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B.SRINIVASAN B.E AMIE.,
Chartered Engineer
CMDA & Greater Chennai Corporation
Registered Structural Engineer

Mobile : 9445210268
Email : srinideepan@rediffmail.com

STRUCTURAL STABILITY CERTIFICATE

STRUCTURAL STABILITY CERTIFICATE FOR THE PROPOSED CONSTRUCTION OF STILT +5 FLOORS RESIDENTIAL BUILDING (HEIGHT-18.30m) WITH 59 DWELLING UNITS (AFFORDABLE HOUSING)(5th FLOOR AT GYM) AVAILLING PREMIUM FSI AT NEDUKUNDRAM MAIN ROAD, KOLAPAKKAM, CHENNAI, COMPRISED IN S.No.72/1B2A1, 72/1A, KOLAPAKKAM VILLAGE,VANDALUR TALUK, CHENGALPET DISTRICT, KATTANKOLATHUR PANCHAYAT UNION.

The Proposed Building referred to above is a framed structure with Stilt and 5 Upper Floors. The Structural Design and Drawing for the building are being prepared by me conforming to the relevant Bureau of Indian Standard viz. IS 456:2000 for Plain and Reinforced Concrete, IS 875(Part II)—1987 for Imposed Loads and IS 1893:2002(part 1) for Seismic Force. We certify that the building when constructed according to our Structural Designs and Drawings will be structurally safe and sound and fit for occupation.

1. The minimum grade of concrete is M25
2. The minimum width of Column at Stilit Floor is 300mm.

For THE NEST

Managing Partner

B.SRINIVASAN, B.E.,A.M.I.E, C.Engg.,
Structural Engineer Grade - II
CMDA Reg No.S.E/GR-II/19/08/152
176/311, ARCOT ROAD,
KODAMBAKKAM, CHENNAI-600 024

CHENNAI METROPOLITAN DEVELOPMENT AUTHORITY
'Thalamuthu Natarajan Building', No.1, Gandhi Irwin Road,
Egmore, Chennai-600 008.

PROFESSIONAL REGISTRATION CERTIFICATE

This is to certify that the **Thiru. B.SRINIVASAN** has enrolled as **Registered Structural Engineer Grade-II (SE)** with Chennai Metropolitan Development Authority (CMDA) who has the qualification of **B.E., (Civil Engg.)** and experience in the relevant field for **18 years**.

He has been given the Registration No.**SE/GR-II/19/08/152** on **21.08.2019.** He shall be required to comply with the duties and responsibilities prescribed by the Government of Tamil Nadu in Part-V, "Registration of Professionals", Tamil Nadu Combined Development and Building Rules, 2019 approved vide G.O.(Ms) No.18 MAWS (MA1) Dept. dated 04.02.2019.

This Registration is valid upto **20.08.2024**.



CHENNAI METROPOLITAN DEVELOPMENT AUTHORITY
CHENNAI-600 008

21.8.19
N. MUNIPRASAD
ASSISTANT PLANNER
CHENNAI METROPOLITAN DEVELOPMENT AUTHORITY
CHENNAI - 600 008.

For THE NEST
Managing Partner

B.SRINIVASAN, B.E.,A.M.I.E, C.Engg.,
Structural Engineer Grade - II
CMDA Reg No.S.E/GR-II/19/08/152
176/311, ARCOT ROAD,
KODAMBAKKAM, CHENNAI-600 024

DESIGN CALCULATION FOR THE PROPOSED CONSTRUCTION OF STILT +5 FLOORS RESIDENTIAL BUILDING (HEIGHT-18.30m) WITH 59 DWELLING UNITS (AFFORDABLE HOUSING)(5th FLOOR AT GYM) AVAILLING PREMIUM FSI AT NEDUKUNDRAM MAIN ROAD, KOLAPAKKAM, CHENNAI, COMPRISED IN S.No.72/1B2A1, 72/1A, KOLAPAKKAM VILLAGE,VANDALUR TALUK, CHENGALPET DISTRICT, KATTANKOLATHUR PANCHAYAT UNION.

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GEO TECHNICAL

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Managing Partner

B.SRINIVASAN, B.E.,A.M.I.E, C.Engg.,
Structural Engineer Grade - II
CMDA Reg No.S.E/GR-II/19/08/152
176/311, ARCOT ROAD,
KODAMBAKKAM, CHENNAI-600 024

1.0 INTRODUCTION

1.1 General Project Information

Project Title
RESIDENTIAL BUILDING CONSISIT OF STILT AND 5 UPPER FLOORS.

Location of Project
NEDUKUNDRAM MAIN ROAD, KOLAPAKKAM, CHENNAI, COMPRISED IN S.No.72/1B2A1, 72/1A, KOLAPAKKAM VILLAGE

Project Description
RCC Framed Building consisting of Stilt and Five Upper floors.

1.2 Purpose of Basis of Design Document

This document details the input data, principles, methods and performance criteria to be used in the structural engineering design of the Project.

The document serves as a plan for the basis of justification and calculations associated with the design and are a repository for all relevant structural information, including references and computer programs pertaining to the project.

The contents of this brief is based on the drawings available at time of design and actual structural working drawings may change to suit latest architectural design at time of construction.

1.3. Structural Design

The main considerations followed for the design of structure are:

(a) Structural safety and stability.
(b) Demands of aesthetics conceived by the architect.
(c) Availability of material, equipment and expertise.
(d) Constructability and ease of maintenance.
(e) Durability.
(f) Economy.
(g) Recyclability.

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Managing Partner

B.SRINIVASAN, B.E.,A.M.I.E, C.Engg.,
Structural Engineer Grade - II
CMDA Reg No.S.E/GR-II/19/08/152
176/311, ARCOT ROAD,
KODAMBAKKAM, CHENNAI-600 024

2.0 STRUCTURAL SYSTEM

This section provides an overview of the selected structural system and the structural concept employed for the Project. The stability of each building against imposed lateral loads, namely seismic loads / wind load is provided by RCC columns.

RCC BUILDING - REINFORCED CONCRETE STRUCTURE

2.1.1 Foundations

The design options for Foundation shall be worked out based on the Soil test report shared by client. The foundations are to comprise of Individual Footing.

2.1.2 Superstructure - Gravity System

The load resisting system is to be framed utilising RCC slabs and beams with columns. Frames are classified as Ordinary Moment-Resisting Frames (OMRF).

2.1.3 Expansion joint

As the total length of the building is found to be not more than normal condition it is found that expansion joint is not necessary.

2.1.4

Seismic loads and earthquake resistant design shall be as per IS 1893(Part-1). Earthquake forces shall not be considered to act at the same time as wind forces. Direction of earthquake loading and combination thereof shall be as per clause 6.3.2 of IS 1893(Part-1).

Zone : III (For Chennai)
Zone factor : 0.16
Importance factor (I) : 1.5
Response reduction factor (R) : 5.0
Avg. response acceleration coefficients (Sa/g) : As per soil condition
The building is designed by static analysis

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Managing Partner

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175/311, ARCOT ROAD,
KODAMBAKKAM, CHENNAI-600 024

3.0 DESIGN CODES, STANDARDS AND REFERENCE DOCUMENT

3.1 Codes, Standards and Commentaries

a) IS 456 – 2000 Plain and Reinforced Concrete structures
b) IS 875 – 1987 Design Loads
c) IS 3370 Part I, Part II and Part IV Concrete Structures for storage of liquids
d) SP 16 Design aids for Reinforced Concrete structures
e) SP 34 Concrete Reinforced & Detailing
f) IS 1786 Specification for high strength deformed bars
g) National Building Code of India 1983
h) IS 13920 -2016 for Seismic detailing

3.2 Design References and Guides

a) Reinforced Concrete Design –SP 16 BIS handbook
b) Reinforced Concrete Designers Handbook

3.3 Specification used

All the buildings have been designed as framed structures in accordance with the relevant Indian Codes of Practice for civil works i.e. IS: 456-2000. Seismic detailing is followed for the entire building wherever found to be necessary.

