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DIGITALLY VERIFIED RECORD

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NO 24 GROUND FLOOR ,
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STRUCTURAL STABILITY CERTIFICATE

Name of work: THE PROPOSED CONSTRUCTION OF STILT FLOOR (PARKING) + 4 FLOORS +5TH FLOOR PART RESIDENTIAL BUILDING WITH 9 DWELLING UNITS (18.30 M HEIGHT) AVAILING PREMIUM FSI WITH TOD BENEFIT AT OLD DOOR NO.5, NEW DOOR NO.17, KRISHNAMMA ROAD AND NAGESWARA ROAD, NUNGAMBAKKAM, CHENNAI 600034 AND COMPRISED IN R.S.NO.144/5 AND 144/15 IN BLOCK NO.21 OF NUNGAMBAKKAM VILLAGE WITHIN THE LIMITS OF GREATER CHENNAI CORPORATION

Preamble :

1. I hereby certify that the structural design sheet is done for column, Foundation, Slab and beam.

2. The usage of the building is Stilt floor + 5 upper Floors.

3. The Super Structure is built on outer 200mm walls and inner 100mm walls.

4. All concrete for RCC members in Stilt + 5 FloorsareM30 concrete.

5. The structural design includes the Earth quakeCriteria as per IS: 1893(part 1)-latest revision.

This is to certify that the Structural Design of the proposed construction of residential building at above said site has been DESIGNED on the basis of EARTHQUAKE RESISTANT DESIGN OF STRUCTURES IS 1893 (Part1): 2002 General Provisions & Buildings, with latest declaration of Seismic Zone III, Zone factor 0.16 and according to I.S. Loading standards I.S. – 875 All precautions have been taken as per the CONTENTS OF REPORT FOUNDATION ANALYSIS. This Report has recommendations for effect of Seismic Condition for this Soil.

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CALCULATION OFSEISMIC CO-EFFICIENT

Name of city	: Chennai
Type of Building	:Residential Building
Building Frame System	: Special RC-Moment resisting frame (SMRF)
Fundamental Natural Period (Ts)	: (0.075)h ^3/4 =0.655sec.
Soil conditions	: medium
Zone Factor (Refer Table:2) (Z)	: 0.16 (moderate)
Importance Factor (Refer Table:6) (I)	: 1
Response Reduction (Refer Table:7)	: 5.0
Average response acceleration Co-efficient (Sa/g)	: 2.35

EARTH QUAKE ANALYSIS:

Horizontal Seismic Co-efficient (Ah)	= (Z/2)(I / R)(Sa/g) = (0.16/2) (1/5.0) (2.35) = 0.038
Design value of Ah	= 0.038
Type of Foundation	: Pile foundation

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1. GENERAL LOADING CONDITIONS:

(a) Imposed loads on Roof - 1.50kN/m^2

(b) Imposed loads on Hall, Kitchen. & Bed, Residential - 2.00kN/m^2

(d) Dead weight of R.C.C - 25kN/m^3

(e) Dead weight of Brick Work - 20kN/m^3

2.LOADING ON SLABS:

2.1 Loading on Roof slab:

Roof finished with lime concrete terracing =(0.10)(20) =2.000kN/m^2

S/W of slab 125mm thick =(.125)(25) =3.125kN/m^2

Dead load =5.125kN/m^2

Live load =1.50kN/m^2

Total load on Roof = 6.625kN/m^2

2.2 Loading on Floor slabs:

Floor finish = 1.00kN/m^2

S/w of slab 125mm thick = 3.125kN/m^2

Dead load =4.125kN/m^2

Live load =2.00kN/m^2

Total load on Roof = 6.125kN/m^2

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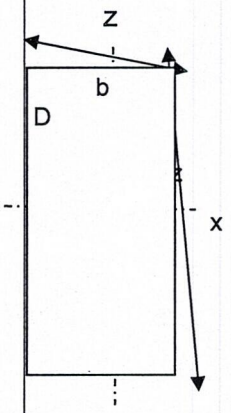
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3DESIGN:

3.1 COLUMN DESIGN

Grade of Concrete			M 30	
Characteristic Strength of Reinf.		N/mm^2	500	
Width of Column	b	mm	300	
Depth of Column	D	mm	850	
Unsupported Length of Column	l_x	mm	3000	
Unsupported Length of Column	l_y	mm	3000	
Clear Cover to Reinf.		mm	40	
Diameter of Bar		mm	20	
Load		T		
Moment	M_{xx}	T.m		
Moment	M_{zz}	T.m		
Factored Load	P_u	kN	850.000	1
Factored Moment	M_{ux}	kN.m	89.950	1
Factored Moment	M_{uz}	kN.m	32.510	1
Effective Length of Column	l_{ex}	mm	3600	1.2
	l_{ez}	mm	3600	1.2
	l_{ex}/D		4.2352941 <12- Short Column	0
	l_{ey}/b		12 <12- Short Column	0
Additional Moment due to Slender	M_{ax}	kN.m	0	
Additional Moment due to Slender	M_{az}	kN.m	0	
Percentage of Reinf.	p	%	1.9	
Gross Area of Cross Section	A_g	mm^2	255000	



