Verified RealEstate™

Your trusted partner for buying, selling, and managing property, ensuring hassle-free service with 100% transparency.

3/350/2 Mettukuppam,
OMR Thoraipakkam,
Chennai, India

hello@verified.realestate
+91 9996 12 9996

Official Property Record

Digitally Verified Record - Powered by Verified RealEstate™



This document is the property of Weavers Engineering and construction Pvt Limited, and must not be passed on to any third person or firm not authorised by us, nor be copied/made use of in full or part by such person or firm without our prior permission writing

M. Dinesh Kumar

M. DINESH KUMAR M.E. (Structure)
Structural Engineer, Regd No. SE/GR-I/19/04/108
N.No: 29, O.No: 14, Gandhi Nagar 1st Main Road,
Adyar, Chennai - 600 020. Mobile : 98401 16064

DATE	REV. NO.	DESCRIPTION	Designed	Checked	Approved
16.12.2024	A	Issued for Approval	AJ	HN	MDK

REVISIONS

STRUCTURAL CONSULTANT:

weavers

WEAVERS ENGINEERING AND CONSTRUCTION PVT LTD.

PROJECT :

PROPOSED APARTMENT FOR VRINDHAVANA ADHIRA.

JOB No. SD-24-180

TOTAL NO. OF PAGES

	NAME	SIGN	DATE
DSGN	AJ		16.12.2024
CHKD	HN		16.12.2024
APVD	MDK		16.12.2024

TITLE :

RCC DESIGN REPORT

DOC. No. WE&CPL-T-DEK-240018 0

CODE	REV.
IS	A

RELEASED FOR ☐ PRELIMINARY ☐ TENDER ☐ INFORMATION ☑ APPROVAL CONSTRUCTION

DESIGN BASIS REPORT

STRUCTURAL SYSTEM

CONTENTS

SL. NO.	DESCRIPTION	PAGE NO.
1.0	Design Philosophy	B3
2.0	Design Loads	B4
3.0	Analysis methods	B6
4.0	Design Life	B6
5.0	Design Methodology	B7
6.0	Materials	B7
7.0	Nominal cover	B8
8.0	Design Standards	B9
9.0	Analysis Report	B10
10.0	Drawings	

B	STRUCTURAL SYSTEM

1.0 Design Philosophy

The project consists of Stilt+5 Floors, The first to fifth Floors are used as Residential Space.Stilt floor is used for car parking.

Length of the building is 45m & width is 24.5m approximately.The block is used for Residential purpose. In Stilt floor Maximum size of columns 375mm x 675mmm .

All designs shall strictly conform to the standards specified in clause 8.0.

2.0 Design Loads

The following are the design loads considered for this project.

SDL - 2 kN/m2

Live Load - 2kN/m2

** All Wall Load are consider as AAC Block Load

** Floor Finish Load due to Tile (10mm thk), bedding mortar (25mm thk) and 40mm thk screed for Block Area.

2.1 Load Combinations

The various loads shall be combined in accordance with the stipulations in IS: 875 (Part 5) – 1987. Whichever combination produces the most unfavorable effect in the building, foundation or structural member concerned shall be adopted.

Values of Partial Safety Factor γ_f for Loads

Load Combination	Limit State of Collapse			Limit State of Serviceability		
	DL	LL	WL/EL	DL	LL	WL/EL
DL + LL	1.5	1.5	--	1.0	1.0	--
DL + WL/EL	1.5/0.9	--	1.5	1.0	--	1.0
DL + LL+WL/EL	1.2	1.2	1.2	1.0	0.8	0.8

This value is to be considered when stability against overturning or stress reversal is critical

DL - Dead load

LL - Live load

WL - Wind load

EL - Earthquake load

3.0 Analysis Methods

3D analysis of the structures is carried out using the ETABS Ver.15.0.0 software package. Appropriate loads and its combinations as per relevant clauses in IS codes, for most unfavorable effects are chosen for design.

4.0 Design Life

The design life of the structure is assumed as 50 years. This requirement is not applicable to replaceable materials.

5.0 Design Methodology

All R.C.C structures shall be designed according to the Limit State Method as specified in IS: 456 – 2000. Post Tensioning Slabs shall be designed according to the Limit State Method as specified in IS: 1343 – 1980. Steel structures shall be designed as per IS: 800 – 1984.

6.0 Materials

The self-weight of the various elements are computed based on the unit weight of materials as given below: -

Materials	Unit weight kN/m^3
Reinforced Cement Concrete	25.00
Plain Cement Concrete	24.00
Cement Concrete Solid Block work	20.00
Steel	78.50
Soil	20.00
Water	10.00
Aluminium	28.00
Glass	25.00
Cement Concrete screed	24.00

Normal weight aggregates shall be considered for arriving at the self-weight of all Concrete works.