4.0 LOADSCRITERIA

The structure is analyzed for all possible combinations of loads i.e. gravity loads(dead and live loads). It should be noted that no extra provision has been made in the design of foundation and vertical structural elements for additional floors.

4.1 MATERIAL DEAD LOADS

Item	Density (kN/m^3)
Dense Concrete	25
Steelwork	78.5
Soil	18.0
Water	10.0
200 thk AAC Block with 8 mm plaster internal walls	8.0

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B.SRINIVASAN, B.E.,A.M.I.E, C.Engg.,
Structural Engineer Grade - II
CMDA Reg No.S.E/GR-II/19/08/152
176/311, ARCOT ROAD,
KODAMBAKKAM, CHENNAI-600 024

4.2 MINIMUM IMPOSED LOADS

RESIDENTIAL BUILDINGS (KN)

a) All rooms and Kitchen	2.0
b) Toilets and bathrooms	2.0
c) Corridors, passages, lobbies and staircases including fire escapes - as per the floor serviced but not less than	3.0

IMPOSED LOADS ON ROOFS

Roofs of buildings used for promenade or incidental to assembly purposes shall be designed for the appropriate imposed floor loads given in Table for the occupancy.

4.3 WIND LOADING

The building structure is of normal high so wind load does not dominate the result of the analysis.

4.4 FIRE RESISTANCE:

Cover to main rebars will be provided as per Table 16 in BIS 456 for fire rating of 1.0 hours.

4.5 EXPOSURE:

The Building will be exposed to Moderate environment as per Table 5 in BIS456.

B.SRINIVASAN, B.E.,A.M.I.E, C.Engg.,
Structural Engineer Grade - II
CMDA Reg No.S.E/GR-II/19/08/152
176/311, ARCOT ROAD,
KODAMBAKKAM. CHENNAI-600 024

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5.0 REINFORCED CONCRETE STRENGTHS.

5.1 Concrete design grades are specified cube strengths to BIS

Elements	Concrete Grade Fck (N/sqmm)
Columns/Shear Walls	25
Foundations	25
Beams / Slabs	25
Lean Concrete	10

5.2 REINFORCEMENT

Reinforcement Yield Strengths used in the design of concrete elements:

Deformed Bars	500 MPa (D)

6.0 GEOTECHNICAL

Geotechnical Model and recommendations are based on report shared by the Client

The recommendations for the proposed structure (Residential building .comprising of an Stilt and Five upper floors)are given below:

a) Type of Foundations : Individual footing

b) Depth of foundations : 3.5mt from the existing ground level

c) Allowable bearing pressure : 30t/m²

d) Settlement considered for calculations: <50mm.

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B.SRINIVASAN, B.E.,A.M.I.E, C.Engg.,
Structural Engineer Grade - II
CMDA Reg No.S.E/GR-II/19/08/152
176/311, ARCOT ROAD,
KODAMBAKKAM, CHENNAI-600 024

Design of TYP FOOTING

From Analysis the Load to the Footing are 400 KN from a square column 300x750 mm (with 25mm bar). M25 Grade of Concrete and Fe 500 steel is used and safe bearing capacity of soil is taken as 100KN/sqm as per soil report.

Maximum Load on Column = 1100 KN.
Add 10% self weight of Footing = 110KN.
Total = 1210 KN.

Area of Footing required $A = \frac{1210KN}{300\ KN/m^2} = 4.03\ m^2.$

Providing footing size = 2.00x 2.00 m.

Ultimate Soil reaction = P/A $= \frac{1.5 \times 1210}{2.0m \times 2.0m}$

$= 453\ KN/m^2$

$= 0.453N/sqmm.$

Depth of footing for shear.

d = 0.453 x 2000 x(950-d)

=860700 – 906d.

Assume Pt = 0.12 ζc = 0.29N/sqmm.

shear resistance

$Vc_1 = 0.29 \times 2000xd$
=580d

Vu1 ≤ Vc1
=860700-906d ≤ 580d

d ≥ 600mm Providing d=660 D=700.

B.SRINIVASAN, B.E.,A.M.I.E, C.Engg.,
Structural Engineer Grade - II
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Flextural moment

Mu = $wl^2/2$

= 303x4x 1.65x1.65/2 = 528KNm = 528148000Nmm.

Mu/bd^2 = 528148000/3500x640x640 = 0.61Mpa.

Pt=1.9% Ast = Ptxbxd/100 = 1.9x1000x460/100 = 861 sqmm/m.

Using 12 mm rod for Footing. Spacing of bar = 1000x112 /861 = 120mm.

Use 12mm rod @ 100mmc/c both ways for Footing.

And Design of other Footings calculated in similar way

Design of TYP Column

From Analysis the Column Axial load is found to be 980 KN.

The size of the column is taken as

230mmx600mm. Grade of Concrete M25 and

Grade of steel Fe500 Cover = 40mm. Ht of

Column = 3mt. Fy = 500N/sqmm & Fck = 25

Effective Length ratio 0.65 as per IS 456:2000 (both end fixed)

Leff1 = 0.65 x 3 = 1.95, Leff2 = 0.65 x 3 = 1.95

Check for Slenderness

Leff1/D = 6.5 Leff1/b = 6.5 Leff2/D = 6.5 Leff2/b = 4.3

All Columns are short about both axis Size of Column

and check e_{min}

e_{min} = Leff/500+D/30 = 1950/500+300/30 = 13.9

Find Mmin = 0.031x980 = 30.38KNm.

Design Axial Load Pu = 980KN.

Design Moment Mx = Mmin = 30.38KNm.

Designing the column as an axially loaded column

with uni-axial moment

Calculation of Area of Steel.

Design Axial Load Pu =480KN.

B.SRINIVASAN, B.E.,A.M.I.E, C.Engg.,
Structural Engineer Grade - II
CMDA Reg No.S.E/GR-II/19/08/152
176/311, ARCOT ROAD,
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Design Moment Mx = Pux e_{min} 30.38KNm.

d' = 40+20/2 = 50mm

d'/D = 50/300 = 0.217

$Mu/FckbD^2$ =30.38x1.5x10^6 /25x230x450x450 =

0.03 Pu/Fckbd = 980x1.5x10^3/25x230x450 = 0.43

From SP 16 Chart 44, p/Fck = 0.089

Ast = 0.089x25x330x600/100 = 1208sqmm.

Required 8 Nos of 16mm tor rods.

For Distributing even arrangement of rod on all 4 sides of column

Also Lateral ties 8 tor rods @ 150c/c are to be Provided. And

Design of other Column calculated in similar way.

Design of TYP Beam

Beam size is taken as 230mm x 600mm.

Simply supported beam Effective span is 4.18mt

From analysis the Beam moment are as follows

Moment Top near support (left) is -224 KNm.

Moment Top near support (right) is -209 KNm.

Moment Bottom @ Mid span is +281 KNm.

Area of steel @ Top near support (left)

Mu = 0.87Ast fy d[1-(Ast fy/b d fck)]

-224000000 = 0.87 x Ast x 500 x 560[1-(Ast x 500 / 230 x 560 x 25)]

-224000000 = 243600Ast – 37.82 Ast^2

Ast = 416 sqmm.

