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DIGITALLY VERIFIED RECORD

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STRUCTURAL STABILITY CERTIFICATE

STRUCTURAL STABILITY REPORT FOR THE PROPOSED CONSTRUCTION OF STILT+5 FLOORS (HEIGHT 18.30M) RESIDENTIAL BUILDING (AFFORDABLE HOUSING) WITH 69 DWELLING UNITS AT PLOT No.20, OTTIYAMBAKKAM MAIN ROAD, NAGALAKSHMI NAGAR EXTENTION, COMPRISED IN OLD S.No.39/2A, 39/4 (DOCUMENT) S.No39/4A1B, 39/10B (PATTA) OF SITHALAPAKKAM VILLAGE, TAMBARAM TALUK, CHENGALPAT DISTRICT, WITHIN THE LIMIT OF ST.THOMAS MOUNT 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 M30
2. The minimum width of Column at Stilt Floor is 300mm.

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STRUCTURAL DESIGN REPORT FOR BLOCK-01 & 02

PROJECT	:	**PROPOSED RESIDENTIAL FLAT @ PLOT No.20, OTTIYAMBAKKAM MAIN ROAD, NAGALAKSHMI NAGAR EXTENTION, OF SITHALAPAKKAM VILLAGE, TAMBARAM TALUK**	
STRUCTURAL CONSULTANTS	:		**B.SRINIVASAN Char. Engg.** No 311 ARCOT ROAD KODAMBAKKAM CHENNAI 600024

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1. GENERAL

SCOPE

This Residential apartment structure is basically a RC framed structure comprising of Stilt + 5 upper floors. The analysis and design are done using Finite Element method using software.

This document covers the general description of proposed structural framing plan for safe, economical & effective system, applicable design codes and standards for the building, loads and combinations considering for analysis and design, characteristics of locally available construction materials considered in the design.

SITE INFORMATION

CONSTRUCTION SITE LOCATION

The construction site is located at OTTIYUMBAKKAM MAIN ROAD SITALAPAKKAM TAMBARAM TALUK, Tamilnadu.

SEISMIC LOCATION

The proposed project site lies in **Zone – III** as per seismic code **IS: 1893 (Part 1)-2002.** All the structures shall be designed for seismic forces based on parameters mentioned in the code.

WIND PRESSURE

Wind force on structures shall be considered accounting basic wind speed of **50 m/s** (for Chennai) as per the provisions of **IS: 875-1987(Part 3).** The wind may be assumed to blow in any direction and most unfavourable condition shall be considered for analysis and design.

REFERENCES, CODES AND STANDARDS FOR ANALYSIS & DESIGN

The structural analysis, design shall be developed on the basis of the latest standard codes and documents listed below.

All designs shall generally be prepared in accordance with Indian Standards (IS) codes of practice.

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CODES AND REFERENCES

All the Indian Standards referred to shall be the latest revision (including all amendments issued thereto) on the date of signing of the Contract.

In case of any deviation / conflict between provisions of IS codes and the design criteria, the provisions that are more stringent shall be followed unless specifically directed otherwise.

The Codes and Standards listed below are applicable for the design and construction of structures and buildings in general. Specifications for materials supplied from India shall follow the Indian Standard Specifications. Field and laboratory testing procedures for materials shall be as per Indian Standard Specifications.

LOADS

IS: 875	Code of Practice for design loads (other than earthquake) for Buildings and structures (All parts)
Part 1	Dead Loads — Unit Weights of Building materials and stored materials
Part 2	Imposed Loads
Part 3	Wind loads
Part 5	Special Loads and Combinations
IS: 1893	Criteria for earthquake resistant design of structure

FOUNDATIONS

IS: 1080	Code of Practice for design and construction of shallow Foundations in soils (other than raft, ring and shell)
IS: 1904	Code of Practice for design and construction of foundations in soils: General requirement
IS: 2950	Code of Practice for design and construction of raft foundations
IS: 8009	Code of practice for Shallow/Deep foundations subjected to symmetrical static vertical loads (All parts)

RCC

IS: 456	Code of Practice for plain and reinforced concrete
IS: 1786	Specification for high strength deformed steel bars and wires for concrete reinforcement
IS: 1893	Criteria for Earthquake resistant design of structures (General provisions and buildings)
IS: 3370	Code of Practice for concrete structures for the storage of liquids: (All parts)
IS: 3414	Code of Practice for design and installation of joints in buildings

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IS: 4326	Code of Practice for earthquake resistant design and construction of buildings
IS: 5525	Recommendation for detailing of reinforcement in reinforced concrete works
IS: 10262	Recommended guidelines for concrete mix design
IS: 13920	Code of Practice for ductile detailing of reinforced concrete structures Subjected to seismic forces.

STRUCTURAL STEEL

IS: 800	Code of Practice for general construction in steel
IS: 808	Dimensions for hot rolled steel sections
IS: 813	Scheme of symbols for welding
IS: 1161	Steel tubes for structural purposes
IS: 2062	Steel for general structural purposes (fusion welding quality)
IS: 4000	High Strength bolts in steel structures – Code of Practice
IS: 7215	Tolerances for fabrication of steel structures
IS: 12843	Tolerances for erection of steel structures

MISCELLANEOUS

IS: 1172	Code of basic requirements for water supply, drainage and sanitation
IS: 1742	Code of Practice for building drainage
IS: 3067	Code of Practice for general design details and preparatory works for damp proofing and water proofing of buildings
SP 6	Handbook for Structural Engineers (all parts)
SP 7	National Building Code of India
SP 16	Design Aids for reinforced concrete to IS: 456-1978
SP 20	Handbook on masonry design and construction
SP 22	Explanatory handbook on codes on earthquake engineering (IS 1893-1975 and IS: 4326-1976)
SP 24	Explanatory handbook on Indian Standard code of Practice For plain and reinforced concrete (IS: 456 -1976)
SP 25	Handbook on causes and prevention of cracks in buildings
SP 34	Handbook of concrete reinforcement and detailing
IRC 15	Standard specifications and Code of practice for construction of concrete roads

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IRC 37	Guidelines for design of flexible pavements
IRC 73	Geometric design of roads
	Bridge rules of Government of India, Ministry of Railways
	(Railway Board)

LOADS AND LOAD COMBINATIONS CONSIDERED FOR DESIGN

The structures shall be designed for the most critical combinations of dead loads, imposed loads, equipment loads, wind loads, seismic loads, temperature loads and any other loading condition which can occur during the design life of the facility as per code provisions.

DEAD LOADS

Dead loads consist of the weights of the structure complete with finishes, fixtures, partitions and all equipment of semi-permanent nature including roofing etc.

The following unit weight of material shall be considered for computation of loads. Loads given in IS: 875 (Part-I) shall be made use of for the materials not listed below.

- Self weight of Plain cement concrete : 23.5 KN/cu.m
- Self weight of Reinforced cement concrete : 25 KN/cu.m
- Solid block masonry : 22 KN/cu.m
- Burnt brick masonry : 19.20 KN/cu.m
- Floor finish : 23.5 KN/cu.m
- Cement plaster : 21.0 KN/cu.m
- Structural steel : 78.5 KN/cu.m
- Aerocon blocks : 7.8 KN/cu.m
- Soil (Dry) : 18 KN/cu.m
- Soil (Wet) : 20 KN/cu.m
- Water : 10 KN/cu.m
- Cinder Filling for sunken portion : 8 KN/cu.m (Wherever filling is required)

IMPOSED LOADS

The imposed loads shall be considered as per **IS: 875 (Part-II)** for different occupancies as per each apartment unit.

Floors and supporting members which may be subjected to heavy equipment live loads shall be designed on the basis of the weight of equipment or specifically defined live loads, whichever is greater.

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EARTH PRESSURE LOADS

Earth pressure load is the horizontal pressure of the soil acting on the underground structure and foundation. Earth pressure for all underground structures shall be calculated using coefficient of earth pressure at rest, coefficient of active or passive earth pressure (whichever is applicable)..

The earth pressure including the surcharge load shall be calculated as follows:

$p = K(\gamma h + q)$ ——— For Normal Condition

$p = K[(\gamma - \gamma_w)h + q] + \gamma_w h$ ——— For submerged condition

Where,

γ = Unit soil weight (kN/m^3)

