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Tamil Nadu Real Estate Regulatory
Authority, Chennai-8.

CIRCULAR

Cirucular No.TNRERA/ A3/3661/2024 Dated: 11.12.2024

Sub: TNRERA – Registration of real estate projects (Buildings) – Dispensing with insisting Geotechnical Report (Soil Report).

***

The Authority considered the receipt of various documents for registration of real estate projects (building) under Section 5 of the Real Estate (Regulation & Development) Act, 2016. Geotechnical Report (Soil Test Report) is one of the documents to be uploaded by the promoter. The Authority felt that it is the duty of the Structural Engineer to verify soil condition and design the structure accordingly.

2. Therefore, the Authority has decided not to insist Geotechnical Report (Soil Test Report) while filing application for registration of building project. Instead, a certificate issued by the Structural Engineer, who has designed the building, to the effect that he has verified the Geotechnical Report (Soil Test Report) and has taken the soil properties into account while designing the building, shall be submitted.

3. Accordingly, the format of Structural Stability Certificate has been revised. The revised format is enclosed herewith. Henceforth, the promoters are required to submit Structural Stability Certificate as per the revised format at the time of filing application for registration of building projects.

for CHAIRPERSON

To
Senior Programmer (for uploading in the website)

Copy to:
1. P.S. to Chairperson
2. P.C. to Member (LS
3. P.C. to Member (K)
4. Additional Director-I
5. Additional Director-II
6. Secretary (Finance & Admn.)
7. Law Officer
8. Accounts Officer
9. A2, A3, A4, A5, A6.

Structural Stability Certificate to be in the letter pad

STABILITY CERTIFICATE

(To be furnished while filing application for registration of building)

The detailed engineering and structure design of the proposed building comprising of..... floors at..... S.No..... has been done by me/us based on the report of geotechnical investigation (soil test) done by..... and considering the functional requirement of the building.

2. It is certified that among other factors, the proposed building has been designed to resist earthquake. I/We have checked various parameters and found that the proposed building would be safe.

3. I/We further certify that:

(i) The minimum grade of concrete is ----------

(ii) The design and analysis has been done using the code of practice for plain and reinforced concrete as per IS 456, design loads as per IS Codes No..... and design of earthquake resistant structure as per IS Code No.....

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

Stamp and Signature

Encl.: Structural Design Calculation

Design Basis Report

Introduction:

It is proposed to construct an affordable housing project, consisting of a residential building at Coimbatore, being developed by Town and City Developers, using Precast wall panels, Precast beams, Portal frames, Precast columns & Precast solid slabs. The structure consists of Underground Basement, Ground floor plus 5 floors.

Design Criterion:

2.1 Bureau of Indian Standard Codes

1. *Reinforced Concrete Members as per IS 456:2000*
2. *Prestressed Concrete Members as per IS 1343:2012*
3. *Structural Steel members as per IS 800:2007*
4. *Precast Large Pannel as per IS 11447:1985*
5. *Precast Elements Design as per IS 15916:2020*
6. *For Design Loads as per IS: 875 (Part 1 & 2)1987*
7. *For Wind Loads as per IS: 875 (Part 3) 2015*
8. *Design and Construction of Foundations in Soils as per IS 1904-1986*
9. *Criteria for Earthquake Resistance Design as per IS 1893:2016*
10. *Ductile Design and detailing of reinforced concrete structures IS 13920:2016*

2.2 International Codes

Wherever the IS codes are silent, International codes are refered-

1. *Builing Code Requirement for Structural Concrete as per ACI: 318*
2. *Code of practice for design and construction as per BS: 8110 - 1985*
3. *Precast and Prestressed Concrete Design as per PCI Handbook 7th Edition*
4. *Ref. Book "Precast Concrete Structure" by KIM S.ELLIOTT*

Load Path

Vertical Load Path

The floors of building are proposed to be constructed using 150mm (90mm PSS + 60mm Screed at apartments and 60mm PSS + 90mm Screed at corridor) pre-cast Reinforced solid slabs. These slabs will typically rest on 160mm thick pre-cast wall panels which are supported by cast in situ Shear Walls and RC raft footings.

Lateral Load Path

The pre-cast wall panels used to support the pre-cast floor forms the lateral load resisting system in both the directions for each appartment typology. To ensure that, the lateral loads are transferred to these walls effectively, tie beams on top of walls and at periphery with reinforcing bars is provided within the insitu screed acting as internal & horizontal ties.

Mathematical Model

The structure is analysed using Staad.Pro v8i. Elastic Analysis is Performed. The Seismic Forces are distributed in Vertical Direction using STATIC Analysis (As per IS 1893 Method). The structure is modelled considering it as a monolithic structure (emulative design)

Precast Shear Wall

The Precast Shear Wall is Modeled using 4 noded rectangular Plane Stress Elements of approximate 500x500 mm size.
For compatibility purpose a vertical border element for different thicknesses of shear walls is modelled as follows :

Shear Wall Thickness	Vertical Boundary Element size
125 mm	125mm x 125mm
160 mm	160mm x 160mm
200 mm	200mm x 200mm

Diapragm

The Rigid diaphragm is applied by Master Slave Command in x-z direction .

Boundary Conditions

As there are adequate number of shearwalls available in both the directions, the out of plane moments in the walls can be neglected, as such the pinned support are provided at each support node of the shear wall.