Providing 3-16# @ Top near Left Support

Area of steel @ Top near support (right)

B.SRINIVASAN, B.E.,A.M.I.E, C.Engg.,
Structural Engineer Grade - II
CMDA Reg No.S.E/GR-II/19/08/152
176/311, ARCOT ROAD,
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Mu = 0.87Ast fy d[1-(Ast fy/b d fck)]

-209000000 = 0.87 x Ast x 500 x 560 [1-(Ast x 500 / 230 x 560 x 25)]

-209000000 = 243600Ast – 37.82 Ast^2

Ast = 466 sqmm.

Providing 3-16# @ Top near Left Support

Area of steel @ Bottom near mid span

Mu = 0.87Ast fy d[1-(Ast fy/b d fck)]

281000000 = 0.87 x Ast x 500 x 560 [1-(Ast x 500 / 230 x 560 x 25)]

281000000 = 243600Ast –37.82 Ast^2

Ast = 505 sqmm.

Providing 3-16# & 3-16# @ Bottom of Mid span

Also Stirrups 8 tor rods @ 150c/c are to be Provided.

And Design of other Beam calculated in similar way.

Design of TYP Slab

Effective span of Slab is 3.89mt x 7.2mt with beam support of 230mm spaced @ 3890mmc/c

Taking M30 Grade Concrete and Fe500 Grade steel.

Thickness of slab = 3890/35 = 111mm.

Slab thickness is taken as 125mm as the building is used for Residence purpose.

Effective depth = d = 125– 20 – 6 = 97mm.

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Managing Partner

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Self wt of slab = 0.125 x 25 = 3.125KN/sqm Finish = 1.5KN/sqm.

Total Dead Load = 5.25KN/sqm.

Live load for Residence building Lobby Corridor etc = 2KN/sqm.

Partition Load on slab is taken as 2KN/sqm.

Total Load = 2+2+5.25 = 9.25KN/sqm.

Factored Load W= 1.5 x 9.25 = 13.875KN/sqm.

Coefficient in Shorter direction = 0.1149.

Shorter Span Positive moment = 0.1149 x 13.875 x 4.5 x 4.5 = 46.24 KNm.

Mu limit = 0.138 fck bdd = 0.138 x 25 x 1000 x 97 x 97 = 53 KNm Since

Mu is less than Mu limit the section is under reinforced. Mu = 0.87Ast

fy d[1-(Ast fy/b d fck)]

46240000 = 0.87 x Ast x 500 x 124 [1-(Ast x 500/1000 x 97 x 25)]

43240000 = 53940 Ast – 8.7 Ast^2

Ast = 645 sqmm.

Provide 10 Tor @ 100mm c/c.

Coefficient in Longer direction = 0.034.

Longer Span Positive moment = 0.034 x 19.875 x 4.5 x 4.5 = 13.68 KN.m

Mu limit = 0.138 fck bdd = 0.138 x 25 x 1000 x 97 x 97 = 53 KNm Since

Mu is less than Mulimit the section is under reinforced. Mu = 0.87Ast

fy d[1-(Ast fy/b d fck)]

13680000 = 0.87 x Ast x 500 x 124 [1-(Ast x 500/1000 x 97 x 25)]

13680000 = 53940 Ast – 8.7 Ast^2

Ast = 264 sqmm.

Provide 10 Tor @ 150mm c/c.

B.SRINIVASAN, B.E.,A.M.I.E, C.Engg.,
Structural Engineer Grade - II
CMDA Reg No.S.E/GR-II/19/08/152
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Check for Shear.

Span load = 19.875 x 4.5 = 89 KN V = 89/2 = 44.7KN.

Actual Shear stress V = 44700/1000 x 97 = 0.36N/sqmm < Tc(min).

From IS 456 Table 19 (Using Pt = 0.65%) Design shear strength = 0.574N/sqmm.

Max Allowable shear stress = 3.95 N/sqmm.

Check for Deflection.

Actual Span to depth ratio = 4500/97 = 36.2

Calculation of Allowable Span to depth ratio.

fs = 0.58 fy (Area of c.s of steel required/ Area of c.s of steel provided)

= 0.58 x 500(945/1120) = 244 N/sqmm. K

= 1/[0.225+0.003fs-0.625log(1/pt)].

= 1/[0.225+0.003x265-0.625log(1/0.65)].

= 1.3

Allowable Span to depth ratio = 30 x K = 30 x 1.3 = 39 < Actual ratio.

And Design of other Slab calculated in similar way.

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Structural Engineer Grade - II
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176/311, ARCOT ROAD,
KODAMBAKKAM, CHENNAI-600 024

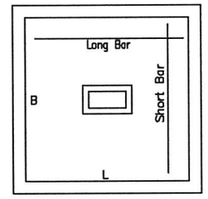
COLUMN DETAILS (M30-Fe500)

C1 375x2100	C2 300x1250	C3 300x900	C4 375x1500	C5 375x1050	C6 375x750	C7 375x600	C8 300x600	C9 230x900	C10 230x600
300 / 2100	300 / 1800	300 / 1500	375 / 1500	375 / 1050	375 / 750	375 / 600	300 / 600	230 / 900	230 / 600
• 20-25ϕ 8ϕ@150c/c	• 16-25ϕ 8ϕ@150c/c	• 16-25ϕ 8ϕ@150c/c	• 20-25ϕ 8ϕ@150c/c	• 20-25ϕ 8ϕ@150c/c	• 16-25ϕ 8ϕ@150c/c	• 12-25ϕ 8ϕ@150c/c	• 8-25ϕ 8ϕ@150c/c	• 12-25ϕ 8ϕ@150c/c	• 8-25ϕ 8ϕ@150c/c

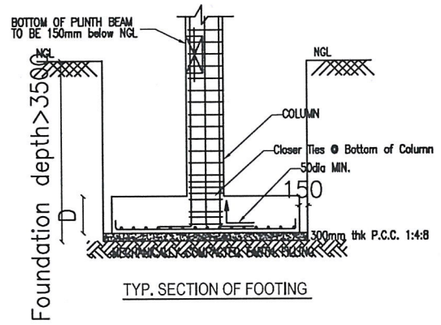
SC STUB COLUMN UP TO PLINTH BEAM

FOUNDATION DETAILS (M30-Fe500)

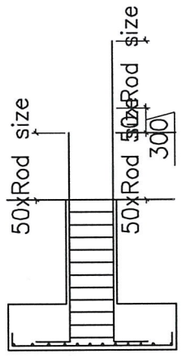
TYPE	LENGTH	BREADTH	D	LONG BAR	SHORT BAR
F1	4800	4800	1200	16ϕ @ 100c/c	16ϕ @ 100c/c
F2	4000	4000	1000	16ϕ @ 125c/c	16ϕ @ 125c/c
F3	3500	3500	900	16ϕ @ 150c/c	16ϕ @ 150c/c
F4	3000	3000	750	12ϕ @ 100 c/c	12ϕ @ 100 c/c
F5	2500	2500	600	12ϕ @ 150 c/c	12ϕ @ 150 c/c
SF	1000	1000	300	10ϕ @ 200 c/c	10ϕ @ 200 c/c
CF1	7500	4000	1000	16ϕ @ 125 c/c(T&B)	12ϕ @ 125 c/c(T&B)
CF2	9000	8000	1000	16ϕ @ 125 c/c(T&B)	16ϕ @ 125 c/c(T&B)
CF3	8000	6000	1000	16ϕ @ 125 c/c(T&B)	16ϕ @ 125 c/c(T&B)
CF4	9000	4000	900	16ϕ @ 150 c/c(T&B)	12ϕ @ 150 c/c(T&B)
CF5	9000	8000	750	12ϕ @ 100 c/c(T&B)	12ϕ @ 100 c/c(T&B)