γ_w = Unit weight of water (kN/m^3)

h = position of earth pressure p from ground surface (m)

q = surcharge load

K = Earth pressure coefficient

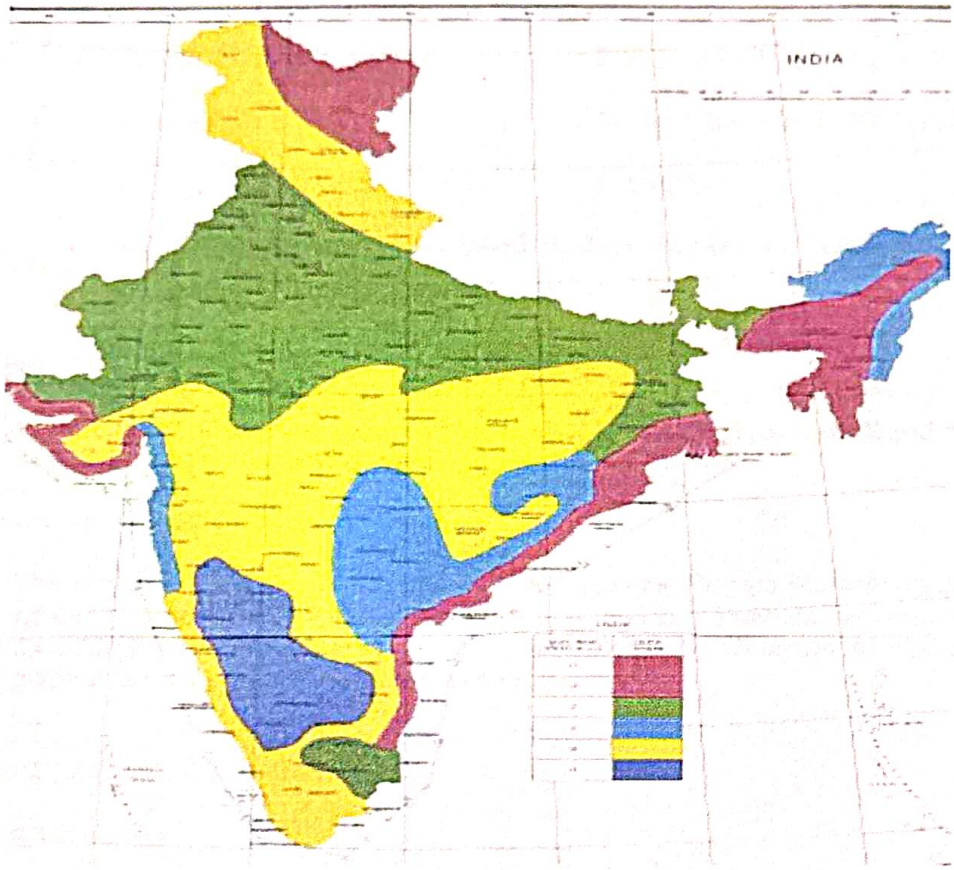
LIVE LOAD REDUCTION

Live load reduction shall be considered as per **IS: 875 (Part-II)**.

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WIND LOADS

The Wind pressure shall be calculated in accordance with IS: 875 (Part-3).



Bangalore is in the state of Karnataka, winds with a wind speed of 33 m/s.

Basic Wind Speed V_b	: 50 m/s
Risk Coefficient k_1	: 1.08
(k_1 corresponds to 100 years Mean Probable Design Life of Structure)	
Terrain, height, structure size factor k_2	: 1.12
Topography factor k_3	: 1.0

The external and internal pressure co-efficient shall be as per respective clauses of IS: 875 (Part 3)

Design wind speed V_z	: $V_b \times k_1 \times k_2 \times k_3$
Design wind pressure p_z	: $0.6 \times V_z^2$

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Chennai falls under seismic zone III as per IS 1893-2025 (Part 1) (Fifth Revision) and has the following factors to be considered for designs.

- Seismic Zone : III
- Seismic Zone factor, Z : 0.16 (As per Table 2-IS: 1893-2025)
- I -Importance factor : 1.0 (Ref Table 6-IS: 1893-2025)
- R -Response reduction Factor : 5 (SMRF)
- Sa/g= For medium soil will be adopted (Depending on Time period to be calculated separately).
- Infill walls will be considered

ELEVATOR LOADS

Elevator / Lift supporting columns / walls shall be designed for vertical and horizontal forces (including impact forces) as per vendor data.

LOAD COMBINATIONS

The individual members of the frame shall be designed for worst combination of forces such as bending moment, axial force, shear force and torsion. Permissible load combinations shall be as per **IS 875 (Part V)** and other relevant IS codes. Following combinations shall be considered for the analysis and design of different blocks/units.

GRAVITY LOAD COMBINATION

1.5DL+1.5LL

SEISMIC LOAD COMBINATIONS (STATIC)

1.5DL + 1.5EQX
1.5DL + 1.5EQY
0.9DL + 1.5EQX
0.9DL + 1.5EQY
1.2DL + 1.2LL + 1.2EQX
1.2DL + 1.2LL + 1.2EQY

WIND LOAD COMBINATIONS

1.5DL + 1.5WLX
1.5DL + 1.5WLY
0.9DL + 1.5WLX
0.9DL + 1.5WLY
1.2DL + 1.2LL + 1.2WLX
1.2DL + 1.2LL + 1.2WLY

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This value is to be considered when stability against overturning and stress reversal is critical where DL/LL/WL/EL denotes,

DL - Dead Load; LL - Live Load; TL - Temperature Load; WL - Wind Load;

EL - Earthquake Load

LOAD COMBINATIONS FOR UNDERGROUND STRUCTURES

Following loading conditions shall be considered in addition to the loading from superstructure for the design of sub structure of pump house, sumps, tanks, trenches and other underground structures.

Earth pressure, surcharge pressure and ground water pressure from outside in combination with / without water pressure from inside shall be accounted.

Base slab of the pump house shall be designed for the condition of different combinations of pump sumps being empty during maintenance stages with maximum ground water table. Intermediate walls in sumps shall be designed considering water on one side only and the other side being empty for maintenance.

Design shall also be checked against buoyancy due to ground water during construction and operation stage. Minimum factor of safety as per IS: 3370 against buoyancy shall be ensured considering empty condition ignoring superimposed loads.

DESIGN DATA SHEETS AND METHODOLOGY

All units/ structures shall be analyzed as framed structures using FINITE ELEMENT MENTHOD. For the loads and their combinations as specified in previous sections, the design shall be done using STRAP using in-house Excel spread sheets.

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STRUCTURAL ANALYSIS AND DESIGN:

GENERAL:

All R.C.C structures shall be designed according to the Limit State Method as specified in IS: 456 – 2000. The structure is idealized as 3D space frame and analyzed using FEM software package for both vertical and lateral loads.
Forces and moments from the 3D analysis output for the worst combinations are used for the design of the structure.
The foundations are designed for critical load combination.
The structure is analyzed for specific loads like dead load, live load, wind and seismic loads and for the load combinations as given in the relevant codes.
The slab is analyzed as two-way and one way slabs.

Design of structural steel members are done using elastic method as per IS: 800 with relevant allowable stresses.

DEFLECTION LIMITS:

For Reinforced concrete works:

Limiting values of deflection (Short and Long term) as per clause 35.3 of IS: 456-2000 is followed in the design.

Limiting value for short term deflection is considered as span/250 and for the long term deflection is considered as span/350 or 20mm whichever less as per IS 456 – 2000.

As per IS1893 (Part1) :2025, Story drift in any story due to minimum specified design seismic lateral force shall not exceed 0.004 times the story height design.

Lateral sway due to wind load should not exceed H/500 (H is the total height of structure).

CRACKING LIMITS:

Limiting values of crack width as per clause 35.3 of IS: 456-2000 is followed in the design.

In general for slabs and beams, the crack width is limited to 0.3mm.

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DESIGN DATA SHEETS

DATA – RESIDENTIAL CONDOMINIUMS

TYPE OF UTILITY	:	RESIDENTIAL
Residential Building	:	Stilt + 5 upper floors for Block 1
Structural system	:	Beam-Column Frame structure
Seismic zone	:	Zone III as per IS 1893
Wind speed	:	50 m/s as per IS 875 if required
SBC considered	:	20 Ton/M2 at 3 m below the ground level.
Height of building:	:	18.0m from NGL
Analysis and design software tool for substructure	:	Found and Excel spread sheets for foundations.
Analysis and design software tool for super structure	:	STRAP/ STAAD Pro for columns & beams and Excel spread sheets for slabs
Basis for Civil / Structural drawings	:	Approval drawings received from Architects

REINFORCED CONCRETE STRUCTURES

GENERAL

All designs of RC structures shall be carried out by limit state method as per **IS 456** and other relevant codes, unless use of working stress method is specifically mentioned.

Following are grades of concrete and steel shall be adopted for different elements in design.

Foundation/Footings	:	M30, Fe 500
Beams and slabs	:	M30, Fe 500 for entire building
Columns	:	M30, Fe 500 for entire height

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KODAMBAKKAM, CHENNAI-600 024

Type of foundation system, shall be based on loading arrangement, load intensity and soil strata. Design of foundation at various levels shall be dependent upon the soil bearing capacity at that level, which in turn shall be as per recommendation of soil investigation report.

All foundations will be designed in accordance with relevant parts of IS: 456 as per limit state method of design. Raft foundation if needed will be designed as per IS: 2950.

Safe bearing capacity of the soil will be increased by 25% and 50% under seismic load combinations for isolated and raft foundations respectively.

3.5 NOMINAL COVER TO REINFORCEMENT:

Nominal cover to main reinforcement shall be as follows:

Footing/Raft	• 50mm/75mm
Columns	• 40mm or Diameter of longitudinal reinforcement
Walls below ground level	• 30mm
Walls above ground level	• 25mm
Lifts and staircase	• 30mm
Beams	• 30mm
Slabs	• 20mm

For any other elements not specified above, clear cover shall be as per the clause 26.4 of **IS: 456 – 2000.** Nominal cover to reinforcement is 25mm for 2 hr. fire resistance.

4. GEOTECHNICAL INVESTIGATION

Soil exploration Report –.

INTRODUCTION

Construct Residential Apartment at Sitalapakkam village, This preliminary report presents a brief summary of the results of the soil investigations work carried out, and includes preliminary recommendations for the design of foundation of the proposed Multi-storeyed buildings.

SCOPE OF WORK

boreholes were progressed to study the subsoil conditions of the site.

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PROJECT DETAILS

THE SITE

The proposed Stilt +5 Sitalapakkam Tamabaram district. The site is fairly level. The ground level at the site is same as road level.

THE STRUCTURES

The proposed Buildings are understood to be RCC Framed Structures, consisting of Stilt and Five upper floors only.

