Proposed
Landing Valve	Required	Proposed
Automatic Sprinkler System	Required	Proposed
Manual Fire Alarm System	Required	Not Proposed
Automatic Fire Detection & Alarm	Required	Proposed
UG Fire Tank	200 KL	200 KL
Overhead Tank	20 KL	20 KL
Electrical motor driven Fire Pump	2 Nos. 2850 LPM	2 Nos. 2850 LPM
Diesel engine driven Fire Pump Jockey Pump Terrace Pump	As per NBC	As per NBC

Details & capacity given in the above tables are minimum requirement only. During detailed designing, if required and found necessary, the capacity / rating of the equipment may be upgraded subject to concurrence of Engineer-In-Charge.

8.4 DGM, CGM & GM FLATS – Above 60 m Height (High-Rise)

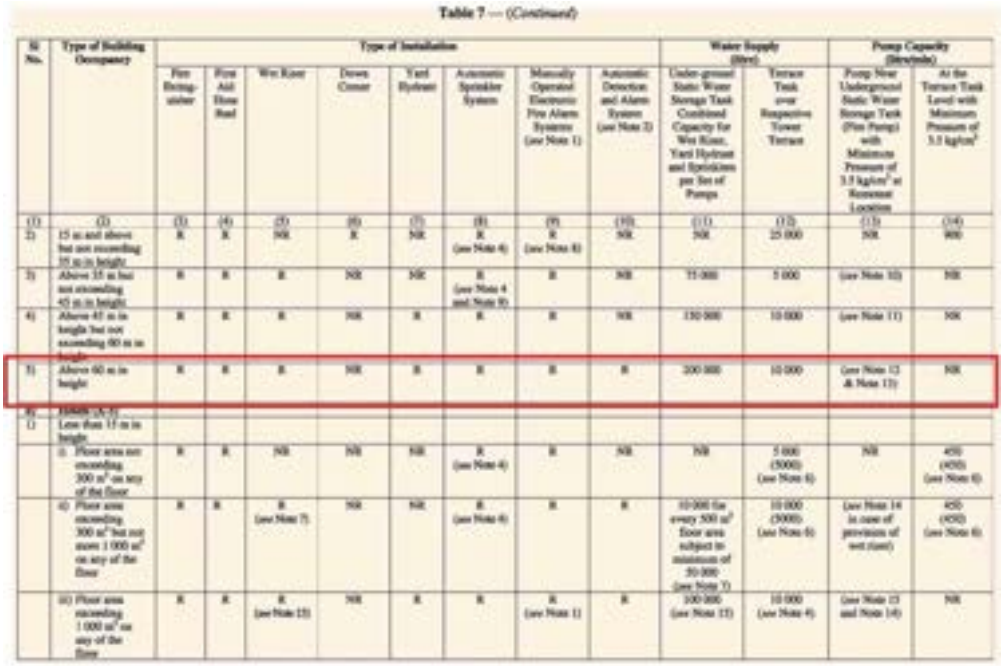


Figure 24 DGM, CGM & GM FLATS Fire fighting installation requirements

The DGM, CGM, and GM flats exceed 60 meters in height and are classified as high-rise buildings, thereby requiring the installation of both wet risers and automatic sprinkler systems throughout. Wet risers must be connected to a fire pump with a backup power supply, and the sprinkler systems are mandated to cover all floors and common areas. Additionally, fire extinguishers, first aid hose reels, and yard hydrants must be provided on every floor. In compliance with high-rise building safety regulations, further provisions such as a fire command center, pressurized staircases, and fire lifts are also necessary. An underground static water storage tank with a minimum capacity of 200 cu.m is required, and any basement area exceeding 200 m² must be equipped with an automatic sprinkler system.

8.5 DMD Bungalow – One or More Family Dwellings (Low-Rise)

Sl No.	Type of Building Occupancy	Type of Installation								Water Supply (litres)		Pump Capacity (litres/min)	
		Fire Extinguisher	First Aid Hose Reel	Wet Riser	Down Comer	Yard Hydrant	Automatic Sprinkler System	Manually Operated Electronic Fire Alarm System (see Note 1)	Automatic Detection and Alarm System (see Note 2)	Under-ground Static Water Storage Tank Combined Capacity for Wet Riser, Yard Hydrant and Sprinklers per Set of Pumps	Terrace Tank over Respective Tower Terrace	Pump Near Underground Static Water Storage Tank (Fire Pump) with Minimum Pressure of 3.5 kg/cm² at Remotest Location	At the Terrace Tank Level with Minimum Pressure of 3.5 kg/cm²
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
RESIDENTIAL BUILDINGS (A)													
a)	Lodging and Rooming Houses (A-1) (see Note 3)												
1)	Less than 15 m in height												
	i) Up to 15 rooms	R	NR	NR	NR	NR	R (see Note 4)	NR	NR	NR	5 000 (see Note 5)	NR	NR
	ii) More than 15 and up to 30 rooms	R	R	NR	NR	NR	R (see Note 4)	NR	NR	NR	5 000 (5 000) (see Note 6)	NR	450 (450) (see Note 6)
	iii) More than 30 rooms	R	R	NR	NR	NR	R (see Note 4)	R (see Note 7)	NR	NR	10 000 (5 000)	NR	450 (450)
b)	One or two Family Private Dwellings (A-2) (see Note 3)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
c)	Dormitories (A-3) and Apartment Houses (A-4)												
1)	Less than 15 m in height	R	R	NR	NR	NR	R (see Note 4)	NR	NR	NR	5 000 (5 000) (see Note 6)	NR	450 (450) (see Note 6)

Figure 25 DMD Bungalow Fire fighting installation requirements

DMD Bungalows, being low-rise structures, fall under the category of residential buildings with one or two-family private dwellings. As per standard regulations, they are typically not required to have wet riser systems or automatic sprinkler systems. Additionally, fire extinguishers, yard hydrants, first aid hose reels, and underground sumps are not mandated by the applicable standards.