TYP.PLAN OF FOOTING

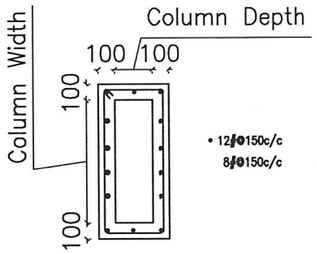


TYP. SECTION OF FOOTING



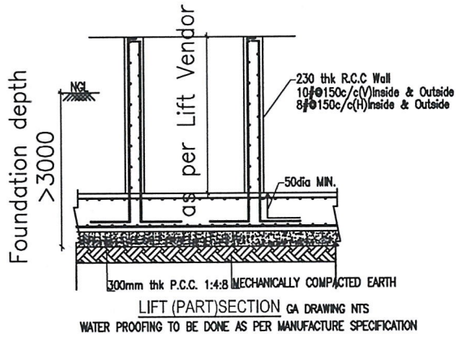
SECTION OF COLUMN FOR LAP

GA DRAWING NTS



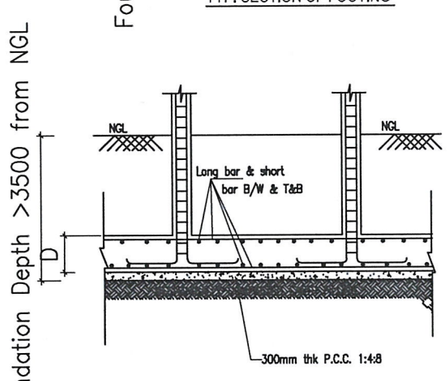
TYP SECTION OF PEDESTAL FOR ALL COLUMN EXCEPT STUB COLUMN

GA DRAWING NTS



LIFT (PART)SECTION GA DRAWING NTS

WATER PROOFING TO BE DONE AS PER MANUFACTURE SPECIFICATION

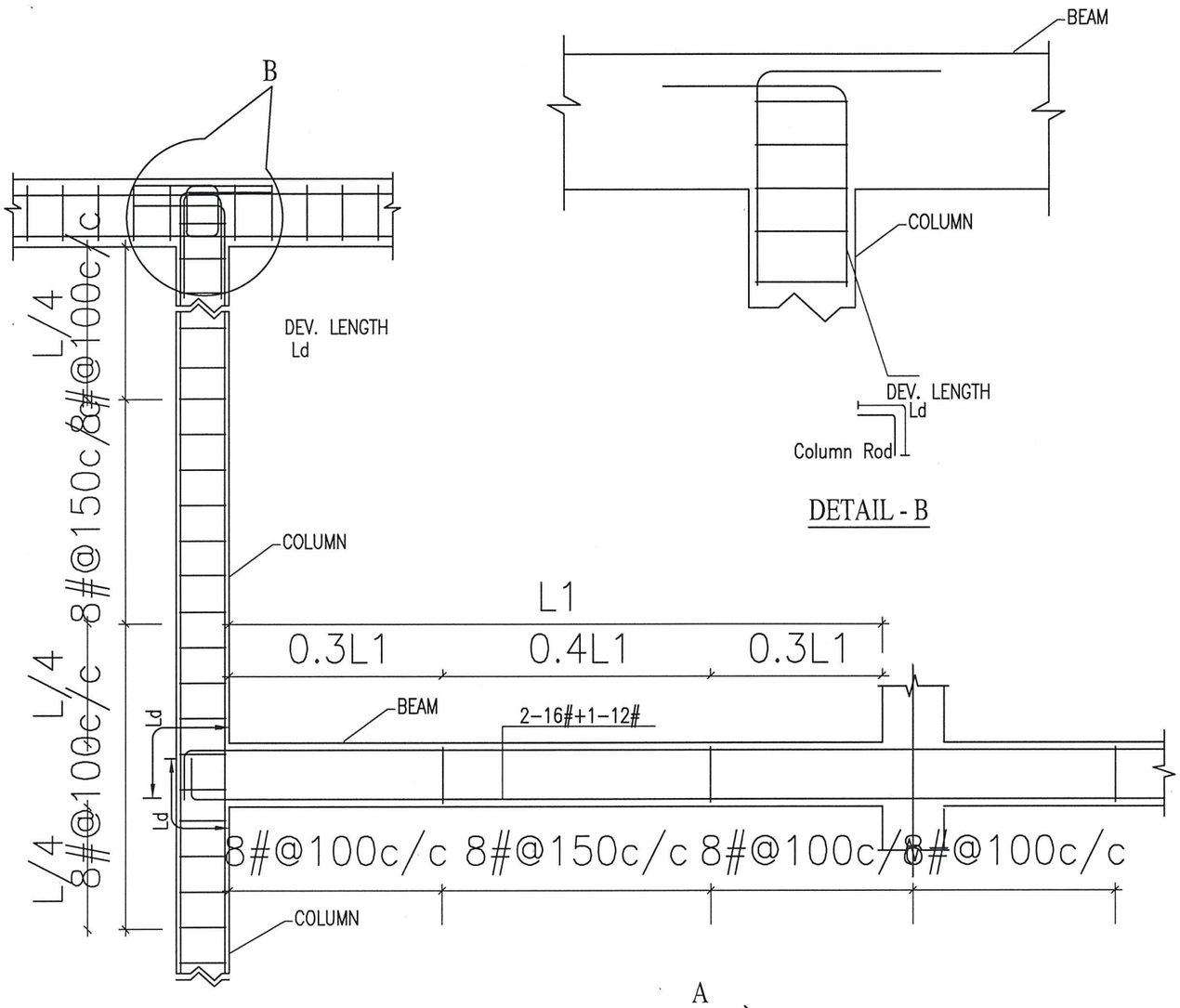


C.S. OF COMBINED FOOTING CF3 (TYP)

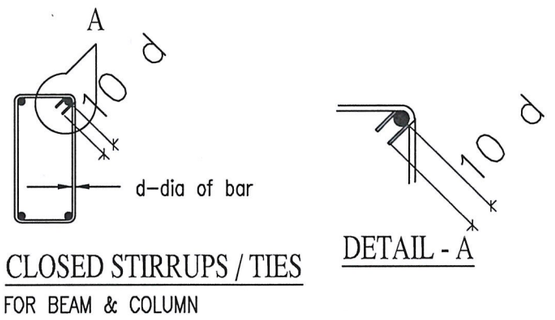
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B.SRINIVASAN, B.E.,A.M.I.E, C.Engg.,
Structural Engineer Grade - II
CMDA Reg No.S.E/GR-II/19/08/152
176/311, ARCOT ROAD,
KODAMBAKKAM, CHENNAI-600 024



DETAIL - B



CLOSED STIRRUPS / TIES
FOR BEAM & COLUMN

DETAIL - A

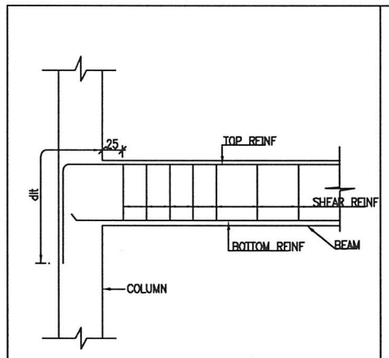
SEISMIC DETAILING

For THE NEST

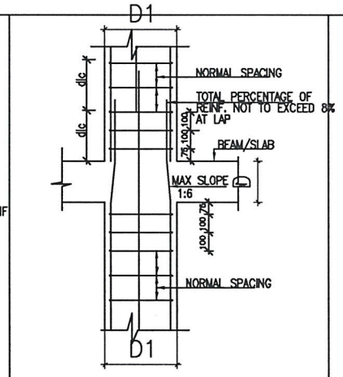
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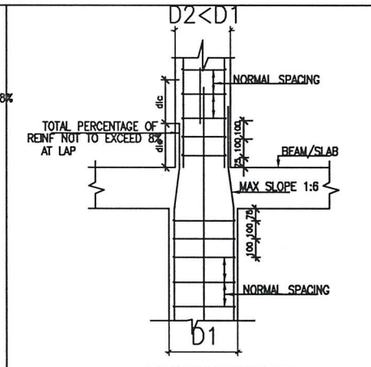
GENERAL DRAWING