6.1 Concrete

Concrete item	Grade	Max. Size of Aggregate (mm)	Type of cement
Footing	M25	20	OPC / PPC
Column	M25	20	OPC / PPC
Slab & beams (Core)	M25	20	OPC / PPC
Walls	M25	20	OPC / PPC

Normal weight aggregates shall be considered for all concrete works.

6.2 Reinforcement

Steel reinforcement shall be of Grade Fe 500 (TMT with a minimum elongation of 14.5% conforming to IS1786-1985) / Fe 415 conforming to IS: 1786-1985 and of Grade Fe250 conforming to IS: 432-1982.

6.3 STRUCTURAL STEEL

Structural Steel shall conform to the provisions outlined in IS: 2062:1999 or BS: 5950 –1: 2000 or BS: 4360 - 1979 or equivalent international standards. Use of high tensile grades is recommended.

7.0 Nominal Cover

7.1 Reinforcement

From Durability requirement, exposure condition is assumed as mild for Structural elements above ground level and moderate for Structural elements below ground level.

The Nominal cover to reinforcement to meet Durability requirement shall be as follows: -

Moderate - 30 mm

The Nominal cover to main reinforcement shall be as follows: -

Columns - 40 mm or dia of longitudinal reinforcement whichever is greater.

For Two-hour fire resistance requirement, The Nominal cover to reinforcement shall be as follows: -

Slabs	-	35 mm for simply supported 25 mm for continuous
Beams	-	40 mm for simply supported 30 mm for continuous
Columns	-	40 mm or diameter of largest bar, whichever is greater

For any other elements not specified above, clear cover shall be as per the clause 26.4 of IS: 456-2000.

8.0 Design Standards

The relevant Indian Standard Codes, as given below, shall be followed for structural design:

S.No.	Code	Description
1.	IS-875 (Part 1) – 1987	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	Code of Practice for Design Loads (other than earthquake) for buildings and structures – Imposed loads.
3.	IS-875 (Part 3) – 2015	Code of Practice for Design Loads (other than earthquake) for buildings and structures – Wind loads.
4.	IS-875 (Part 4) – 1987	Code of Practice for Design Loads (other than earthquake) for buildings and structures – Snow loads.
5.	IS-875 (Part 5) – 1987	Code of Practice for Design Loads (other than earthquake) for buildings and structures – Special loads and load combinations.
6.	IS: 456 – 2000	Code of Practice for Plain and Reinforced Concrete.
7.	IS: 1786 – 1985	Specification for High Strength Deformed Steel Bars and Wires for Concrete Reinforcement.

S.No.	Code	Description
8.	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.
9.	IS: 13920 - 2016	Ductile detailing of reinforced concrete structures subjected to seismic forces – Code of practice
10.	IS: 2062 – 1999	Steel for General Structural Purposes. Specification.
11.	IS: 1161 – 1998	Specification for Steel tubes for Structural Purposes.
12.	IS: 800 – 1984	Code of Practice for General Construction in Steel.
13.	IS: 1893 – 2016	Criteria for Earthquake resistant design of structures.
14.	BS: 5950–2000(Part 1)	Code of practice for design – Rolled and welded sections.
15.	BS: 4360-1979	Hot Rolled steel for general engineering purposes.

COLUMN DESIGN

PROJECT	PROPOSED APARTMENT FOR VRINDHAVANA ADHIRA.
TITLE:	DESIGN OF COLUMN C4- GRID F28

DATA

Length of column		D	=	530	mm
Breadth of column		b	=	300	mm
Unsupported length (longer direction)		L_z	=	3200	mm
Unsupported length (shorter direction)		L_y	=	3200	mm
Eff. length (longer direction)	1.20xLz	L_{ez}	=	3840	mm
Eff. length (shorter direction)	1.20xLy	L_{ey}	=	3840	mm
Braced/Unbraced				**Unbraced**	
Factored axial load		P_u	=	1687	kN
Factored moment (longer direction)		M_{iz}	=	5	kNm
Factored moment (shorter direction)		M_{iy}	=	1	kNm
Charac. comp strength of concrete		f_{ck}	=	25	N/mm^2
Yield stress of steel		f_y	=	500	N/mm^2
cover			=	40	mm

(* The factored moment is inclusive of eccentric moment)

