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Vivek Designs
Structural Consultants | Engineers

C.ARUL B.Tech.,
Structural Consultant

STRUCTURAL DESIGN STABILITY CERTIFICATE

I hereby certify that the PROPOSED CONSTRUCTION OF RESIDENTIAL APARTMENT BUILDING IN DOOR NO: 112, PLOT NO: 31, T.S. NO: 27, WARD NO: AK, BLOCK NO: 4,CRAWFORD COLONT MAIN ROAD, CRAWFORD, K.ABISHEKAPURAM VILLAGE, ZONE – IV (PONMALAI ZONE), TIRUCHIRAPPALLI CITY CORPORATION building will withstand against the Earthquake, (Seismic Zone II as per IS 1893 (Part- 1) 2002) loading stress parameters are within limits of National Building Code and Bureau of Indian standards code of practice for concrete and loading. The building consists of Stilt + Five floors upper floors. The R.C.C. building frame of the structure is designed as per the Indian Standard code of practice for concrete and loadings. The structure will be constructed as per our structural design and detailing of reinforcements given in our drawing from foundation to roof slab and beam. For external and internal partition walls 230/115 thick brick wall are used. The building Structure will be structurally sound and stable.

For VIVEK DESIGNS,

C. ARUL B. Tech
Structural Consultant
Registered Structural Engineer
Grade II (SE) in CMDA
Reg. No. SE/GR-II/19/03/003 Dt.04-03-2019
2/3, Railway Colony, 1st Street,
Nelson Manickam Road, Aminjikarai
Chennai-600 029

(C. ARUL)

Structural Consultant

STABILITY CERTIFICATE

(Form of Certificate of structural soundness under sub-section (4) of section 4 of the Tamilnadu public Buildings (Licensing)Act, 1965 (Tamilnadu Act, 13 of 1965) referred to in rule 4 of the Tamilnadu public buildings (Licensing) Rules 1966

1.	Door Number of building	:	Door No - 112
2.	Location (Street number, Panchayat Union / Township / Cantonment)	:	PLOT NO: 31, T.S. NO: 27, WARD NO: AK, BLOCK NO: 4,CRAWFORD COLONT MAIN ROAD, CRAWFORD, K.ABISHEKAPURAM VILLAGE, ZONE – IV (PONMALAI ZONE), TIRUCHIRAPPALLI CITY CORPORATION
3.	Year of Construction	:	Proposed Residential Building
4.	Approximate cost of construction	:	4.25 Cr
5.	Purpose for which the building is Being used or proposed to be used	:	Prop. Residential Building
6.	Purpose for which the building has hitherto been used	:	Proposed Residential Building (Stilt + Five Floors)
7.	Details of Construction of the Building (particulars of the Foundations soil specification of the various parts under)	:	
	(1) Foundation	:	RCC framed structure, With Isolated Foundation
	(2) Basement	:	Plinth beam with brick in CM
	(3) Super Structure	:	RCC frame with slab and beam
	(4) Floor and roof	:	
	a) Stilt Floor	:	RCC roof, Grano flooring
	b) F.F, S.F&T.F.Floor	:	RCC roof, Tile flooring
8.	Period for which licence required	:	Proposed Building
9.	No. of person to be accommodated	:	15 Residential Flats ---45 Persons

Station : Chennai
Date : 22.06.2023

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Signature of the Engineer

FORM - B

(Form of Certificate of structural soundness under sub-section (4) of section 4 of the Tamilnadu public Buildings (Licensing)Act, 1965 (Tamilnadu Act, 13 of 1965) referred to in rule 4 of the Tamilnadu public buildings (Licensing) Rules 1966

Since the building is a proposed one this certificate is not issued

Station : Chennai
Date : 22.06.2023

Signature of the Engineer

STATEMENT OF ACCOMPANY THE CERTIFICATE OF STRUCTURAL SOUNDNESS

1. Location of the building door number	:	DOOR NO: 112, PLOT NO: 31, T.S. NO: 27, WARD NO: AK, BLOCK NO: 4,CRAWFORD COLONT MAIN ROAD, CRAWFORD, K.ABISHEKAPURAM VILLAGE, ZONE – IV (PONMALAI ZONE), TIRUCHIRAPPALLI CITY CORPORATION.
2. Age of the Building	:	Proposed Building
3. Purpose for which the building will be structurally sound :	:	Proposed Residential flats
4. The period for which the building will be structurally sound :	:	Proposed Building
5. Number of persons to be accommodate	:	15 Residential Flats ---45 Persons
6. Remarks	:	Proposed Building

Station : Chennai
Date : 22.06.2023

C. ARUL B. Tech
Structural Consultant
Registered Structural Engineer
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Signature of the Engineer

FORM - C

(Form of Certificate of structural soundness under sub-section (4) of section 4 of the Tamilnadu public Buildings (Licensing)Act, 1965 (Tamilnadu Act, 13 of 1965) referred to in rule 4 of the Tamilnadu public buildings (Licensing) Rules 1966