8.6 Office Building – Above 30m:

Table 7 — (*Continued*)

Sl No.	Type of Building Occupancy	Type of Installation								Water Supply (litre)		Pump Capacity (litres/min)	
		Fire Extinguisher	First Aid Hose Reel	Wet Riser	Down Comer	Yard Hydrant	Automatic Sprinkler System	Manually Operated Electronic Fire Alarm Systems (*see* Note 1)	Automatic Detection and Alarm System (*see* Note 2)	Under-ground Static Water Storage Tank Combined Capacity for Wet Riser, Yard Hydrant and Sprinklers per Set of Pumps	Terrace Tank over Respective Tower Terrace	Pump Near Underground Static Water Storage Tank (Fire Pump) with Minimum Pressure of 3.5 kg/cm^2 at Remotest Location	At the Terrace Tank Level with Minimum Pressure of 3.5 kg/cm^2
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
BUSINESS BUILDINGS (E)													
1)	Less than 10 m in height	R	R	NR	R	NR	R (*see* Note 4)	R	NR	NR	10 000 (5 000) (*see* Note 6)	NR	450 (450) (*see* Note 6)
2)	Above 10 m but not exceeding 15 m in height	R	R	R	NR	NR	R (*see* Note 4)	R	R	50 000	5 000 (5 000) (*see* Note 6)	(*see* Note 14)	450 (450) (*see* Note 6)
3)	Above 15 m and up to 24 m in height	R	R	R	NR	R	R	R	R	100 000	10 000	(*see* Note 10)	NR
4)	Above 24 m and up to 30 m in height	R	R	R	NR	R	R	R	R	150 000	20 000	(*see* Note 11)	NR
5)	Above 30 m in height	R	R	R	NR	R	R	R	R	200 000	20 000	(*see* Note 12)	NR
MERCANTILE BUILDINGS (F)													
a)	F-1 and F-2 (*see* Note 16)												
1)	Less than 15 m in height												
	i) Ground plus one storey, with total of all floor area not exceeding 500 m^2	R	R	NR	NR	NR	R (*see* Note 4)	NR	NR	NR	5 000 (5 000) (*see* Note 6)	NR	450 (450) (*see* Note 6)

Figure 26 Office fire fighting installation requirements

An office building, classified as a business building with a height exceeding 30 meters, must comply with fire safety regulations that mandate the installation of wet risers to ensure an adequate water supply across all floors. The provision of fire extinguishers, first aid hose reels, yard hydrants, and an automatic sprinkler system is also required.

To further enhance fire protection, the integration of fire alarm control panels and proper compartmentation is essential. Additionally, a 200 cu.m underground static water storage tank and a 20 cu.m overhead fire tank are required.

Based on NBC 2016, Volume 1, Part 4-Fire and Life safety, the refuge balcony to be provided in the office block. Refuge area shall be provided in buildings of height more than 24 m. Refuge area provided shall be planned to accommodate the occupants of two consecutive floors (this shall consider occupants of the floor where refuge is provided and occupants of floor above) by considering area of 0.3 m2 per person for the calculated number of occupants and shall include additionally to accommodate one wheelchair space of an area of 0.9 m2 for every 200 occupants, portion thereof, based on the occupant load served by the area of refuge or a minimum of 15 m2, whichever is higher.

8.7 Clubhouse – Above 15 m and up to 24 m

Table 7 — (*Continued*)

Sl No.	Type of Building Occupancy	Type of Installation								Water Supply (litres)		Pump Capacity (litres/min)	
		Fire Extinguisher	First Aid Hose Reel	Wet Riser	Down Comer	Yard Hydrant	Automatic Sprinkler System	Manually Operated Electronic Fire Alarm Systems (see Note 1)	Automatic Detection and Alarm System (see Note 2)	Under-ground Static Water Storage Tank Combined Capacity for Wet Riser, Yard Hydrant and Sprinklers per Set of Pumps	Terrace Tank over Respective Tower Terrace	Pump Near Underground Static Water Storage Tank (Fire Pump) with Minimum Pressure of 3.5 kg/cm² at Remotest Location	At the Terrace Tank Level with Minimum Pressure of 3.5 kg/cm²
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
2)	10 m and above but not exceeding 15 m in height	R	R	R	NR	R	R (see Note 4)	R	R	100 000	5 000 (5 000) (see Note 6)	(see Note 10)	NR
3)	15 m and above but not exceeding 24 m in height	R	R	R	NR	R	R	R	R	150 000	10 000	(see Note 11)	NR
4)	24 m and above but not exceeding 30 m in height	R	R	R	NR	R	R	R	R	200 000	20 000	(see Note 11)	NR
ASSEMBLY BUILDINGS (D) (see Note 16)													
a)	Buildings (D-1 to D-5)												
1)	Less than 10 m in height												
	i) Up to 300 persons	R	R	NR	R	NR	R (see Note 4)	R	NR	NR	20 000 (5 000) (see Note 6)	NR	450 (450) (see Note 6)
	ii) More than 300 persons	R	R	NR	R	NR	R (see Note 4)	R	NR	NR	25 000 (5 000) (see Note 6)	NR	900 (450) (see Note 6)
2)	Above 10 m but not exceeding 15 m in height	R	R	R	NR	NR	R (see Note 4)	R (see Note 1)	R	100 000	5 000 (5 000) (see Note 6)	(see Note 10)	450 (450) (see Note 6)
3)	Above 15 m but not exceeding 24 m in height	R	R	R	NR	R	R	R	R	150 000	10 000	(see Note 10)	NR
4)	Above 24 m but not exceeding 30 m in height	R	R	R	NR	R	R	R	R	200 000	20 000	(see Note 11)	NR
b)	D-6	R	R	R	NR	R	R	R	R	200 000	20 000	(see Note 12)	NR
c)	D-7	For details see 6.4.4											

Figure 27 Clubhouse Fire Fighting installatioon requirements

Description	Total Area (Sq.m)	No. of Units	Occupancy Considered per unit	Population	Volume of the OHT	Volume of the UG sump
					Total Volume of the OHT Fire Safety (Cu.m) (As per NBC)	Volume of the Fire Sump (Cu.m) (As per NBC)
DGM	28734	104	7	728	10	200
CGM& GM	11031	30	7	210	10	200
CLUB HOUSE	2247	-	-	225	10	150
DMD -	645	-	8	8		

RESIDENCE						
COMMERCIAL (OFFICE BUILDING)	24085	-	-	2409	20	200

Table 39 Fire Sump & Fire OHT Capacity

The **clubhouse**, classified as an **assembly building** with a height exceeding 15 meters but not exceeding 24 meters, must comply with relevant fire safety regulations. These regulations mandate the installation of **wet risers** to ensure adequate water supply across all floors. Additionally, the provision of **fire extinguishers**, **first aid hose reels**, **yard hydrants**, and an **automatic sprinkler system** is required to provide comprehensive fire protection.

