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DIGITALLY VERIFIED RECORD

APC Anagha
Prudent Consultants LLP

22-01-2025
Bengaluru

STABILITY CERTIFICATE

It is certified that the proposed construction [(basement+ stilt+ 7 floors) IT building at plot no. 170/a & b, development plot industrial Estate, 2nd main road and estate main road, Palavakkam, chennai, at s.no. 140/19a, palavakkam Village, sholinganallur taluk, greater Chennai Corporation, zone-14, div – 185] is designed to resist earthquake. Check has been made and found safe and I hereby certify that:

1. The minimum grade of concrete is M30.

2. The design and analysis using the code of practice for plain and reinforced concrete as per IS 456, Design Loads as per relevant IS, wind loads as per IS 875 part 3 and Design of Earthquake resistant Structure as per IS 1893 –2016 are carried out.

The building will be safe and sound when used for the purpose for which it is designated.

This certificate is invalid, if any subsequent modifications are made to the structure in any manner. Further the certificate is invalid In the case of misrepresentation of data, suppression of records or wilful modifications to records by the builder or their agents.

Structural Engineer (V.G.Palaksha)
CMDA Reg. No. SE/GR-1/19-06-149

V.G. PALAKSHA, M.E.(STR)
Structural Consultant
CMDA Reg. No. SE/GR-I/19/06/149
1696/5, 6th Cross, Dr. SRK Nagar
MCECHS Layout, Jakkur
Bangalore-560 064, Mob: 9972097980

Structural Design Philosophy

For

COVE IT BUILDING, Chennai

V.G. PALAKSHA, M.E.(STR)
Structural Consultant
CMDA Reg. No. SE/GR-I/19/06/149
1696/5, 6th Cross, Dr. SRK Nagar
MCECHS Layout, Jakkur
Bangalore-560 064, Mob: 9972097980

Revision Index

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V.G. PALAKSHA, M.E.(STR)
Structural Consultant
CMDA Reg. No. SE/GR-I/19/06/149
1696/5, 6th Cross, Dr. SRK Nagar
MCECHS Layout, Jakkur
Bangalore-560 064, Mob: 9972097980

1.0 GENERAL INFORMATION

NAME OF PROJECT	:	**COVE IT BUILDING**
LOCATION OF PROJECT	:	**CHENNAI**
NAME OF OWNER	:	**COVE HOLDINGS PVT LTD**
NAME AND ADDRESS OF ARCHITECTS	:	**Amer & Ani Architects** #14, 32nd Cross St, Tiruvalluvar Nagar, Besant Nagar, Chennai, Tamil Nadu -600090.
NAME AND ADDRESS OF CONSULTANT	:	**Anagha Prudent Consultants LLP** #114-A, CIL Layout, 2nd Cross, 3rd Main, Sanjaynagar Bangalore – 560 094, India Telephone: +91-80-41313961, www.anaghaprudent.com

V.G. PALAKSHA, M.E.(STR)
Structural Consultant
CMDA Reg. No. SE/GR-I/19/06/149
1696/5, 6th Cross, Dr. SRK Nagar
MCECHS Layout, Jakkur
Bangalore-560 064, Mob: 9972097980

2.0 PROJECT BRIEF

2.1 PROJECT DESCRIPTION.

Cove IT Building are proposed to construct IT buildings at Chennai.

The proposed development consists of commercial building. It consists of Basement + Stilt + 7 Floors +Terrace. Basement and Stilt are used for car parking. ITES units starts from first floor to 7th floor.

2.2 BUILDING DESIGN DATA.

The details of the IT Building to be constructed are as follows.

Sr. No	NAME	Approx. Size		Description	No of Floors	Design Consideration
		L (mtr)	W (mtr)			
1	IT Building	37	30	Multiple floors RCC FLAT SLAB structure	1B+1S+7+T	1B+1S+7+T

The IT Building development consists of Basement + Stilt + 7 Floors +Terrace.

Height of typical Floor is 3600mm and Stilt is 4700mm.

3.0 STRUCTURAL DESIGN CRITERIA

3.1 DESIGN BRIEF:

The material chosen for the structural elements in the building is reinforced concrete. Concrete is homogeneous in nature with good strength for compressive forces. Concrete also has a good resistance to fire and weather.

