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Design Brief Report

Mr. A.SIVAKUMAR

R-009-2024

STRUCTURAL DESIGN OF S+4 BUILDING

DESIGN BRIEF REPORT

PRILIMINARY REPORT

- **PROJECT** : **R-009-2024 - S+4 APPARTMENT BUILDING @ NGO C COLONY**
- **CLIENT** : **Mr. A.SIVAKUMAR**
- **SITE ADDRESS** : **C-35, T.SURVEY N0 –39, OLD S.No – 518(PART) KULAVANEEGARPURAM VILLAGE.**
- **STRUCTURES** : **BALA STRUCTURAL CONSULTANT**

P. BALA SUBRAMANIAN, M.E.,(Structure)
REGISTERED STRUCTURAL ENGINEER GRADE-II
Regn. No. RSE-Gr.II 02/TVLD/2021
1/8, Periyar Nagar Salai, North Highground Road,
Palayamkottai, Tirunelveli-627002.
Cell: 99949 54448

I. GENERAL DATA:

Building profile- S+4 Apartment Building

Building Purpose – Appartment Building

Building location – Kulavaneegarpuram Village

This Report is for APPROVAL PURPOSE only. (Not Good for Construction).

II. SBC OF SOIL

SBC= 200T/m^2 at 1.5m

LOADS

i. Dead Loads

Dead load shall include weight of all structural and Architectural components. Self-weight of the materials shall be calculated on the basis of unit weights given in IS: 875 Part 1.

Floor Finish	1.5kN/m^2
Sunken load	4.75kN/m^2

ii. Imposed Floor Loads

Minimum Imposed loads are tabulated for various occupancies as per IS 875 (Part2).

Occupancy	Uniformly Distributed load (kN/m^2)
Bed Room, Dressing Room, Dormitories and Lounges	2
Kitchen, Laundries and Laboratories	3
Dining, Cafeterias and Restaurant	3
Toilet and Bathroom	2
Office	2.5

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Corridor, Staircase	4
Balconies	4

As per IS 1893-2016 Part 1 table 10 percentage of imposed load to be considered for seismic weight calculation is

Imposed Uniformity Distributed Floor Load Loads (kN/ m^2)	**Percentage of Imposed**
Up to and including 3.0	25
Above 3.0	50

III. MATERIAL UNIT WEIGHT –

Items:	Unit Weight (kN/m^3):
Steel	78.50
Plain Concrete	24.00
Reinforced Concrete	25.00
Brickwork	18.00
Soil	18.00
Water	10.00
Glass	27.00
Stainless steel	78.5

IV. MATERIAL

1. **Concrete** will be used for all structural components. So minimum grade of concrete will be as per codal provision confirming IS 456:2000, for 'moderate' environmental exposure condition (As per IS-456-2000 Table-3). Grades of concretes have been used to design the structural elements as per the design requirement.

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Particular	Grade of Concrete
Walls 230 mm	M25
Columns and Pedestals	M25
Foundation	M25
RCC slab and beams,	M25

2. **Steel reinforcement** shall be plain round hot rolled mild steel bars of characteristic strength high-yield high-bond bars of characteristic strength Fe-550 N/mm² complying with IS 1786.

V. CLEAR COVER FOR REINFORCEMENT:

The nominal cover shall be provided in accordance to IS-456:2000 clause 26.4 & 26.4.3 unless noted in the drawings:

- Footing 50mm
- Pedestal 40mm
- Column 40mm
- Beam 25mm
- Slabs, Canopy For Bars > 12mm, Cover: 25mm
  For Bars < 12mm, Cover: 20mm

VI. FRAMING OF RCC STRUCTURES:

Beam Sizes: B230 X380, B230X450, B230X600, B230X750, B230X900.

Column Sizes: C230X380, C230X450, C450X600, C600X600, CL230X230.

Slab Thickness: 150mm & 125mm

Brick wall: 230mm thick

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VII. AIM OF DEIGN:

The aim of design is to achieve the acceptable probability that structure being designed will perform satisfactory during the design span life. With an appropriate degree of safety, the building will sustain all the loads and deformations of normal construction and use and have adequate durability and adequate resistance to the effects of misuse.

VIII. METHOD OF DESIGN:

This RCC structure and structural elements are designed by Limit State Method.

This Steel structure and structural elements are designed by IS800-2007 Limit State Method. Characteristic loads with appropriate partial safety factors are considered in the design. Besides the strength, to ensure durability of the structure, Concrete Mix M25 is used for columns and M25 for beams and slabs with grade of reinforcement steel of Fe-550.

IX. LOAD COMBINATION:

A factor of 1.50 has been used for the calculation of design forces and moments from the analysis model.

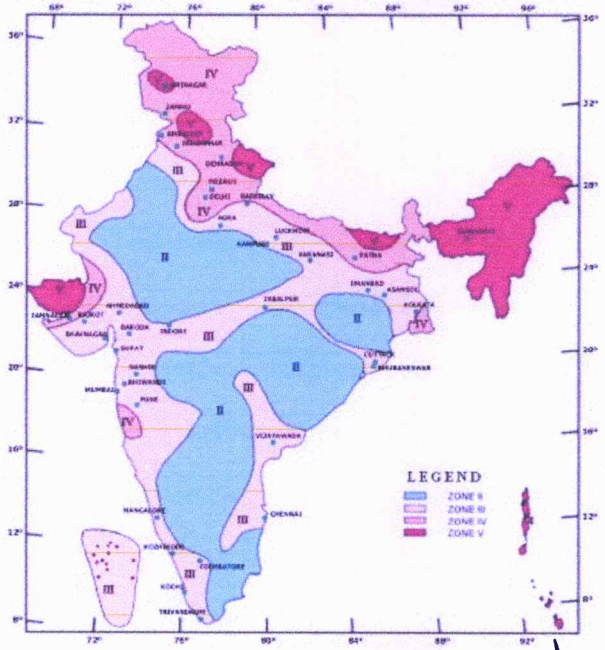
As Per IS456-2000 the Load combinations adopted are:

1 1.2(DL+LL+(ELX+0.3ELY)
2 1.2(DL+LL+(ELX-0.3ELY))
3 1.2(DL+LL-(ELX+0.3ELY))
4 1.2(DL+LL-(ELX-0.3ELY))
5 1.2(DL+LL+(ELY+0.3ELX))
6 1.2(DL+LL+(ELY-0.3ELX))
7 1.2(DL+LL-(ELY+0.3ELX))
8 1.2(DL+LL-(ELY-0.3ELX))
9 1.5(DL+(ELX+0.3ELY))
10 1.5(DL+(ELX-0.3ELY))
11 1.5(DL-(ELX+0.3ELY))
12 1.5(DL-(ELX-0.3ELY))
13 1.5(DL+(ELY+0.3ELX))
14 1.5(DL+(ELY-0.3ELX))
15 1.5(DL-(ELY+0.3ELX))
16 1.5(DL-(ELY-0.3ELX))
17 0.9DL+1.5(ELX+0.3ELY)
18 0.9DL+1.5(ELX-0.3ELY)
19 0.9DL-1.5(ELX+0.3ELY)
20 0.9DL-1.5(ELX-0.3ELY)
21 0.9DL+1.5(ELY+0.3ELX)

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22 0.9DL+1.5(ELY-0.3ELX)
23 0.9DL-1.5(ELY+0.3ELX)
24 0.9DL-1.5(ELY-0.3ELX)
25 1.5 (DL+LL)
26 1.2(DL+LL+ELX)
27 1.2(DL+LL+ELZ)
28 1.2(DL+LL-ELX)
29 1.2(DL+LL-ELZ)
30 1.5(DL+ELX)
31 1.5(DL+ELZ)
32 1.5(DL-ELX)
33 1.5(DL-ELZ)
34 0.9DL+1.5ELX
35 0.9DL+1.5ELZ
36 0.9DL-1.5ELX
37 0.9DL-1.5ELZ
38 1(DL+LL)
39 1(DL+ELX)
40 1(DL+ELZ)
41 DL+.8(LL+ELX)
42 DL+.8(LL+ELZ)

X. SEISMIC ZONE



Tirunelveli lies in Zone II (IS 1893-Part1)

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		Zone Factor, Z (Clause 6.4.2)		
Seismic Zone	II	III	IV	V
Seismic Intensity	low	Moderate	Severe	Very Severe
Z	0.1	0.16	0.24	0.36

Calculations

1. Calculate design horizontal seismic coefficient, A_h, which is given by (cl. 6.4.2 of IS1893 – 2016:

$$A_h = \frac{ZIS_a}{2Rg}$$

Where, Z is the zone factor, given in table 3 of IS1893 – 2016.

