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STRUCTURAL STABILITY CERTIFICATE

STRUCTURAL STABILITY REPORT FOR THE PROPOSED CONSTRUCTION OF RESIDENTIAL BUILDING STILT AND FIVE UPPER FLOORS AT No.12/14, DOOR No.2,TVH EDEN APARTMENT FOURTH CROSS STREET , UNITED INDIA COLONY KODAMBAKKAM, CHENNAI-600024,COMPRISED IN SURVEY .No. 87/1,87/2 & 87/3 , GREATER CHENNAI CORPORATION.

The Proposed Building referred to above is a framed structure with Stilt and Five 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 fit for occupation.

1. The minimum grade of concrete is M25.
2. The Minimum column with at stilt is 300mm

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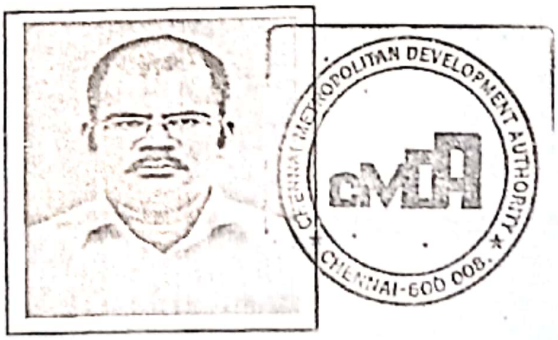
CHENNAI METROPOLITAN DEVELOPMENT AUTHORITY
'Thalamuthu Natarajan Building', No.1, Gandhi Irwin Road,
Egmore, Chennai-600 008.

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/2019/08/152 Renewed on 21.08.2024.** 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 **20.08.2029**.



21/8/2024

(A. MEGANATHAN)
Superintendent

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DESIGN CALCULATION FOR THE PROPOSED CONSTRUCTION OF RESIDENTIAL BUILDING STILT AND FIVE UPPER FLOORS AT No.12/14, DOOR No.2,TVH EDEN APARTMENT FOURTH CROSS STREET , UNITED INDIA COLONY KODAMBAKKAM, CHENNAI-600024,COMPRISED IN SURVEY .No. 87/1,87/2 & 87/3 , GREATER CHENNAI CORPORATION.

TABLE OF CONTENTS

INTRODUCTION

* GENERAL PROJECT INFORMATION
* PURPOSE OF BASIS OF DESIGN DOCUMENT
* STRUCTURAL DESIGN

STRUCTURAL SYSTEM

* RCC FACTORY BUILDING – REINFORCED CONCRETE STRUCTURE
    * FOUNDATION
    * SUPER STRUCTURE – GRAVITY SYSTEM
    * EXPANSION JOINT

DESIGN CODES,STANDARDS AND REFERENCE DOCUMENTS

* CODES,STANDARDS AND COMMENTARIES
* DESIGN REFERENCE AND GUIDES
* SPECIFICATION USED

LOAD CRITERIA

* MATERIAL DEAD LOAD
* MINIMUM IMPOSED LOAD
* WIND LOADING
* FIRE RESISTANCE
* EXPOSURE

REINFORCED CONCRETE STRENGTH

* CONCRETE
* REINFORCEMENT

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1.0 INTRODUCTION

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1.1 General Project Information

Project Title
RESIDENTIALBUILDING CONSISIT OF STILT & 5 UPPER FLOORS

Location of Project
No.12/14, DOOR No.2,TVH EDEN APARTMENT FOURTH CROSS STREET , UNITED INDIA COLONY KODAMBAKKAM, CHENNAI-600024

Description of Project

RCC Framed Building consisting OF STILT & 5 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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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 RESIDNETIAL 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 Pile foundation.

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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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
225 thk AAC Block with 8 mm plaster internal walls	7.5

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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.

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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	30
Beams / Slabs	25/25
Lean Concrete	10

5.2 REINFORCEMENT

Reinforcement Yield Strengths used in the design of concrete elements:

Deformed Bars	500 MPa (D)

FOUNDATION

Safe vertical load capacity of bored cast insitu concrete piles for pile diameters, without considering negative drag

Diameter	Safe capacity of bored cast insitu concrete piles
600 mm	93 tonnes

Since bored cast insitu concrete piles are adopted, the pile bore can be terminated at a depth of up to Weathered Rock by Socketing it inside the Rock where an equivalent SPT value of at least 150 is obtained. Correlations developed between dropping of the chisel and the SPT value show that "chiseling may be terminated at a depth where 100 blows of drop of 1 tonne chisel with 1.2 m height of fall does not cause a penetration of more than 150 mm". If the chisel weight or height of drop is different, an equivalent energy criterion may be adopted

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At least M 30 grade of concrete shall be used for concrete in the piles. All other requirements given in Indian Standard, IS:2911 (Part-1 / Section 1) or IS:2911 (Part-1 / Section 2), as the case may be, shall be complied with.

For installing the bored cast-insitu concrete piles, "DMC method (Direct Mud Circulation method)" shall be followed. Tremie pipe shall be used for concreting.

Specifications for the "basic properties of drilling mud (bentonite) given in Appendix-A of IS:2911 (Part-1 / Section 2)-1979, as amended in Amendment No.1, August 1982 or any other latest Amendment (if any) shall be followed. Prior to beginning of concreting using tremie-pipe, the pile bore shall be flushed clean, until no soil particles come out of the pile bore from the drilling mud being circulated".

It is desirable to use a pile group (a group of at least two piles) under each column, so that any inadvertent eccentricity between the piles and the column will be taken care by the pile group as axial compression or axial upward force.

In case a single pile is adopted for a column, the column shall be grown over the pile, in order to avoid any eccentric loading on the pile.

It is necessary that the piling work is executed by an experienced contractor with proven ability in installing driven cast insitu concrete piles or bored cast-insitu concrete piles, as the case may be.

It is recommended that at least one initial test pile is installed and tested for the purpose of evaluating the ability of the contractor and workmanship to install proper driven cast insitu or bored cast-insitu concrete piles and also to determine the capacity of the pile for vertical load.

After the initial test pile is load-tested, and the results analysed, regular piles (working piles) may be installed. At least one working pile shall be load-tested (routine pile load test).

The initial pile load test and the routine pile load test shall be carried out as per guidelines given in Indian Standard, IS: 2911(Part-4)-1985 "Code of practice for design and construction of pile foundations, Part-4: Load test on piles".

The initial pile load test shall be carried out up to a "test load" of at least two times the estimated safe load, preferably up to two and a half times the estimated safe load. The routine pile load test on working pile shall be carried out up to either a "test load" of one and a half times the design safe load or up to a settlement of 12 mm whichever occurs first.

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DESIGN OF PILE

600 diameter circular Pile

As the Pile has the carrying capacity of 930KN the pile is designed for the same load.

Ultimate load = 1.5x930 = 1395KN Length of Pile = Socketed inside the Weathered Rock

fck = 30N/sqmm.
fy = 500 N/sqmm.

Longitudinal Reinforcement

Pu = 0.4fckAg+(0.67fy-0.4fck)Asc.

1395x1000 = 0.4 x 30x 3.14/4x600x600 + (0.67 x 500 – 0.4 x 30)Asc.

1395000 = 1507200 + 323 Asc.

Asc = 2371 sqmm. Use 8nos of 20 Tor with cover of 40mm.(2512 sqmm)

DESIGN OF PILE CAP(TWO PILE GROUP)

A column 300mmx600mm has to carry a Axial load of 1680 KN to be supported on 2 Piles each of 600 mm diameter and spaced at 1800 mm centers. fck =25N/sqmm and fy=500N/sqmm.

Pile diameter = 450mm Spacing of Pile = 1800mm

Column size = 300mm x 600mm

Service Load = 1680KN

Factored Load = 2520KN

Safe Load on Single Pile = 840 KN

Concrete Grade = M30 Steel Grade = Fe500

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Pile cap dimension

Length of Pile cap = 1800+600+300 = 2700

Width of Pile cap = 600+300 = 900

Depth of pile cap

Empirical formula = 1/3(8xdia of pile +600) = 1066mm (too high)

Adopting over all depth as 900mm.