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1. Foundation	:	Isolated Foundation
i) Depth below ground level	:	2.50 m deep
ii) Nature of soil met with at Foundation	:	Integrated rock particles
iii) Probable safe bearing capacity of the soil	:	35 T /M2 at 2.50M LVL
iv) Pressure at foundation	:	15T/m2 to 20 T/m2
2. Superstructure		
i) Maximum stress in the most critical Section of masonry and concrete	:	For Concrete 13 N/mm^2 For Brick Masonry 0.5 N/m^2
ii) Nature of masonry and concrete and its safe permissible stresses	: :	M20 Grade Concrete 20N/nm2 Brick Masonry in CM 0.75 N/nm2

This is stated that the building will be designed to take seismic forces and other loads as per the relevant Indian standard codes.

Place : Chennai

Date : 22.06.2023

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Signature of the Engineer

PROPOSED CONSTRUCTION OF RESIDENTIAL APARTMENT BUILDING IN DOOR NO: 112, PLOT NO: 31, T.S. NO: 27, WARD NO: AK, BLOCK NO: 4,CRAWFORD COLONT MAIN ROAD, CRAWFORD, K.ABISHEKAPURAM VILLAGE, ZONE – IV (PONMALAI ZONE), TIRUCHIRAPPALLI CITY CORPORATION

DESIGN BASIS REPORT – STRUCTURAL

REV	DATE	DESCRIPTION	PREPARED BY
R0	22.06.23	ISSUED FOR APPROVAL	C.ARUL

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1. PROJECT BRIEF:

PROPOSED CONSTRUCTION OF RESIDENTIAL APARTMENT BUILDING IN DOOR NO: 112, PLOT NO: 31, T.S. NO: 27, WARD NO: AK, BLOCK NO: 4,CRAWFORD COLONT MAIN ROAD, CRAWFORD, K.ABISHEKAPURAM VILLAGE, ZONE – IV (PONMALAI ZONE), TIRUCHIRAPPALLI CITY CORPORATION has development area of 6262 Sqft. This Building comprises of Stilt + 5 Floors with Car parking (15No.), Two Wheelers parking (12 Nos.) , Building Consist each floor of 3505 Sqft. This specification covers the general requirements for structural design and analysis of proposed residential development project.

2. STRUCTURAL SYSTEM

The structural system adopted is as below, based on preliminary analysis and design, which have been elaborated later in this report:

- The building is basically a RC framed structure. The analysis and design are done using STAAD/SAFE/RCDC software.
- Conventional RC beam-slab system is adopted for substation areas respectively.
- For obtained bearing capacity of soil, isolated foundation system is recommended by the soil consultant.

3. DESIGN STANDARDS:

Sl.No.	Code	Title
1	IS-875(Part 1)-1987 (Reaffirm 2013)	Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures - Unit Weights of Buildings Materials and Stored Material
2	IS-875(Part 2)-1987 (Reaffirm 2013)	Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures - Imposed Loads
3	IS-875(Part 3)-1987(Reaffirm 2013)	Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures - Wind Loads
4	IS-875(Part 5)-1987(Reaffirm 2013)	Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures - Special Loads and Load Combinations
5	IS:456-2000	Code of Practice for Plain and Reinforced Concrete
6	IS:432(Part 2)-1982	Specification for Mild Steel and Medium Tensile Steel Bars and Hard Drawn Steel Wire for Concrete Reinforcement – Hard Drawn Steel Wire

7	IS: 1893:2002	Criteria for Earthquake Resistant Design of Structures Part - 1 General Provisions and Buildings
8	IS: 800-2007	General construction of steel- code of practice.
9	IS 1080 :1985	Code of practice for design & construction of shallow foundations in soil
10	IS 1904 :1986	Code of practice for design & construction of foundations in soil general requirements
11	IS 2950, Part 1:1981	Code of practice for design & construction of raft Foundations, Part I - Design
12	IS 2911 Pt. 1 Section- I 1979	Code of Practice for Design and Construction of Pile Foundation.- Driven Cast in situ concrete pile
13	IS 2911 Pt. 1 Section- II - 1979	Code of Practice for Design and Construction of Pile Foundation. – Bored cast in situ piles
14	IS 2911 Pt. IV 1985	Code of Practice for Design and Construction of Pile Foundation – Load test on piles
15	IS 6403:1981	Code of Practice for determination of bearing capacity of shallow foundations
16	IS 13920 : 1993 (Reaffirmed 1998) Edition 1.2 (2002-03)	Ductile Detailing Of Reinforced Concrete Structures Subjected to Seismic Forces – Code of Practice

4. SOIL DATA:

With reference to "Geotechnical Report" submitted by TIME INSTITUTE FOR MATERIALS TESTING NO.25, SANJEEVI NAGAR, TRICHY – CHENNAI BYEPASS ROAD, TIRUCHIRAPPALLI – 620 002 have recommended foundation system shall be isolated open foundations.