Check for slenderness

Longer Direction

Slenderness ratio		L_{ez}/D	=	7.25	**short**
Additional moment due to slenderness	Pu x (Lez/D)	M_{az}	=	0	kN-m

Shorter Direction

Slenderness ratio		L_{ey}/b	=	12.80	**slender**
Additional moment due to slenderness	Pu x (Ley/D)	M_{ay}	=	41.459712	kN-m

Calculation of P_{uz}

Assumed percentage of reinforcement	p_t	=	0.800	%
Area of concrete	**Ag**	=	159000	mm^2
Ultimate axial load (without moments)	P_{uz}	=	2251	kN

Calculation of P_b:

Longer Direction

	d'/D	=	0.050	
Coefficient k_1(from TABLE 60 of SP 16:1980)	k_{1z}	=	0.219	
Coefficient k_2(from TABLE 60 of SP 16:1980)	k_{2z}	=	0.545	
Axial load corresponding to balanced failure	P_{bz}	=	940	kN
Reduction factor for additional moments	k_z	=	0.430	
Moment due to slenderness	M_{az}	=	**0.00**	kN-m

Shorter Direction

	d'/b	=	0.050	
Coefficient k_1(from TABLE 60 of SP:1980)	k_{1y}	=	0.219	
Coefficient k_2(from TABLE 60 of SP:1980)	k_{2y}	=	0.545	
Axial load corresponding to balanced failure	P_{by}	=	940	kN
Reduction factor for additional moments	k_y	=	0.430	
Moment due to slenderness	M_{ax}	=	**17.84**	kN-m

Check for moments due to min. eccentricity

Longer Direction

Minimum eccentricity	e_z	=	24.07	mm
Moment due to min. eccentricity	M_z	=	40.60	kN-m
Moment in longer direction	M_{uz}	=	40.600467	kNm

Shorter direction

Minimum eccentricity	e_y	=	16.40	mm

PROJECT	PROPOSED APARTMENT FOR VRINDHAVANA ADHIRA.
TITLE:	DESIGN OF COLUMN C4- GRID F28

Moment due to min. eccentricity	M_y	=	27.67	kN-m
Moment in shorter direction	M_{uy}	=	27.6668	kNm
Final design moments				
Moment in longer direction	M_{uz}	=	**40.60**	kNm
Moment in shorter direction	M_{uy}	=	**45.51**	kNm
Check for interaction				
p/f_{ck}	p/f_{ck}	=	0.032	
$P_u/f_{ck}bD$ value	$P_u/f_{ck}bD$	=	0.424	
$M_{ux1}/f_{ck}bD^2$ value (from SP 16:1980)	$M_{uz1}/f_{ck}bD^2$	=	0.2	
Uniaxial moment capacity (longer direction)	M_{uz1}	=	**421.35**	kNm
$M_{uy1}/f_{ck}b^2D$ value (from SP 16:1980)	$M_{uy1}/f_{ck}b^2D$	=	0.2	
Uniaxial moment capacity (shorter direction)	M_{uy1}	=	**238.5**	kNm
P_u/P_{uz} ratio	P_u/P_{uz}	=	**0.749**	
Value of exponent	α_n	=	1.916	
Interaction ratio		=	**0.05**	**< 1.00 safe**
Area of steel required		=	**1272**	mm2
Dia of steel provided (At corners)		=	**20**	mm
No of steel provided (At corners)		=	**4**	
Dia of steel provided (At faces)		=	**16**	mm
No of steel provided (At faces)		=	**10**	
Area of steel provided		=	**3268**	mm2

Design of Ties:

Dia of tie bar shall be the greater of the following,

(i) 6 mm

(ii) $\phi/4$ mm

Choosing 8 mmdia of ties and the pitch is taken as the minimum of the following,

(i)	Least lateral dimension of the column	=	300	mm
(ii)	16 times the smallest dia of the longitudinal bar	=	256	mm
(iii)	300 mm	=	300	mm

Provide 8 mm dia ties @ 150mm c/c

FOOTING DESIGN

PROJECT	PROPOSED APARTMENT FOR VRINDHAVANA ADHIRA.				
TITLE	Foundation Design	DESIGNED	CHKD	DATE	SHEET NO.
		AJ	HN	17-12-2024	1

Reference

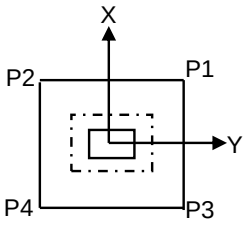
DL+LL

Footing ID

F1

Axial load	P =	118	T	fy =	500	N/sqmm
MOMENT	Mx =	0.3	T-m/m	fck =	30	N/sqmm
	My =	-0.01	T-m/m	**SBC =**	**24.1**	T/sqm