RESULTS AND DISCUSSIONS

RECOMMENDATIONS

Minimum Depth of Foundations :

Allowable Bearing Pressure:

For ISLOATED Footing, the Net Allowable Bearing Pressure can be expected to vary between 20t/m2

Construction Advisory

Loose pockets of soil / disintegrated rock, wherever encountered, should be completely removed and backfilled with well compacted earth. A 15cm thick layer of 40-50mm size gravel should be laid and rammed into the backfilled earth. A layer of sand should be placed and compacted in order to fill the voids. A levelling course of lean concrete can then be laid over the gravel, and construction of foundations can be taken up subsequently.

Refusal strata are encountered at shallow depths in the boreholes. Hence, during excavation for basement and foundations, hard disintegrated rock to hard rock will be encountered, and further excavation by ordinary manual means, (using crowbar and pickaxe) or mechanical means, will not be possible. This should be taken into account while planning the work.

Wherever hard disintegrated rock / hard rock is encountered, and further excavation is not possible, the foundations may rest on the hard strata, after suitably dressing and benching the area.

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From Analysis the Seismic and Axial Load to the Footing are 980 KN from a rectangular column 200x450 mm . M25 Grade of Concrete and Fe 500 steel is used and safe bearing capacity of soil is taken as 200KN/sqm as per soil report.

Maximum Load from Column = 1307 KN.

Add 10% self weight of Footing = 130 KN.

Total = 1436 KN.

Area of Footing required A = 1346 KN / 200 KN/m2 = 7.18 m2.

Size of footing required = 2.68 m x 2.68m.

Providing footing size = 2.75 x 2.75 m.

Ultimate Soil reaction = P/A = 1.5 x 1078 / 2.75m x 2.75m

= 221 KN/m2 = 0.221N/sqmm.

Depth of footing for shear.

d = 0.221 x 2700 x(1250-d)

=745875 – 597d.

Assume Pt = 0.12 ζc = 0.29N/sqmm.

shear resistance

Vc1 = 0.29 x 2700xd

=783d

Vu1 ≤ Vc1

=745875-597d ≤ 783d

d ≥ 540mm

Providing effective depth d=638 D=700.

Flextural moment

Mu = wl2/2

= 221x2.7x 1.25x1.25/2 = 466KNm = 466000000Nmm.

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Mu/bd2 = 466000000/2700x638x638 = 0.424Mpa.

Pt=0.12% Ast = Ptxbxd/100 = 0.12x1000x638/100 = 765sqmm/m.

Using 12 mm rod for Footing. Spacing of bar = 1000x112 /765 = 146mm.

Use 12mm rod @ 125mm c/c both ways for the above said Footing.

And Design of other Footings calculated in similar way

DESIGN OF COLUMN

TYPICAL COLUMN DESIGN

The Column has to carry an Axial load of 810 KN.

The size of the column is taken as 200mmx500mm.

Grade of Concrete M25 and Grade of steel Fe500

Cover = 40mm. Ht of Column (including basement) = 4mt.

Fy = 500N/sqmm & Fck = 25N.sqmm

Effective Length ratio 0.65 as per IS456:2000 (both end fixed)

Leff1 = 0.65 x 4 = 2.6, Leff2 = 0.65 x 4 = 2.6

Check for Slenderness

Leff1/D = 10.4 Leff1/b = 5.2 Leff2/D = 10.4 Leff2/b = 5.2

All Columns are short about both axis

Size of Column and check e_{min}

e_{min} = Leff/500+D/30 = 3900/500+750/30 = 32.8

Find Mmin = 0.0328x3810 = 125KNm.

Design Axial Load Pu = 810KN.

Design Moment Mx = Mmin = 25KNm.

Designing the column as an axially loaded column with uniaxial moment

Calculation of Area of Steel.

Design Axial Load Pu =3810KN.

Design Moment Mx = Pu x e_{min} 125KNm.

d' = 40+25/2 = 52.5mm

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d'/D = 52.5/750 = 0.07

$Mu/FckbD^2$ =25x1.5x10^6 /25x375x750x750 = 0.035

Pu/Fckbd = 810x1.5x10^3/25x375x750 = 0.812

From SP 16 Chart 44, p/Fck = 0.10

Ast = 0.1x25x200x500/100 = 2500sqmm.

Required 6 Nos of 25 tor rods to be provided.

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

6 Nos of 25 tor rods are provided.

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

And Design of other Column calculated in similar way.

7.4 Design of Beam

TYPICAL BEAM DESIGN

Continuous beam supported by Columns of Effective span 10mt of 2 bay of size 200mm x 600mm has to carry Factored moment as follows.

Negative moment @ Top of Left Support of first span = 678KNm

Positive moment @ Bottom of Mid of first span = 645KNm

Negative Moment @ Top of mid support = 937KNm

Positive moment @ Bottom of Mid of Second span = 612KNm

Negative moment @ Top of Right Support of first span = 640KNm

Negative moment @ Top of Left Support of first span = 678KNm

Mu limit = 0.138 x fck x b x d x d = 0.138 x 25 x 300 x 854 x 854 = 754KNm

As Mu limit is greater than Mu

678000000=0.87Ast x 500 x 854[1-(Ast x 500/300x854x25)]

678000000 = 371490Ast-29Ast^2

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Ast = 2204 sqmm.

Use 3 Nos of 32 mm Rod and 2 Nos of 20mm Rod

Positive moment @ Bottom of Mid of first span = 645KNm

Mu limit = 0.138 x fck x b x d x d = 0.138 x 25 x 300 x 854 x 854 = 754KNm

As Mu limit is greater than Mu

645000000=0.87Ast x 500 x 854[1-(Ast x 500/300x854x25)]

645000000 = 371490Ast-29Ast^2

Ast = 2072 sqmm.

Use 3 Nos of 32 mm Rod and 2 Nos of 25mm Rod

Negative moment @ Top of Left Support of first span = 937KNm

Mu limit = 0.138 x fck x b x d x d = 0.138 x 25 x 300 x 854 x 854 = 754KNm

As Mu limit is less than Mu

Mu – Mu limit = 937 – 754 = 183KNm

fsc = [0.0035(Xumax – d')/ Xumax] x Es

=[{0.0035(0.46 x 854) – 46}/0.46 x 854] x 200000 = 618 N/sqmm

But fsc is greater than 0.87 fy (0.87 x 500 = 435 N/sqmm)

Asc = (Mu-Mulimit)/(fsc (d-d') = 183000000/435 x 808 = 520 sqmm

Provide 2 bars of 20mm Rod (Asc = 628 sqmm).

Ast2 = (Asc x fsc)/0.87fy = 628 x 435 / 0.87 x 500 = 628 sqmm

Ast1 = (0.36 x fck x b x (Xu limit) / 0.87 fy = 0.36 x 25 x 300 x 0.46 x 854 / 0.87 x 500

Ast1 = 2438 sqmm

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Ast = Ast1 + Ast2 = 3066 sqmm

So Provide 5 nos of 32mm Rod.

Positive moment @ Bottom of Mid of Second span = 612KNm

Mu limit = 0.138 x fck x b x d x d = 0.138 x 25 x 300 x 854 x 854 = 754KNm

As Mu limit is greater than Mu

612000000=0.87Ast x 500 x 854[1-(Ast x 500/300x854x25)]

612000000 = 371490Ast-29Ast^2

Ast = 1942 sqmm.

Use 3 Nos of 32 mm Rod and 2 Nos of 25mm Rod

Negative moment @ Top of Right Support of first span = 640KNm

Mu limit = 0.138 x fck x b x d x d = 0.138 x 25 x 300 x 854 x 854 = 754KNm

As Mu limit is greater than Mu

640000000=0.87Ast x 500 x 854[1-(Ast x 500/300x854x25)]

640000000 = 371490Ast-29Ast^2

Ast = 2052 sqmm.

Use 3 Nos of 32 mm Rod and 2 Nos of 20mm Rod

And Design of other Beam calculated in similar way.

Design of RCC SLAB

TYP RCC SLAB DESIGN

Effective span of Slab is 4.26mt x 9.88mt with beam support of 200mm spaced @ 4260mmc/c Taking M25 Grade Concrete and Fe500 Grade steel.

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Thickness of slab = 4260/25 = 170mm

Slab thickness is taken as 200mm as the building is used for storage purpose.

Effective depth = d = 200 – 20 – 6 = 174mm

Self wt of slab = 0.2 x 25 = 5KN/sqm Finish = 2KN/sqm

Total Dead Load = 7KN/sqm

Live load for storage building having a roof ht of 5mt = 12KN/sqm

Total Load = 7+12 = 19KN/sqm

Factored Load W= 1.5 x 19 = 28.5KN/sqm

Moment Mu = $W L^2 / 12$ = 28.5 x 4.26x4.26/8 = 64.65KNm

Mu limit = 0.138 fck bdd = 0.138 x 25 x 1000 x 174 x 174 = 104 KNm

Since Mu is less than Mu limit the section is under reinforced.

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

64650000 = 0.87 x Ast x 500 x 174 [1-(Ast x 500/1000 x 174 x 30)]

64650000 = 75690 Ast – 7.25 Ast^2

Ast = 938.5 sqmm

Provide 12 Tor @ 100mm c/c

Distributor Steel Percentage = 0.12%

Ast = 0.12 x 1000 x 174 / 100 = 208sqmm

Provide 10 Tor @ 200c/c as Distributor wherever required.

Check for Shear

Span load = 28.5 x 4.26 = 121 KN V = 121/2 = 60.5KN.

Actual Shear stress V = 60500/1000 x 174 = 0.34N/sqmm < Tc(min).