Details & capacity given in the above table are minimum indicative only. During detailed designing, if required and found necessary, the capacity / rating of the equipment may be upgraded subject to concurrence of Engineer-In-Charge.

8.8 Yard hydrant & internal wet risers:

The Yard hydrant shall cover the entire building externally with Hydrant points at appropriate location with hose boxes, hoses with all required hydrant accessories etc. Valve chambers shall be provided for housing the valves for underground pipes. The internal hydrant system involving wet risers shall have landing valves, hoses, hose reels and branch pipes etc. in suitable hose cabinets at appropriate points on every floor.

Wet riser cum down comer of internal diameter of 15cms of G.I. C class pipe shall be provided with single/double hydrant outlet (as per local fire authority approval) and hose reel on each floor as shown on the plan. Pressure reducing discs or orifices shall be provided at lower level so as not to exceed the pressure of 5.5 kg/sq m.

The parameters, specifications, and information provided in the tender documents are intended to give a broad understanding of the project scope and design intent. It shall be the sole responsibility of the Contractor to carry out all necessary investigations, validations, detailing, and coordination required to deliver a fully functional, complete, and operational building. The building shall be designed and constructed fit for occupancy and use, and shall be handed over to the Client in full compliance with the latest provisions of the National Building Code (NBC) of India, all relevant Indian Standards (IS Codes), applicable statutory requirements, and the specific functional and operational requirements of the SBI, Hyderabad.

8.9 Fire water source:

Underground RCC water storage tanks of 200cum capacity has been created in the basement& 20 Cum overhead tank shall be provided for Commercial. Underground RCC water storage tanks each of 200cum capacity in basement& 10 Cum overhead tank shall be provided for Residential flats. Underground RCC water storage tanks of 150cum capacity in basement& 10 Cum overhead tank shall be provided for Clubhouse. Pump house adjacent to the fire storage tank, where various fire water pumps and associated equipment would be located.

8.10 Fire service inlet:

The Contractor shall provide suitably located Fire Service Inlets (FSIs) on the external face of the building, adjacent to the fire water tank and with direct vehicular access for fire tenders. The FSIs shall be installed in accordance with the latest NBC norms, local fire authority requirements, and relevant IS codes.
Separate and independent FSIs shall be provided for:
(a) Each vertical wet riser system, and
(b) Each sprinkler system zone or loop, including those serving laboratories, parking structures, or specialized areas.
All FSIs shall be clearly marked, fitted with standard instantaneous couplings, non-return valves, and be located at an accessible height for manual operation. The Contractor shall coordinate the location and routing with the fire authority during detailed engineering and obtain necessary approvals prior to installation. Breeching connection inlet shall be provided to refill U.G. Tank

8.11 Pressurisation system:

This system shall comprise of One (1) No. electric motor driven Jockey pump, Pressure vessel. The hydrant system shall be kept pressurized all the times. The jockey pump shall start automatically upon getting impulse from pressure switch/relay. The pump shall stop automatically. The jockey pump shall take care of the leakages in the system, pipe lines, valves etc.

8.12 Mode of operation:

a) The residual pressure in the hydrant pipe network shall be maintained between 15.0 kg/cm² (maximum) and **3.5 kg/cm² (minimum).** In the event of a fire, when one or more valves are opened, the jockey pump will compensate for the water demand. If the demand exceeds the capacity of the jockey pump, the pressure fall in the header shall automatically trigger the AC motor-driven fire pump via pressure switches. If the pump fails to meet the required water demand or in the event of a power failure, the standby diesel engine driven pump shall start automatically to maintain the pressure and flow. However, the shutdown of the pumps shall be manual, except for the jockey pump, which will start and stop automatically via the pressure switches.

8.12.1 Accessories and Equipment:

Strainers: The system shall include strainers on the suction side of each pump to prevent debris and foreign objects from damaging the pump.
Flow Meters: A flow meter shall be provided to monitor the flow rate of the water, ensuring it meets the necessary firefighting requirements.
Firefighting panel
Firefighting panels shall be provided for each building integrated with the Building Management System (BMS). The panel shall be equipped with both visual and audible alarms for system malfunctions.
Annunciation Panel
Fire alarm Graphic annunciation Panel shall be located in the fire control room on the ground floor of each building which shall give feedback allowing for remote access to pump, engine and tank water level status. It shall be capable of providing user friendly graphics user interface to Analog

Addressable Fire Detection and Alarm System. It shall be capable of performing various Monitoring & Controlling functions.

Pressure Switch Settings: The pressure switches shall be adjustable to allow site-specific configurations for the desired sequence of pump start-ups, ensuring the system operates as required based on pressure drops.

Flexible Connectors: Flexible connectors shall be provided at the inlet and outlet of the pump system to absorb vibrations and reduce mechanical stress on pipes and fittings. These connectors shall be designed to prevent strain on the system caused by thermal expansion, contraction, or system movement. The material and size of the connectors shall be compatible with the fire-fighting system and shall conform to relevant IS standards.

Manual Starting Facility: In addition to the automatic start feature, the main fire pump shall also have an overriding manual start facility via a push-button arrangement in case of an emergency.

Each underground fire water tank shall be provided with level switches and level indicators.

All instrumentation used in fire fighting system shall be BMS compatible and to be integrated with the BMS system.

8.13 Fire brigade inlet connection:

Fire brigade inlet connection shall be of gun metal with four 63 mm dia instantaneous type inlets with proof built in type check valves and 150 mm dia flanged outlet connections feeding to the main fire grid and UG water tank & risers. The collecting head shall conform to IS-904.