The Isolated open foundation at the depth of 2.5 m the SBC shall be 35 t/m2. At location where Disintegrated Rock Particles is encountered.

5. LOADING DATA

a. Dead load

Self-weight of the materials shall be calculated on the basis of unit weights given in(IS: 875 -1987(PART- I).

- ✓ Unit weight of concrete - 25.0 kN /m^3
- ✓ Unit weight of AAC block - 6.0 kN /m^3
- ✓ Unit weight of solid block - 20.0 kN /m^3
- ✓ Unit weight of steel - 78.5 kN /m^3
- ✓ Unit weight of floor finishes - 20.0 kN /m^3
- ✓ Unit weight of water - 9.807 kN /m^3
- ✓ Partitions, ducts, False ceiling - 1.50 kN /m^2

b. Wall load

The load from wall shall be calculated separately and assigned in the analysis.

c. Floor load

TERRACE FLOOR SLAB:

Weathering Coarse - 4.00 kN/m^2 (screed is 200mm)

FIRST – FIFTH FLOOR SLAB:

Toilet - 7.00 kN/m^2 (Sunken is 350mm)

Floor finishes - 2.00 kN/m^2 (Finishes of 100mm)

d. Live load:

On the basis of intended occupancy and use, the loading shall be based on IS: 875 -1987(PART-II).

All Room & Kitchen	- 2.00 kN/m^2
Toilet & bath room	- 2.00 kN/m^2
Corridors, passages, staircases including tire escapes and store	- 3.00 kN/m^2
Balconies	- 3.00 kN/m^2

Terrace floor with access - 1.50 kN/m^2

Live load reduction:

Live load reduction is considered for foundation and column design as per IS 875 – 1987 (Part-2).

e. Wind load:

Wind loads design of structures shall be based on the following parameters to arrive design wind speeds. (IS: 875 -1987(PART- III).

Basic wind speed (Vb)	- 33 m/sec
Risk Coefficient, K1	- 1.0
Terrain, Height, structure size factor, K2	- Ter.category-3& class B
Topography factor, K3	- 1.0
Design wind speed (Vz)	- Vb x K1 x K2 x K3
Design wind pressure (Pz)	- 0.6 Vz^2

f. Seismic load:

Seismic loads design of structures shall be considered as per IS 1893-2002.

Zone	- III
Zone factor (Z)	- 0.16
Importance factor (I)	- 1.0 - Table 6of IS 1893-2002
Response reduction factor (R)	- 3.0 (OMRF) Table 7of IS 1893-2002

Avg. response acceleration coefficients (Sa/g) for soil conditions as per Fig 2 of IS 1893-2002

Design Horizontal seismic coefficient (A_h) = 0.01667 x (Sa/g)

Time period - moment-resisting frame building without brick infill panels (0.075 $h^{0.75}$)

The building is designed for static analysis.

6. DESIGN LOAD COMBINATIONS:

The building is designed using the limit state method with appropriate load factors as per IS: 456-2000.

TABLE: PARTIAL SAFETY FACTORS FOR LOADS, γf, FOR LIMIT STATES

LoadCombination	Limit State of Collapse			Limit State of Serviceability		
	DL	LL	WL/EL	DL	LL	WL/EL
DL + LL	1.5	1.5	--	1	1	--
DL + LL ±WL	1.2	1.2	1.2	1	0.8	0.8
DL + LL ±EL	1.2	1.2	1.2	1	0.8	0.8
DL ± WL	1.5 or 0.9[$]	--	1.5	1	--	1
DL ± EL	1.5 or 0.9[$]	--	1.5	1	--	1

Where,DL - Dead Load, LL - Live Load, WLX, WLZ - Wind load in X and Z direction,

ELX, ELZ - Seismic load in X and Z direction

7. DESIGN PARAMETERS

Material specifications

Concrete and reinforcement strengths:

a) Grade of concrete - M20

b) Grade of reinforcement - Fe 500

Exposure conditions and cover for RCC members

Nominal cover for all structural members shall be based on "MILD" exposure condition and 2 hours Fire rating whichever is governing.

Structural element	Cover to reinforcement
Floor slab	- 25 mm
Beam/walls	- 30 mm
Column	- 40 mm
Foundations	- 50 mm

8. ANALYSIS

1. The structure is idealized as 3D frame and analyzed using software package both vertical and lateral loads.
2. The lateral loads include wind loads and earthquake loads.
3. Seismic load intensity of Zone - III is considered Seismic analysis and design purpose.
4. Forces and moments from the three dimensional analysis output the worst combination are used the design of the structure. The foundation is designed critical un-factored load combinations.
5. The support conditions of all the columns are assumed to be fixed.

9. DESIGN AND DETAILING:

The designs of the RCC elements are made using the limit state method with appropriate load factors as per IS: 456 – 2000 in consonance with SP 34-1987 for detailing.

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