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From Table 19 (Using Pt = 0.547%) Design shear strength = 0.509N/sqmm.

Max Allowable shear stress = 3.12 N/sqmm.

Check for Deflection

Actual Span to depth ratio = 4266/174 = 24.5

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(938/1130) = 240 N/sqmm.

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

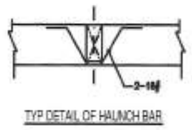
= 1/[0.225+0.003x240-0.625log(1/0.547)]

= 1.278

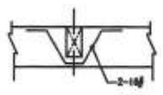
Allowable Span to depth ratio = 20 x K = 20 x 1.278 = 25.5 < Actual ratio.

And Design of other Slab calculated in similar way.

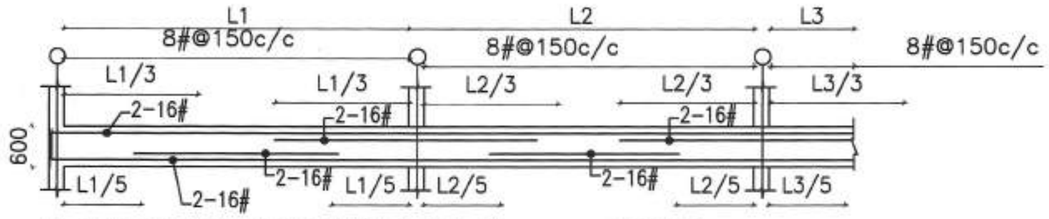
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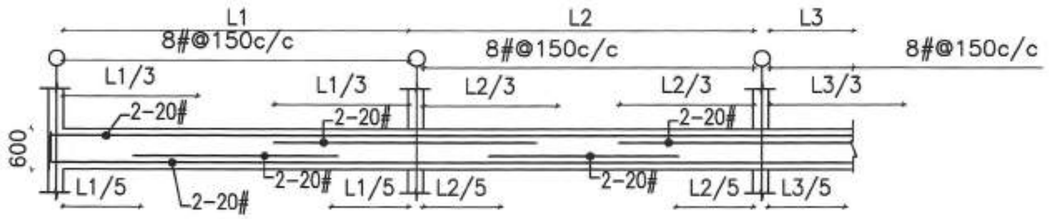
TYP DETAIL OF HAUNCH BAR



TYP DETAIL OF HAUNCH BAR



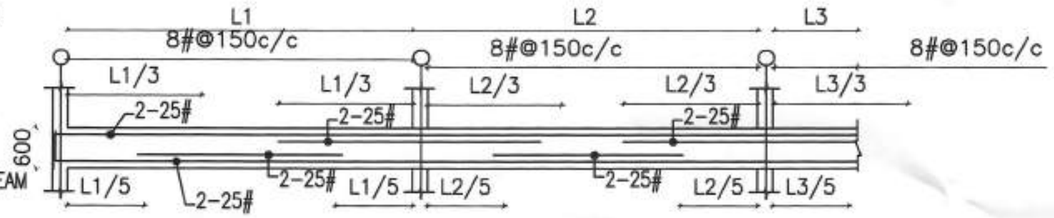
L.S. OF RB-200x600 SPAN LESS THAN 4mt (with Column support 200x500)



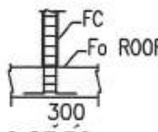
L.S. OF RB-200x600 SPAN 4mt to 6mt(with Column support 200x500)



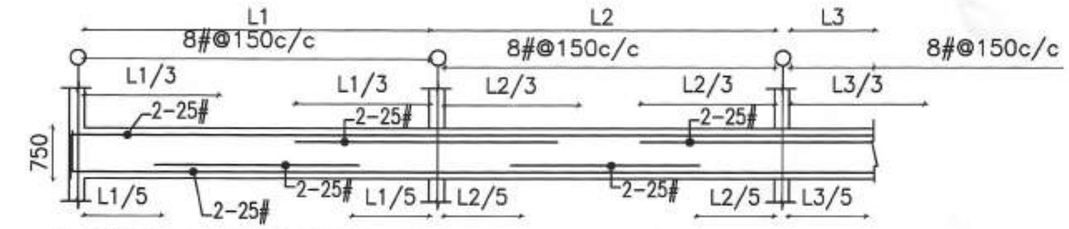
C.S OF FC
230x230



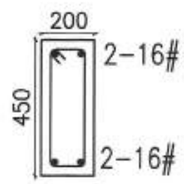
L.S. OF RB-200x600 SPAN ABOVE 6mt(with Column support 200x500)



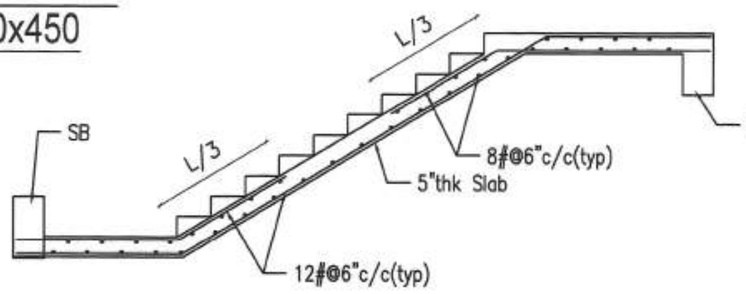
L.S OF FC



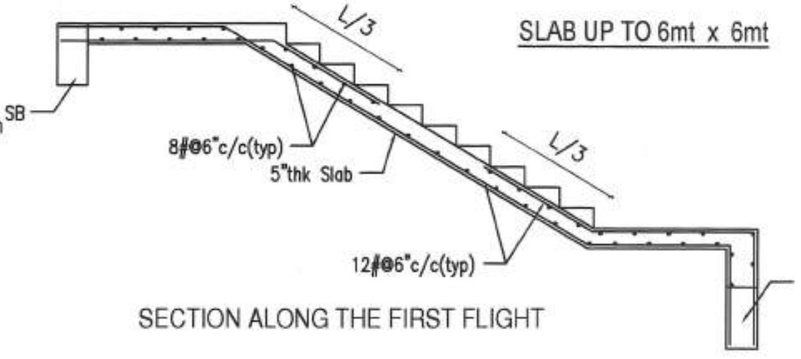
L.S. OF RB-200x750 MORE THAN 8mt(with Column support 200x750)