8.14 Pressure vessel, air compressor, pressure relief valve:

To compensate for minor pressure losses in the system and to provide an air cushion for counteracting pressure surges or water hammer in the pipework, an air vessel conforming to IS:3844 shall be installed in the pump room near the fire pump assembly.

The air vessel shall normally be half-filled with water, with the remaining volume filled with compressed air. During normal operation, the air shall remain under compression to effectively absorb transient pressure spikes and minimize shock to the pipe network.

To maintain the required air pressure inside the vessel, the following components shall be provided:

Air Compressor:

A suitably rated air compressor shall be installed to periodically replenish and maintain the required volume of compressed air within the vessel. The compressor shall operate automatically and be equipped with a pressure switch to start/stop based on preset pressure limits.

Pressure Relief Valve:

A pressure relief valve shall be installed on the air vessel to release excess air pressure and prevent over-pressurization. The valve shall be set to open at a pressure slightly above the maximum working pressure of the vessel. It will discharge excess air either to the atmosphere or into a designated drain, as appropriate. This ensures that the system remains within safe pressure limits, protecting both the air vessel and the pipework.In addition to the air vessel, a pressure relief valve shall also be installed on the hydrant ring main, at strategic points, to protect the entire fire-fighting system from over-pressurization caused by pressure surges or water hammer. These valves will ensure that pressure within the ring main does not exceed safe operational limits.

8.15 Automatic sprinkler system:

The automatic sprinkler system with separate Sprinkler riser of suitable size of G.I. 'C' class pipe shall be provided in each habitable room on each floor, in lift lobby/common corridor at each floor level and the sprinkler heads shall be distributed as per the Tariff Advisory Committee (TAC) / NBC-2016, Part IV so as to cover every 9 Sq Mtr. area with each sprinkler head. The sprinkler pump shall be suitable for automatic operation when there is a drop of pressure in the system. Sprinklers shall be provided through out the building with separate sprinkler risers as required. Installation control valves and a hydraulic alarm in the basement shall be provided. An electrical sensor flow switch shall be provided on each floor and connected to fire control panel so that it would be possible to identify the location and the affected floor immediately.

8.16 Water curtain system

The Contractor shall design, provide, install, test, and commission automatic Water Curtains along with all associated apparatus in the buildings wherever applicable, strictly in accordance with the latest provisions of the National Building Code of India, 2016 (NBC 2016) Part 4: Fire and Life Safety, and applicable IS Codes including but not limited to IS 2189 (Fire Detection and Alarm System), IS 15301 (Smoke Barriers and Water Curtains), IS 8758 (Fire Protection of Cable Tunnels), and other relevant standards.
The Water Curtain system shall be designed to prevent the spread of flame and smoke between compartments, particularly across openings such as lift lobbies, staircase enclosures, vehicle ramps, and vertical service shafts. The underground tank capacity shall be accordingly worked out and implemented in the fire water tank.

The following components shall be included as part of the complete Water Curtain system:

1. Automatic Fire-Resistant Curtains: Gravity fail-safe, motorised deployment type, with fire resistance rating as per NBC and IS 15301. Shall have certification for performance under fire and smoke conditions.
2. Control Panels: Independent local control panels for each Water Curtain, linked to a centralized Fire Alarm Control Panel (FACP) and/or Building Management System (BMS), capable of manual override and diagnostics.
3. Fire/Smoke Detectors and Heat Sensors: To trigger curtain deployment upon detection of fire/smoke, with appropriate zoning and sensitivity as per IS 2189.
4. UPS/Power Backup Units: To ensure operation of curtains and control systems in the event of a power failure, with minimum 60-minute backup capacity.
5. Integration with Fire Alarm and BMS: Full interfacing with the building's fire detection, annunciation and smoke extraction systems.
6. Safety Signage and Warning Systems: Illuminated and photoluminescent signs indicating "WATER CURTAIN DROP ZONE", along with audible/visual pre-deployment warning signals to alert occupants before curtain descent.
7. Protective Enclosures and Finishing: Provision of concealed or semi-concealed enclosures for curtain housing, integrated into the false ceiling or soffit in coordination with architectural finishes.

8.17 Fire pump, sprinkler pump, jockey pump & booster pump

Wet riser shall be connected to a fire pump at ground level of appropriate capacity as mentioned in table above for hazard classification of each building type and their respective provisions as per NBC 2016, Part IV giving a pressure of not less than 3.5 kgs/sq cm at the topmost hydrant with suitable jockey pump.Booster pump of capacity 900 litres/min. having pressure of not less than 3.5 kg/sq cm at the hydrant outlets of the wet riser along with starter panel and pressure switch shall be provided at the terrace floor level.

An independent sprinkler pump of suitable cacpacity along with jockey pump shall be provided Sprinkler riser of suitable size of G.I. 'C' class pipe shall be provided in each habitable room on each floor, in lift lobby/common corridor at each floor

Diesel engine's day oil tank shall be of capacity sufficient to hold fuel up to 6 hrs of engine operation and mounted over stand fabricated using 25mm x 25mm x 6mm size MS angle providing with level indicator, inlet port, outlet port, drain port and diesel return line port and fuel pre filter, after filter etc.First fill of all consumables including grease, lubricants, oil and diesel fuel. Contractor shall also refill all the consumables after successful testing at the time of handing over the system.

Exhaust system having flexible metallic mufler, 150mm dia MS heavy pipe extended upto 10m outside pump house duly insulated with 50mm thick glass wool with 1mm thick aluminium sheet cladding, residential silencer with necessary MS support arrangements from wall or ceiling as per site condition. Diesel engine control panel shall be provided which will be also monitoring and displaying the critical diesel engine related parameters
Battery charger for diesel engine driven pump shall be provided at appropriate location.

8.18 Portable fire extinguishers

Fire Extinguishers as per applicable regulations in a few key areas as defined under (but not limited to) shall be provided near all the Internal Fire Hose Cabinets,
inside HT Panel Room,

LT Panel Room,

Lift Machine Room,

Fire Pump House,

Server Room,

UPS Room,

Fire Control Room,

Security Control Room,

Car Parking etc.