Flat Slab system is proposed for the proposed IT Building. Columns will be arranged in basements, typical floors based on functional and economical considerations for supporting of above floors. Columns are used in resisting lateral loads caused by Wind and Earthquake.

V.G. PALAKSHA, M.E.(STR)
Structural Consultant
CMDA Reg. No. SE/GR-I/19/06/149
1696/5, 6th Cross, Dr. SRK Nagar
MCECHS Layout, Jakkur
Bangalore-560 064, Mob: 9972097980

The grade of concrete shall be as per Design requirement & Reinforcement steel shall be with a yield stress of **500** N/mm². Also lean concrete with strength of 10 N/mm² (M-10) shall be used for levelling course.

Columns shapes shall be rectangular and the sizes shall depend upon the detailed analysis & design, considering the optimum utilization of steel & concrete.

SUPER STRUCTURE:

Super structure of the building is Flat slab, beam system with columns, shear and lift cores as RCC walls. The beams are arranged based on architectural requirement. Continuity of slabs are considered wherever possible for design of slabs.

Slab thickness 285mm and 525mm thick unless mentioned otherwise as per shown in drawing.

SUB STRUCTURE:

Sub structure consists of pile foundation, which distributes gravity loads & lateral loads from super structure to soil beneath as recommended from soil investigators.

3.2 BASIC ASSUMPTION

1. The building shall be designed as one rigid monolithic structure.
2. Sizes of structural elements have been provided for optimal design of maximum stress.
3. Load carrying capacity of compression members increases with higher grade of concrete mix. Therefore to achieve economy and reduced size of columns, shear wall, higher grade of concrete is proposed.
4. Grade of concrete for beams and slabs where flexural strength shall be basis of design, grade M-30 concrete shall be proposed.
5. Continuity of structural members is very much desirable since it will provide multiple path of load resistance. Therefore as far as possible all parts of building are tied together to act as one unit in resisting external forces.

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6. The floor slabs shall be considered as horizontal diaphragms and stiff enough in their planes to produce equal lateral displacement of all shear walls at a given floor level.
7. Non-linear analysis considered for analysis involving super-position of actions and displacements.
8. The cladding and other non-structural components do not influence the behaviour of the building against lateral loads.
9. The out of plane action of slabs are disregarded for lateral load analysis.

3.3 LIMIT STATE METHOD OF DESIGN

Limit state method of design has become common method. In view of this, all structural elements of the building shall be designed with "LIMIT STATE METHOD" as per Indian standards.

3.3.1 LOAD COMBINATIONS

The following load Combinations shall be used for the structural load analysis

Load Combinations		Remarks
1.5 (DL+LL)		**DL** = Dead Load on the Structure **LL** = Live Load on the structure **RSPX** = Earthquake Load along X direction **RSPY** = Earthquake Load along Y direction **WX** = Wind Load along X direction **WY** = Wind Load along Y direction
1.5 (DL± RSPX)	1.5 (DL ± WX)	
1.5 (DL ± RSPY)	1.5 (DL ± WY)	
(0.9 DL ± 1.5 RSPX)	(0.9DL ± 1.5 WX)	
(0.9 DL ± 1.5 RSPY)	(0.9DL ± 1.5 WY)	
1.2 (DL+ LL ± RSPX)	1.2 (DL+ LL ± WX)	
1.2(DL + LL ± RSPY)	1.2 (DL+ LL ± WY)	

Load Combinations for Limit State of Serviceability	
1.0 (DL+LL)	
1.0 (DL± RSPX)	1.0 (DL ± WX)
1.0 (DL ± RSPY)	1.0 (DL ± WY)
DL + 0.8 (LL ±RSP X)	DL+0.8(LL ± WX)
DL + 0.8(LL ± RSPY)	DL + 0.8(LL ± WY)

3.3.2 SERVICEABILITY CHECK

This is given with following limitations:

a. For Vertical deflections : Total load deflections = Span / 250

b. Lateral drift of Structure(wind) : = Height / 500

c. Storey drift = 0.004H*

where H = total height of the building
H* = storey height

d. For Cracking

1. For water retaining structure = cracked section, limiting crack width to 0.2 mm

3.3.3 COMPUTER ANALYSIS

All structures shall be analyzed using STAADPro Software / ETABS / SAFE and RCDC.