Effective depth of pile cap = 900-10-75 = 815mm

Pile cap size 1950mmx750mmx750mm.

Self wt of Pile cap = 1.5(2.7 x 0.9 x 0.9 x 25) = 82KN

Check for truss action

av = 345 , d = 915mm

ratio of av/d = 0.37 < 2

Truss action exists.

Total Factored Load = 2520 + 82 = 2602 KN

Tension steel:

Tx = P/12Ld x (3LxL – axa)

= [2602/(12 x 1800 x 915)] (3 x 1800x 1800 – 900x900)

=1356KN

As = 1356 x 750/0.87x500 = 1520 sqmm

Percentage of steel p = 3117 x 100 /900 x 1115 = 0.31% > 0.2%

Provide 9nos of 16 Tor rod 1600sqmm. @ TOP & BOTTOM.

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Check for shear (fck = 25) using enhanced shear theory,

Spacing of Piles 400dia = 1800mm(3 times Pile diameter)

Hence enhanced shear is allowed in the section

= 0.36 x 2 x 915/345 = 1.9N/sqmm but < 3.1N/sqmm(Enhanced shear)

Shear = 2927 x 1000/2(900x915) = 1.77 N/sqmm < 1.9 N/sqmm.

And Design of other Pile Foundation is calculated in similar way

Design of TYP Column C1

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 = 890KN.

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 =980KN.

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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 /25x230x600x600 =

0.03 Pu/Fckbd = 980x1.5x10^3/25x230x600 = 0.43

From SP 16 Chart 44, p/Fck = 0.089

Ast = 0.089x25x230x600/100 = 1408sqmm.

Required 8 Nos of 16 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 450mm.

Simply supported beam Effective span is 2.06mt

From analysis the Beam moment are as follows

Moment Top near support (left) is -4 KNm.

Moment Top near support (right) is -18 KNm.

Moment Bottom @ Mid span is +60 KNm.

Area of steel @ Top near support (left)

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

-4000000 = 0.87 x Ast x 500 x 410[1-(Ast x 500 / 230 x 410 x 25)]

-4000000 = 178350Ast – 37.82 Ast^2

Ast = 197 sqmm.

Providing 3-12# @ Top near Left Support

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Area of steel @ Top near support (right)

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

-180000 = 0.87 x Ast x 500 x 410 [1-(Ast x 500 / 230 x 410 x 25)]

-1800000 = 178350Ast – 37.82 Ast^2

Ast = 278 sqmm.

Providing 3-12# @ Top near Left Support

Area of steel @ Bottom near mid span

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

600000 = 0.87 x Ast x 500 x 410 [1-(Ast x 500 / 230 x 410 x 25)]

600000 = 178350Ast –37.82 Ast^2

Ast = 212 sqmm.

Providing 3-12# & 3-12# @ 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 3.46mt x 7.96mt with beam support of 230mm

Taking M25 Grade Concrete and Fe500 Grade steel.

Thickness of slab = 3460/30 = 115mm.

Slab thickness is taken as 150mm

Effective depth = d = 150 – 20 – 6 = 124mm.

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Self wt of slab = 0.15 x 25 = 3.75KN/sqm Finish = 1.5KN/sqm.

Total Dead Load = 5.25KN/sqm.

Live load for Office building Lobby Corridor etc = 4KN/sqm.

Partition Load on slab is taken as 4KN/sqm.

Total Load = 4+4+5.25 = 13.25KN/sqm.

Factored Load W= 1.5 x 13.25 = 19.875KN/sqm.

Coefficient in Shorter direction = 0.1149.

Shorter Span Positive moment = 0.1149 x 19.875 x 3.46 x 3.46 = 46.24

KNm. Mu limit = 0.138 fck bdd = 0.138 x 25 x 1000 x 124 x 124 = 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 124 x 25)]

43240000 = 53940 Ast – 8.7 Ast^2

Ast = 645 sqmm.

Provide 10 Tor @ 150mm c/c.

Coefficient in Longer direction = 0.034.

Longer Span Positive moment = 0.034 x 19.875 x 3.46 x 3.46 = 13.68

KN.m Mu limit = 0.138 fck bdd = 0.138 x 25 x 1000 x 124 x 124 = 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 124 x 25)]

13680000 = 53940 Ast – 8.7 Ast^2

Ast = 264 sqmm.

Provide 8 Tor @ 150mm c/c.

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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 124 = 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 = 4500/124 = 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)].

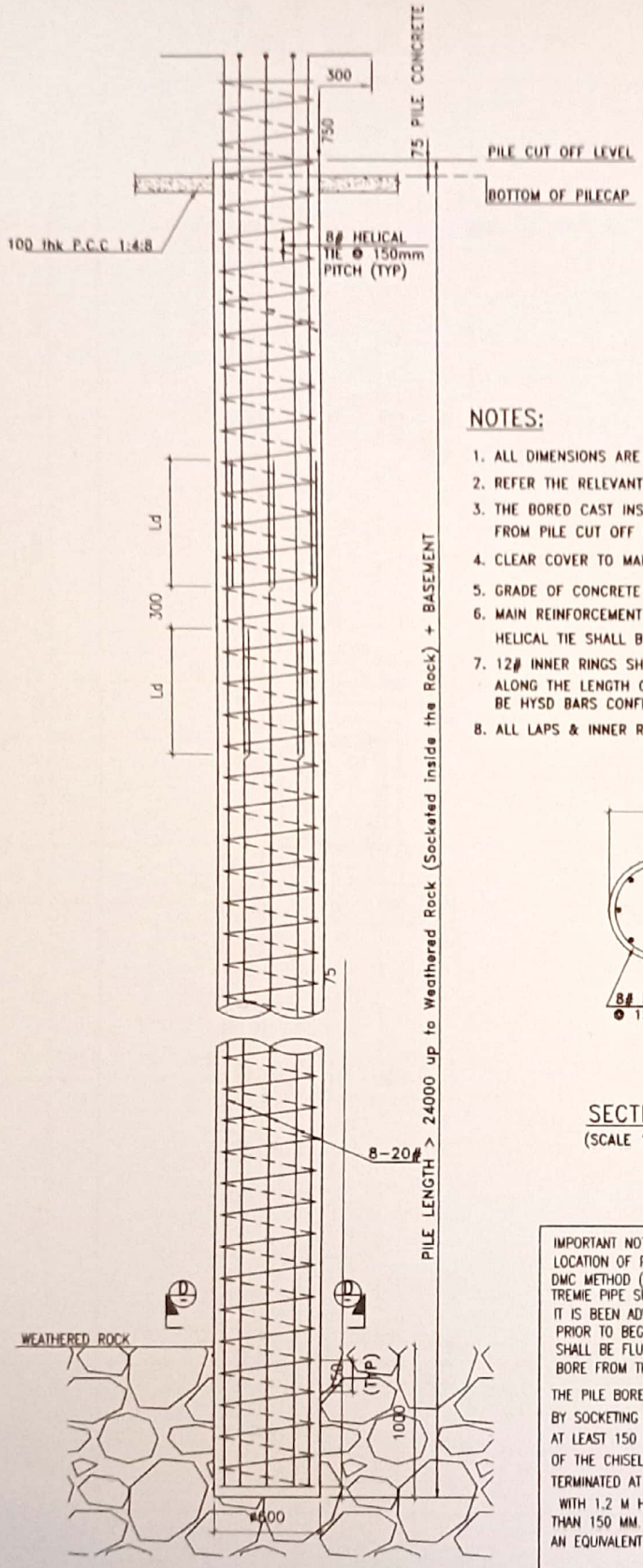
= 1.3

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

And Design of other Beam calculated in similar way.