Load Calculations

Dead Loads

Dead Loads on typical Floor Slab (Living+ Bed Rooms)

Self weight of precast Solid Slab 90mm thk		2.25	kN/sqm
Self weight of 60mm thk screed		1.5	kN/sqm
Services		0.25	kN/sqm
Floor Finish		1	kN/sqm
Total		**5**	**kN/sqm**

Dead Loads on typical Floor Slab (Kitchen)

Self weight of precast solid Slab 90mm thk		2.25	kN/sqm
Self weight of 60mm thk screed		1.5	kN/sqm
Services		0.25	kN/sqm
Floor Finish		1	kN/sqm
Total		**5**	**kN/sqm**

Dead Load on Toilet slab 1

Self weight of precast solid Slab 90mm thk		2.25	kN/sqm
Self weight of 60mm thk screed		1.5	kN/sqm
Services		0.25	kN/sqm
Floor Finish		1	kN/sqm
Partition Wall load	=	2.10	kN/sqm
Total		**7.10**	**kN/sqm**

Dead Load on Toilet slab 1

Self weight of precast solid Slab 90mm thk		2.25	kN/sqm
Self weight of 60mm thk screed		1.5	kN/sqm
Services		0.25	kN/sqm
Floor Finish		1	kN/sqm
Partition Wall load	=	1.5	kN/sqm
Total		**6.50**	**kN/sqm**

Dead Load on balcony slab 1 and balcony 2

Self weight of precast solid slab 90mm thk		2.5	kN/sqm
Services		0.3	kN/sqm
50mm Sunk		1	kN/sqm
Floor Finish		1	kN/sqm
Total		**4.8**	**kN/sqm**

Dead Load on Corridor

Self weight of precast solid Slab 60mm thk		1.5	kN/sqm
Self weight of 90mm thk screed		2.3	kN/sqm
30mm Sunk		1.5	kN/sqm
Services		0.3	kN/sqm
Floor Finish		1	kN/sqm
Total		**6.5**	**kN/sqm**

Dead Loads on staircase

Self weight of waist slab 150mm thk		3.8	kN/sqm
Self weight of steps 100mm thk avg.		2.5	kN/sqm
Floor Finish		1.3	kN/sqm
Total		**7.5**	**kN/sqm**

Dead Loads on Lift Machine Room

Self weight of LMR structure (walls and slabs)	=	15	kN/sqm
Total		**15**	**kN/sqm**

Dead Loads From Over Head Water Tank (OHWT)

Self weight of OHWT (walls and slabs)		15	kN/sqm
Total		**15**	**kN/sqm**

Live Loads

Live Loads on Roof Slab

Total **2** **kN/sqm**

Live Loads on Typical Floor Slab (Rooms)

Total **2** **kN/sqm**

Live Loads on staircase

Total **3** **kN/sqm**

Live Loads on Lift Machine Room

Total **10** **kN/sqm**

Live Loads on balcony

Total **3** **kN/sqm**

Summary of Gravity Loads				
Location	*Dead Load*		*Live Load*	
Living+Bed precast Hollowcore Slab 150mm	5.0	KN/sqm	2	KN/sqm
Kitchen of precast solid Slab 150mm thk	5.0	KN/sqm	2	KN/sqm
Tiolet precast solid Slab 150mm thk	7.1	KN/sqm	3	KN/sqm
Tiolet precast solid Slab 150mm thk	6.5	KN/sqm	3	KN/sqm
Balcony precast solid slab 90mm thk	4.8	KN/sqm	3	KN/sqm
Corridor solid Slab 120mm thk	6.5	KN/sqm	3	KN/sqm
Staircase	7.5	KN/sqm	3	KN/sqm
Lift Machine Room	15	KN/sqm	10	KN/sqm
Over Head Water Tank (OHWT)	15	KN/sqm	20	KN/sqm

Gravity Loads Applied in Mathematical Model (Floor)						
No.	Location	Span (m)	Floor Load (kn/sqm)		Applied UDL (kN/m)	
			DL	LL	DL	LL
1	Living+Bed	3.475	5.0	2	8.688	3.475
2	Kitchen	3	5.0	2	7.500	3.000
3	Toilet 1	1.85	7.1	3	6.568	2.775
4	Toilet 2	3.475	6.5	3	11.294	5.213
5	Balcony	1.5	4.8	3	3.600	2.250
6	Lobby	3	5.0	3	7.500	4.500
7	Stairs	4.4	7.5	3	16.5	6.600
8	Toilet 3	1.85	5.0	3	4.6	2.775
9	cis slab	3.475	5.0	2	8.688	3.475
10	cis coridor	1.8	6.5	3	5.850	2.700

Load of partition walls:

1) Load of partion wall is considered on the slab as distributed load in case of toilet slab.

2) In other case where partition wall is resting on beam, load of partition wall is applied as a uniformly distributed load on beam under it.

Seismic Forces

Design Horizontal Seismic Coefficient

$$Ah = \frac{Z \times I \times Sa}{2 \times R \times g}$$

Clause 6.4.2 of IS 1893-part1

Where, Z = 0.16

I = 1

R = 3

Sa/g in x-dir = 1.673

Sa/g in z-dir = 1.232

Clause 6.4.5 (Hard soil/ Rock) (N>30) 1

Hence,

Ah in x-direction = 0.0446

Ah in z-direction = 0.0329

Seismic Weight (Refer Staad o/p)

= 216490.4 kN From STAAD-Pro

Base Shear in X- Dir	=	9661 kN	=	14125.71	kN
Base Shear in Z- Dir	=	7114 kN	=	14297.27	kN
Base Shear in Y- Dir	=	9622 kN	=	4576.45	kN

Scale Factor in X-Dir	=	**0.684**
Scale Factor in Z-Dir	=	**0.498**
Scale Factor in Z-Dir	=	**2.102**



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