Footing Size (B X L) mts	2.35	2.12
Pedestal/Column Size	0.53	0.3



P/A	23.69	T/sqm
Mz/Z	0.17042485	T/sqm
My/Z	-0.005124832	T/sqm
P_1 =P/A+Mz/Z+My/Z =	23.85056698	T/sqm
P_2 =P/A-Mz/Z+My/Z =	23.50971728	T/sqm
P_3 =P/A+Mz/Z-My/Z =	23.86081664	T/sqm
P_4=P/A+Mz/Z+My/Z =	23.51996694	T/sqm

As per Soil report

< SBC, Hence SAFE

Moment in :

Longer Direction: **M** = 9.855134298 T-m/m Shorter Direction **M** = 9.87587505 T-m/m

Depth of footing Required d= 477.39 mm say d_e = **625** mm

D= **675** mm

Percentage of Steel pt = 0.120 % Ast = **750.00** sqmm

% of Steel provided pt = 0.120

Check for one way shear :

IS:456-2000

Longer direction	V =	6.79	T
Shorter Direction	V =	6.80	T
	ζve =	0.16	N/sqmm
	ζc =	0.27	N/sqmm OK

Check for two way Shear :

ζve = 0.53 N/sqmm

ζc = 0.25*√fck = 1.37 N/sqmm OK

Summary

	Breadth	Length	Depth	Reinforcement	
				Bar Size	Spacing
REQUIRED	2350	2120	675	12	151
	7.71	6.96	2.2		0.5
SIZE PROVIDED	**7'-9"**	**7'-0"**	**2'-3"**	**12**	**0'-6"**

BEAM DESIGN

PROJECT: PROPOSED APARTMENT FOR VRINDHAVANA ADHIRA.
TITLE: DESIGN OF BEAM(SFB-41)

DIMENSIONS:

WIDTH	0.23 m
DEPTH	0.45 m
THICKNESS OF SUPPORT	
LONGER IN mm	0.45
SHORTER IN mm	0.23
GRADE OF STEEL, **fy**	500 N/mm^2
GRADE OF CONCRETE, **fck**	25 N/mm^2
EFFECTIVE LENGTH OF BEAM,m Span-01	3.28 m
EFFECTIVE LENGTH OF BEAM,m Span-02	3.38 m

FORCE INPUT:

SUPPORT-1:

Left Negative Moment	20 kNm
Mid span positive Moment	22 kNm
Right Negative Moment	24 kNm

SUPPORT-2:

Left Negative Moment	25.3 kNm
Mid span positive Moment	23 kNm
Right Negative Moment	16 kNm

TO FIND LIMITING MOMENT:

M_{ulim}	161 kNm

AREA OF STEEL:

SPAN:01

Min Area of Steel	157 mm^2
Area of Steel Required at Left Support	477 mm^2 **(3Nos of 16mm Dia)**
Area of Steel Required at Right Support	410 mm^2 **(3Nos of 16mm Dia)**
Area of Steel Required in midspan	303 mm^2 **(3Nos of 16mm Dia)**

SPAN:02

Min Area of Steel	157 mm^2
Area of Steel Required at Left Support	432 mm^2 **(3Nos of 16mm Dia)**
Area of Steel Required at Right Support	444 mm^2 **(3Nos of 16mm Dia)**
Area of Steel Required in midspan	262 mm^2 **(3Nos of 16mm Dia)**

SHEAR REINFORCEMENT:

SPAN :01

Shaer Vu:	54.7KN (max)
Shear reinforcement provided	2 legged 8mm dia
Spacing required (Cl 40.4):	
Sv= (0.875*Fy*Asv*d)/Vu	336mm
Spacing provided	150mm

SHEAR REINFORCEMENT:

SPAN :02

Shaer Vu:	49.3KN (max)
Shear reinforcement provided	2 legged 8mm dia
Spacing required (Cl 40.4):	
Sv= (0.875*Fy*Asv*d)/Vu	372mm
Spacing provided	150mm

Hence ok.