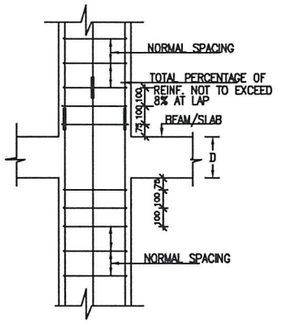
TYPICAL REINF. DETAILING
OF COLUMN-BEAM JUNCTION
dlt - DEVELOPMENT LENGTH IN TENSION



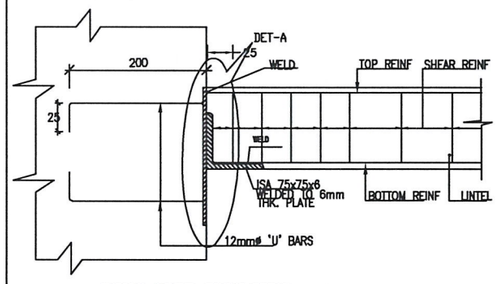
SAME COLUMN SIZE
dlc - DEVELOPMENT LENGTH



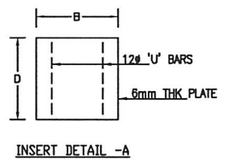
REDUCING COLUMN SIZE
TYPICAL COLUMN SPLICING DETAIL
AT FLOOR LEVEL



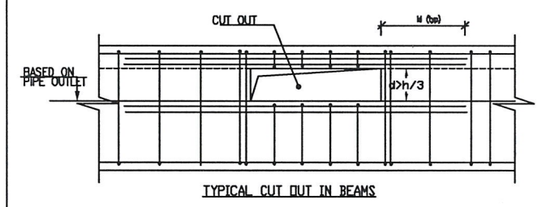
MECHANICAL SPLICING DETAIL



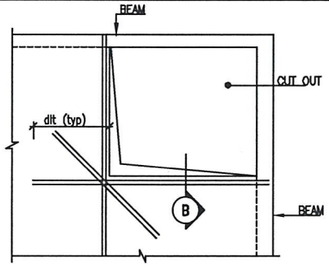
TYPICAL LINTEL FIXING DETAIL



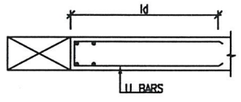
INSERT DETAIL -A



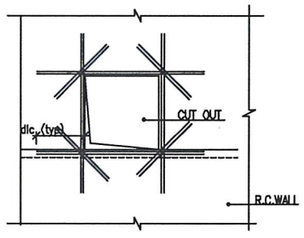
TYPICAL CUT OUT IN BEAMS



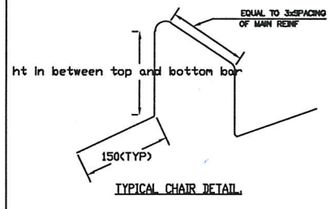
TYPICAL CUT OUT DETAIL IN SLABS



SECTION B-B



TYPICAL CUT OUT DETAIL IN R.C.WALLS



TYPICAL CHAIR DETAIL

GENERAL NOTES

1. GENERAL

1.1 ALL DIMENSIONS ARE IN MM.

1.2 WORK TO FIGURED DIMENSIONS AND DO NOT SCALE THE DRAWING.

1.3 ALL STRUCTURAL DRAWINGS SHALL BE READ IN CONJUNCTION WITH RELEVANT ARCHITECTURAL AND SERVICE DRAWINGS.

1.4 ANY DISCREPANCY IN THE DRAWING SHALL BE BROUGHT TO THE NOTICE OF CONSULTANTS BEFORE COMMENCING THE WORK.

1.5 THE STRUCTURE IS DESIGNED FOR :
AS PER PLAN

2. DESIGN CRITERIA

2.0 STANDARDS AND LOADS.

2.1 THE CONCRETE DESIGN IS BASED ON IS: 456-2000.

2.2 LIVE LOADS ARE BASED ON IS:875 PART II:

a) GENERATORS

b) LIVE,ELECTRICAL PANNEL. EQIPMENT: 300 Kg/Sq.m
: AS PER ACTUALS

c) STAIRS

d) TERRACES : 400Kg/Sq.m

2.3 SHUTTERING FOR FOOTING AND PEDESTAL/ 200KG/SQ.M
SHUTTERING FOR COLUMN AND BEAMS BY STEEL/ PLYWOOD SHEETING.
SHUTTERING FOR SLABS BY STEEL/PLYWOOD SHEETING.

3. CONCRETE

3.1 ALL CONCRETE SHALL BE OF DESIGN MIX AND ARE TO BE OBTAINED FROM REPUTEDTESTING LABORATORIES AND APPROVED BY CONSULTANTS, THE MATERIALS THAT ARE PROPOSED TO BE USED IN THE PROJECT SHALL BE TESTED AND TEST CERTIFICATE TO BE FURNISHED BEFORE USE OF MATERIAL AT SITE.

3.2 IRRESPECTIVE OF WHAT MENTIONED ON DRAWING THE PCC MIX SHALL BE AS FOLLOWS.

I). PCC FOR PILE CAP / PLINTH BEAM / RAFT SLAB MIX 1:4:8

3.3 CANTILEVERED SLAB/BEAMS SHALL BE PROPPED TILL COUNTER BALANCING WEIGHT BECOMES EFFECTIVE.

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GENERAL DETAILS

4. REINFORCING STEEL/DEVELOPMENT AND ANCHORAGE LENGTHS

4.1 ALL REINFORCEMENT STEEL SHALL CONFORM TO IS:1786 –1985 HIGH STRENGTH DEFORMED STEEL BARS,PRODUCED BY THE THERMO–MECHANICAL TREATMENT PROCESS, OF GRADE Fe500, HAVING ELONGATION MORE THAN 14.5% CAN BE USED

4.4 COUPLER CAN BE PROVIDED INSTEAD OF LAPPING.

Developed Length & Anchorage length

FOR Fe500 in mm	BAR IN TENSION M25	BAR IN COMPRESSION M25
10	485	388
12	583	466
16	777	621
20	971	777
25	1214	971

5. SOIL DATA & WATER TABLE

5.1 FOOTING CARRYING CAPACITY IS BASED ON SOIL REPORT.
5.2 MINIMUM DEPTH OF EXCAVATION SHALL BE AS INDICATED IN DRAWINGS.
5.3 FOR LIME SAND COMPACTION FILLING REFER ARCH DWG.
5.4 GROUND WATER LVL AS PER SOIL REPORT.

6. CONCRETE CLEAR COVER TO MAIN REINFORCEMENT

6.1 CONCRETE CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH 75MM.

6.2 PILE --- 50MM (BOTTOM), 50MM (SIDES)
PILE CAP 75MM (BOTTOM), 75MM (TOP)
FOOTING 50MM (BOTTOM & SIDES)
LINTELS 20MM
BEAMS 30MM
COLUMNS 40MM >12#Rod & 25MM≤12#Rod
SLABS 20MM
RCC WALLS 40MM ON EARTH SIDE/WATER SIDE
20MM ON ATMOSPHERE SIDE

6.3 COVER BLOCKS SHALL BE USED TO GIVE CORRECT COVER TO REINFORCEMENT.

7. WATER PROOFING

7.1 WATER PROOFING SHALL BE DONE FOR : SUMP TANKS, OVERHEAD TANK, TOILET SLABS, TERRACE, LIFT RCC WALL, AS PER STANDARD SPECIFICATIONS.