I is the importance factor of the structure depending on the function or use. This factor can be obtained from table 8 of the code.(I is taken as 1.5)

R is response reduction factor. This value is obtained from table 7 of the code. The value of 1/R shall not be more than one.(R=5)

S_a/g is average response acceleration coefficient. This value depends on time period of structure and on soil type. This can be obtained from clause 7.6.2 of the code.(S_a/g =2.5)

$A_h = 0.09$

2. Calculate design seismic base shear for the structure (V_B). This is the total design lateral force along any principal direction. This is calculated as:

$V_B = A_h \times W$

Where A_h = horizontal seismic coefficient as calculated above in step 1.

W = Total weight of the structure.

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XI. WIND LOAD

The static wind pressure shall be calculated based on the data furnished below and other provisions laid in IS: 875(Part 3) – 1987.

Basic Wind Speed = 39 m/sec

Risk coefficient(K1) = 1.0

Terrain category (K2) = 1.058 Varies with height (Category 2& Class A)

Structure class = Class B for structures and/or their components such as

Structures and/or their components such as cladding, glazing, roofing, etc, having maximum dimension (greatest horizontal or vertical dimension) between 20 -50m.

Topography factor (K3) = 1

Wind loads on cladding / glazing:

For designing the cladding / glazing supports, the wind load will govern the design, for which the above design wind pressure will be considered with appropriate local pressure coefficient

wind speed is 50 m/s.

$Vz = Vb*K1*K2*K3*K4$

Vb =50 m/s

K1=Probability Risk Factor for 50 years from table 1 is 1.

K2=Terrain height and structure size factor based on terrain category-2 from table 2 is 1.06.

K3=Topography factor is 1.

Therefore,

$Vz = 39*1*1.058*1$

Vz =41.26 m/s

$Pz=0.6*Vz^2$

Pz=Design wind pressure N/m2

$Pz=0.6*41.26^2=1021N/m2.$

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XII. STRUCTURAL ANALYSIS FOR RCC STRUCTURES:

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RCC structure was analysed by modelling in Staad Pro. The analysis results were checked to ensure the right structural behaviour.

CHECK-

All Members passes in STAAD Pro Software.

LIST OF CODES & REFERENCES:

IS: 456 2000: Code of practice for Plain and Reinforced Concrete.

IS: 875 Part 1: Code of Practice for Design of Dead Loads for buildings and structures.

IS: 875 Part 2: Code of Practice for Design of imposed Loads for buildings.

IS:1893 Part- 1 2016- Criteria for earthquake resistant design of structures.

IS 1786-1985: Code of practice for steel.

IS 432-1982: Code of practice for steel.

IS 875(Part 3): 1987- Wind Loads.

SP 64: Explanatory Hand book on Indian Standard code of practice for designloads (other than earthquake) for Buildings and Structures Part 3 Wind Loads.

SP 16: Design aids for reinforced concrete to IS: 456- 1978.

SP 34: Hand book on concrete reinforcement detailing.

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Tirunelveli-627002.
Cell: 09349 54443

1) GENERAL NOTES:

1. DIMENSIONS TO BE CHECKED AS PER THE SITE CONDITION.
2. ALL DIMENSIONS ARE IN FEET AND INCHES UNLESS OTHER WISE MENTIONED.
3. ALL LEVELS ARE IN FEET UNLESS OTHER WISE MENTIONED.
4. ANY DISCREPANCY IN DRAWING SHALL BE NOTIFIED TO THE STRUCTURAL CONSULTANT BEFORE STARTING THE WORK.
5. READ THE STRUCTURAL DRAWING ALONG WITH ARCHITECTURAL DRAWING
6. ALL LAPS SHALL CONFORM TO IS:456-2000. (REFER NOTE - 8)
7. NET ALLOWABLE BEARING CAPACITY AT THE FOUNDATION LEVEL IS 250 kN/Sq.m (SAFE BEARING CAPACITY).
8. CONCRETE FOR R.C.C SHALL CONFIRM TO M-25,GRADE AS PER IS: 456-2000 WITH COARSE AGGREGATE OF MAX.SIZE 20mm.
9. # DENOTES HIGH YIELD STRENGTH DEFORMED BARS Fe 550D GRADE CONFIRM TO IS: 1786-2008.

2) TECHNICAL NOTES:

2.COVERS

2.1 FOR GRADE / PLINTH BEAM	25 MM (1")
2.2 FOR FOOTING / PILE CAP BOTTOM	75 MM (3")
2.3 FOR COLUMN	40 MM (1-1/2")
2.4 FOR FOOTING / PILE CAP SIDE	75 MM (3")
2.5 FOR ALL ROOF BEAM	25 MM (1")
2.6 FOR ALL ROOF SLAB	20 MM (3/4")
2.7 FOR R.C.C WALL (SHEAR WALL,SUMP)	40 MM (1-1/2")
2.8 FOR PILE SIDE	50 MM (2")
2.9 FOR SUMP BOTTOM SLAB	40 MM (1-1/2")
2.10 FOR COVER SLAB	25 MM (1")

3.REMOVAL OF FORM WORKS	AFTER CASTING CONCRETE	
	43 GRADE	53 GRADE
3.1 FOR COLUMNS	24 HOURS	12 HOURS
3.2 FOR ROOF BEAM SIDE	24 HOURS	12 HOURS
4.FOR ROOF BEAM BOTTOM		
4.1 CLEAR SPAN LESS THAN 6M :	14 DAYS	07 DAYS
4.2 CLEAR SPAN MORE THAN 6M :	21 DAYS	14 DAYS

5. DESIGNED FOR STILT + 4 STOREY ONLY.

3) FOUNDATION NOTES:

1. SAFE BEARING CAPACITY OF SOIL (S.B.C) IS SHOWN ON THE FOUNDATION DRAWINGS.
2. AFTER EXCAVATION FOR FOUNDATIONS, THE IMPORTED SOIL FOR FILLS, BACKFILLS SHALL BE COMPACTED 95 % OF THE MAXIMUM DRY DENSITY OF THE SOIL.
3. DEPTH OF EXCAVATION OF FOUNDATION SHOULD BE CHECKED WITH RESPECT TO THE EXISTING NEIGHBOURS,DESIGNED DEPTH AND APPROVED BY THE ENGINEER.
4. THE CONTRACTOR SHALL PROVIDE,IF NECESSARY,PROPS AND SUPPORT TO EXISTING STRUCTURES FOR SAFETY AND ACCORDING TO THE INSTRUCTIONS OF THE ENGINEER.
5. GROUND WATER ENCOUNTERS REFER DEWATERING NOTES.
6. NO FOUNDATION SHALL PROJECT OUTSIDE THE PLOT.
7. ALL FOUNDATIONS ARE TO REST ON P.C.C. 6" THICKNESS.
8. POLYTHENE SHEETS 1000 GAUGE TO BE LAID BELOW FOUNDATIONS (TOP OF P.C.C).
9. ALL STRUCTURES BELOW GROUND LEVEL IN CONTACT WITH SOIL SHALL BE PAINTED WITH TWO COATS OF BITUMEN, TO THE ENGINEER'S APPROVAL.