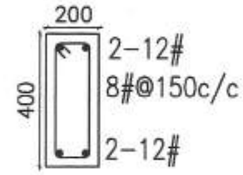
C.S OF SB
200x450



SECTION ALONG THE SECOND FLIGHT

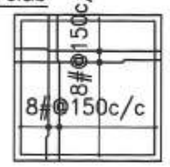


SECTION ALONG THE FIRST FLIGHT



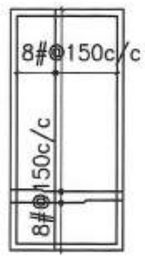
C.S OF RB SPAN LESS THAN 2mt
200x400

125 thk slab



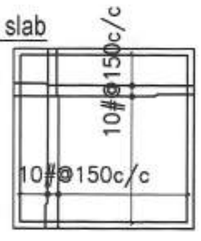
2 WAY SLAB UP TO 4mt x 4mt

125 thk slab



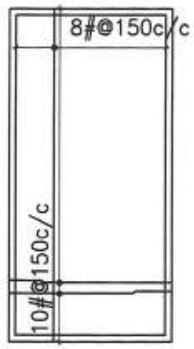
1 WAY SLAB UP TO 3mt

150 thk slab



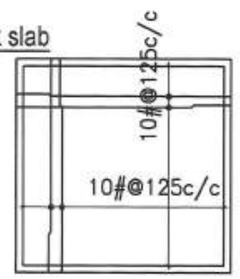
SLAB UP TO 5mt x 5mt

150 thk slab



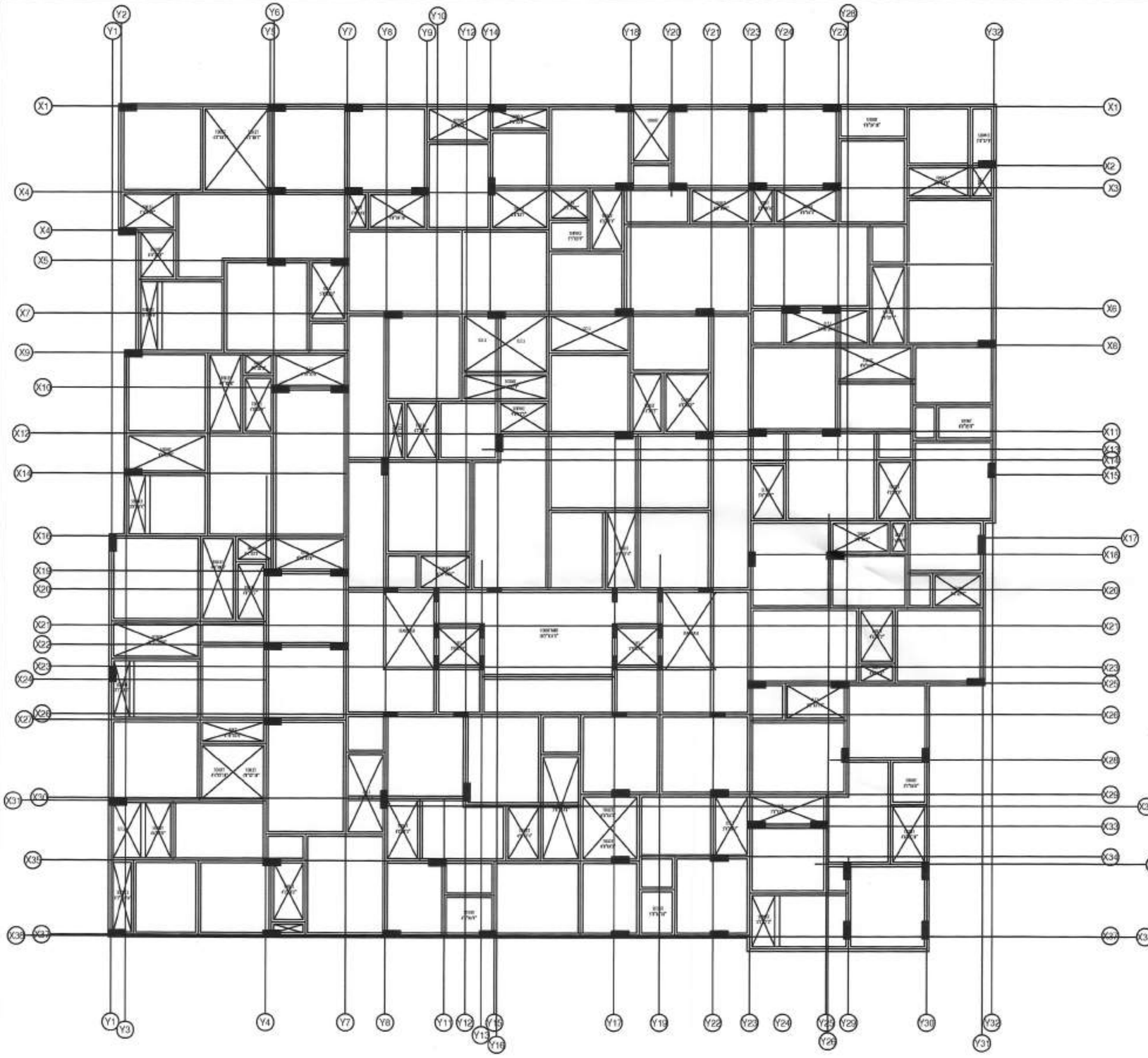
1 WAY SLAB UP TO 4.5mt

175 thk slab



SLAB UP TO 6mt x 6mt

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TYP ROOF LAYOUT

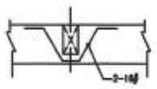
Notes:

1. All drawing should be read along with the relevant Architectural drawings.
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3. All plain and Reinforced Cement Concrete work shall strictly confirm to IS: 456 – 2000
4. Tor 40 steel conforming to I.S 1786 – 1985 Grade – Fe 550
5. Clear cover to steel as follows
   - For footing 50mm
   - For column 40mm
   - For beam 25mm
   - For slab 20mm
6. Lap length for all bars shall be 60 times the dia of the bar unless otherwise Specified
7. Provide 8 ϕ @ 200 c/c as Distribution steel for all top reinforcement
8. Spacer bar to be provided in between two layers of reinforcement of same dia @ every 1000 c/c
9. Cantilever props should not be released until the roof is concreted
10. Removal of Form works
    i) For slabs
    a. Slabs spanning upto 4.5 m – 7days
    b. Slabs spanning over 4.5 m – 14days
    ii) For beams and arches
    a. Beams and arches spanning upto 6m – 14 days
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11. All reinforcements shall be placed and maintained in the position shown in the drawing (cross section) by proving proper cover blocks, spacers & supporting bars.
12. First stirrup in the beam is 50mm away from face of support.
13. All dimensions are in Feet and inches unless otherwise specifically stated.

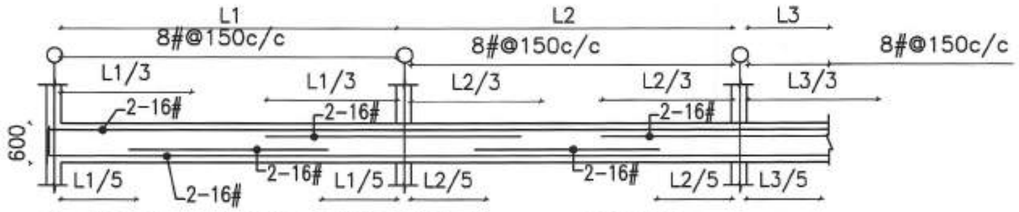
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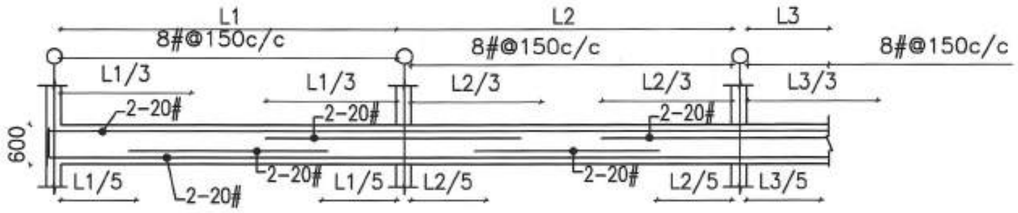
TYP DETAIL OF HAUNCH BAR



TYP DETAIL OF HAUNCH BAR



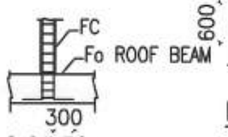
L.S. OF RB-200x600 SPAN LESS THAN 4mt (with Column support 200x500)



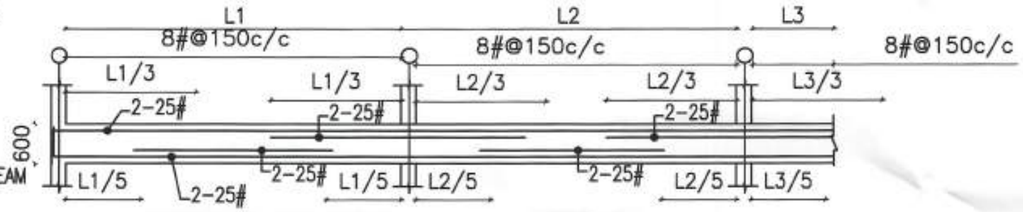
L.S. OF RB-200x600 SPAN 4mt to 6mt(with Column support 200x500)



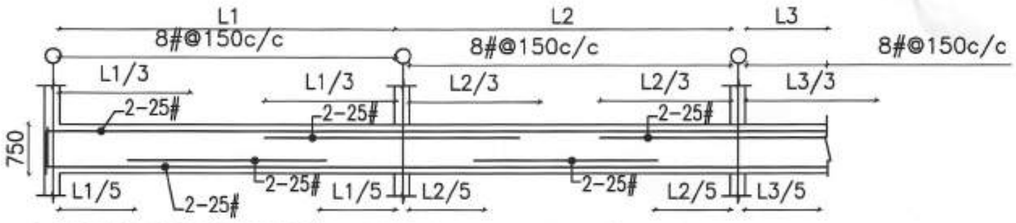
C.S OF FC
230x230



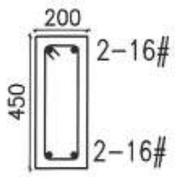
L.S OF FC



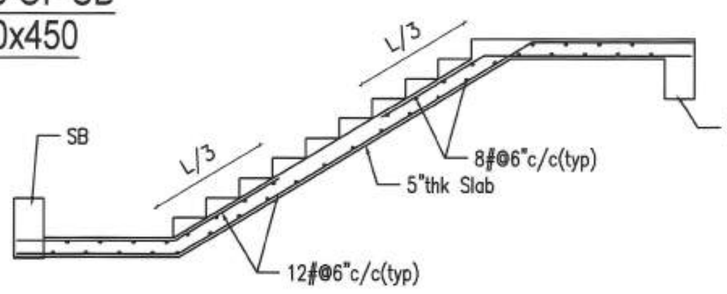
L.S. OF RB-200x600 SPAN ABOVE 6mt(with Column support 200x500)



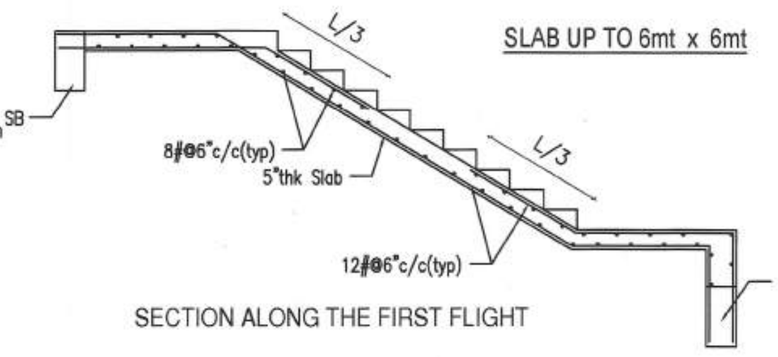
L.S. OF RB-200x750 MORE THAN 8mt(with Column support 200x750)