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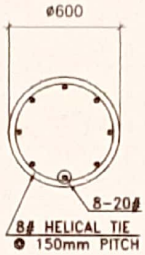
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PILE DETAILS

NOTES:

1. ALL DIMENSIONS ARE IN MM.
2. REFER THE RELEVANT PILE LAYOUT DRAWING FOR PILE CUT OFF LEVEL.
3. THE BORED CAST INSUIT PILE SHALL BE TERMINATED @ HARD ROCK FROM PILE CUT OFF LEVEL AND AT N > 100.
4. CLEAR COVER TO MAIN REINFORCEMENT SHALL BE 50mm.
5. GRADE OF CONCRETE SHALL BE M30 – Fe500
6. MAIN REINFORCEMENT SHALL BE HYSD BARS CONFORMING TO IS:1786, HELICAL TIE SHALL BE MILD STEEL BARS CONFORMING TO IS:432.
7. 12ϕ INNER RINGS SHALL BE PROVIDED IN 600ø PILE @ 2m SPACING ALONG THE LENGTH OF THE PILE FOR CAGE STABILITY. THESE BARS SHALL BE HYSD BARS CONFIRMING TO IS:1786.
8. ALL LAPS & INNER RINGS SHALL BE STITCH WELDED



SECTION D (SCALE 1:20)

IMPORTANT NOTE:
LOCATION OF PILE TO BE CHECK WITH DWG BEFORE EXECUTION
DMC METHOD (DIRECT MUD CIRCULATION METHOD) SHALL BE FOLLOWED
TREMIE PIPE SHALL BE USED FOR POURING CONCRETING.
IT IS BEEN ADVISED TO USE CASING PIPE FOR CASTING PILE
PRIOR TO BEGINNING OF CONCRETING USING TREMIE-PIPE, THE PILE BORE SHALL BE FLUSHED CLEAN, UNTIL NO SOIL PARTICLES COME OUT OF THE PILE BORE FROM THE DRILLING MUD BEING CIRCULATED.

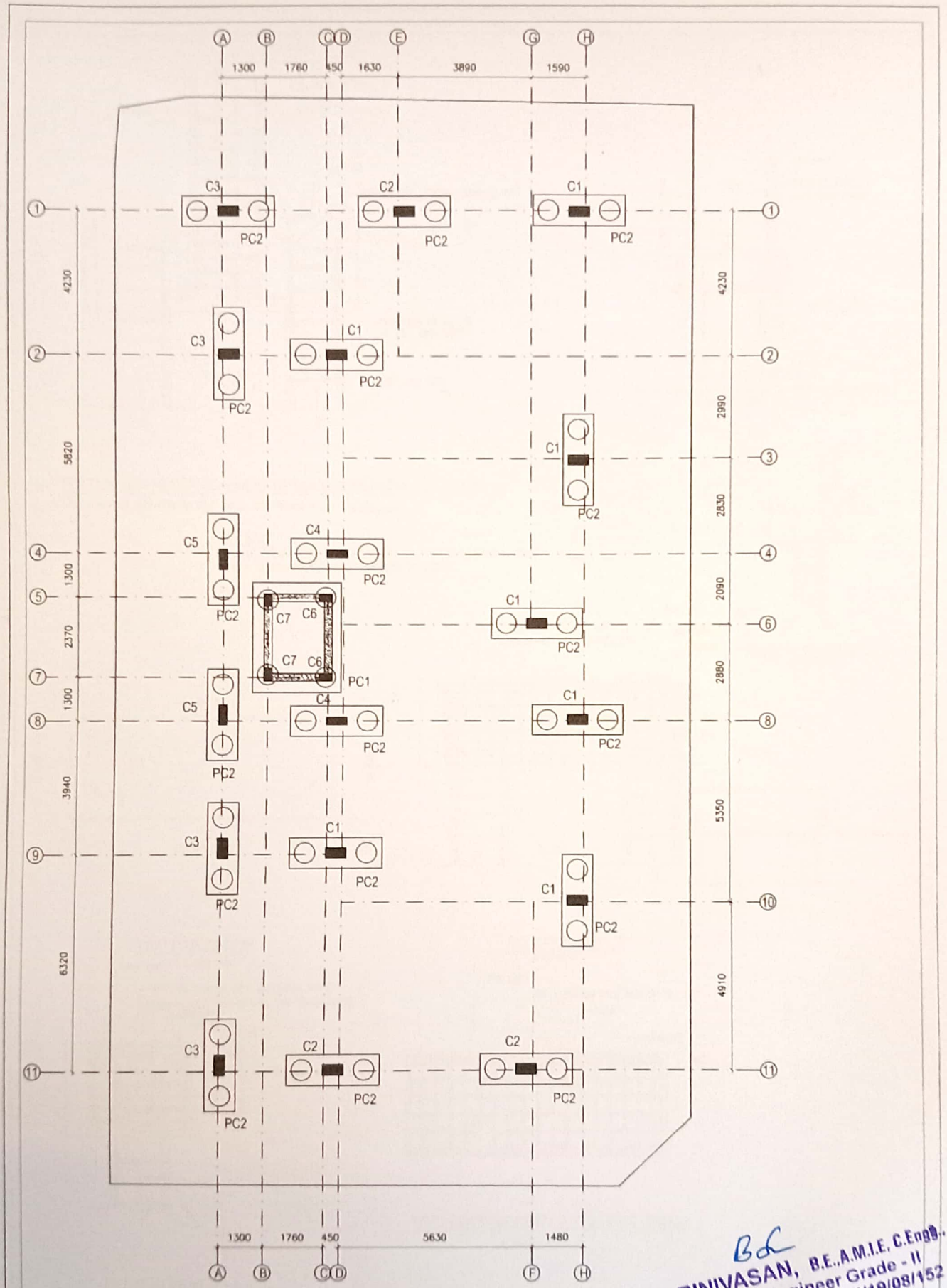
THE PILE BORE CAN BE TERMINATED AT A DEPTH OF UP TO WEATHERED ROCK BY SOCKETING IT INSIDE THE ROCK WHERE AN EQUIVALENT SPT VALUE OF AT LEAST 150 IS OBTAINED. CORRELATIONS DEVELOPED BETWEEN DROPPING OF THE CHISEL AND THE SPT VALUE SHOW THAT ?CHISELING MAY BE TERMINATED AT A DEPTH WHERE 100 BLOWS OF DROP OF 1 TONNE CHISEL WITH 1.2 M HEIGHT OF FALL DOES NOT CAUSE A PENETRATION OF MORE THAN 150 MM. IF THE CHISEL WEIGHT OR HEIGHT OF DROP IS DIFFERENT, AN EQUIVALENT ENERGY CRITERION MAY BE ADOPTED

REINF. DETAILS OF 600ø PILE

GA DRAWING NTS

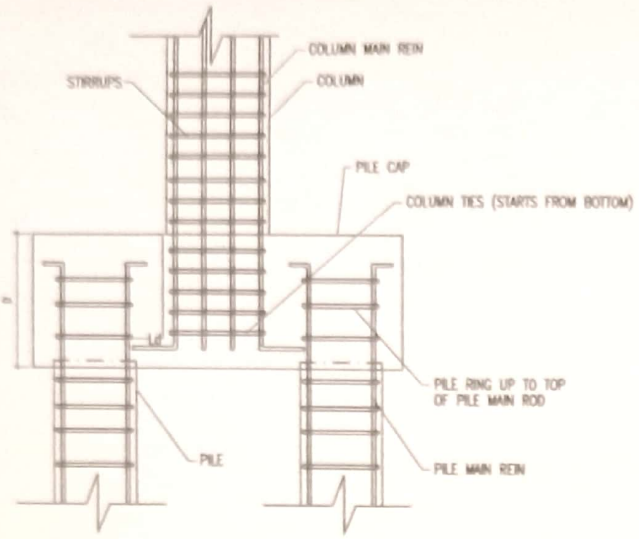
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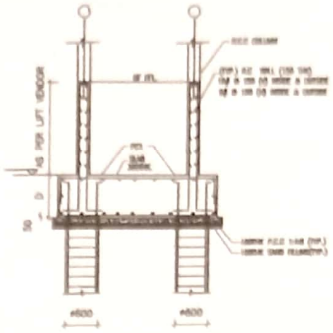
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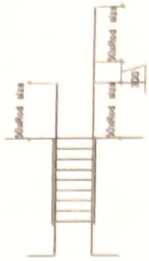