4) STEEL REINFORCEMENT NOTES:

1. REINFORCING BARS ARE TO IS 1786-2008.
2. ALL REINFORCEMENT BARS ARE TO BE HIGH TENSILE HAVING YIELD STRESS OF 550 N/Sq.mm.
3. REINFORCEMENT BARS ARE TO BE COLD BENT WITH A MAXIMUM RADIUS OF 8 TIMES DIAMETER,EXCEPT FOR STIRRUPS AND COLUMN TIES ARE TO BE 4 TIMES BAR DIAMETER.
4. WHERE BARS END IN COLUMNS,BEAMS & SLABS, A HOOK OF 90° OR 180° WITH A STRAIGHT END OF 12 BAR DIAMETER AND 6 BAR DIAMETER RESPECTIVELY SHOULD BE PROVIDED.

5) CONCRETE NOTES:

1. MIX DESIGN :- CONCRETE MIX SHOULD BE DESIGNED TO GIVE MINIMUM CUBE STRENGTH OF 25 N/Sq.mm. CUBE AND MAXIMUM FREE WATER/CEMENT RATIO 0.50
   MIX SHOULD BE VERIFIED BEFORE CASTING AND APPROVED BY THE ENGINEER. DESIGN AND CONSTRUCTION TO COMPLY WITH IS 10262:1982
2. ORDINARY PORTLAND CEMENT TO BE USED FOR ALL WORKS ABOVE PLINTH.UNLESS OTHERWISE SHOWN ON THE DRAWINGS.
3. COARSE AND FINE AGGREGATES ARE TO BE TO I.S 383
4. WATER IS TO BE TO I.S 3025 (REFER BELOW SCHEDULE) :-

SI. NO	DESCRIPTION	PERMISSIBLE LIMIT, (MAX.)
1)	ORGANIC	200 mg/l
2)	INORGANIC	3000 mg/l
3)	SULPHATE (as SO3)	400 mg/l
4)	CHLORIDES (AS Cl)	500 mg/l
5)	SUSPENDED MATTER	2000 mg/l

5. PLAIN CONCRETE USED BELOW FOOTINGS SHALL BE OF MINIMUM STRENGTH AT 28 DAYS OF 10 N/Sq.mm AND MINIMUM CEMENT OF 220 Kg/Cube.m.
6. NO CONCRETING IS ALLOWED AT A SHADE TEMPERATURE EXCEEDING 37° C . CONCRETE TEMPERATURE AS PLACED SHALL NOT EXCEED 33° C, IN ALL CASES THE CONTRACTOR SHALL NOTIFY AND OBTAIN THE ENGINEER'S APPROVAL WITH REGARD TO THE TIME FOR CONCRETING.
7. NO OPENING SHALL BE MADE IN CONCRETE WORKS WITHOUT WRITTEN PERMISSION OF THE ENGINEER.
8. SECTION AT NECK OF COLUMN BELOW PLINTH LEVEL IS TO BE INCREASED ON EACH SIDE INORDER TO HAVE A CLEAR CONCRETE COVER TO REINFORCEMENT OF MINIMUM 3" (75 mm).
9. VIBRATORS MUST BE USED FOR ALL CONCRETING WORKS.
10. FRESHLY PLACED CONCRETE SHALL BE PROTECTED FROM RAIN,DUST,AND SUN RAYS.CONCRETE TO BE CURED FOR 7 DAYS AS REQUIRED BY THE ENGINEER USING FRESH WATER AND COVERED WITH JUTE MATTING.
11. ADMIXTURES TO BE USED ONLY AFTER WRITTEN APPROVAL OF THE ENGINEER. USE OF ADMIXTURES CONTAINING CHLORIDE IS NOT PERMITTED.
12. MINIMUM 6 NOS. OF CONCRETE CUBE SHALL BE TAKEN ON EACH DAY OF CONCRETING OR FOR EACH 100 Cube.m. OF CONCRETE OR AS DECIDED BY THE ENGINEER.THE CUBES SHALL BE TESTED AT A LABORATORY APPROVED BY THE ENGINEER AND IN ACCORDANCE WITH THE RECOMMENDATIONS OF IS 456 - 2000.
13. ALL CONSTRUCTION JOINTS, COLUMN HEADS CONCRETE TO BE CHIPPED BEFORE NEW CONCRETING.

6) FORM WORK NOTES:

1. CONTRACTOR IS RESPONSIBLE FOR THE STABILITY OF THE FORM WORK .
2. BEFORE CONCRETING, CHECK AND FINALIZE THE LEVEL OF TOP OF CONCRETE WORK.
3. ALL SHUTTERING WORKS SHOULD BE DONE EITHER BY CONCRETE (OR) WOOD,STEEL SURFACE.
4. SHUTTERING SIZES MUST BE AS PER STRUCTURAL RECOMMENDED SIZES IN DRAWING.
5. ABOVE FLOOR FINISHED LEVEL, WHILE PROVIDING FORM WORKS, THE LABORS SHOULD BE PROVIDED ALL SAFETY MATERIALS.
6. ANY KIND OF SHUTTERING MATERIALS SHOULD BE PAINTED WITH OIL ON THE INNER SURFACE, BEFORE CONCRETING.
7. FOUNDATION & GRADE BEAM FORM WORKS WILL BE MUST DONE ONLY BY THE TOP OF P.C.C SURFACE.
8. AFTER COMPLETED THE SHUTTERING WORK PROVIDE PROPER PROPS AND STRUT & OUTSIDE SUPPORTS.
9. THE CLEAR SIZE & HEIGHT OF FORM WORKS IS TO BE CHECKED AND CONFIRMED BY THE SITE ENGINEER .
10. THE SHUTTERING SHOULD NOT BE REMOVED BEFORE CONCRETE RIGIDITY TIME (OR) STRUCTURAL ENGINEER ADVICE DAY (REFER TECHNICAL NOTES, CLAUSE -2.3).
11. STRUCTURAL CONSULTANT RECOMMEND ONLY FOR THE FRAMED STRUCTURE CONSTRUCTION ONLY. DO NOT EXECUTE ANY SORT OF LOAD BEARING CONSTRUCTION.

7) CURING WORK NOTES:

1. AFTER COMPLETION OF THE CONCRETING WORK CURING IS MUST FOR 8 HOURS.
2. WET COVERINGS SUCH AS WET GUNNY BAGS, JUTE MATTING,STRAW ETC.,ARE WRAPPED TO VERTICAL SURFACE FOR KEEPING THE CONCRETE WET.
3. THE CURING STRENGTH SHOULD BE ATTAINED BY THE CONCRETE FOR MINIMUM 7 DAYS AND MAXIMUM 21 DAYS.

8) DEVELOPMENT LENGTH VALUES:

CONCRETE GRADE	STEEL GRADE	TENSION (EX: BEAM,etc.,)	COMPRESSION (EX: COLUMN,etc.,)
M 20	Fe 500	60 X d	48 X d
M 25	Fe 500	50 X d	40 X d
M 30	Fe 500	48 X d	38 X d
M 20	Fe 500	63 X d	50 X d
M 25	Fe 500	54 X d	43 X d
M 30	Fe 500	50 X d	40 X d

	CONCRETE LINE (THIN)
	REINFORCEMENT (THK.)
	REINFORCEMENT IN A DIFFERENT LAYER (THK.)
	SECTION OF A REINFORCING BAR
	CENTER LINE
	DIMENSION LINE
	CONCRETE BEAM FRAMING INTO COLUMN WHICH EXTENDS THROUGH FLOOR
	CONCRETE BEAM FRAMING INTO COLUMN WHICH STOPS AT FLOOR
	BAR SHOWN BENT AT RIGHT ANGLE
	BAR WITH HOOKS
	BAR WITH 90° BENDS
	BAR SHOWN SEPARATE
	LEVEL MARK ELEVATION
	LEVEL MARK IN PLAN
	BENDS NORMALLY
	BENDS WITH SMALLEST
	BUNDLE WITH THREE IDENTICAL
	FOOTING REINFORCEMENT RANGE
	FOOTING REINFORCEMENT RANGE CONTINUOUS
N	EXTENSIONS,SECTION CUT SYMBOL
	IF THE ARRANGEMENT OF THE REINFORCEMENT IS NOT CLEARLY SHOWN BY THE SECTION, AN ADDITIONAL SKETCH SHOWING THE REINFORCEMENT MAY BE DRAWN OUTSIDE THE SECTION.
(OR)	ALL THE TYPES OF STIRRUPS OR TIES PRESENT SHALL BE INDICATED ON THE DRAWING. IF THE ARRANGEMENT IS COMPLICATED, IT MAY BE CLARIFIED BY THE AID OF A SKETCH IN CONNECTION WITH THE NOTATION.