In addition to the above essential requirements sufficient qty. of portable/trolley mounted type fire extinguishers (Gas Based stored pressure type CO2 type /Ammonium Phosphate Type/ Mechanical Foam etc.) shall be provided at all levels of the building, plant room, substation etc. at

strategic locations as per requirements, generally to follow NBC-2016 and IS— 2190: 2010 to extinguish fire of class A, B ,C. As per NBC 2016/applicable IS Codes/statutory approval guidelines area of the Fire Extinguishers shall be considered.

8.19 Sand buckets

Sand buckets shall be provided as a basic fire-fighting measure in compliance with NBC 2016 – Part 4, Clause 3.4.6, particularly in areas prone to flammable liquid use or storage. Each unit shall comprise of at least four metal buckets (minimum 9-liter capacity), painted red and marked “FIRE”. Buckets shall be filled with dry, clean sand and mounted on a metal stand at a height of ~1 meter from finished floor level, placed in easily accessible and visible locations.

8.20 Refuge balcony

To ensure life safety in high-rise office buildings, refuge areas shall be provided in accordance with NBC 2016 – Part 4. For buildings exceeding 24 m in height, refuge areas shall be provided as follows:

a) Refuge area provided shall be planned to accommodate the occupants of two consecutive floors (this shall consider occupants of the floor where refuge is provided and occupants of floor above) by considering area of 0.3 m2 per person for the calculated number of occupants and shall include additionally to accommodate one wheelchair space of an area of 0.9 m2 for every 200 occupants.

b) The minimum area of the refuge shall be 15 m² or 0.3 m² per person (whichever is higher), based on the occupant load of that floor.

c) The refuge area must be open to the external air, clearly marked, and not used for any other purpose (e.g., storage).

d) It should be accessible from the staircase and located on a non-combustible cantilevered platform or within a protected area.

e) The location and design shall be such that it allows safe evacuation and temporary waiting space for building occupants in case of fire.

The EPC Contractor shall ensure that the design and construction of refuge areas fully comply with the latest NBC provisions and are coordinated with the architectural and structural disciplines.

8.21 Fire sealants:

Fire-resistant sealants shall be provided at all openings, joints, and penetrations in the fire-rated partitions, walls, floors, and ceilings, as per NBC 2016 guidelines. The sealants must comply with the IS 12117 standard for fire-resistant materials and ensure that fire and smoke do not pass through critical openings, maintaining the integrity of fire-rated barriers. These sealants shall be applied around pipes, cables, ducts, and other penetrations to prevent the spread of fire and smoke. Sealant material shall be selected based on the fire resistance rating (FRR) of the structure and the specific requirements of the area.

8.22 Clean agent fire suppression system

Clean agent fire extinguishing system shall be provided critical areas as per the fire safety requirements of the project. Clean agent fire extinguishers shall use an extinguishing agent, such as FM-200, Novec 1230, or CO2, which are effective in suppressing fires without leaving residue and without damaging sensitive equipment or materials. These extinguishers shall particularly be provided for areas containing electronic equipment, valuable research materials, and sensitive processes.

Critical areas shall include (but not limited to) spaces such as server rooms, data centers, control rooms, and telecommunication rooms, where the presence of electrical or electronic equipment demands fire protection that minimizes damage from fire suppression agents

For Server Rooms Rack Rooms & BMS / Battery rooms etc:
The Total Room Flooding system of fire detection and quenching is proposed in all Low Voltage Equipment rooms namely (but not limited to) Server rooms, Data Rack Rooms, BMS/ Battery rooms etc. where water sprinklers cannot be used. The Gas cylinder assembly should be UL/FM approved with seamless CCOE approved cylinder and will be connected to discharge nozzles through metal Piping. The master cylinder Kit fitted on Gas cylinder will be operated through separate Fire detection Panel and will release zero Ozone depletion potential Gas (Novec 1230) through the nozzles in case of fire. The system shall be designed as per NFPA 2001-2018 addition. Clean agent shall be UL/FM/VDS approved.

For Electrical panels:
Tube based Fire protection system shall be used in the Electrical Panels installed in substations. The detection Tube shall be installed throughout the compartment of panels. The location and spacing of tube shall be above the hazard to be protected. Seamless aluminium PESO approved Cylinder equipped with brass valve, pressure Gauge isolation valve will be fitted on the wall of the panel with suitable brackets and will be connected to the detection tube. In case of fire the tube shall rupture at a point. The rupture Tube (UL Listed) shall result in formation of discharge point and release Gas Agent (Novec 1230) in Uniform pattern. The cylinder shall be helium leak tested to 10^-7 mbar litre per second.

Fire Signage
Various types of signage shall be provided throughout all the buildings in compliance with NBC 2016 Part - IV. The material for the signage shall be made of acrylic or aluminium, with dimensions conforming to the prescribed standards.
At each floor, near the lift landing, a diagram indicating the stairways shall be displayed, along with the instruction: “IN CASE OF FIRE, USE STAIRS UNLESS INSTRUCTED OTHERWISE”. This signage shall be placed above the call push button in the Lift Lobby.
Floor-specific signage shall be installed within the staircase area, clearly visible and easily readable. Additionally, each floor’s corridor shall feature directional signage indicating the Fire Escape Route to guide occupants to safety.
These signs may be equipped with LED lighting and shall be backed by a UPS power supply to ensure visibility during power failures. The signage shall be finished with photoluminescent paint to remain visible in the dark, enhancing safety during emergencies.