LIFT PART SECTION
(water proofing to be done as per Manufacture Specification)
GA DRAWING NTS

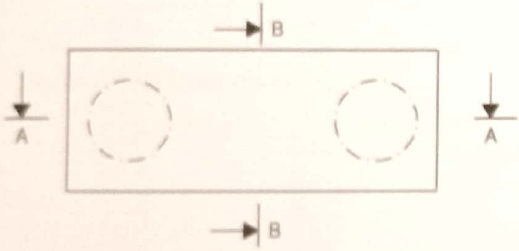
TYP COLUMN REINFORCEMENT DETAILS @ PILE CAP JUNCTION

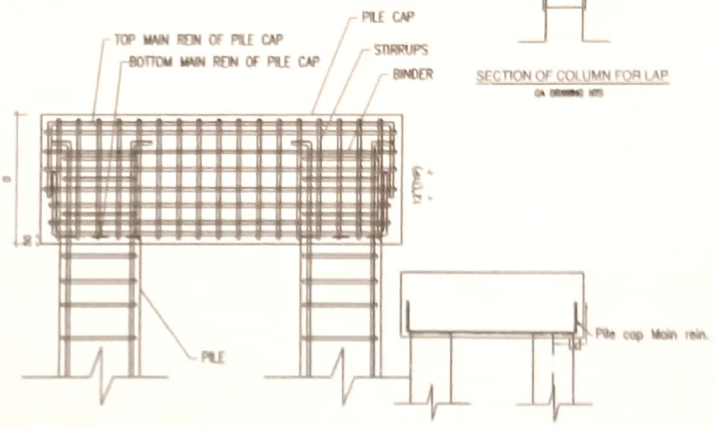
TOP / BOTTOM MAIN REIN OF PILE CAP IS NOT SHOWN HERE GA DRAWING NTS

NOTE:
1.) DRAWING SHOWN HERE IS FOR TYP PILE CAP ONLY AND IT IS A GENERAL ARRANGEMENT DWG.

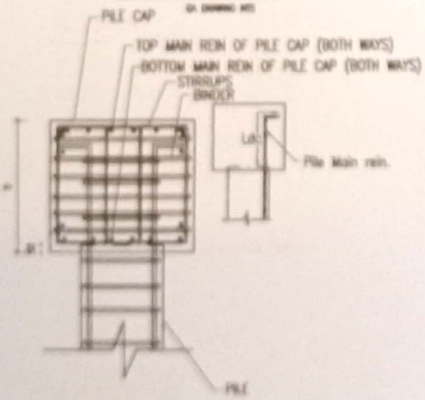


SECTION OF COLUMN FOR LAP
GA DRAWING NTS

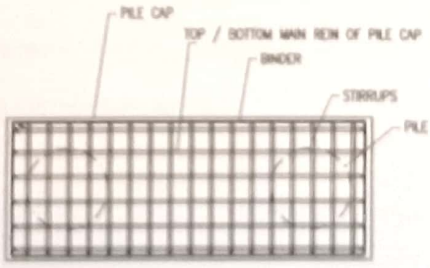




TWO PILE GROUP
GA DRAWING NTS



SECTION VIEW - A
GA DRAWING NTS



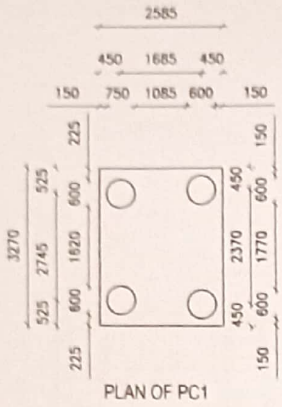
TOP / BOTTOM VIEW OF TWO PILE GROUP
GA DRAWING NTS

SECTION VIEW - B
GA DRAWING NTS

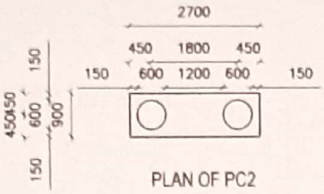
GENERAL ARRANGEMENT DWG.

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PLAN OF PC1



PLAN OF PC2

NOTES:-

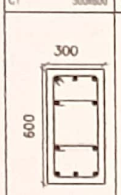
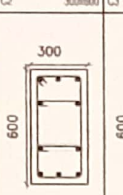
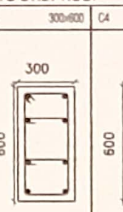
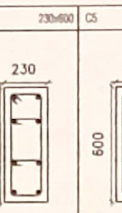
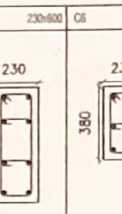
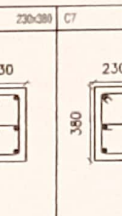
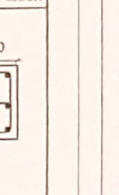
1. All dimensions in Feet & Inches.
2. Dimensions to be read, not scaled, and to be Checked with arch. dwg only.
3. Clear cover to the main reinf. as follows
   a) Pile cap 75mm c) Col 25mm for 12mm bars & 40mm for >12mm
   b) Pile 50mm
4. For Any Mts refer arch dwg only.
5. Leave dowels wherever necessary.
6. Grid Dimension and number refer arch dwg only
7. 12ϕ inner rings shall be provided in 600ϕ pile @ 1m spacing along the length of the pile for cage stability. these bars shall be fe500 bars confirming to IS:1786.
8. All laps shall be 50dia.

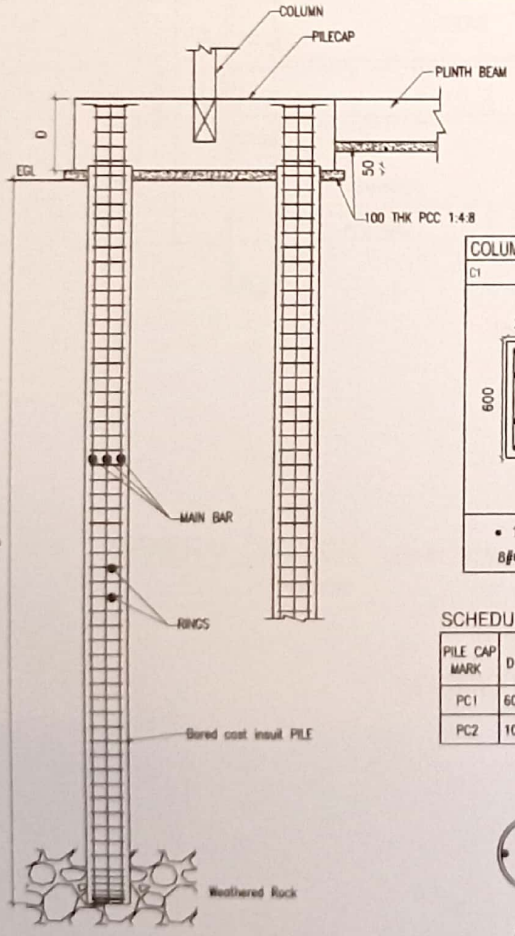
PILE TO BE PROJECTED 50MM INSIDE THE PILE CAP

9. Use M30 Conc & Fe500 for pile & pile cap
10. Foundation designed for S+5 Flrs. only.
11. Depth of pile > 24000mm.(Socketed in to Weathered rock up to 1000mm)
12. No. of piles to be tested 1%
13. Leave dowels wherever necessary.
14. Check this dwg along with arch dwg.