SLAB DESIGN

PROJECT: PROPOSED APARTMENT FOR VRINDHAVANA ADHIRA.
TITLE: DESIGN OF SLAB ID S1 GRID(A TO B-1 TO 4)

CLEAR SPAN:

L	3.38 m
B	2.92 m
THICKNESS OF SUPPORT	
LONGER IN mm	230
SHORTER IN mm	230
LIVE LOAD IN kN/m^2	2
DEAD LOAD IN kN/m^2	2
WALL HEIGHT	3.2 m
GRADE OF STEEL, **fy**	500 N/mm^2
GRADE OF CONCRETE, **fck**	25 N/mm^2
DEPTH OF SLAB IN mm	125
DEPTH OF COVER IN mm	25

TO FIND ONE WAY OR TWO WAY SLAB:

LONGER SPAN, L_y	3.4
SHORTER SPAN, L_x	2.9
Ly/Lx	1.16
CHECK Ly/Lx< 2	**DESIGN OF SLAB AS TWO WAY**

TO FIND EFFECTIVE DEPTH OF SLAB IN mm, 96

TO FIND EFFECTIVE SPAN LENGTH IN m:

clear span in m	2.9
(i) clear span+ d	3.86
(ii) c/c distance	3.14
TAKE LEAST VALUE	

TO FIND LOADINGS:

Self weight of slab in kN/m^2	3.125
Design Load	7.125
Factored Load in kN/m^2 (W)	10.69

TO FIND SHEAR FORCE AND BENDING MOMENT :

If one long edges continuous (ref. IS 456:2000)

α_x	0.067
α_y	0.043
Moment at shorter span in kNm	4.37
Moment at longer span in kNm	3.27
shear force in kN , V_u	16.78

TO CHECK DEPTH :

requied depth is 32

check $d_{req} < d_{assume}$ Hence it is ok

REINFORCEMENT IN SHORTER DIRECTION :

REF SP16 T-2	Mu/bd^2=0.71	
Pt=	0.17 (ref SP:16, Pg.no:49)	
Ast=	164	mm^2
use of bar	8	mm
	Ast provided> Mini Ast	
Minimum Ast	121	mm^2
spacing required	225	mm
spacing provided=	150	
Ast provided=	8 mm Dia at 150mm Spacing	

REINFORCEMENT IN LONGER DIRECTION:

REF SP16 T-3	Mu/bd^2=	0.54
Pt=	0.13	ref SP:16, Pg.no:49
Ast=	113	mm^2
use of bar	8	mm
spacing requied	250	mm
Ast provided=	8 mm Dia at 150mm Spacing	

SHEAR REINFORCEMENT:

$Vu/bd(\tau_U)$=	0.17	N/mm^2
Pt=	0.33	
τ_C=	0.4	N/mm^2
K=	1.3	ref. IS 456-2000 (pg.no:72)
$K.\tau_C$=	0.52	N/mm^2

HENCE SHEAR REINFORCEMENT IS NOT REQUIED

CHECK FOR DEFLECTION:

Basic span depth ratio=	20	
fs=	185	ref. IS456-2000 (fig-4 pg.no:38)
kt=	1.7	
pt=	0.27	
L/D(actual) =	26	
L/D(max) =	34	

HENCE DEFLECTION IS SAFE



our services doesn't just end there

Buying & Selling Services

Property Buying Assistance, Property Selling Support, Market Price Analysis, Owner Outreach and Negotiation.

Legal & Documentation Services

Certified EC, Patta, legal opinions, property verification, due diligence, litigation solutions, and legal heir certificates.

Property Development & Approvals

Building plan approvals, construction, layout and sub-division approvals, zone conversion, and occupancy certification.

NRI & Investment Services

Escrow Services, Rentals, Litigation Solutions, Property Valuation and Property Management

Compliance & Special Services

Demolition, Vaasthu checks, regularization of unauthorized buildings, and office space solutions.



empowering your real estate decisions with smart tools

Property Valuation & Cost Estimation

Guideline Value, Apartment Composite Value, Stamp Duty & Registration Fees Calculator, Building Value Calculator, Capital Gains Calculator, Area Unit Converter, Length Unit Converter

Ownership, Compliance & Legal Verification

Encumbrance Certificate (EC) Search, Find Your SRO, Temple Property Check, WAQF Property Check, View Patta/Chitta, View FMB, Patta Analyzer, EC Analyzer

Zoning & Land Use Analysis

Land Use Zone Finder, CRZ Zone Check, Aquifer Zone Check, CBA Check, EWS Check, Road Width Check, Proposed Road Widening Check, FSI Calculator

Property Documentation & Workflow Tools

Forms & Templates, Document Generator, Document Translation, Dictionary

Vastu & Property Management Tools

Home Vastu Shastra, Plot Vastu Shastra, Property Management

Verified RealEstate™

We're honored to be part of your real estate journey

3/350/2 Mettukuppam,
OMR Thoraipakkam,
Chennai, India

hello@verified.realestate
+91 9996 12 9996
www.verified.realestate