Electrical Works related to Fire Fighting System

Fire fighting panel of suitable size incomer & sufficient numbers of outgoing feeders for all pumps along with spares/spaces shall be provided.
Power cabling of suitable size to be laid from LT panel to firefighting panel. Power cabling of suitable size from firefighting panel to fire pumps to be laid. Control cabling from fire pumps to fire fighting panel & fire fighting panel to pressure switch to be done. Fire annunciation panel is to be provided inside the fire control room at the ground floor level and it shall be integrated with the BMS system of the building.
Suspenders and/or cable trays for laying cables to be used for sprinkler system, fire annunciation panel needs to be considered. Motor shall be TEFC squirrel cage AC induction type. The motor shall be suitable for continuous duty & rating necessary to drive the pumpat150% of its rated discharge with at least 65% rated head. Motorshall be with class F insulation &1E-2 class efficiency. DOL/star delta starter/VFD shall be provided as per H.P rating of motors.
Adequate no. of NO/NC contacts for interlocks, indicating lamps, remote operation etc. shall be provided on starter/contactor.
Metallic body of all motors, medium voltage equipment etc. shall be connected by 2 separate & distinct earth conductors to the earth stations of the installations. Looping of such body earth conductors is acceptable from one equipment to anotherequipment considered of various sizes as per site conditions to maintain symmetry & crossing of ducts & other utilities
Automatic Upright Sprinklers shall also be installed in false ceiling voids exceeding 800 mm in height.
Pressure in the sprinkler installation piping shall not exceed 12 bar and pressure at the most remote sprinkler at any level shall not be less than 0.5 bar

8.23 Alternate Source of Power Supply

An alternate and independent source of electric power supply shall be provided for all critical fire and life safety systems including, but not limited to fire-fighting pumps, fire alarm systems, emergency lighting, smoke extraction systems, and public address systems. This alternate supply shall be derived from diesel generator (DG) set located at a safe distance and electrically isolated from the main supply to ensure continuity of service in the event of failure of the primary source.
The alternate source shall automatically take over the load within the prescribed switchover time as per applicable standards and statutory codes (e.g., NBC, IS: 3034, IS: 1646, or NFPA, as applicable). Both primary and alternate power sources shall be continuously monitored and maintained to remain in operational condition at all times.An alternate source of LV supply from a D.G. set with appropriate changeover switch shall be provided for fire lifts, fire man evacuation lift, fire pump, booster pumps, sprinkler pump, jockey pump, staircase and corridor lighting circuits, detection and fire alarm system. It shall be housed in separate cabin.

8.24 Water Curtain calculations

Curtain Length: Total water curtain length: **30 metres**

Design Flow Rate:(As per CPWD/NBC/NFPA norms for drencher/water curtain systems)

Flow Rate = 30–40 L/min/m

Total Flow Requirement:

At 30 L/min/m × 30 m = **900 LPM (15 L/s)**

At 40 L/min/m × 30 m = **1200 LPM (20 L/s)**

Operational Duration:

10 minutes (as per CPWD/NBC standard)

Total Water Requirement:

Minimum: 900 LPM × 10 min = **9,000 litres**

Maximum: 1200 LPM × 10 min = **12,000 litres**

Impact on Fire Water Tank Capacity:

Increase dedicated fire water storage by **9,000 to 12,000** litres (preferably 12,000 litres for conservative design)

Impact on Fire Pumping Capacity:

Additional flow demand: **15–20 L/s**

Ensure either: Existing fire pump accommodates additional flow, or Provide dedicated deluge pump (min. 20 L/s @ ≥3.5 kg/cm²)

8.25 List of IS Codes for Reference of Fire Fighting Design:

S. No	ISI No.	Description
1	NBC: Part IV - 2016	National Building Code - Fire Protection
2	IS 4736: 1986	Galvanizing G.I. Pipes
3	IS: 778-1984	Specifications for copper alloy gate, globe and check valves for water works purposes
4	IS: 14846-2000	Specifications for sluice valves for water work purposes (50 to 1200 mm size)
5	IS: 5312: 1984	Specifications for swing check type reflux (Non-return) valve
6	IS: 5290: 1983	Specifications for landing valves
7	IS: 884: 1985	Specifications for first-aid hose reel for fire fighting
8	IS: 903: 1994	Specifications for fire hose delivery couplings branch pipe, nozzles and nozzles spanner
9	IS: 2190: 1992	Code of practice for selection, installation and maintenance of portable first-aid fire extinguishers
10	IS: 2878: 1986	Specifications for fire extinguisher - Carbon-dioxide type
11	IS: 3844: 1989	Code of practice for installation and maintenance of internal fire hydrants and hose reels on premises
12	IS: 2189 – 1999	Code of practice for selection and maintenance of automatic fire detection and alarm system
13	IS: 9668 – 1990	Code of practice for provision and maintenance of water supplies for fire-fighting
14	IS: 1538 – 1993	Specifications for cast iron fittings for pressure pipes for water, gas and sewage
15	IS: 15683	Portable Fire Extinguishers – Performance and Construction Specification

16	IS: 15105 – 2021	Design and Installation and maintenance of fixed Automatic Sprinkler Fire Extinguishing
17	CPWD SPECIFICATIONS	General Specification for Electrical Works Part-V (wet riser & Sprinkler Systems) 2020

8.25.1 General Responsibilities of the EPC Contractor

All major firefighting equipment shall undergo Factory Acceptance Testing (FAT) to ensure compliance with the relevant provisions of Part 4 – Fire and Life Safety of the National Building Code of India (latest edition), as well as applicable IS codes and manufacturer's standards.

The indicative list of equipment (but not limited to) requiring FAT includes:

Fire Pumps (Main, Jockey, and Standby – Electric/Diesel)

Pump Controllers and Panels

Motors and Diesel Engine for Fire Pump Sets

Fire Water Storage Tanks (prefabricated tanks, if applicable)

Pre-fabricated Hydrant Valves and Accessories

Sprinkler Control Valves and Assemblies

Fire-rated Doors and Glazing (if factory-finished)

Note: The Employer/Consultant shall be notified in advance for witnessing FAT. Acceptance of equipment at the factory shall not absolve the Contractor from responsibility for site performance and compliance with the approved design.

Testing, Commissioning & Certification: All systems shall be tested as per manufacturer's instructions and relevant IS codes. Functional tests shall be conducted in the presence of the Employer/Engineer's Representative and Fire Officer. Compliance certificates shall be obtained from certified agencies or local fire authority.
Documentation & Training: Contractor shall submit shop drawings, wiring diagrams, O&M manuals, test reports, and warranty certificates. On-site training shall be provided for the facility management team. The Contractor shall coordinate the fire services with all other services including structural works, Celectrical cabling, access control, and interior design to ensure seamless integration and code compliance.