DESIGNED FOR AAC BLOCK ONLY

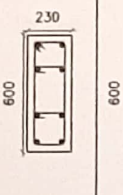
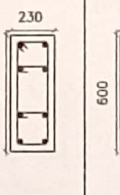
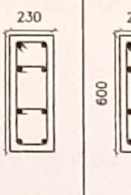
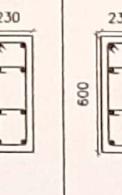
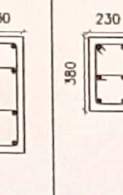
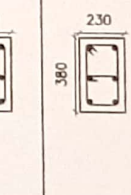
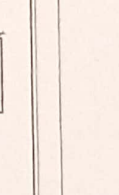
COLUMN DETAILS (M30-Fe500) UP TO STILT ROOF

C1 300x600	C2 300x600	C3 300x600	C4 230x600	C5 230x600	C6 230x380	C7 230x380
						
• 10-25ϕ 8ϕ@150c/c	• 10-20ϕ 8ϕ@150c/c	• 8-16ϕ 8ϕ@150c/c	• 8-25ϕ 8ϕ@150c/c	• 8-20ϕ 8ϕ@150c/c	• 6-16ϕ 8ϕ@150c/c	• 6-12ϕ 8ϕ@150c/c



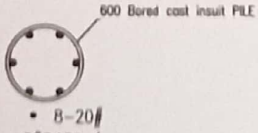
TYP SECTION OF A PILE & PILE CAP

COLUMN DETAILS (M30-Fe500) UP TO STILT ROOF

C1 230x600	C2 230x600	C3 230x600	C4 230x600	C5 230x600	C6 230x380	C7 230x380
						
• 10-25ϕ 8ϕ@150c/c	• 10-20ϕ 8ϕ@150c/c	• 8-16ϕ 8ϕ@150c/c	• 8-25ϕ 8ϕ@150c/c	• 8-20ϕ 8ϕ@150c/c	• 6-12ϕ 8ϕ@150c/c	• 6-12ϕ 8ϕ@150c/c

SCHEDULE OF PILE CAP-(M25-Fe500)

PILE CAP MARK	D	BOTTOM R/F	TOP R/F	STIRRUPS	BINDER
PC1	600	12ϕ@6"c/c(B/W)	12ϕ@6"c/c(B/W)	-	12ϕ@6"c/c
PC2	1000	9-16ϕ	9-16ϕ	4L-10ϕ@6"c/c	12ϕ@6"c/c