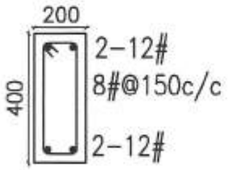
C.S OF SB
200x450



SECTION ALONG THE SECOND FLIGHT

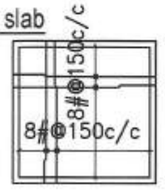


SECTION ALONG THE FIRST FLIGHT



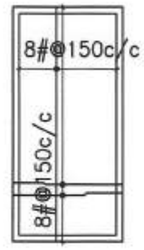
C.S OF RB SPAN LESS THAN 2mt
200x400

125 thk slab



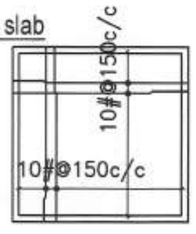
2 WAY SLAB UP TO 4mt x 4mt

125 thk slab



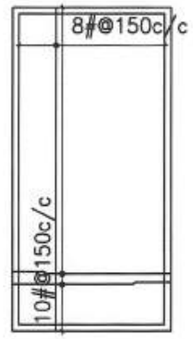
1 WAY SLAB UP TO 3mt

150 thk slab



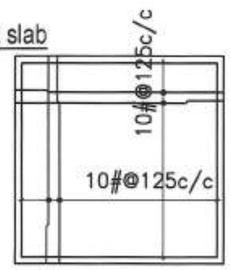
SLAB UP TO 5mt x 5mt

150 thk slab



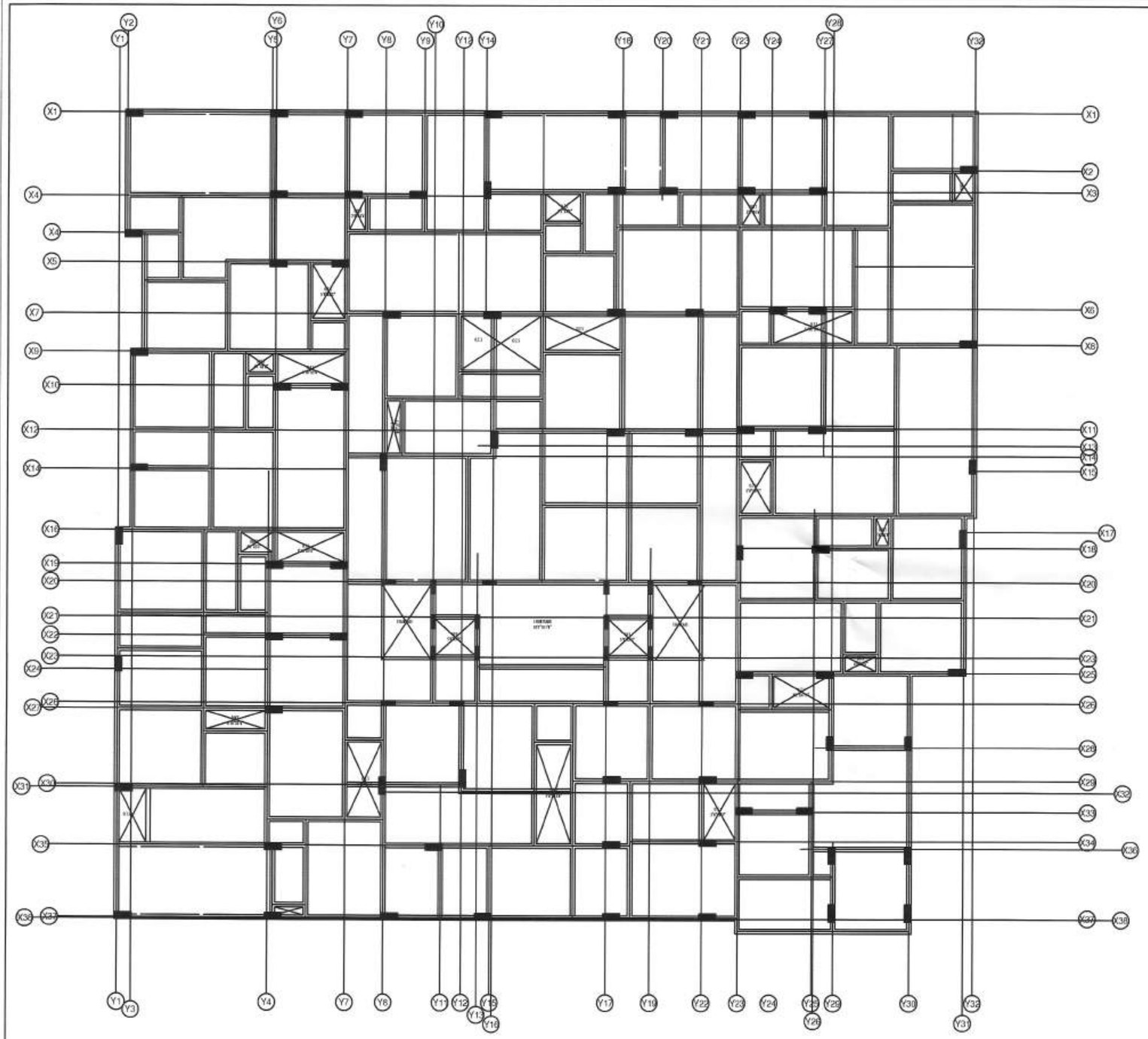
1 WAY SLAB UP TO 4.5mt

175 thk slab



SLAB UP TO 6mt x 6mt

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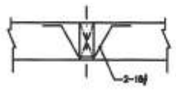


Notes:

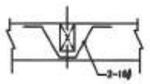
1. All drawing should be read along with the relevant Architectural drawings.
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3. All plain and Reinforced Cement Concrete work shall strictly confirm to IS: 456 – 2000
4. Tor 40 steel conforming to I.S 1786 – 1985 Grade – Fe 550
5. Clear cover to steel as follows
   - For footing 50mm
   - For column 40mm
   - For beam 25mm
   - For slab 20mm
6. Lap length for all bars shall be 60 times the dia of the bar unless otherwise Specified
7. Provide 8 ϕ @ 200 c/c as Distribution steel for all top reinforcement
8. Spacer bar to be provided in between two layers of reinforcement of same dia @ every 1000 c/c
9. Cantilever props should not be released until the roof is concreted
10. Removal of Form works
    i) For slabs
    a. Slabs spanning upto 4.5 m – 7days
    b. Slabs spanning over 4.5 m – 14days
    ii) For beams and arches
    a. Beams and arches spanning upto 6m – 14 days
    b. Beams and arches spanning Above 6m – 21 days
11. All reinforcements shall be placed and maintained in the position shown in the drawing. (cross section) by proving proper cover Blocks, spacers & supporting bars.
12. First stirrup in the beam is 50mm away from face of support.
13. All dimensions are in Feet and inches unless otherwise specifically stated.

FINAL ROOF LAYOUT

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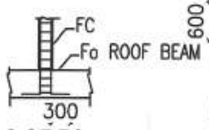
TYP DETAIL OF HAUNCH BAR



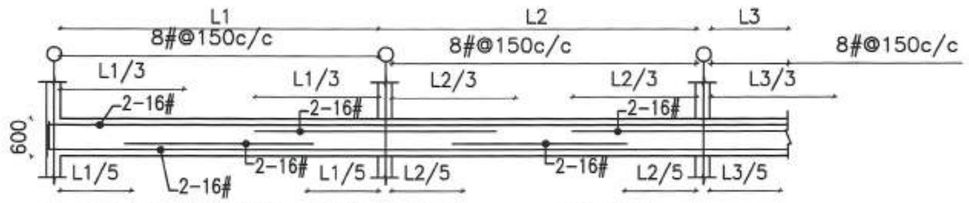
TYP DETAIL OF HAUNCH BAR



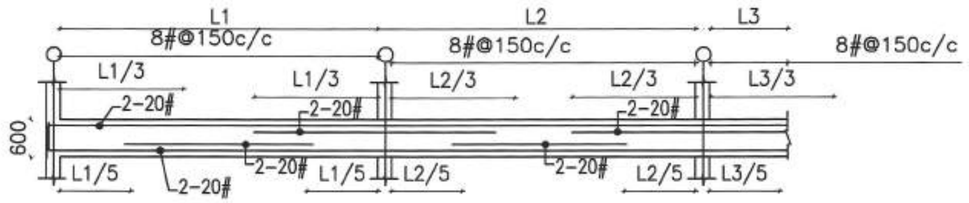
C.S OF FC
230x230



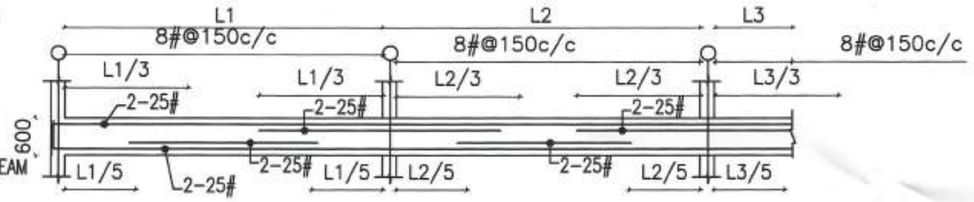
L.S OF FC



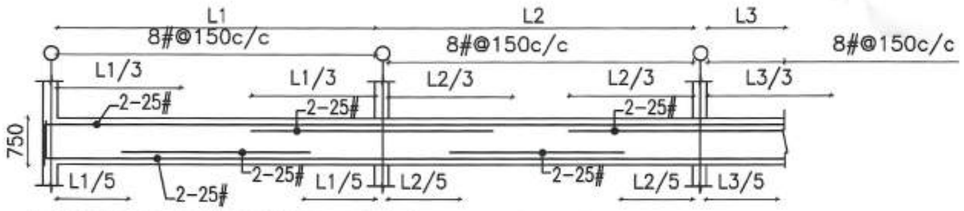
L.S. OF RB-200x600 SPAN LESS THAN 4mt (with Column support 200x500)



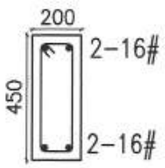
L.S. OF RB-200x600 SPAN 4mt to 6mt(with Column support 200x500)