Ultimate Axial Load	P_{uz}	kN	5193.9675	
d'/D (about x-x axis)			0.059	0.1
d'/D (about y-y axis)			0.167	0.2

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(Table 60)	k1		0.207		
	k2		0.328		
	P_{bx}	kN	1742.466		
	k1		0.184		
	k2		0.028		
	P_{bz}	kN	1421.166		
	k_x		1.000		
	k_y		1.000		
Minimum Eccentricity	e_x	mm	34.333333		
	e_y	mm	16		
Moments due to min. eccentricity	M_{ex}	kN.m	29.18	< 89.950 kN.m	
Moments due to min. eccentricity	M_{ez}	kN.m	13.60	< 32.510 kN.m	
Total Moments for which the column is to be designed are					
	M_{ux}	kN.m	89.950		
	M_{uz}	kN.m	32.510		
The section is to be checked for biaxial bending					
	$P_u/f_{ck}bD$		0.111		
	p/f_{ck}		0.0633333		
Referring (d'/D is0.1)	$M_u/f_{ck}bD^2$		0.05		
	M_{ux1}	kN.m	325.125		
Referring to (d'/D = 0.2)	$M_u/f_{ck}bD^2$		0.090		
	M_{uy1}	kN.m	206.550		
	M_{ux}/M_{ux1}		0.277		
	M_{uy}/M_{uy1}		0.157		
	P_u/P_{uz}		0.164		
		a	0	1	
Mux/Mux1 + Muy/Muy1			0.434	< 1 OK	
Area of Reinforcement	As	mm^2	4845		
Minimum no of to be provided			8		
No of Bars to be provided	Nos.		16		
Provide 16 Nos of 20 Diameter					

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3.2 FOUNDATION DESIGN

3.2.1 PILE CAP DESIGN

SLAB

Bending moment (Mu) (kN-m/m)		Req.depth (D) (mm)	Total depth (D) (mm)	Bar dia. (mm)	Clear cover (mm)	Effect. depth (d) (mm)
Mx (+) =	547.00	675.15	830	20	50	770
Mx (-) =	621.00	719.37	830	20	50	770
My (+) =	11.00	95.74	830	20	50	750
My (-) =	398.00	575.91	830	20	50	750

Width (b) (mm)	Mu/bd^2	$p_t$required (%)	Ast required (mm^2/m)	S required mm c/c	S provided mm c/c	p_t provided (%)	Remarks
1000	0.923	0.219	1686.30	186	125	0.272	20Y @ 125 c/c
1000	1.047	0.249	1917.30	164	125	0.272	20Y @ 125 c/c
1000	0.020	0.170	1275.00	246	125	0.279	20Y @ 125 c/c
1000	0.708	0.170	1275.00	246	125	0.279	20Y @ 125 c/c

Check for Shear stresses :

Shear stress (τ_v) (N/mm^2)		p_t provided (%)	τ_c table 19, IS:456 (N/mm^2)	Remarks
SQx =	0.04	0.272	0.390	safe
SQy =	0.01	0.279	0.394	safe

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3.3 BEAM DESIGN

Beam Design

Beam Data

width	200 mm
depth	700 mm
clear cover to main reinf.	30 mm
Slab Thickness	125 mm

d' 51 mm .= cc+ sdia + mdia/2
eff depth 650 mm .= d - d'

Material Grades

Concrete	30 MPa
Steel	500 MPa

				Span Moment	Support Moment
Span Moment	326 KN-m		Mu/bd^2	3.86	3.97
			xumax	296	296
			Mulim	337	337
Support Moment	335 KN-m	335 KN-m	$Mulim/bd^2$	3.99	3.99
		0 KN-m			

Span Reinforcement
Beam is designed as Singly Reinforced Beam

Area of Steel	Tension (Ast)	Compr (Asc)
Percentage	1.086 %	-----
Area of Steel	1410 sqmm	

Refer Table 2 SP 16 pg 48

661 KN-m

Tension Reinforcement

Type	Bar dia	Nos	Area of Steel
Layer 1	25 mm	3	1473 sqmm
Layer 2	20 mm	2	628 sqmm
Layer 3	-		
		Total Steel Provided	2101 sqmm

1.617 %

2391 sqmm

Provided Steel OK

Compression Reinforcement

Type	Bar dia	Nos	Area of

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			Steel
Layer 1	-		
Layer 2	-		
Layer 3			
		Total Steel Provided	#VALUE!