8. CURING

8.1 CURING BY WATER SHALL BE DONE FOR ALL RCC STRUCTURE FOR A MINIMUM PERIOD OF 10 DAYS FOR OPC AND 12 DAYS FOR PPC CONCRETE.

9. DESHUTTERING TIME

9.1 TYPE OF FORM WORK FOR : — MINIMUM PERIOD BEFORE STRIKING (EXCLUDING THE DAY OF CASTING)

a. SLABS — 14 DAYS
b. BEAMS UPTO 6.0M — 14 DAYS
OVER 6.0M — 21 DAYS
c. WALL/COLUMN VERTICAL FACES — 1 DAY

9.2 SHUTTERING CAN BE RELEASED EARLIER THAN SPECIFIED ABOVE PROVIDED THE PROPS ARE RETAINED AT REASONABLE SPACINGS AND CONCRETE ATTAINS THE FULL STRENGTH AT THE TIME OF DESHUTTERING AS PER IS 456 – 2000. DESHUTTERING SHALL BE DONE BY PROVIDING DAMPENING MATERIAL BELOW IN ORDER TO REDUCE THE IMPACT AT THE LOWER LEVEL.

9.3 SIMPLY SUPPORTED AND CONTINUOUS SPANS SHALL BE DESHUTTERED FROM MID SPAN TOWARDS SUPPORTS.

CANTILEVERS SHALL BE DESHUTTERED FROM FREE END TOWARDS SUPPORTS

9.4 SLAB/BEAMS SHALL BE REPROPPED UNTIL THE NEXT LEVEL SLAB IS CAST AND DESHUTTERED.

10. CONSTRUCTION JOINTS

10.1 SLABS : AT MIDDLE ONE THIRD OF THE SPAN.
10.2 BEAMS : AT MIDDLE ONE THIRD OF THE SPAN. IF ANY CROSS BEAMS ARE LOCATED IN THIS REGION THE JOINT SHALL BE LOCATED TWO TIMES THE WIDTH OF THE BEAM AWAY FROM THE BEAM.
10.3 RETAINING WALL : AT THE JUNCTION OF THE WALL AND FOOTING WITH A KEY JOINT AND AT MIDDLE OF VERTICAL SPAN, VERTICAL JOINTS TO BE AVOIDED.
10.4 RAFT SLAB : AT MIDDLE ONE THIRD OF THE SPAN.

10.5 CANTILEVERS : CONSTRUCTION JOINT SHALL NOT BE PROVIDED IN CANTILEVERS.

10.6 AT CONSTRUCTION JOINTS OF WATER RETAINING STRUCTURES AND BASEMENTS: PRE FORMED PLASTIC WATER STOP (SYNKOFLEX OR EQUIVALENT) SHALL BE PROVIDED.

11. SLUMP OF CONCRETE

11.1 SLUMP OF CONCRETE SHALL RANGE BETWEEN 100 TO 180MM DEPENDING ON THE MANNER OF CONCRETING.

THE TABLE BELOW GIVE THE GENERAL GUIDANCE:

PILING	SLUMP(in mm) Min.	Max.	
A	100	180	POURING IN TO WATER–FREE UNLINED BORE HAVING WIDELY SPACED REINFORCEMENT. WHERE REINFORCEMENT IS NOT SPACED WIDELY ENOUGH, CUT–OFF LVL OF PILE IS WITHIN THE CASTING AND DIAMETER OF PILE IS LESS THAN OR EQUAL TO 600MM, HIGHER ORDER OF SLUMP WITH IN THIS RANGE MAY BE USED.
B	150	180	WHERE CONCRETE IS TO BE PLACED UNDER WATER OR DRILLING MUD BY TREMIE OR BY PLACER.

12. MISCELLANEOUS

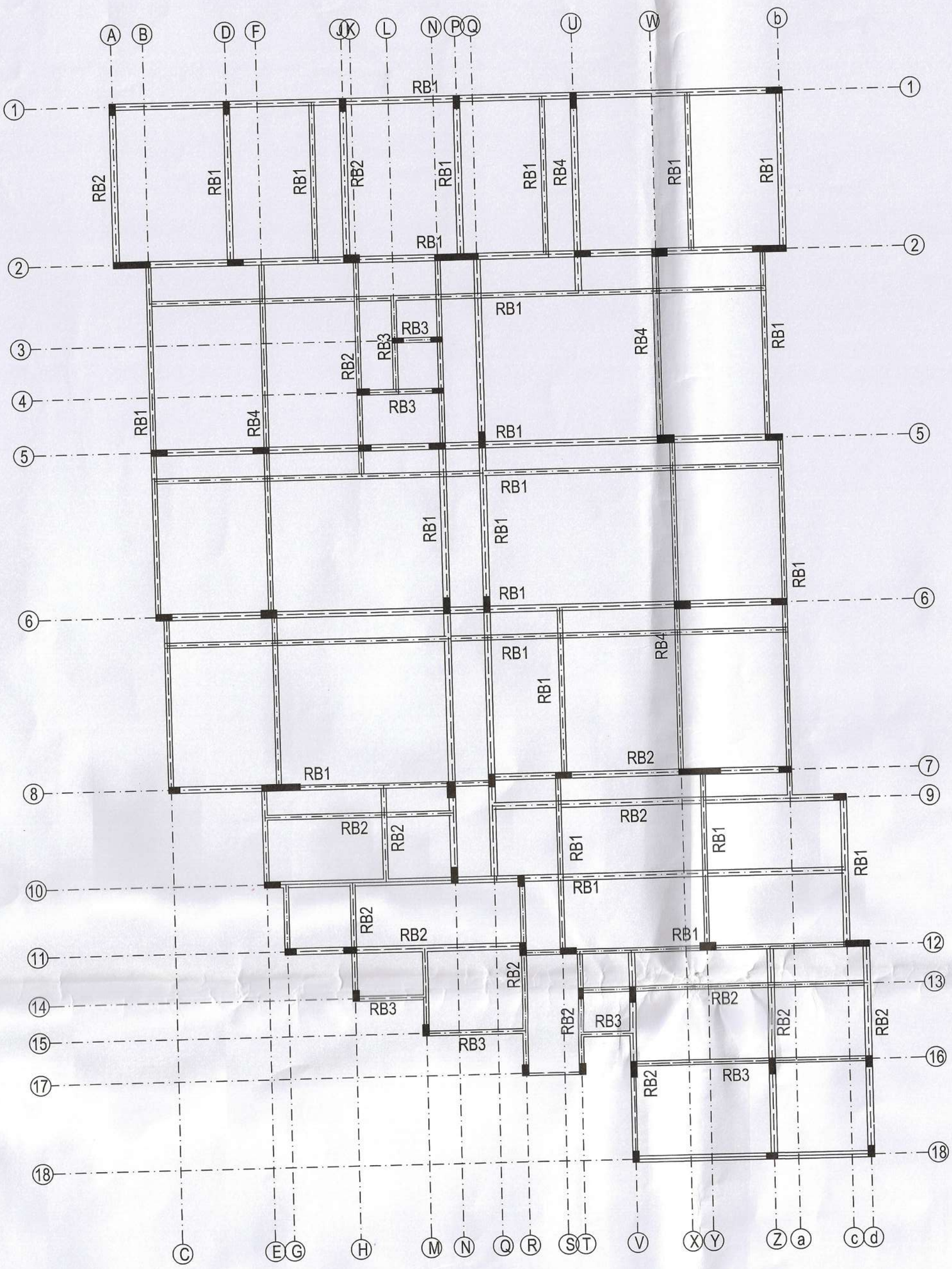
12.1 ROD EQUAL AND ABOVE 20mm DOUBLE BINDING TO BE DONE.
12.2 CHAIR ROD TO BE PROVIDED AT PROPER SPACING NOT MORE THAN 3'0".
12.3 AT CONSTRUCTION JOINTS A COAT OF SBR–LATEX TO BE APPLIED BEFORE CONCRETING
12.4 COLUMN CAN BE RAISED AFTER 1 COMPLETE DAY FOR CONCRETING.