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3.4 DESIGN LOAD DATA

The RCC/Basic frame structure shall be designed considering the dead loads of the following elements.

WALLS

External walls **200mm**

Internal walls **200mm**

SUNKEN SLAB

Toilet Sinking	**150 mm**
Balcony Sinking	**100 mm**
Utility Sinking	**150 mm**

Toilet filling material **PCC**

O.H. WATER TANKS

The R.C.C. over head water tank shall be considered for Potable /Fire & Raw water storage at locations as per MEP consultants. Capacity of tanks considered based on input from MEP consultants.

3.4.1 DEAD LOADS – IS 875: Part 1

The densities of different materials considered for design are as follows:-

Density of reinforced concrete	25 kN/ cu.m
Density of soil	18 kN/ cu.m
Density of steel	78.5 kN/ cu.m
Density of plain concrete	24 kN/ cu.m
Density of finishes / plaster for walls	20.4 kN/ cu.m
Density of Granite	26 kN/ cu.m
Density of solid blocks	21 kN/ cu.m

Density of Cinder for filling	8 kN/ cu.m
Density of Brickbat filling	20 kN/ cu.m
Floor finishes	2.4 kN/sq.m
Terrace level floor finish	2.4 kN/sq.m
Car parking level floor finish	2.4 kN/sq.m
Curtain wall glazing	0.90 kN/sq.m

3.4.2 LIVE LOADS– IS 875: Part 2

The LIVE loads recommended herein is for UDL (Uniformly Distributed Load) over the Floor.

1. Staircase - 4.0 KN/ m^2
2. Corridors, Balconies - 3.0 KN/ m^2
3. Toilet Floor - 4.0 KN/ m^2
4. Terrace Floor - 2.0 KN/ m^2
5. Lift Machine slab - 12.0 KN/ m^2
6. Fire Driveways - 45.0 MT WAGON Load (a unifomly distributed load of 15.0 KN/m^2 is assumed on the slab as equivalent load)
7. Podium slabs - For landscape filling as per Landscape drawings.
8. Gym area - 5.0 KN/ m^2
9. Car parking - 3 KN/ m^2
10. Indoor Games - 3.0 KN/ m^2
11. Party Hall - 5.0 KN/ m^2
12. Lift Lobby - 4.0 KN/ m^2
13. Electrical Room - 7.5 KN/m^2

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3.4.3 WIND LOAD – IS:875 Part 3

As per IS.875 part 3 2015 Basic wind speed in Chennai is considered as **50** m / sec.

Risk Coefficient K1	: 1.00 (k1 corresponds to 50 years Mean Probable Design Life of Structure)
Terrain, height, structure size factor K2	: It varies wrt height from 1 to 1.2 (To suit the height of the structure for terrain Category 4 is considered)
Topography factor K3	: 1.13
Importance factor K4	: 1.00
Design wind speed Vz	: Vb x K1 x K2 x K3xK4

3.4.4 SEISMIC LOAD:

1. Sesmic loads shall be calculated as per IS 1893-(Part 1) - 2016.
2. According to the IS: 1893, the Indian Sub-Continent has been divided into four seismic zone. Zone II is zone of "Low Seismic Risk", Zone III is of "Moderate Seismic Risk", Zone IV is of "Severe Seismic Risk", & Zone V is of "Very Severe Seismic Risk".
3. **Chennai** comes under Zone III which is of "Moderate Seismic Risk".
4. Various design parameters for seismic analysis, suggested are as follows:
   a. Zone factor (Z) = 0.16
   b. Importance factor for the structure (I) = 1.2
   c. Response reduction factor (R) = 3.0
   d. Soil site factor = Medium

   Period considered for the structure is WITHOUT INFIL as per Cl 7.6.2(a).
5. For calculating the earthquake force on roofs the live load shall not be considered.
6. The horizontal earthquake force shall be calculated for the full dead load and 25% of live loads.
7. The Dynamic method is used for the analysis of structure.

3.5 CONSTRUCTION MATERIALS.

3.5.1 STEEL

All reinforcing steel shall be **Fe 550** grade with 14.5% elongation.

Y – on all drawings represents high yield strength deformed bars.