The parameters, specifications, and information provided in the tender documents are intended to give a broad understanding of the project scope and design intent. It shall be the sole responsibility of the Contractor to carry out all necessary investigations, validations, detailing, and coordination required to deliver a fully functional, complete, and operational building. The building shall be designed and constructed fit for occupancy and use, and shall be handed over to the Client in full compliance with the latest provisions of the National Building Code (NBC) of India, all relevant Indian Standards (IS Codes), applicable statutory requirements, and the specific functional and operational requirements of the SBI.

9 DESIGN BASIS REPORT – MECHANICAL VENTILATION:

9.1 Design Principles

Objective of Mechanical ventilation System Design is to ensure proper Indoor Air Quality as per design standards mentioned above along with Energy Efficiency, Flexibility of Operation, Cost Optimization, BMS Compatibility and Green Building Rating Compliances. All fixtures shall be selected to ensure energy efficiency in accordance with the Indian Green Building Council (IGBC) rating system.

Mechanical ventilation to be considered for the basement.

All ducting shall be GSS / GI construction as per SMACNA standard or IS-655.

9.2 Ventilation:

Natural Ventilation: Maximize natural ventilation to reduce reliance on mechanical ventilation, especially in non-air-conditioned areas.

Proper Ventilation Design: Design and install a ventilation system that provides adequate fresh air supply and removes stale air efficiently.

9.3 Outside Conditions

Summer: 39.0°C DB ; 28.0°C WB

Monsoon: 31.5°C DB ; 26.5°C WB

Winter: 16.0°C DB ; 11.0°C WB

Note: Hyderabad has a semi-arid climate with high summer temperatures and moderate humidity during the monsoon. Winters are mild and dry.

9.4 Mechanical Ventilation

For Mechanical Ventilation designing, NBC 2016 (National Building Code of India) guidelines shall be followed

For smaller toilet / toilet on external I / toilet with single WC / private toilet, circular fan for Toilet /propeller fan shall be used for Kitchen.

Pressurization of Lift Lobby, Lift Well, Staircase & Staircase Lobby (Wherever required)

All the staircases shall be pressurized to maintain 50 Pa pressure.

All the staircases lobbies shall be pressurized to maintain 25 Pa pressure.

All the lift well shall be pressurized through multi-level air injection to maintain 50 Pa pressure.

All the lift lobby shall be pressurized through multi-level air injection to maintain 25 Pa pressure. Latest NBC norms prevailing at the time of approval & execution to be followed.

Smoke extraction system in the basement will be provided by using axial fans. The whole floor will be converted in number of zone of each area 750-3000 Sq. Mt. as per NBC

9.5 Car parking ventilation (Emergency/Normal)

The entire basement car parking shall be ventilated zone wise.

Each zone shall have its independent fresh air and exhaust system.

The car parking zone area should not exceed by 3000 sq.m. as per NBC-2016.

The car parking ventilation shall be carried out by using axial fans for each zone.

In all zones, fresh air shall be brought mechanically by using suitable size axial fans.

The exhaust system for each zone shall be fully ducted (12 ACPH for Normal/Smoke exhaust) and fresh air supply shall also be fully ducted (12 ACPH for Normal/Makeup air in case of fire) in all zones.

The exhaust fans for all zones are split in the following configuration:

1 Nos exhaust fan at 6 ACPH capacity (Jet fan)

The fresh air fans for all zones are split in the following configuration:

1 Nos fresh air fan at 6 ACPH capacity (Jet fan)

The axial fan shall be suitably selected for best efficiency, low noise, optimum operating speed and lowest possible power consumption.

The axial fan shall have back draft dampers and all protective covering (like inlet wire mesh etc) so that any possible mishappening may be avoided.

9.6 CO Sensor

CO Sensors shall be installed for car park ventilation area zone wise.

They shall sense the level of CO in a particular zone and shall trigger the exhaust/fresh air fan accordingly.

The basis of triggering can be obeyed as:

a) CO level < 30 ppm – All fan off

b) 30 ppm< CO level <100 ppm – Normal Exhaust and fresh air fan

c) CO level > 100 ppm – Both Normal and Emergency Exhaust/Fresh Air fans are on

9.7 Design Engineering & Calculation

All required detail calculations shall be done by the EPC Contractor’s appointed team and it shall be submitted to SBI/PMC for approval before starting the execution of the project. Calculations shall be prepared by a qualified Engineer.

9.8 Tender Drawings

The drawings issued with the tender documents are only for guidance of the tenderer.The actual & final mechanical ventilation GFC & Shop Drawings shall be prepared by the successful EPC Contractor after due co-ordination with other services & shall be approved by the SBI/ PMC before commencement of site work. The tenderer has to ensure that their proposal will meet with all the

current rules & regulations pertaining to the relevant local / national statutory & NBC 2016.

9.9 Objective

The purpose of this report is to establish the design basis for the mechanical ventilation system required for the Residential block and office in SBI Enclave.

This DBR given below shall be read in conjunction with the detailed specification, List of Make & overall other contract documents forming part of the EPS contract. In case of any variance, mechanical requirement given in this DBR or stringent among those shall supersede any other requirements mentioned in any parts of EPC contract document & the instructions/directions of SBI/PMC will be binding on the contract.

The design philosophy is to ensure fulfillment of all fundamental requirements in accordance with Design Guidelines, Relevant Standards and Codes as well as local Bye Laws.

The Design approach shall be sensitive to environmental issues. The main thrust shall be laid on Energy Conservation, Safety and Ease of Maintenance and current technical development.

The mechanical ventilation system must ensure ventilation, and filtration that meets safety, operational efficiency, and environmental compliance.

9.10 Standard & Codes

The applicable standards/ codes are: -

i. ASHRAE Standard 170-2017, Ventilation of Health Care Facilities.

ii. ASHRAE 62.1 – Indoor Air Quality

iii. National building codes – Building Services.

iv. IS: Codes.

v. ECBC 2017

vi. CPWD HVAC Specification 2017.