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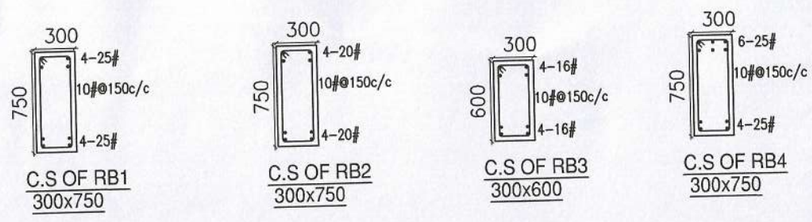
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NOTES

1. All dimensions are in mt.
2. Dimensions to be read, not scaled, Check in arch. dwg
3. Clear cover to the main reinf. as follows
   a) Col 25mm for 12mm bars & 40mm for >12mm
   b) Slab 20mm
   c) Beams 30mm
4. Use M25 Conc & Fe500 unless specified otherwise.
5. Slab thickness 125mm unless specified otherwise.
6. Crank length 0.2L of span.
7. Top rod extn. 0.3L of span.
8. Sunk the slab as per arch dwg.
9. Roof Levels refer to Arch. Drg.
10. Leave dowels/Sleeves wherever necessary.



FINAL ROOF LAYOUT

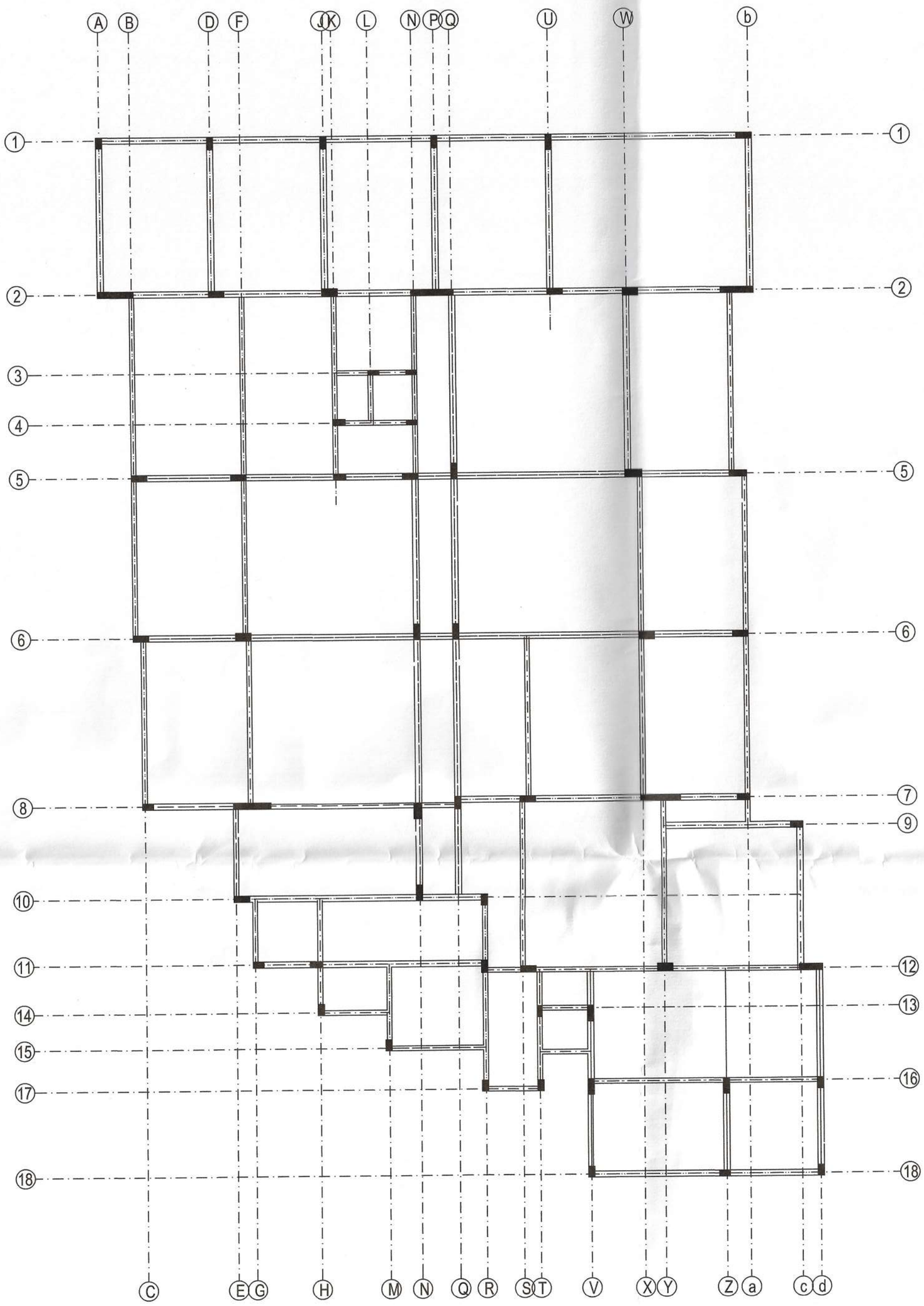


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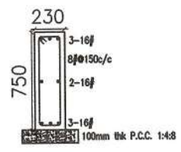
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NOTES

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2. Dimensions to be read, not scaled, and to be Checked with arch. dwg only.
3. Clear cover to the main reinf. as follows
   a) Col 25mm for 12mm bars & 40mm for >12mm
   b) Plinth beam 30mm
4. Use M30 Conc & Fe500 Steel.
5. Leave dowels wherever necessary.