3.5.2 CONCRETE

Grade of concrete for shear walls and columns shall be as per design requirement. Grade of concrete of for beams, slabs and all other elements shall be M30. Flyash or GGBS can be replaced for concrete upto 20%.

FOUNDATION, RETAINING WALLS & OTHER CONCRETE BELOW GROUND LEVEL.

Grade of concrete for sub-structural elements shall be as per the design requirements with minimum cement content of **400 Kg/m^3** for walls of liquid retaining structures. Flyash or GGBS can be replaced for concrete upto 20%.

SLAB & BEAMS

Concrete grade shall be as per the design requirement with minimum cement content of **320 Kg/m^3**. Flyash or GGBS can be replaced for concrete upto 20%.

MINIMUM CEMENT CONTENT:

GRADE OF CONCRETE	MIN CEMENT CONTENT
M20 & M25	300 Kg/m^3
M30	320 Kg/m^3
M35	340 Kg/m^3
M40	360 Kg/m^3
M45	380 Kg/m^3

Maximum cement content not to exceed 450 Kg/m^3.

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FOUNDATIONS

1. Pile foundation is adopted as recommended from soil investigators.
2. All loose pockets and soft spots are to be filled in mass concrete of grade M10.
3. All backfilling shall be well compacted to achieve 95% modified dry density. Compaction shall be done in layers of not more than 300mm.
4. Suggested precautions indicated in geotechnical report shall be followed while undertaking the construction activity.
5. Design of foundation / substructure shall be done as per recommendations of geotechnical investigations report and relevant codes of practice / handbooks.

PILE DETAILS:

TABLE:- 4.1 RECOMMENDED SAFE LOAD CARRYING CAPACITIES OF BORED CAST-IN SITU PILES

S. NO	REF BOREHOLE NUMBER	LENGTH OF PILE BELOW EGL	SOCKET IN WEATHERED ROCK			DIAMETER OF PILE	SAFE LOAD CARRYING CAPACITY (kN)		
			TOP OF SOCKET	BOTTOM OF SOCKET	LENGTH OF SOCKET		VERTICAL LOAD CARRYING CAPACITY	PULL OUT CAPACITY	LATERAL LOAD CARRYING CAPACITY
1.0	BH-01	13.0	11.5	13.0	1.5	500	1250	600	Design as structural piles with fixity beyond 10.0m
2.0						600	1650	700	
3.0						750	2350	800	
4.0						800	2600	900	

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3.5.3 LAP / DEVELOPMENT LENGTH

Lap / Development Length	**Fe 500 for bars in Tension**	**Fe 500 for bars in compression**
M20	57x dia.	46x dia.
M25	49x dia.	39x dia.
M30	45 x dia.	36 x dia.
M35	40 x dia.	32 x dia.
M40 & above	36x dia.	36x dia.

3.5.4 CONCRETE COVER

The structures shall be designed with Clear concrete cover to reinforcement as follows:

Solid slabs	25 mm
Pile cap	75&50 mm for bottom & top respectively
Retaining Wall	30 mm on earth side
Beams	40 mm simply supported / 30mm continuous mm
Columns	40 mm
UG and OH Water tanks	30 mm on outer side / 30 mm on water side
Staircase	30 mm
Shear wall	30 mm
Grade Slab	40 mm from top

The structure is designed for 2.0 hr fire rating.

3.5.5 WATER PROOFING

Tanking membrane/Crystalline water proofing is proposed for retaining walls.

Crysatallisation/Membrane/Elastomeric cementitious coating for wet areas and Single component PU for podium and roof.

3.6 GENERAL NOTES

1. Structural drawings shall be read and used in conjunction with Architectural, Mechanical, Plumbing, Electrical drawings and project specifications.
2. Unless otherwise noted, details shown on any structural drawings are to be considered typical for all similar conditions.
3. All 'levels' to be read from Architectural drawings & corresponding services drawings.
4. All dimensions in structural drawings, reinforcing bar diameters / spacing of bars are in millimeters.
5. Exposure condition considered for the sub and super structure is moderate as per Table-3 of IS 456.
6. Cracked section properties as per Table-6 of IS-16700-2017 is adopted.

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3.7 DESIGN CODES AND REFERENCES:

Indian Standard Code of Practice for Design Loads (other than Earthquake) for buildings and structures. IS: 875 (Part 1 DEAD LOADS) 1987.