9.11 GFC Drawings, Shop Drawings & Technical Submittal

On the award of the work, the Contractor shall prepare & submit the detailed technical submittal of equipments & materials along with Services Space Planning Drawings indicating services rooms & cutouts along with shafts in architectural & structural drawings clearing defined with numberings, GFC drawings for approval of SBI/ PMC. Based on GFC drawings contractor shall submit shop drawings for approval before commencement of execution work at site.

The Contractor shall prepare and submit Good for Construction (GFC) drawings for all relevant

disciplines, including but not limited to Architecture, Structural, and MEP services, for review and approval by SBI/PMC prior to commencement of the corresponding works.

It shall be the Contractor's responsibility to ensure that all drawings and documents requiring prior approval are submitted sufficiently in advance to avoid any delay in project execution.

To achieve the desired parameters/requirements as specified in Design Basis Report/Technical Specifications/Tender Drawings etc., the Contractor shall prepare detailed Heat Load Sheets of occupants of basement areas, CFM sizing of Fans (ventilation/pressurization) & submit to SBI/PMC for approval.

The EPC Contractor shall prepare the following shop drawings:-

A. Completion Drawings (As Built Drawings)

The EPC Contractor shall submit three sets (or as required by the engineer in charge) of paper prints of the as-built drawings & one soft copy, showing accurate record of the work as installed to the Client for his reference.

B. Operation and Service Manuals

The contractor shall also submit three copies (or as required by the engineer in charge) of an Operating Manuals in ring binder describing the brief write up on the system installed, operating instruction for all equipments, catalogues, maintenance of equipments etc.

The Contractor shall submit requisite sets of operation and service manuals in respect of the mechanical ventilation including salient details of plant including internal circuit diagrams. Following minimum details shall be furnished:

i. Detailed equipment data as approved by the Engineer-in-charge.

ii. Manufacturer's maintenance and operating instruction.

iii. Approved test readings.

The Contractor's all also submit requisite sets of technical literature on all automatic controls and complete technical literature on all equipment and materials.

C. Technical Submittals

The Contractor shall submit Technical Submittals for all materials, equipment and machinery for approval in writing of the SBI/PMC before placing orders.

The material submittals shall comprise of at least the following:

a) Manufacturer's technical catalogues and brochures, pump curves, Certifications etc. giving technical data about performance and other parameters.

b) Manufacturers drawings / sketches showing construction, dimensional and installation details.

c) Rating charts and performance curves clarifying rating of equipment proposed.

D. **Samples and Prototypes**

The Contractor shall submit samples of items as required by the SBI/PMC for prior approval in writing before placing the order. The Contractor shall also construct prototype or samples of work as laid down in the Contract or as instructed by the Engineer-in-charge.

9.12 Inspection at Work / Contractor's Premises

The client, PMC or their representatives shall at all reasonable time have free access to the Contractor's premises/works. The Contractor shall give every facility to them and necessary help for inspection and examinations and test of the materials and workmanship.

These representatives shall have full powers to inspect drawings of any portion of the work or examine the materials and workmanship at the contractor's works or at any other place from where the material or equipment is to be obtained. Acceptance of any material or equipment shall in no way, relieve the Contractor of his responsibility for meeting the requirement of the specifications.

9.13 Testing, Commissioning & Handing Over

9.13.1 Testing

Tests on equipment as called for in the specifications shall be carried out by the Contractor in accordance with the specifications, the relevant Bureau of Indian Standard Codes (BIS) and International Standards.

The Contractor shall pay for and arrange without any cost, all necessary balancing and testing equipment, instruments, materials, accessories, power, water, fuel and the requisite labour for testing. Any defects in materials and/or in workmanship detected in the course of testing shall be rectified by the Contractor entirely at his own cost, to the satisfaction of the SBI/PMC. The installation shall be tested again after removal of defects if any and shall be commissioned only after approval by the SBI/PMC. All tests shall be carried out in the presence of the SBI/PMC or his representative.

All types of specified & routine tests of the equipments shall be carried out at the works of the EPC Contractor or the manufacturers of the components. The Department shall be free to witness any or all tests, if they so desired. The EPC Contractor has to inform to the department before dispatch of any material / equipment.

On the completion of the installation, the EPC Contractor shall arrange to carry out various initial tests as detailed below:-

i. To operate and check proper functioning of all electrically operated components viz. Compressor motor, pumps, fans etc. as well as other electrical motors.

ii. To test and check the proper functioning of electrical gears, safety and other controls to ensure their proper functioning.

iii. To check the air distribution system and to provide designed airflow in all areas by adjusting the grills, diffusers and dampers for air-conditioning.

iv. To check the systems against leaks in different circuits, alignment of motor, 'V' belt adjustments, control setting and all such other tests which are essential for smooth functioning of the plant.

v. EPC Contractor shall have to submit the capacity test of all equipment at site.

9.13.2 Balancing

The EPC contractor has to balance the mechanical ventilation provided in the buildings

9.13.3 Provisional Taking Over

After completion of the system, the same shall be put to a continuous running test for a period of 72 (Seventy Two) hours. All adjustments should be made prior to this test so that proper conditions / working are achieved during this testing.

The Contractor shall pay for and arrange at his own cost for materials, accessories, power, water, fuel and the requisite labour for this testing the test readings shall be noted in the Testing format approved by the SBI/PMC.

The plant will be provisionally taken over after successful completion of the above test and the defects liability period shall commence after taking over of the system.

9.14 Performance Guarantee from EPC contractor

The EPC Contractor shall submit a performance guarantee certificate from OEM who supplied the work, counter signed by the EPC Contractor that the system shall maintain the desired parameters within tolerance limit of the specified parameters who shall also guarantee that the capacity of various components as well as the whole system covered under the scope of work, technical schedules and requirements etc., shall not be less than the specified capacities. The guarantee of the specific equipment supplied alone with regard to the performance of the system shall not be acceptable and overall responsibility of the Contractor for performance of work & its compliance with the Contract terms and conditions remains unchanged.