PLINTH BEAM LAYOUT



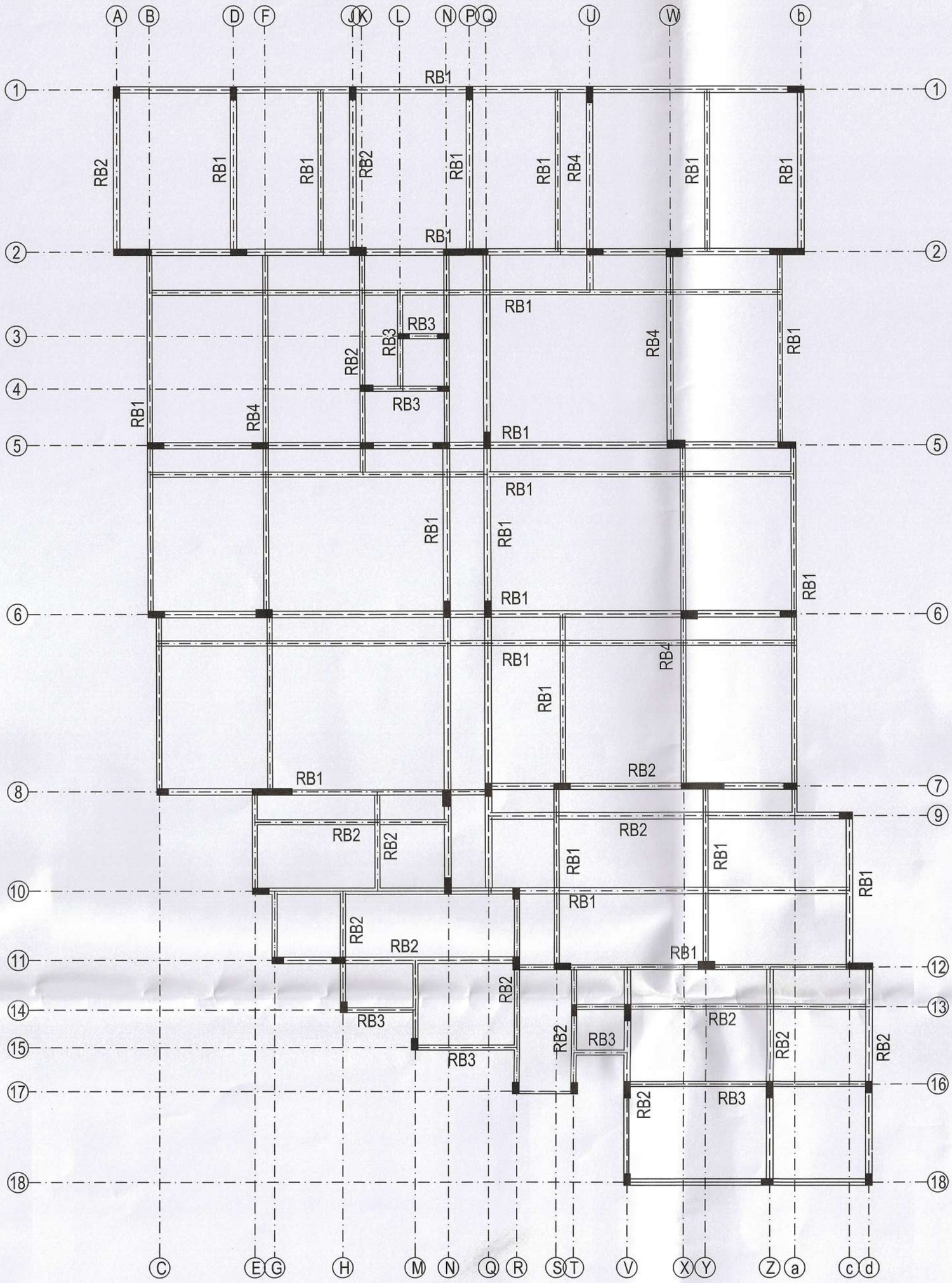
C.S OF PLINTH BEAM
230x750
(USE M30-Fe500)

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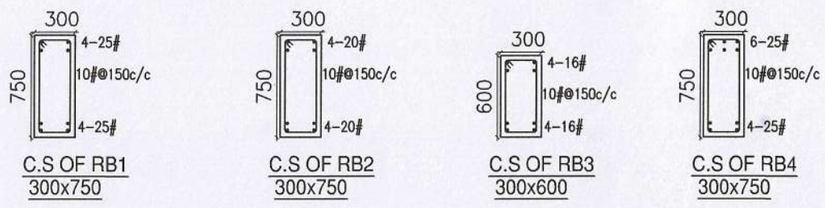
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NOTES

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2. Dimensions to be read, not scaled, Check in arch. dwg
3. Clear cover to the main reinf. as follows
   a) Col 25mm for 12mm bars & 40mm for >12mm
   b) Slab 20mm
   c) Beams 30mm
4. Use M25 Conc & Fe500 unless specified otherwise.
5. Slab thickness 125mm unless specified otherwise.
6. Crank length 0.2L of span.
7. Top rod extn. 0.3L of span.
8. Sunk the slab as per arch dwg.
9. Roof Levels refer to Arch. Drg.
10. Leave dowels/Sleeves wherever necessary.



TYP ROOF LAYOUT



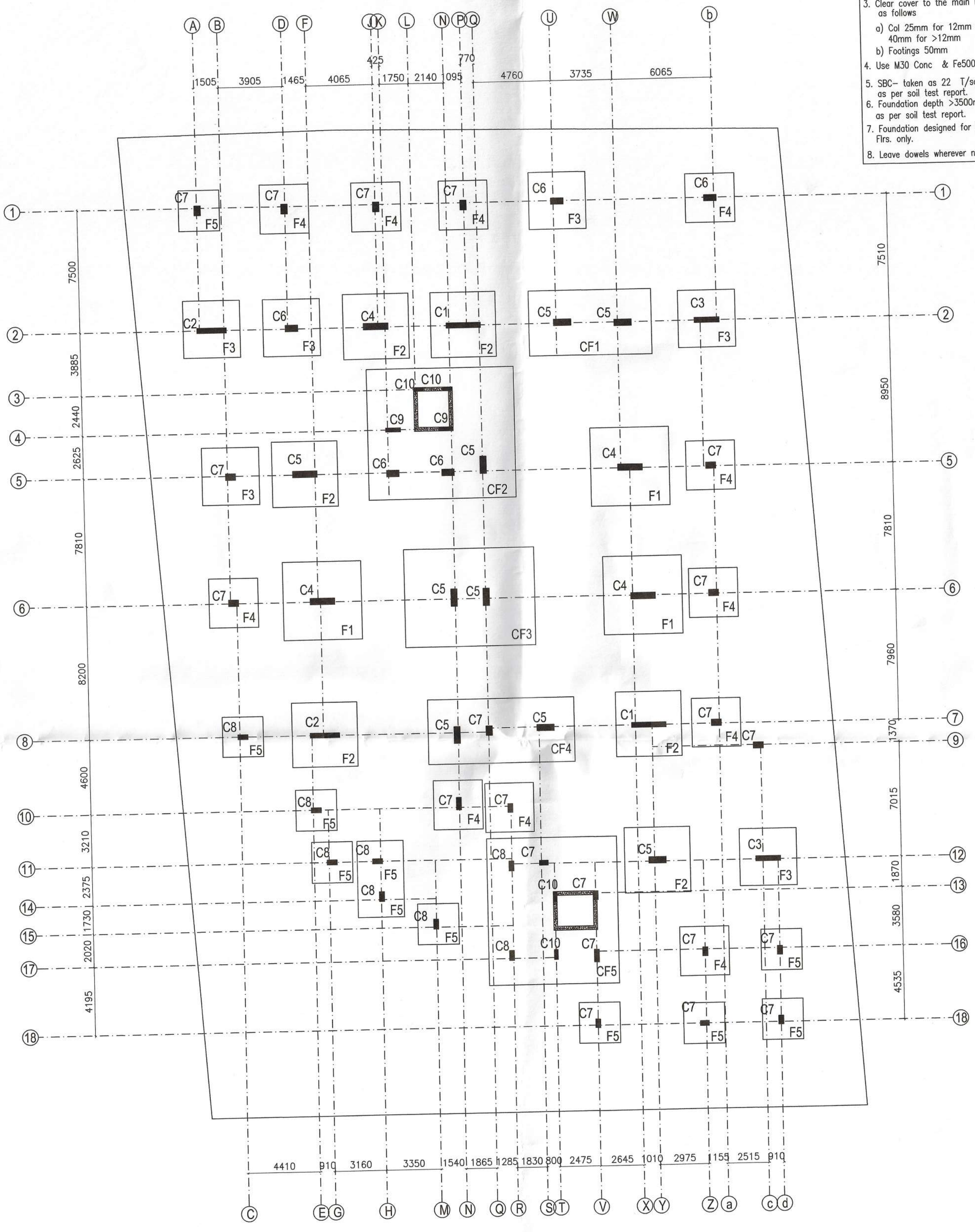
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NOTES

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3. Clear cover to the main reinf. as follows
   a) Col 25mm for 12mm bars & 40mm for >12mm
   b) Footings 50mm
4. Use M30 Conc & Fe500 Steel.
5. SBC– taken as 22 T/sqm as per soil test report.
6. Foundation depth >3500mm as per soil test report.
7. Foundation designed for Stilt+5 Flrs. only.
8. Leave dowels wherever necessary.



FOOTING LAYOUT

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