1. Indian Standard Code of Practice for Design loads (other than Earthquake) for buildings and structures. IS: 875 (Part 2 LIVE LOADS) – 1987.
2. Indian Standard Code of Practice for Design loads (other than Earthquake) for buildings and structures. IS: 875 (Part 3 WIND LOADS) – 2015.
3. Indian Standard Code of Practice for Design loads (other than Earthquake) for buildings and structures. IS: 875 (Part 5 SPECIAL LOADS & COMBINATIONS) – 1987.
4. Indian Standard Plain and Reinforced Concrete. Code of Practice. IS: 456 : 2000.
5. Indian Standard Criteria for Earthquake Resistant Design of Structures IS:1893(Part1) :2016.
6. Indian Standard code of practice for Earthquake Resistant Design and construction of buildings (2nd Revision) IS: 4326 – 1993.
7. Indian Standard Code of practice for concrete structures for the storage of liquids IS: 3370 (Part I&II) – 2009.
8. SP-16 – 1980, Design Aids for reinforced concrete to IS: 456 – 2000.
9. SP: 24 – 1983. Explanatory Hand book on Indian Standard Code of Practice for Plain and Reinforced Concrete to IS: 456 – 2000.
10. Indian standard code of practice for ductile design and detailing of reinforced concrete structure subject to seismic force IS:13920-2016.
11. Indian standard code of practice for structural safety of tall concrete building IS:16700-2017
12. Indian Standard Hand Book on Concrete Reinforcement and Detailing SP:34(S&T)–1987.
13. Foundation Analysis and Design – Joseph E Bowles – McGraw-Hill Publications.
14. Reinforced Concrete Designer's Hand Book – C.E. Reynolds and James C. Steedman.
15. Hand Book of Concrete Engineering – Mark Fintel – CBS Publishers and Distributors.
16. IS 1904-Indian Standard Code of Practice for design & construction foundation in soil general requirements.

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17. IS 2950 - Indian Standard Code of Practice for design & construction of raft foundation (Part-1)
18. IS 2911 part 1 section 1 – Indoan code of practice for design & construction of Pile foundations.

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THE LANDLENS SUITE

Eight ways to know a piece of land before you pay for it.

This report covers one part of the picture. These cover the rest, drawn from the same government records, for any property in Tamil Nadu.

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Ask anything about a property and get an answer grounded in live government records, with the sources shown.
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Verify My Land
Every record check run on one property and returned as a single report.
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Legal Opinion
An advocate's written opinion on the title, built on the records we pull for it.
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One Map
Every layer on one map: the parcel, its boundary, zoning, water bodies and what sits around it.
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PriceMap
What land actually changed hands for around this plot, taken from the registered deeds.
/landlens/pricemap

Build Scope
What you are allowed to build here: floor space, height, coverage and setbacks.
/landlens/build-scope

Property Tracker
Watch a property and hear about it when something new is registered against it.
/landlens/property-tracker

Deal Room
Run the transaction in one place: documents, stamping, signatures and the parties.
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Records and verification

The registers themselves, read for you.

- Encumbrance Certificate
- Patta and Chitta
- Field Measurement Sketch
- EC Analyzer
- Bank charge check
- Court case search
- Seller background check
- Approval check by survey

Value and duty

What it is worth and what it costs to register.

- Guideline value by street
- Guideline value by survey
- Stamp duty and registration fees
- Capital gains
- Floor space index
- Area unit converter

Zoning and land use

What the plan says can happen on this land.

- Land use zone finder
- CMDA land use check
- Coastal regulation zone
- Master plan check
- Water bodies finder
- Airport height clearance

Registers and directories

Who holds it, and which office keeps the record.

- Find your registering office
- Temple property check
- Waqf property check
- RERA register

Every free tool
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Every claim in this document traces back to a government record.

- Legal opinions, due diligence and title verification
- Building plan, layout and sub-division approvals
- Completion and occupancy certificates, regularisation
- Escrow, negotiation and NRI property management
- Land survey, soil testing, architecture and construction

Verified RealEstate
3/350/2 Mettukuppam,
OMR Thoraipakkam,
Chennai 600 097, India
hello@verified.realestate
+91 9996 12 9996

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