Support Reinforcement
Beam is designed as Singly Reinforced Beam

Area of Steel	Tension (Ast)	Compr (Asc)	
Percentage	1.125 %	------	*Refer Table 2 SP 16 pg 48*
Area of Steel	1461 sqmm		

3.47655076176700
-
0.773499575108680
-
0.038938932347594

Tension Reinforcement

Type	Bar dia	Nos	Area of Steel	
Layer 1	**20 mm**	**3**	942 sqmm	
Layer 2	**25 mm**	**3**	1473 sqmm	
Layer 3	-			
		Total Steel Provided	2415 sqmm	1.859 %
		Provided Steel OK		

2181 sqmm
1822 sqmm

Compression Reinforcement

2863 sqmm

Type	Bar dia	Nos	Area of Steel	
Layer 1	-			
Layer 2	-			
Layer 3				
		Total Steel Provided		#VALUE!

Shear Force (Vu)	**60 KN**		
ζv	0.462	*.=Vu / (b * d)*	
ζc	0.783	*Refer Table 61 SP 16 pg 179*	*or =(0.85*√(0.8*fck)*√(1+5β)-1)) / (6β)*
ζcmax	3.5	*Refer Table J SP 16 pg 175*	

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Type	Bar Dia	Nos	Area of Steel	
Layer 1	-			
Layer 2	-			
Layer 3	-			
			0 sqmm	0.000 %

Sectional Dimensions OK
Shear Check OK

Provide Nominal Shear Reinforcement

Steel	**415 MPa**		Vus/d	-0.643 kN/cm	1.458
Type of stirrup	**2 legged**				
Stirrup diameter	**8 mm**				
Spacing	300 c/c	Safe			

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3.4 TWO WAY SLAB DESIGN

Slab Design

Slab thickness	t	125 mm
Concrete	fck	30 MPa
Steel	fy	500 MPa

Sunken Depth: 0 mm

Loading

Slab Load

Dead Load	DL	3.125 KN/m
Live Load	LL	3.000 KN/m
Finishes Load	WL	1.000 KN/m
Total Load	Ws	7.125 KN/m
Factored Load	Wsu	11 KN/m

Sunken Slab Load

Dead Load	DL	3.125 KN/m
Filler Load	FL	0 KN/m
Live Load	LL	0.0 KN/m
Finishes Load	WL	0.0 KN/m
Total Load	Wsk	3.13 KN/m
Factored Load	Wsku	5 KN/m

Slab Data

Slab Type	Regular
Load	11 KN/m
Longer Span (ly)	6.33 m
Shorter Span (lx)	3.62 m

ly/lx ratio	1.75
Slab type	+

Loading on edges		*one way*	*two way*
W_{longer}	**17 KN/m**	$.=w*lx/2$	$.=(w*lx/2) + (1-(1/3)*(lx/ly)^2)$
$W_{shorter}$	**13 KN/m**		$.=w*lx/3$

Moments		*one way*	*two way*
Mx	12 KN-m	$.=w*lx^2/8$	$.=\alpha x * w*lx^2$
My	8 KN-m		$.=\alpha y * w*lx^2$

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Thickness Check	OK
Deflection	50 mm

.=Mulim > Mux or Muy
*.= 5*W*l⁴/(384EI)*

Area of Steel	Astx	Asty
	285 sqmm	**176 sqmm**

Refer Chart 4 SP 16 pg 21
Refer Table 5-44 SP 16 pg 51-80

or

Spacing required in mm

8#		10#		12#		16#	
x	y	x	y	x	y	x	x
176 c/c	**285 c/c**	**275 c/c**	**446 c/c**	**397 c/c**	**642 c/c**	**705 c/c**	**1141 c/c**

*.=ast of bar*1000/ast req*

Final Ast provided	x	y
	10# @ 150c/c	**10# @ 150c/c**

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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.

LandLens One
Ask anything about a property and get an answer grounded in live government records, with the sources shown.
/landlens/one

Verify My Land
Every record check run on one property and returned as a single report.
/landlens/verify-my-land

Legal Opinion
An advocate's written opinion on the title, built on the records we pull for it.
/landlens

One Map
Every layer on one map: the parcel, its boundary, zoning, water bodies and what sits around it.
/landlens/one/map

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.
/landlens/deal-room

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Twenty-four checks you can run yourself, at no cost.

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
/tools

Services we run for you
/services

The LandLens suite
/landlens/one

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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

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Prepared from the registers named on the page each finding sits on. Where a register could not be read, this document says so in its place rather than leaving the gap to be read as a clean result.