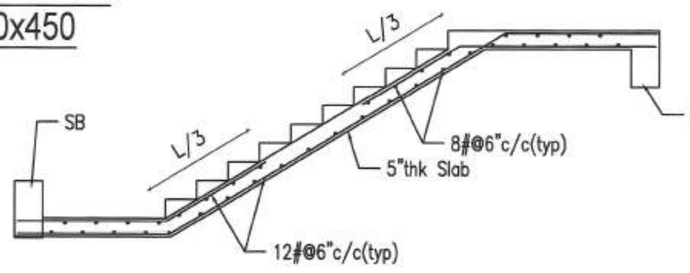
L.S. OF RB-200x600 SPAN ABOVE 6mt(with Column support 200x500)



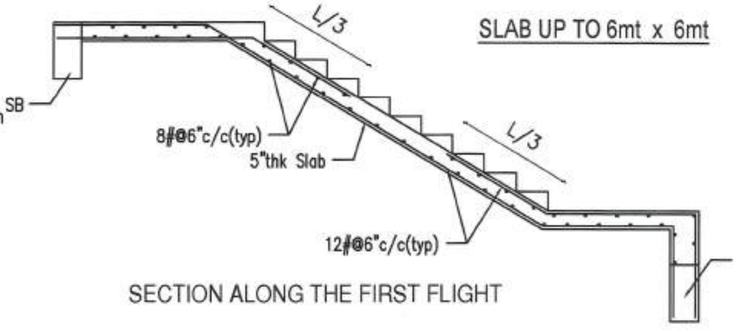
L.S. OF RB-200x750 MORE THAN 8mt(with Column support 200x750)



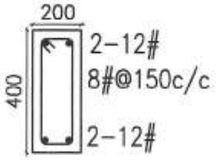
C.S OF SB 200x450



SECTION ALONG THE SECOND FLIGHT

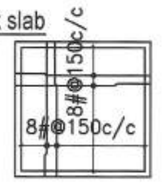


SECTION ALONG THE FIRST FLIGHT



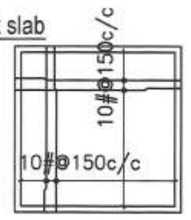
C.S OF RB SPAN LESS THAN 2mt 200x400

125 thk slab



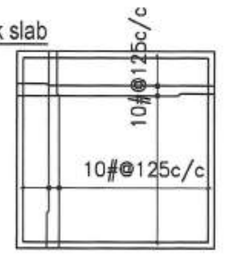
2 WAY SLAB UP TO 4mt x 4mt

150 thk slab



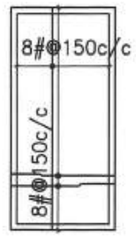
SLAB UP TO 5mt x 5mt

175 thk slab



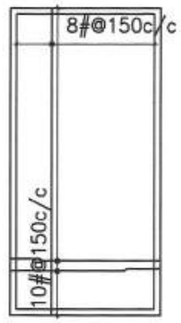
SLAB UP TO 6mt x 6mt

125 thk slab



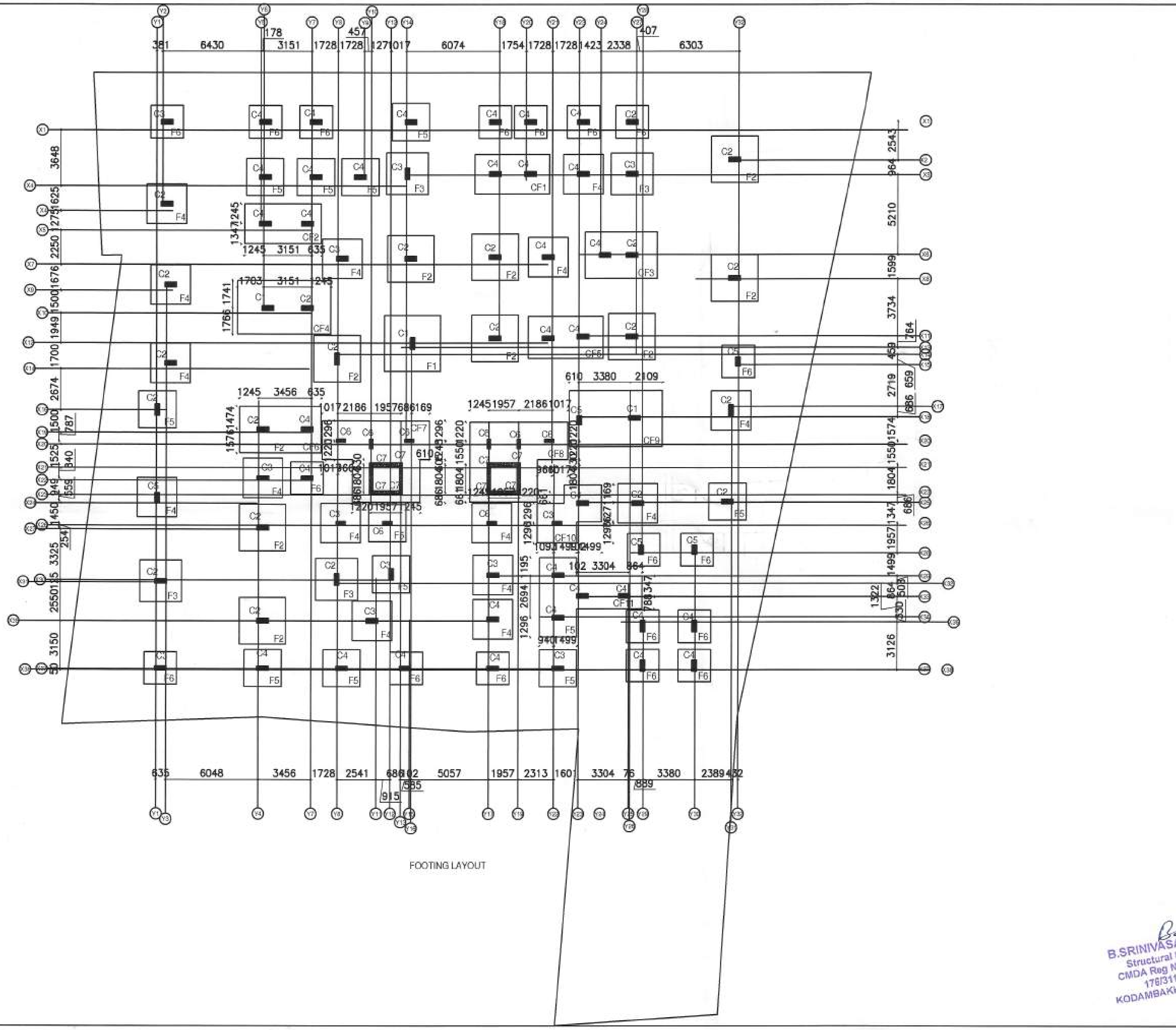
1 WAY SLAB UP TO 3mt

150 thk slab



1 WAY SLAB UP TO 4.5mt

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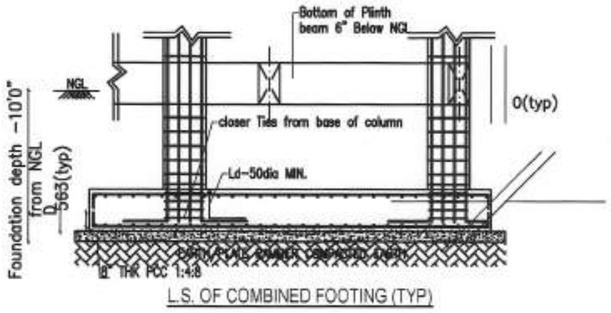
FOOTING LAYOUT

Notes:

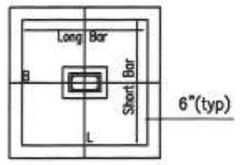
1. All drawing should be read along with the relevant Architectural drawings.
2. Grade of R.C.C. items shall be M30 by design mix confirming to I.S. 456 – 2000 unless otherwise specified
3. All plain and Reinforced Cement Concrete work shall strictly confirm to IS: 456 – 2000
4. Tor 40 steel conforming to I.S 1786 – 1985 Grade – Fe 550
5. Clear cover to steel as follows
   - For footing 50mm
   - For column 40mm
   - For beam 25mm
   - For slab 20mm
6. Lap length for all bars shall be 60 times the dia of the bar unless otherwise Specified
7. Provide 8 # @ 200 c/c as Distribution steel for all top reinforcement
8. Spacer bar to be provided in between two layers of reinforcement of same dia @ every 1000 c/c
9. Cantilever props should not be released until the roof is concreted
10. Removal of Form works
    i) For slabs
    a. Slabs spanning upto 4.5 m – 7days
    b. Slabs spanning over 4.5 m – 14ddys
    ii) For beams and arches
    a. Beams and arches spanning upto 6m – 14 days
    b. Beams and arches spanning Above 6m – 21 days
11. All reinforcements shall be placed and maintained in the position shown in the drawing (cross section) by proving proper cover blocks, spacers & supporting bars.
12. First stirrup in the beam is 50mm away from face of support.
13. All dimensions are in Feet and inches unless otherwise specifically stated.
14. Foundation depth–10'0" from NGL
15. Footing CL to coincide with Column CL. unless specified otherwise.
16. Foundation has been designed for Stilt Floor and Five Upper Floors only.
17. Leave dowels wherever necessary.
18. Any discrepancies noted shall be brought to the notice of the structural engineer prior to execution.