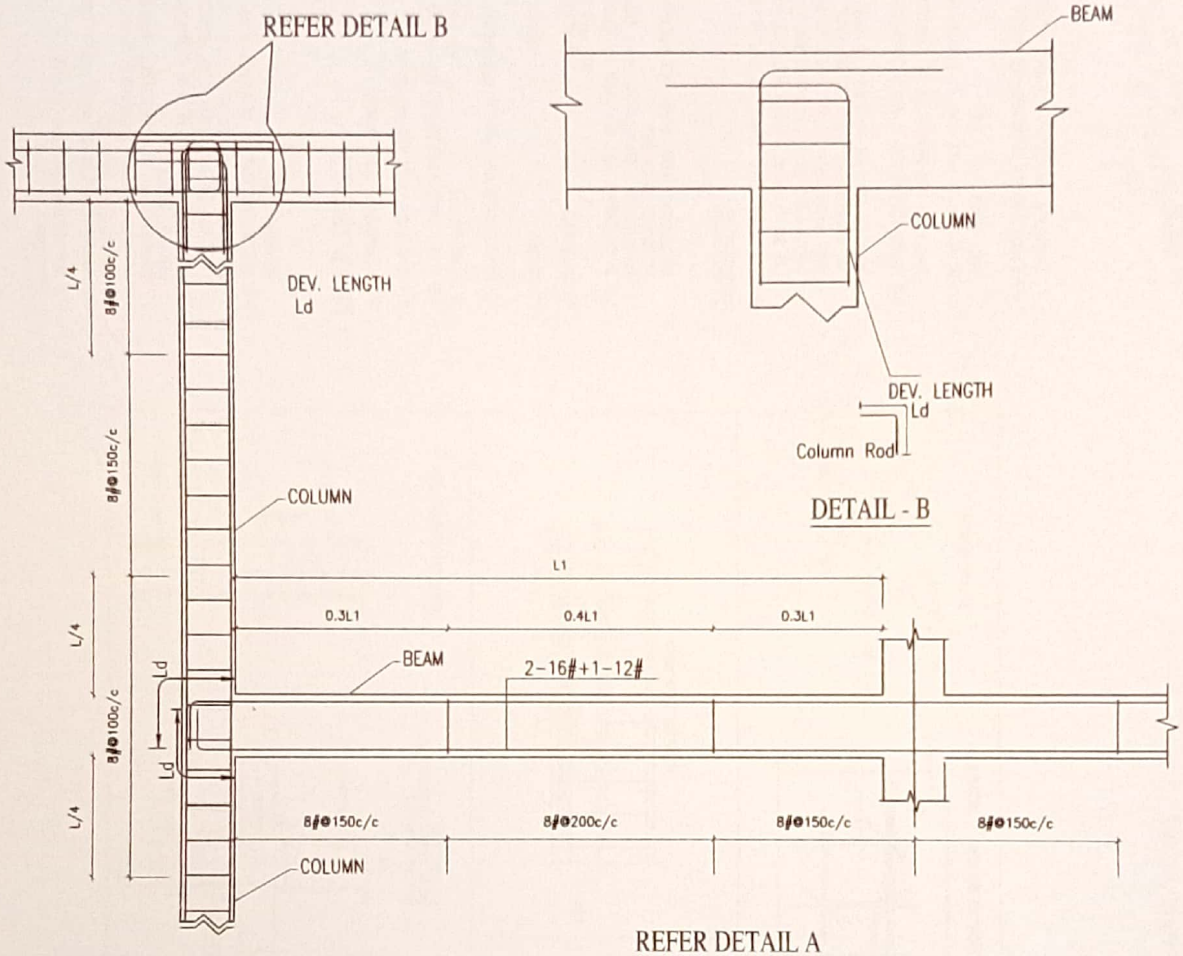


• 8-20ϕ
8ϕ@150c/c

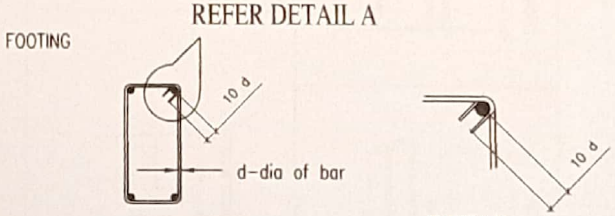
SECTION OF PILE -600Ø

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DETAIL - B



CLOSED STIRRUPS / TIES
FOR BEAM & COLUMN

DETAIL - A

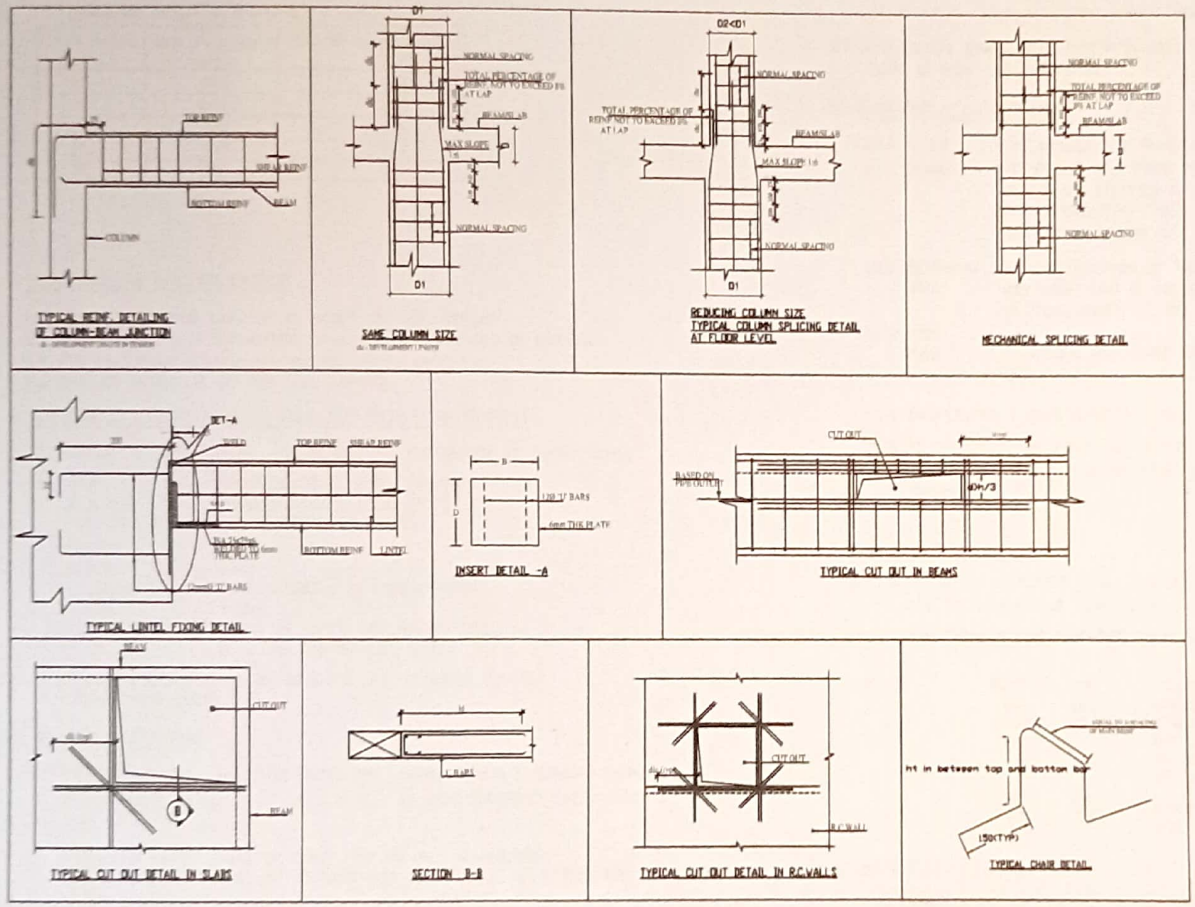
GENERAL SECTION (SEISMIC DETAILING)
GA DRAWING NTS

SEISMIC DETAILING

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GENERAL DRAWING



GENERAL DETAILS

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 : AS PER ACTUALS

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

c) STAIRS : 400Kg/Sq.m

d) TERRACES : 200Kg/Sq.m
AS PER ARCHI. DRGS.

2.3 SHUTTERING FOR FOOTING BY STEEL/PLYWOOD SHEETING.
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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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

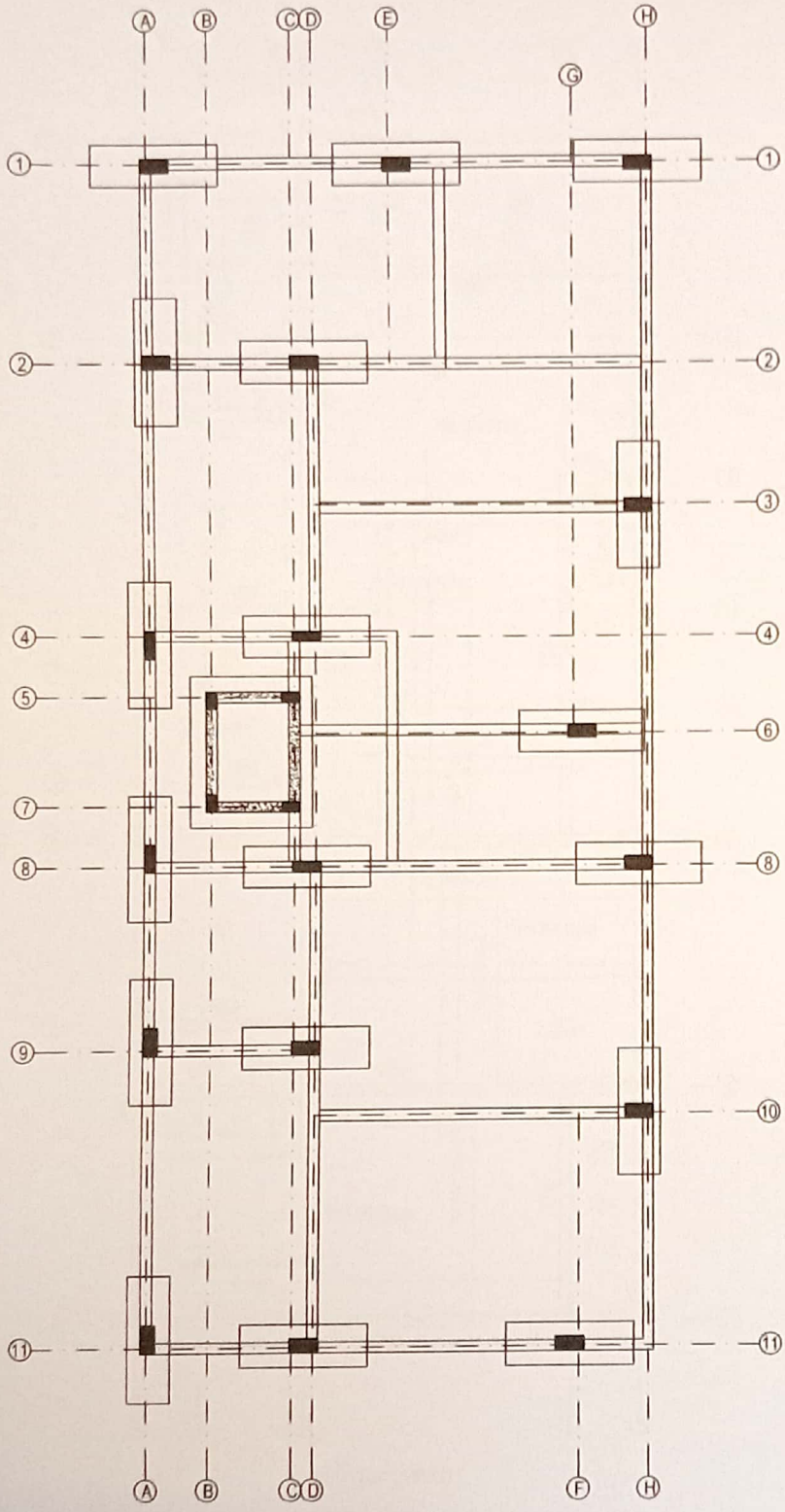
12.1 ROD EQUAL AND ABOVE 20mm DOUBLE BINDING TO BE DONE.
12.2 CHAIR ROD TO BE PROVIDED AT PROPER SPACING NOT MORE THAN 3'0".
12.3 AT CONSTRUCTION JOINTS A COAT OF SBR-LATEX TO BE APPLIED BEFORE CONCRETING
12.4 COLUMN CAN BE RAISED AFTER 1 COMPLETE DAY FOR CONCRETING.