PROJECT:

PROPOSED APPARTMENT BUILDING AT NGO C COLONY.

JOB TITLE:

TECHNICAL NOTES

ARCHITECT:

Ar. SIVAKUMAR

DESIGNED :	P.BALA SUBRAMANIAN		
CHECKED :	P.BALA SUBRAMANIAN		
FILE NAME :	D:_BALA_STRUCTURAL_CONSULTANT\2024\21-24 SIVAKUMAR APPARTMENT - NGO C COLONY\FDN & GBR\R0		
SCALE	1:1	DATE	11-08-24
SIZE	A3		
DWG .NO. 1	JOB .NO. 021-24	REV .NO.	R0

BALA STRUCTURAL CONSULTANT

19B,GANANTHA NAYANAR STREET,
PALAYAMKOTTAI MARKET,
PALAYAMKOTTAI,
TIRUNELVELI-2.

Cell : 9994954448
Email :balastructuralconsultant@gmail.com

1) QUALITY STANDARDS:

1. QUALITY SHOULD BE MAINTAINED IN SITE FOR FINE AGGREGATE, COARSE AGGREGATE, CEMENT AND WATER.

2. HANDLING, STORAGE AND PRESERVATION OF CEMENT MUST BE INSPECTED PROPERLY.

3. DESIGN MIX CONTROL FOR CONCRETE IS MUST.

4. DOCUMENTATION OF CUBE TEST RESULTS IS MANDATORY.

5. SAFETY HELMET AND SAFETY SHOES SHOULD BE MADE COMPULSORY FOR SITE WORKERS

2) QUALITY OF AGGREGATES:

1. CRUSHING STRENGTH OF THE AGGREGATE SUITABLE FOR CONCRETE IS 80-100 MPa.

2. THE AGGREGATES SHOULD BE CLEAN IN ORDER TO ENSURE GOOD BOND STRENGTH. THE PERMISSIBLE LEVELS OF IMPURITIES (% BY WEIGHT) IN AGGREGATES ARE GIVEN AS FOLLOWS:

DELETERIOUS SUBSTANCES	FINE AGGREGATES %	COARSE AGGREGATES %
• COAL AND LIGNITE	1	1
• CLAY LUMPS	1	1
• MATERIAL FINER THAN 75μ SHALE	3	3
• TOTAL PERCENTAGE OF ALL IMPURITIES	5 (15% for M-Sand)	5

3. SHAPE OF THE AGGREGATE SHOULD BE ANGULAR AND TEXTURE SHOULD BE ROUGH FOR HIGH STRENGTH OF CONCRETE.

4. THE TEST FOR AVERAGE LOSS OF WEIGHT FOR AGGREGATES AGAINST MECHANICAL ACTIONS SUCH AS FREEZING OR THAWING, WETTING OR DRYING AND SWELLING AFTER 10 CYCLES SHOULD NOT EXCEED 12% - 18% WHEN TESTED WITH SODIUM SULPHATE AND MAGNESIUM SULPHATE RESPECTIVELY.

5. GRADATION OF FINE AGGREGATES SHOULD BE ACCORDING TO IS 383-2016 GRADING ZONE-III

SIEVE DESIGNATION	% PASSING THROUGH SIEVE
10mm	100
4.75mm	90-100
2.36mm	85-100
1.18mm	75-100
600μm	60-79
300μm	12-40
150μm	0-10

6. THE DRY UNIT WEIGHT OF AGGREGATES SHOULD BE 1600 KG/m³.

7. WATER ABSORPTION OF FINE AGGREGATE SHOULD BE 1% AND COARSE AGGREGATE SHOULD BE 0.5%.

8. THE ALTERNATIVE AGGREGATES USED IN SITE MUST BE CLEAN, DEVOID OF CHEMICAL IMPURITIES OR CLAY AND FINE PARTICLES WHICH WILL AFFECT HYDRATION OF CEMENT.

3) TESTS ON AGGREGATES:

1. TEST FOR DELETERIOUS CONSTITUENTS: A SIMPLE FIELD TEST FOR DETERMINING SILT IS AS FOLLOWS:
- COMMON SALT SOLUTION IS PLACED IN 250mL JAR.
- SAND IS THEN ADDED TILL THE WATER LEVEL REACHED 100mL.
- MORE SALT SOLUTION IS ADDED TILL THE LEVEL REACHES 150mL.
- AFTER AGITATION THE SOLUTION IS ALLOWED TO STAND STILL FOR 3 HOURS.
- THE DEPTH OF SOLID LAYER AND DEPTH OF SILT LAYER IS MEASURED. AS PER IS 383-2016 THE PERMISSIBLE LIMIT FOR DELETERIOUS MATERIALS FOR CRUSHED SAND IS 15%, FOR MIXED SAND IS 12% AND FOR MANUFACTURED OR M-SAND IS 10%.

Sl.No.	QUALITY TEST	STANDARD	LIMIT
1	CRUSHING VALUE	IS: 2386 (PART IV) 1963	
	• NON WEARING SURFACE		45 %
	• WEARING SURFACE		30 %
2	ABRASION VALUE	IS: 2386 (PART IV) 1963	
	• NON WEARING SURFACE		50 %
	• WEARING SURFACE		30 %
3	FLAKINESS INDEX	IS: 2386 (PART I) 1963	NOT >25 %
4	ELONGATION INDEX	IS: 2386 (PART I) 1963	
5	ABSORPTION	IS: 2386 (PART III) 1963	
6	IMPURITIES		15 %
	• CRUSHED SAND	IS: 383-2016	12 %
	• MIXED SAND		10 %
	• M-SAND		

4) QUALITY OF WATER:

1. SMALL AMOUNT OF WATER IS NEEDED TO HYDRATE CEMENT.ADDITIONAL WATER IS REQUIRED TO LUBRICATE THE MIX.TOO MUCH WATER CAN LEAD TO CREATION OF CAPILLARY PORES.THE WATER CEMENT RATIO AND MINIMUM GRADE OF CONCRETE FOR DIFFERENT ENVIRONMENTAL CONDITIONS ARE GIVEN BELOW (IS: 456-2000) :

ENVIRONMENTAL EXPOSURE CONDITION	WATER-CEMENT RATIO	MINIMUM CONCRETE GRADE
MILD	0.55	M25
MODERATE	0.50	M25
SEVERE	0.45	M30
VERY SEVERE	0.45	M35
EXTREME	0.40	M40

2. WATER USED FOR MIXING AND CURING MUST BE FREE FROM OIL, ACID & ALKALI, SALTS AND ORGANIC MATERIAL. WHENEVER THERE IS UNCERTAINTY OF QUALITY, WATER SHOULD BE TESTED BEFORE USE.

3. IMPURITIES IN WATER:
- CHLORIDES: CAN CAUSE CORROSION OF STEEL REINFORCEMENT
- SULPHATES: REDUCTION IN LONG TERM STRENGTH LEVELS
- ORGANIC MATTER: AFFECTS SETTING AND STRENGTH DEVELOPMENT
- SUGAR: SUGAR RETARDS SETTING TIME. TOO MUCH SUGAR MAY KILL THE CONCRETE (IT WILL NOT SET)
- WASTE WATER: IT IS BEST NOT TO USE WASTE WATER AND CAN BE USED AFTER PROPER TESTING AND TREATMENT.

4. THE pH VALUE OF HYDROGEN ION CONCENTRATION IS A MEASURE OF ACIDITY OR ALKALINITY OF WATER. IF IT IS MORE THAN 7, THEN THE SOLUTION IS ALKALINE. THE Ph VALUE OF WATER SHOULD NOT BE LESS THAN 6

5. IS: 456-2000 STATES THAT WATER FOUND SATISFACTORY FOR MIXING CONCRETE CAN ALSO BE USED FOR CURING CONCRETE. HOWEVER, IT SHOULD NOT PRODUCE ANY OBJECTIONABLE STAIN ON THE SURFACE OF CONCRETE.

5) QUALITY OF R.M.C.:

1. INFORMATION TO BE SUPPLIED BY THE PRODUCER (IS 4926:2003):
- NATURE AND SOURCE OF EACH CONSTITUENT MATERIAL
- SOURCE OF SUPPLY OF CEMENT
- PROPOSED PROPORTIONS OF QUANTITY OF EACH CONSTITUENT /m³ OF FRESH CONCRETE

2. THE CONCRETE TO BE DISCHARGED FROM THE TRUCK MIXER WITHIN 2 HOURS FROM THE TIME OF LOADING.

3. ONE SAMPLE FOR EVERY 50m³ OF PRODUCTION OR EVERY 50 BATCHES IS MUST TO ENSURE TYPE OF CONCRETE PRODUCED

4. DOCUMENTATION OF MIX-DESIGN IS MANDATORY

6) QUALITY OF CONCRETE SLUMP:

PLACING CONDITION	DEGREE OF WORKABILITY	SLUMP (mm)
BLINDING CONCRETE		
• **SHALLOW SECTIONS**	VERY LOW	TOO SMALL TO MEASURE
• **PAVEMENTS USING PAVERS**		
MASS CONCRETE		
LIGHTLY REINFORCED SECTIONS IN:	LOW	25-75
• SLABS		
• BEAMS		
• WALLS		
• COLUMNS		
• FLOORS		
• HAND PLACED PAVEMENTS		
• STRIP FOOTINGS		
HEAVILY REINFORCED SECTIONS IN	MEDIUM	50-100
• SLABS		
• BEAMS		75-100
• WALLS		
• COLUMNS		
• SLIP FORM WORK		
• PUMPED CONCRETE		
TRENCH FILL	HIGH	100-150
• IN SITU PILING		

7) QUALITY OF RAW MATERIALS:

1. STACKING AND STORAGE OF CONSTRUCTION MATERIALS AT SITE RECOMMENDATIONS AS PER IS 4082:1996.

2. MATERIALS SHOULD BE STORED AT SITE DEPENDING UPON THE INDIVIDUAL CHARACTERISTICS AND SHALL BE PROTECTED FROM ATMOSPHERIC ACTIONS SUCH AS RAIN, SUN, WINDS AND MOISTURE TO AVOID DETERIORATION.

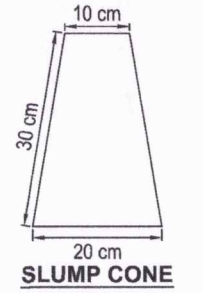
3. MATERIALS LIKE TIMBER, COAL, PAINTS, ETC., SHALL BE STORED IN SUCH A WAY THAT THERE MAY NOT BE ANY POSSIBILITY OF FIRE HAZARDS.

4. STACKS SHALL NOT BE PILED SO HIGH TO MAKE THEM UNSTABLE UNDER FIRE FIGHTING CONDITIONS AND IN GENERAL THEY SHALL NOT BE MORE THAN 4.5m HEIGHT [IS 13416 (PART 5):1994].

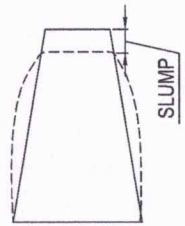
5. MATERIALS LIABLE TO BE AFFECTED BY FLOODS SHALL BE SUITABLY STORED TO PREVENT THEM BEING WASHED AWAY OR DAMAGE DUE TO FLOODS.

6. STAIRWAYS, PASSAGEWAYS AND GANGWAYS SHALL NOT BECOME OBSTRUCTED BY STORAGE OF BUILDING MATERIALS, TOOLS OR ACCUMULATED RUBBISH.

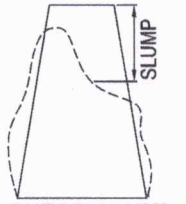
7. STORAGE FOR CEMENT BAGS:
- CEMENT SHALL BE STORED AT THE WORK SITE IN A BUILDING OR A SHED WHICH IS DRY, LEAK PROOF AND AS MOISTURE-PROOF AS POSSIBLE.
- CEMENT BAGS SHALL BE STACKED OFF THE FLOOR ON WOODEN PLANKS IN SUCH A WAY AS TO KEEP ABOUT 150-200mm CLEAR ABOVE THE FLOOR.
- A SPACE OF 600mm MINIMUM SHALL BE LEFT ALL AROUND THE EXTERIOR WALLS AND THE STACKS
- BIS PRESCRIBES THAT CEMENT SHOULD BE USED WITHIN 90 DAYS OF ITS PRODUCTION. IN CASE IT IS USED AT A LATER DATE, IT SHOULD BE TESTED BEFORE USE.