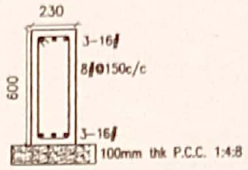
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NOTES

1. All dimensions are in mm.
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.





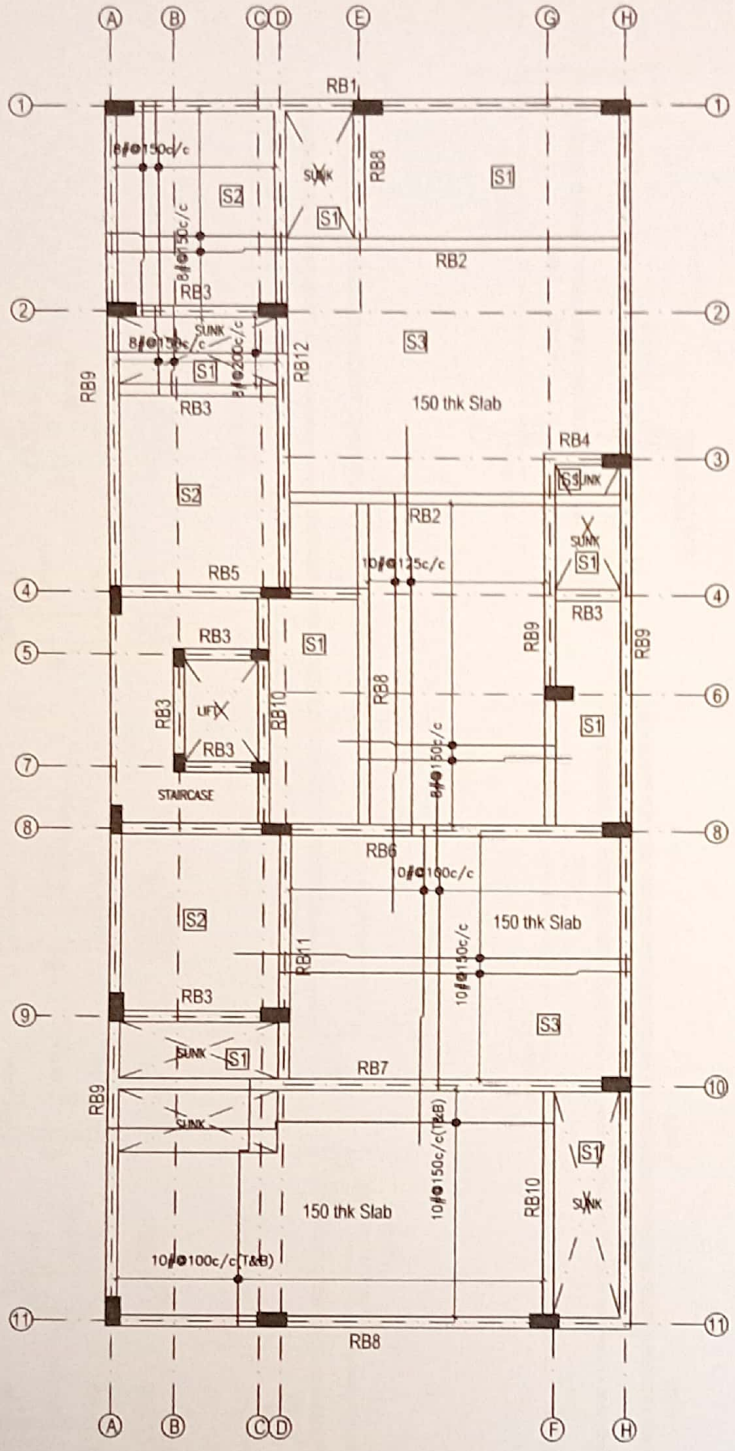
C.S OF PLINTH BEAM
230x600
(USE M30-Fe500)

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KODAMBAKKAM, CHENNAI-600 024

Scanned with OKEN Scanner

NOTES

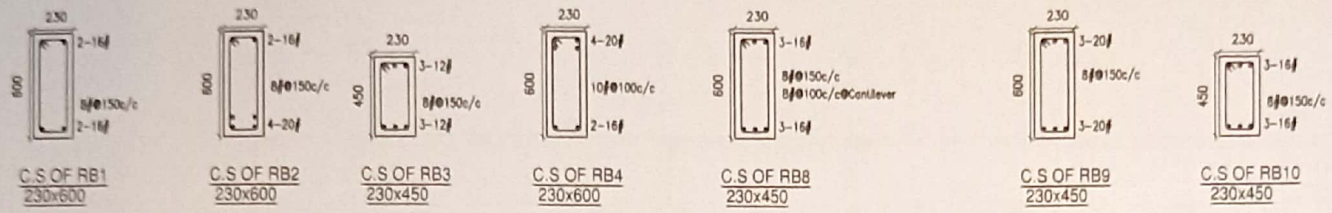
1. All dimensions are in mt.
2. Dimensions to be read, not scaled, Check in arch. dwg
3. Clear cover to the main reinf. as follows
   a) Col 25mm for 12mm bars & 40mm for >12mm
   b) Slab 20mm
   c) Beams 30mm
4. Use M30 Conc. & Fe500 unless specified otherwise.
5. Slab thickness 125mm unless specified 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.



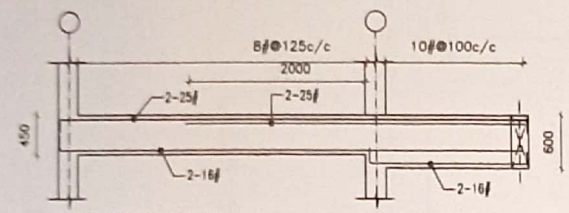
TYP ROOF LAYOUT

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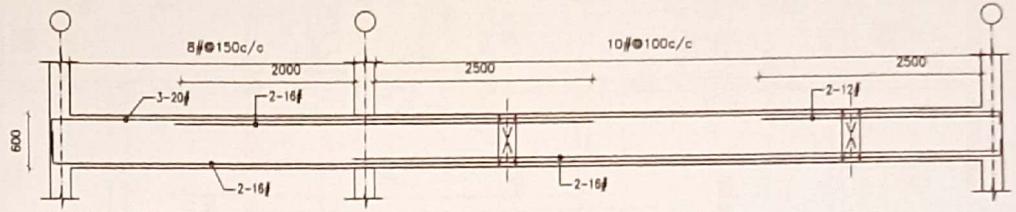
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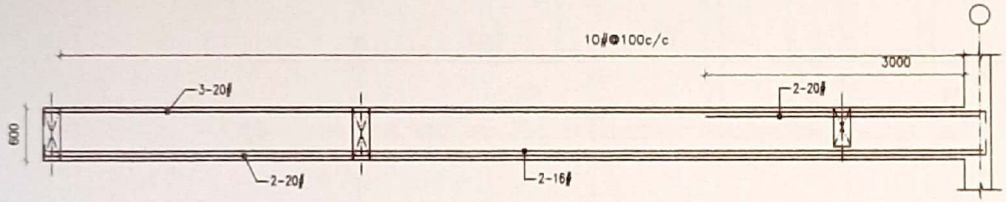
C.S OF RB1 230x600 | C.S OF RB2 230x600 | C.S OF RB3 230x450 | C.S OF RB4 230x600 | C.S OF RB8 230x450 | C.S OF RB9 230x450 | C.S OF RB10 230x450



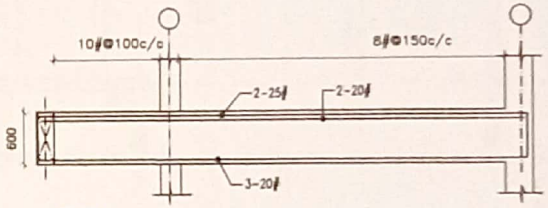
L.S. OF RB5-230x600/230x450



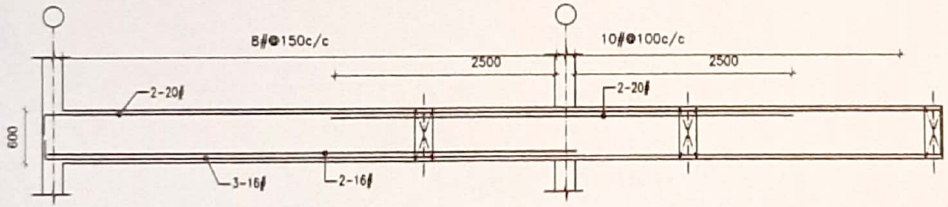
L.S. OF RB6-230x600



L.S. OF RB7-230x600



L.S. OF RB11-230x600



L.S. OF RB12-230x600

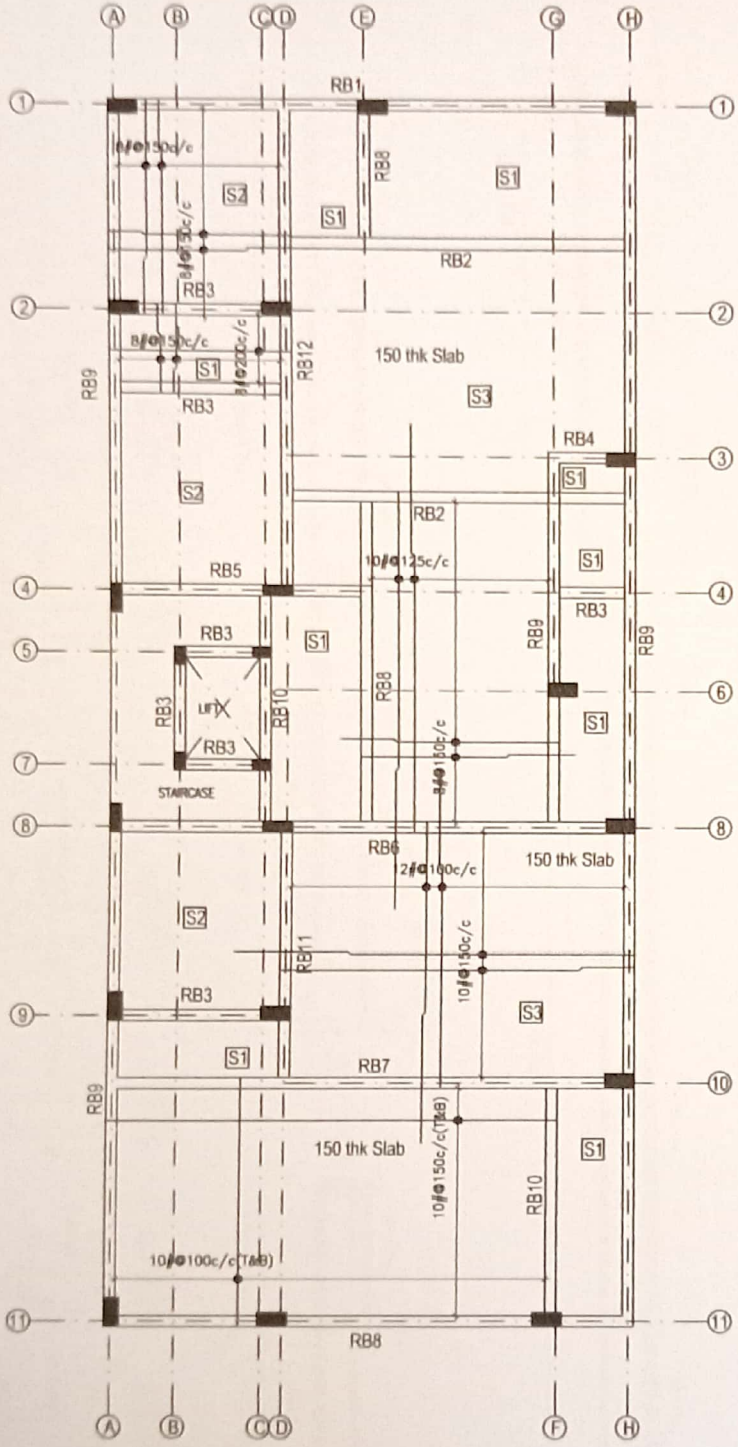
TYP ROOF LAYOUT

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NOTES

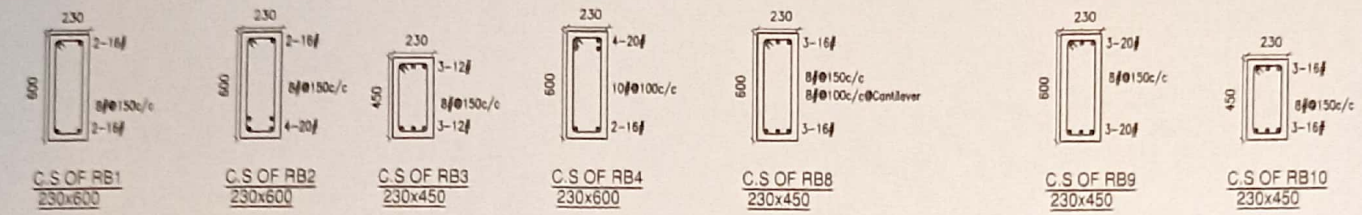
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10. Leave dowels/Sleeves wherever necessary.

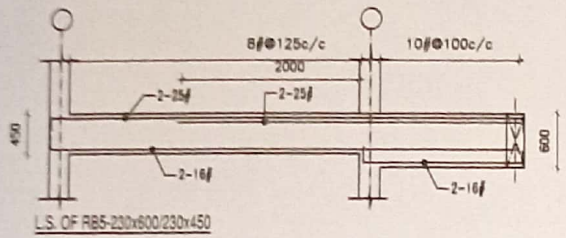


FINAL ROOF LAYOUT

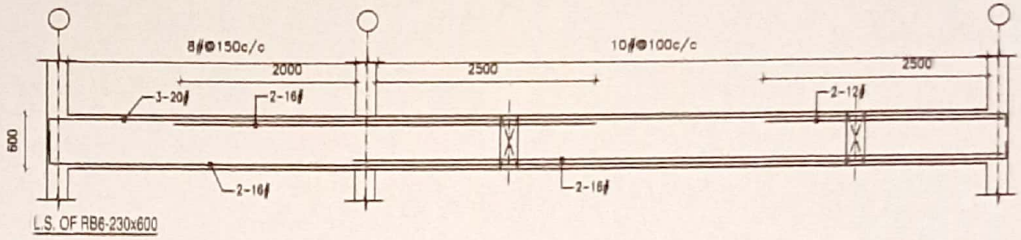
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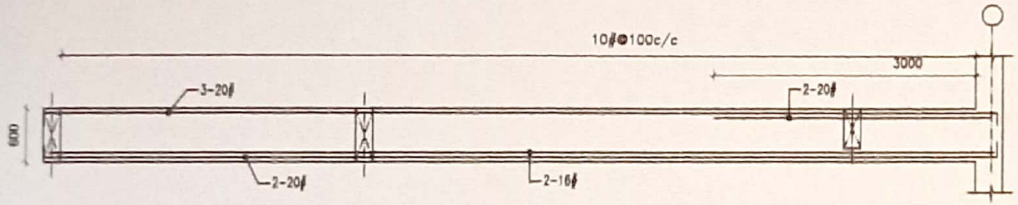




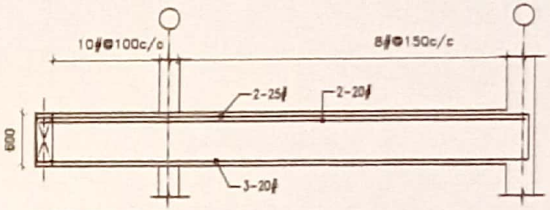
L.S. OF RB5-230x600/230x450



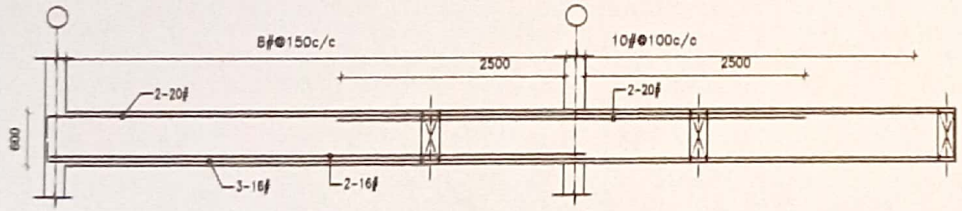
L.S. OF RB6-230x600



L.S. OF RB7-230x600



L.S. OF RB11-230x600



L.S. OF RB12-230x600

FINAL ROOF LAYOUT

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