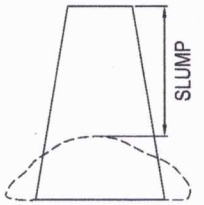
SLUMP CONE



TRUE SLUMP



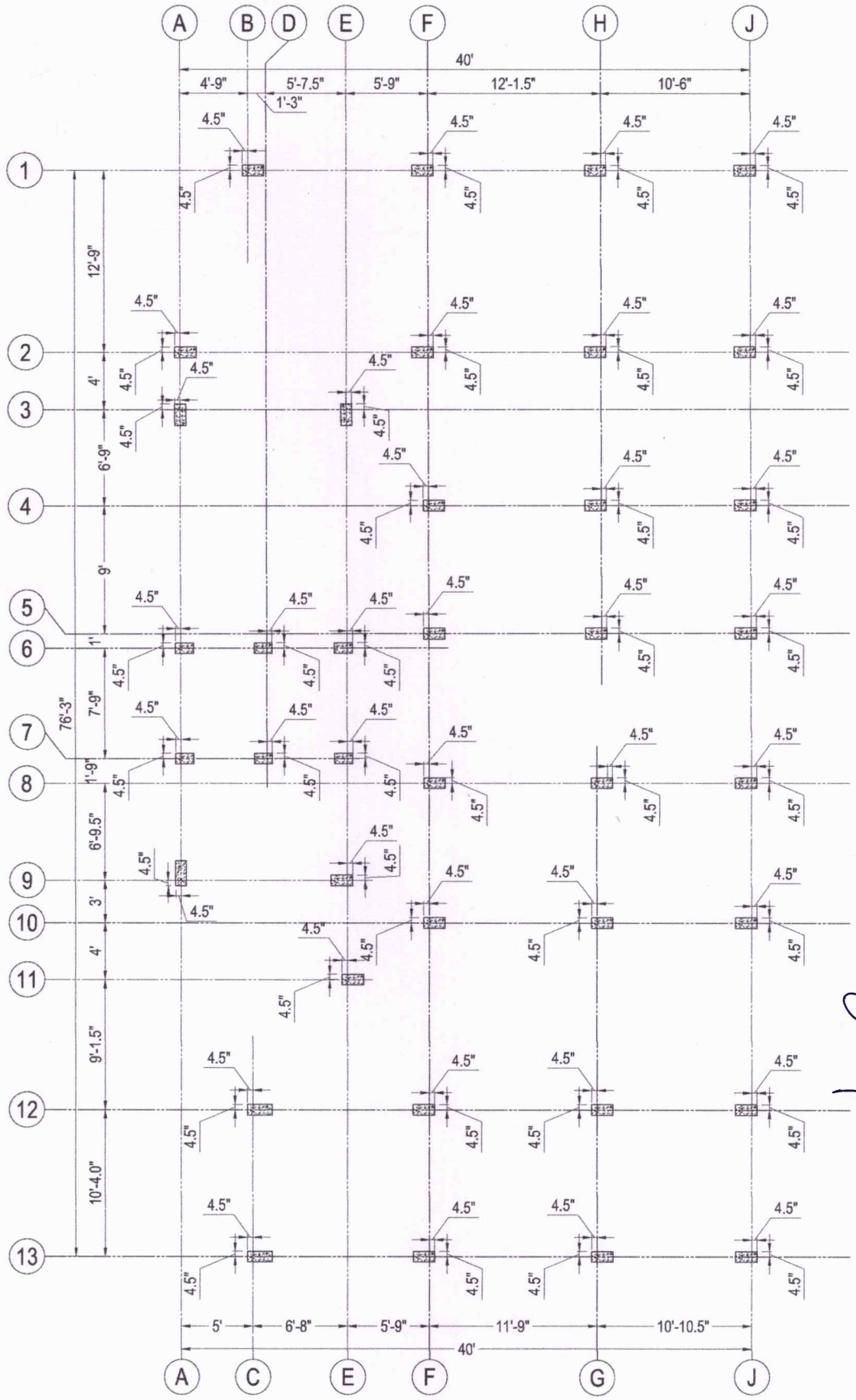
SHEAR SLUMP



COLLAPSE

PROJECT: PROPOSED APPARTMRNT BUILDING AT NGO C COLONY.	**DESIGNED:** P.BALA SUBRAMANIAN	FILE NAME :	D:_BALA_STRUCTURAL_CONSULTANT\2023\021-24-Ar.SIVAKUMAR -S+I\CADD\RG		
		SCALE	1:1	DATE	11-08-24
		SIZE	A3		
JOB TITLE: QUALITY STANDARDS	**DETAILED:** P.BALA SUBRAMANIAN	DWG .NO. 1.1	JOB .NO. 021-24	REV .NO.	R0
ARCHITECT: Ar. SIVAKUMAR		**BALA STRUCTURAL CONSULTANT**			

19B,GANANTHA NAYANAR STREET,
PALAYAMKOTTAI MARKET,
PALAYAMKOTTAI,
TIRUNELVELI-2.
Cell : 9994854448
Email :balastructuralconsultant@gmail.com



COLUMN CENTRELINE LAYOUT

P. BALA SUBRAMANIAN, M.E.,(Structure)
REGISTERED STRUCTURAL ENGINEER GRADE-II
Regn. No. RSE-Gr.II 02/TVLD/2021
18, Periyar Nagar Salai, North Highground Road,
Palayamkottai, Tirunelveli-627002.
Cell: 99949 54448

NOTE:
SITE ENGINEER HAS TO CHECK DIAGONAL MEASUREMENTS USING PYTHAGORAS THEOREM

TAKE CARE ABUTTING WALLS & SOIL WITH PROPER PROTECTION WHILE EXCAVATION

SL.NO	DWG.NO	DESCRIPTION	DATE
RO		FOR DISCUSSION	11-08-24
REV.NO		DESCRIPTION	DATE

GENERAL NOTES & TECHNICAL NOTES

REFER SHEET 1

1.GRADE OF CONCRETE :
M25 - (DESIGN MIX) (AS PER IS 456-2000)

2.GRADE OF STEEL - **Fe550** (AS PER IS 1786-2008)

3.SEISMIC DESIGN AS PER IS 1893-2002.(ZONE-III)

4.DESIGNED FOR S+4 ONLY.

DESIGN LOADS:

1. FLOOR SLAB - 2,3 kN/Sq.m
2. TERRACE - 1.5kN/Sq.m

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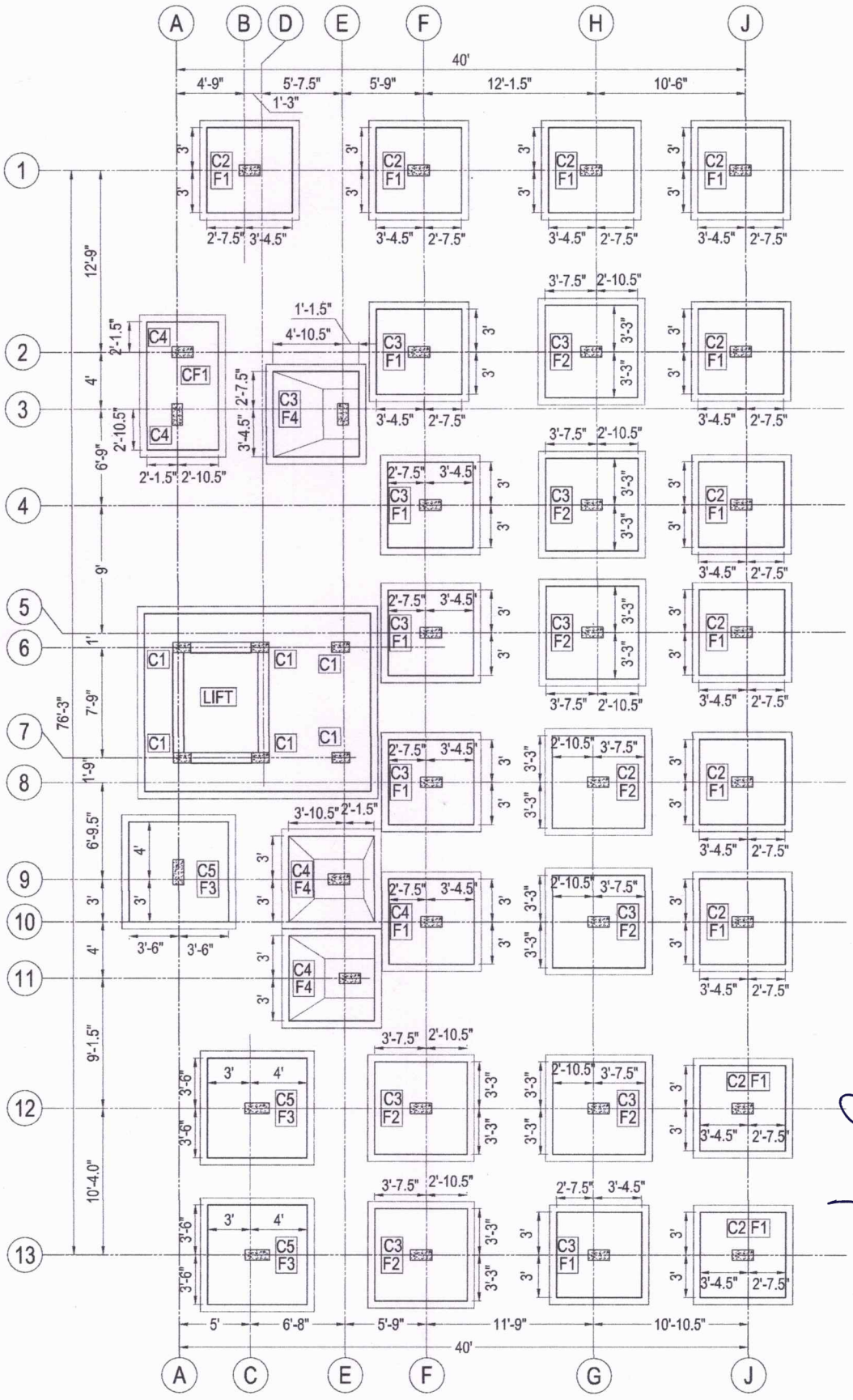
PROJECT:
PROPOSED APARTMENT AT NGO C COLONY

JOB TITLE:
COLUMN CENTRELINE LAYOUT

CLIENT:
Ar. SIVAKUMAR

DESIGNED :	S. VENKATESH				
DETAILED :	S. VENKATESH				
CHECKED :	P.BALA SUBRAMANIAN				
APPROVED :	P.BALA SUBRAMANIAN				
FILE NAME :	D:_BALA_STRUCTURAL_CONSULTANT\2024\21-24 SIVAKUMAR APPARTMENT - NGO C COLONY\FDN & GBVR0				
SCALE	1:60		DATE	11-08-24	
SIZE	A1				
DWG .NO.	1A	JOB .NO.	021-24	REV .NO.	R0

BALA STRUCTURAL CONSULTANT
7, PERIYAR NAGAR SALAI,
NORTH HIGH-GROUND ROAD,
PALAYAMKOTTAI, TVL-11.
Ph : +91-99949-54448
Email :balastructuralconsultant@gmail.com



FOOTING LAYOUT

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P. BALA SUBRAMANIAN, M.E.,(Structure)
REGISTERED STRUCTURAL ENGINEER GRADE-II
Regn. No. RSE-G.II 02/TVLD/2021
1B, Periyar Nagar Salai, North Highground Road,
Palayamkottai, Tirunelveli-627002.
Cell: 99949 54448

SL.NO	DWG.NO	DESCRIPTION	DATE

RO	11-08-24	FOR DISCUSSION
REV.NO	DATE	DESCRIPTION

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PROJECT:
PROPOSED APARTMENT AT
NGO C COLONY

JOB TITLE:
FOOTING LAYOUT

CLIENT:
Ar. SIVAKUMAR

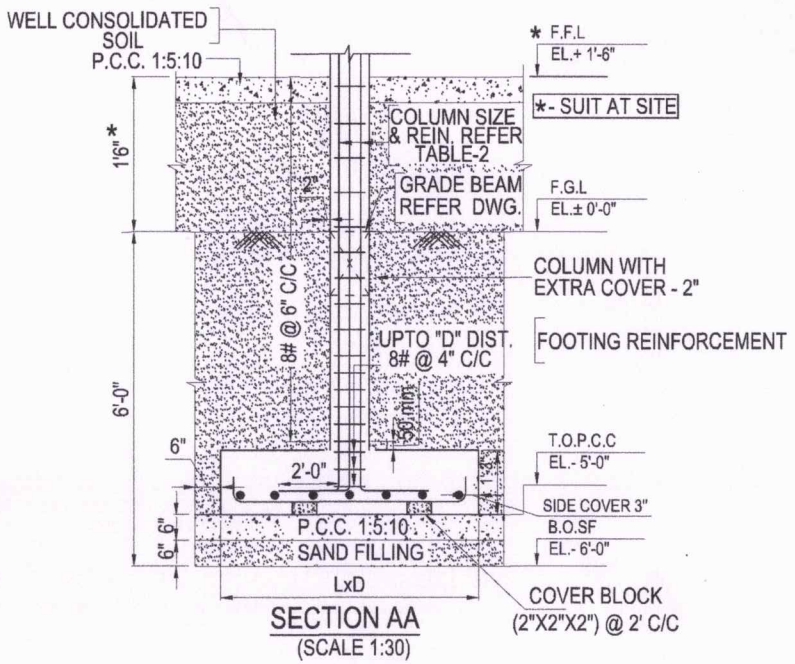
DESIGNED :	S. VENKATESH				
DETAILED :	S. VENKATESH				
CHECKED :	P.BALA SUBRAMANIAN				
APPROVED :	P.BALA SUBRAMANIAN				
FILE NAME :	D:_BALA_STRUCTURAL_CONSULTANT\2024\21-24 SIVAKUMAR APPARTMENT - NGO C COLONY\FDN & GBR\R0				
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BALA STRUCTURAL CONSULTANT
1, PERIYAR NAGAR SALAI,
NORTH HIGH-GROUND ROAD,
PALAYAMKOTTAI, TVL-11.
Ph : +91-99949-54448
Email :balastructuralconsultant@gmail.com

TABLE-1 FOOTING DETAILS:

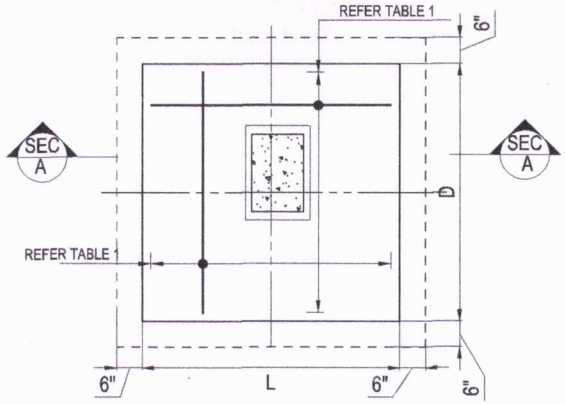
SBC-250 KN/SQ.M

FOOTING MARK	NO. OF FOOTINGS	GRID REFERENCE	(L)	(B)	(D)	DIA. (mm)	SPACING C/C (BOTH WAYS)
F1	17	B1,F1,F2,F4,F5,F8,F10,G13, H1,J1,J2,J4,J5,J8,J10,J12,J13	6'-0"	6'-0"	1'-3"	10#	6" C/C
F2	08	F12,F13,G8,G10,G12,H2,H4,H5	6'-6"	6'-6"	1'-6"	12#	6" C/C
F3	03	A9,C12,C13	7'-0"	7'-0"	1'-9"	12#	6" C/C
F4	03	E3,E9,E11	6'-0"	6'-0"	1'-9"/ 1'-3"	12#	6" C/C DOUBLE MAT
CF1	01	A2+A3	6'-6"	6'-6"	1'-9"	12#	6" C/C
LIFT	01	A6+A7+D6+D7+E6+E7	12'-6"	16'	1'-3"	12#	6" C/C DOUBLE MAT



SECTION AA

(SCALE 1:30)



ISOLATED FOOTING PLAN-F1

(SCALE 1:30)

P. BALA SUBRAMANIAN, M.E.,(Structure)
REGISTERED STRUCTURAL ENGINEER GRADE-II
Regn. No. RSE-Gr.II 02/TVLD/2021
16, Periyar Nagar Salai, North Highground Road,
Palayamkottai, Tirunelveli-627002.
Cell: 99949 54448

SL.NO	DWG.NO	DESCRIPTION	DATE
RO	11-08-24	FOR DISCUSSION	
REV.NO	DATE	DESCRIPTION	

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CHECKED BY :
DATE :

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DESIGN LOADS:

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2. TERRACE - 1.5kN/Sq.m

PROJECT:

PROPOSED APARTMENT AT NGO C COLONY

JOB TITLE:

FOOTING DETAILS & SECTION

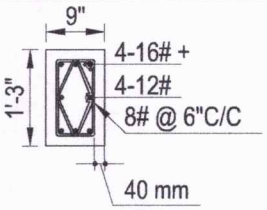
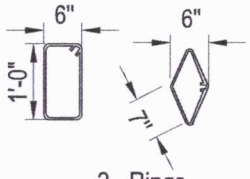
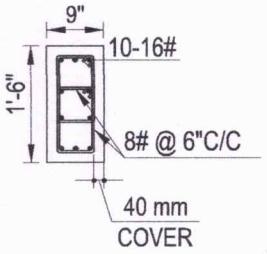
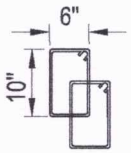
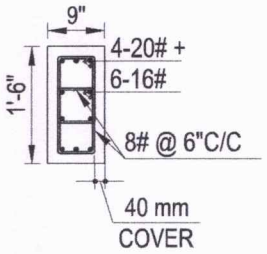
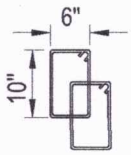
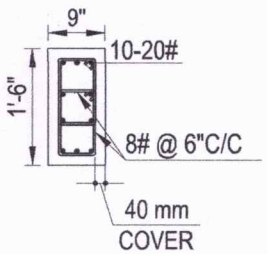
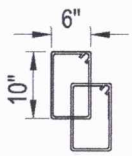
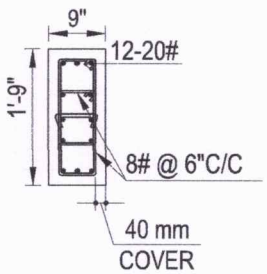
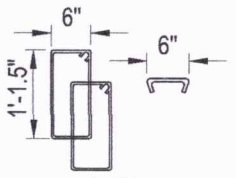
CLIENT:

Ar. SIVAKUMAR

DESIGNED :	S. VENKATESH
DETAILED :	S. VENKATESH
CHECKED :	P.BALA SUBRAMANIAN
APPROVED :	P.BALA SUBRAMANIAN
FILE NAME :	D:_BALA_STRUCTURAL_CONSULTANT\2024\21-24 SIVAKUMAR APPARTMENT - NGO C COLONY\FDN & GB\R0
SCALE	1:30,36
SIZE	A3
DATE	11-08-24
DWG .NO.	1C
JOB .NO.	021-24
REV .NO.	R0

BALA STRUCTURAL CONSULTANT
9, PERIYAR NAGAR SALAI,
NORTH HIGH-GROUND ROAD,
PALAYAMKOTTAI, TVL-11.
Ph : +91-99949-54448
Email :balastructuralconsultant@gmail.com

TABLE 2: COLUMN DETAILS

COLUMN MARK	NO OF COLUMN	GRID NUMBER	ALL FLOORS	TIES SHAPE
C1	06	A6,A7,D6,D7,E6,E7		
C2	12	B1,F1,G8,H1,J1,J2, J4,J5,J8,J10,J12,J13		
C3	13	E3,F2,F4,F5,F8,F12,F13, G10,G12,G13,H2,H4,H5		
C4	05	A2,A3,E9,E11,F10		
C5	03	A9,C12,C13		

SL.NO	DWG.NO	DESCRIPTION	DATE
RO	11-08-24	FOR DISCUSSION	
REV.NO	DATE	DESCRIPTION	

GENERAL NOTES & TECHNICAL NOTES

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DESIGN LOADS:

1. FLOOR SLAB - 2,3 kN/Sq.m
2. TERRACE - 1.5kN/Sq.m

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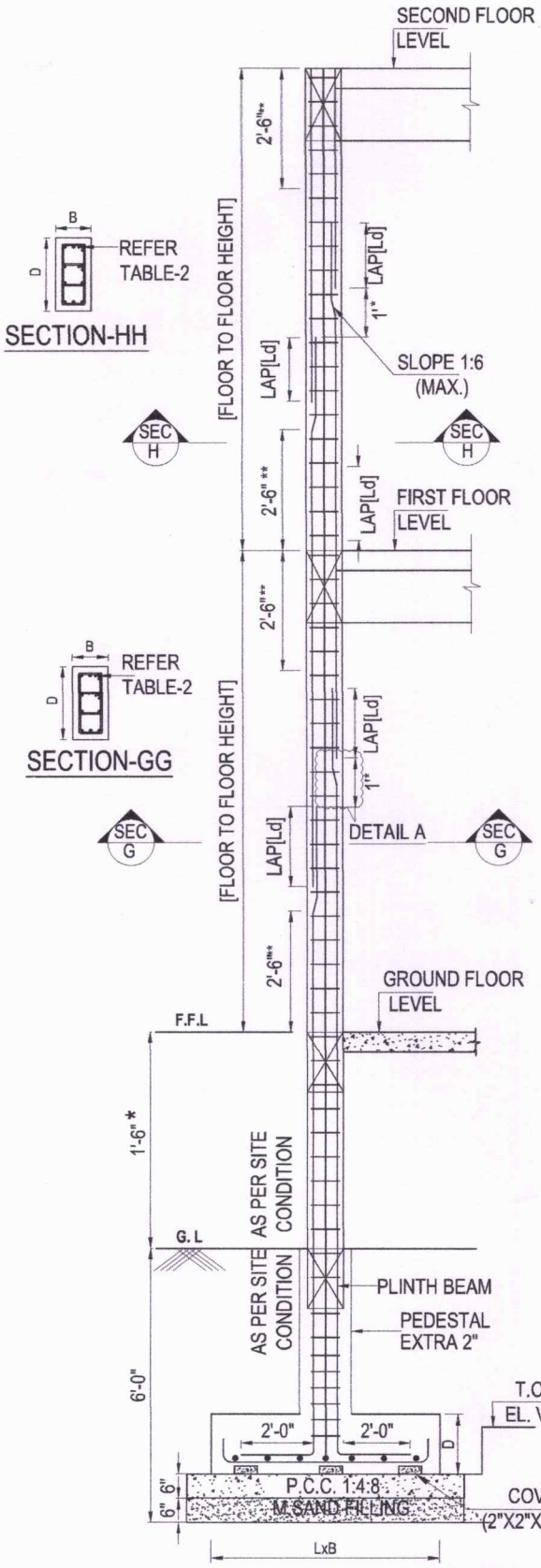
PROJECT:
PROPOSED APARTMENT AT NGO C COLONY

JOB TITLE:
COLUMN DETAILS

CLIENT:
Ar. SIVAKUMAR

DESIGNED :	S. VENKATESH				
DETAILED :	S. VENKATESH				
CHECKED :	P.BALA SUBRAMANIAN				
APPROVED :	P.BALA SUBRAMANIAN				
FILE NAME :	D1_BALA_STRUCTURAL_CONSULTANT\2024\21-24 SIVAKUMAR APPARTMENT - NGO C COLONY\FOR A ISSUE				
SCALE	1:60		DATE	11-08-24	
SIZE	A1				
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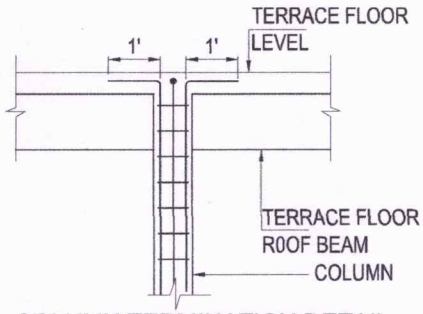
BALA STRUCTURAL CONSULTANT
7, PERIYAR NAGAR SALAI,
NORTH HIGH-GROUND ROAD,
PALAYAMKOTTAI, TVL-11.
Ph : +91-99949-54448
Email :balastructuralconsultant@gmail.com



TYPICAL COLUMN SPLICING DETAILS

SAME COLUMN SIZE

LEGEND	
D	COLUMN DEPTH
B	COLUMN BREADTH
Ld	DEVELOPMENT LENGHT



COLUMN TERMINATION DETAIL

NOTE:
** - LAPPING SHOULD NOT BE DONE AT THIS ZONE
* - MINIMUM 1'-0" GAP BETWEEN LAPPING OF ROD FOR ADJACENT ROD

NOTE:
LAPPING SHOULD NOT BE DONE MORE THAN 50% AT SAME LOCATION

NOTE:
WHILE LAPPING STARTER BAR SHOULD NOT BE CLINKED

P. BALA SUBRAMANIAN, M.E.,(Structure)
REGISTERED STRUCTURAL ENGINEER GRADE-II
Regn. No. RSE-Gr.II 02/TVLD/2021
15, Periyar Nagar Salai, North Highground Road,
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REV.NO	DATE	DESCRIPTION	

GENERAL NOTES & TECHNICAL NOTES

REFER SHEET 1

1.GRADE OF CONCRETE :
M25 - (DESIGN MIX) (AS PER IS 456-2000)
2.GRADE OF STEEL - **Fe550** (AS PER IS 1786-2008)
3.SEISMIC DESIGN AS PER IS 1893-2002.(ZONE-III)
4.DESIGNED FOR S+4 ONLY.

DESIGN LOADS:

1. FLOOR SLAB - 2,3 kN/Sq.m
2. TERRACE - 1.5kN/Sq.m

THIS DRAWING IS VALID ONLY IF CONSULTANT CHECKED AT SITE

PROJECT:
PROPOSED APARTMENT AT NGO C COLONY

JOB TITLE:
COLUMN SPLICING DETAILS

CLIENT:
Ar. SIVAKUMAR

DESIGNED :	S. VENKATESH			
DETAILED :	S. VENKATESH			
CHECKED :	P.BALA SUBRAMANIAN			
APPROVED :	P.BALA SUBRAMANIAN			
FILE NAME :	D:_BALA_STRUCTURAL_CONSULTANT\2024\21-24 SIVAKUMAR APPARTMENT - NGO C COLONY\FDN & GB\RB			
SCALE	1:60		DATE	11-08-24
SIZE	A1			
DWG .NO.	1E	JOB .NO.	021-24	REV .NO. R0

BALA STRUCTURAL CONSULTANT
9, PERIYAR NAGAR SALAI,
NORTH HIGH-GROUND ROAD,
PALAYAMKOTTAI, TVL-11.
Ph : +91-99949-54448
Email :balastructuralconsultant@gmail.com



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3/350/2 Mettukuppam,
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hello@verified.realestate
+91 9996 12 9996
www.verified.realestate