SBC TAKEN- 20T/sqm @ 10'0" from NGL

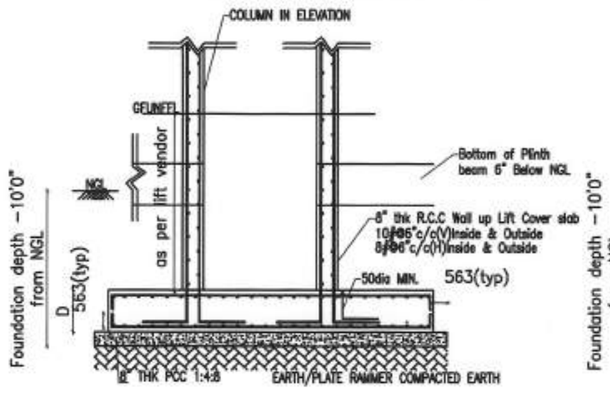
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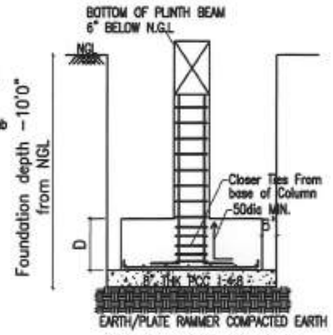
L.S. OF COMBINED FOOTING (TYP)



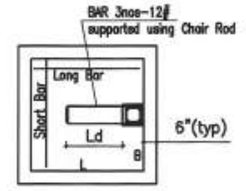
PLAN OF FOOTING
DETAIL(TYP)



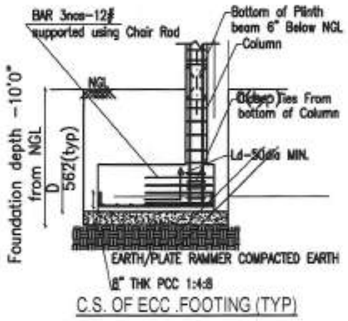
LIFT SECTION
WATER PROOFING TO BE DONE AS PER MANUFACTURE SPECIFICATION



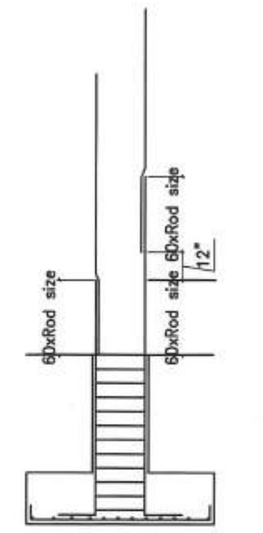
C.S. OF FOOTING (TYP)



PLAN OF TYP ECC FOOTING
SHOWING ONLY U BAR DETAIL



C.S. OF ECC .FOOTING (TYP)



SECTION OF COLUMN FOR LAP
GA DRAWING NTS

FOUNDATION DETAILS (M30-Fe550)					
TYPE	LENGTH	BREADTH	D	LONG BAR	SHORT BAR
F1	12'-0"	12'-0"	36"	16# @ 6" c/c	16# @ 6" c/c
F2	10'-0"	10'-0"	32"	12# @ 4" c/c	12# @ 4" c/c
F3	9'-0"	9'-0"	28"	12# @ 4" c/c	12# @ 4" c/c
F4	8'-6"	8'-6"	26"	12# @ 4" c/c	12# @ 4" c/c
F5	8'-0"	8'-0"	24"	10# @ 4" c/c	10# @ 4" c/c
F6	7'-0"	7'-0"	22"	10# @ 4" c/c	10# @ 4" c/c
SF	3'-3"	3'-3"	12"	10# @ 8" c/c	10# @ 8" c/c
CF1	16'-0"	8'-6"	26"	12# @ 4" c/c(T&B)	10# @ 4" c/c(T&B)
CF2	16'-6"	8'-6"	26"	12# @ 4" c/c(T&B)	10# @ 4" c/c(T&B)
CF3	18'-0"	10'-6"	32"	12# @ 4" c/c(T&B)	12# @ 6" c/c(T&B)
CF4	20'-0"	11'-6"	36"	16# @ 4" c/c(T&B)	12# @ 6" c/c(T&B)
CF5	16'-0"	9'-0"	26"	12# @ 4" c/c(T&B)	10# @ 4" c/c(T&B)
CF6	17'-6"	10'-0"	32"	12# @ 4" c/c(T&B)	12# @ 6" c/c(T&B)
CF7	REFER	REFER	26"	12# @ 4" c/c(T&B)	12# @ 4" c/c(T&B)
CF8	REFER	REFER	24"	12# @ 4" c/c(T&B)	12# @ 4" c/c(T&B)
CF9	20'-0"	12'-0"	36"	16# @ 6" c/c(T&B)	12# @ 6" c/c(T&B)
CF10	REFER	REFER	26"	12# @ 4" c/c(T&B)	12# @ 4" c/c(T&B)
CF11	REFER	REFER	24"	10# @ 4" c/c(T&B)	10# @ 4" c/c(T&B)

IMPORTANT NOTE
FOR M30 MIX USE 375KG/CUM OPC 43/53 GRADE CEMENT FOR ALL RCC ELEMENTS
FOUNDATION TO BE DONE IN DRY CONDITION
FOR MASONRY WORK, PLASTERING AND FACIA IF ANY USE PPC CEMENT
AS ONLY VERY FEW OF THE FOOTING COMES AT BOUNDARY LINE SO CARE SHOULD BE TAKEN WHILE EXCAVATION AS IT SHOULD NOT DISTURB ANY NEAR BY EXISTING STRUCTURE AND PROPER SCAFFOLDING TO BE DONE TO AVOID CAVING OF SOIL
ADVICE
IT IS ADVISED TO DO ALTERNATIVE FOOTING EXCAVATION AND CONCRETING AND BACK FILLING

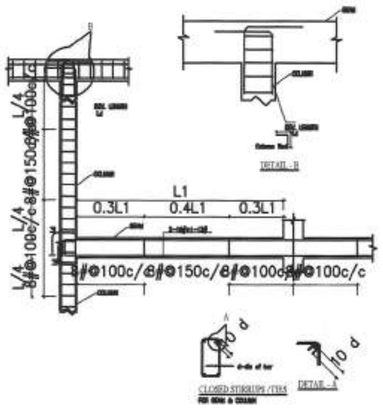
NOTE:
EXCAVATION SHALL BE MADE UP TO A DEPTH OF AT LEAST 10'0" FOOTING CONCRETE TO BE DONE IN DRY CONDITION.
DO THOROUGH COMPACTION OF THE BOTTOM OF EXCAVATION, USING EITHER A VIBRATORY PLATE OR AN EARTH RAMMER
SAME CAN BE DONE FOR BASEMENT FILLING, USING EITHER A VIBRATORY PLATE OR AN EARTH RAMMER.

COLUMN DETAILS UP TO STILT ROOF (M30-Fe550)

C1 12"x30"	C2 12"x30"	C3 12"x30"	C4 12"x30"	C5 12"x24"	C6 8"x24"	C7 8"x24"	SC 12"x12"
300 / 750	300 / 750	300 / 750	300 / 750	300 / 600	200 / 600	200 / 600	300 / 300
• 14-25#	• 10-25#	• 10-20#	• 10-16#	• 8-25#	• 8-20#	• 8-12#	• 4-12#
8#@6"c/c	8#@6"c/c	8#@6"c/c	8#@6"c/c	8#@6"c/c	8#@6"c/c	8#@6"c/c	8#@6"c/c

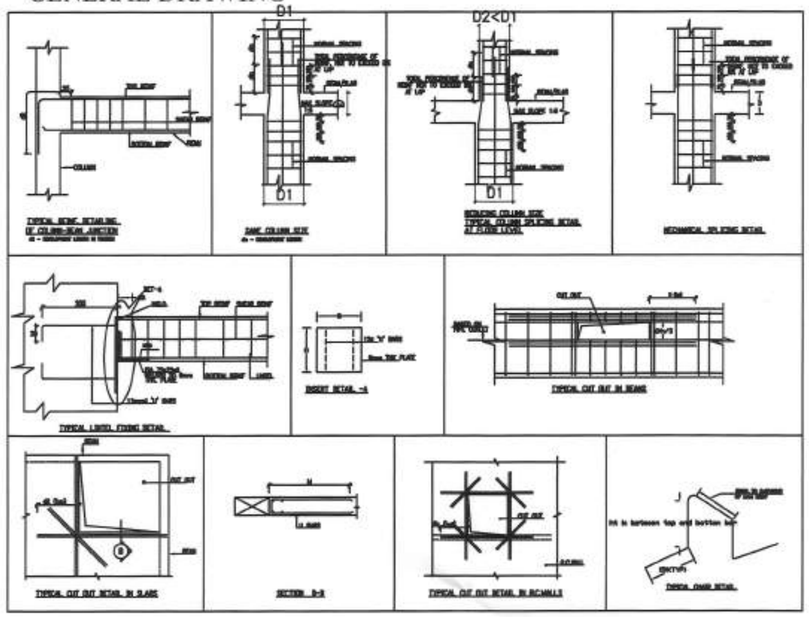
SC - STUB COLUMN TO BE TERMINATED AT PLINTH BEAM LVL

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SEISMIC DETAILING

GENERAL DRAWING



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, EQUIPMENT : AS PER ACTUALS

c) STAIRS

d) TERRACES : 400Kg/Sq.m

2.3 SHUTTERING FOR FOOTING [illegible] PLYWOOD SHEETING.
SHUTTERING FOR COLUMN AND [illegible] 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.

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 >12ϕRod & 25MM≤12ϕRod
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.

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.

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

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

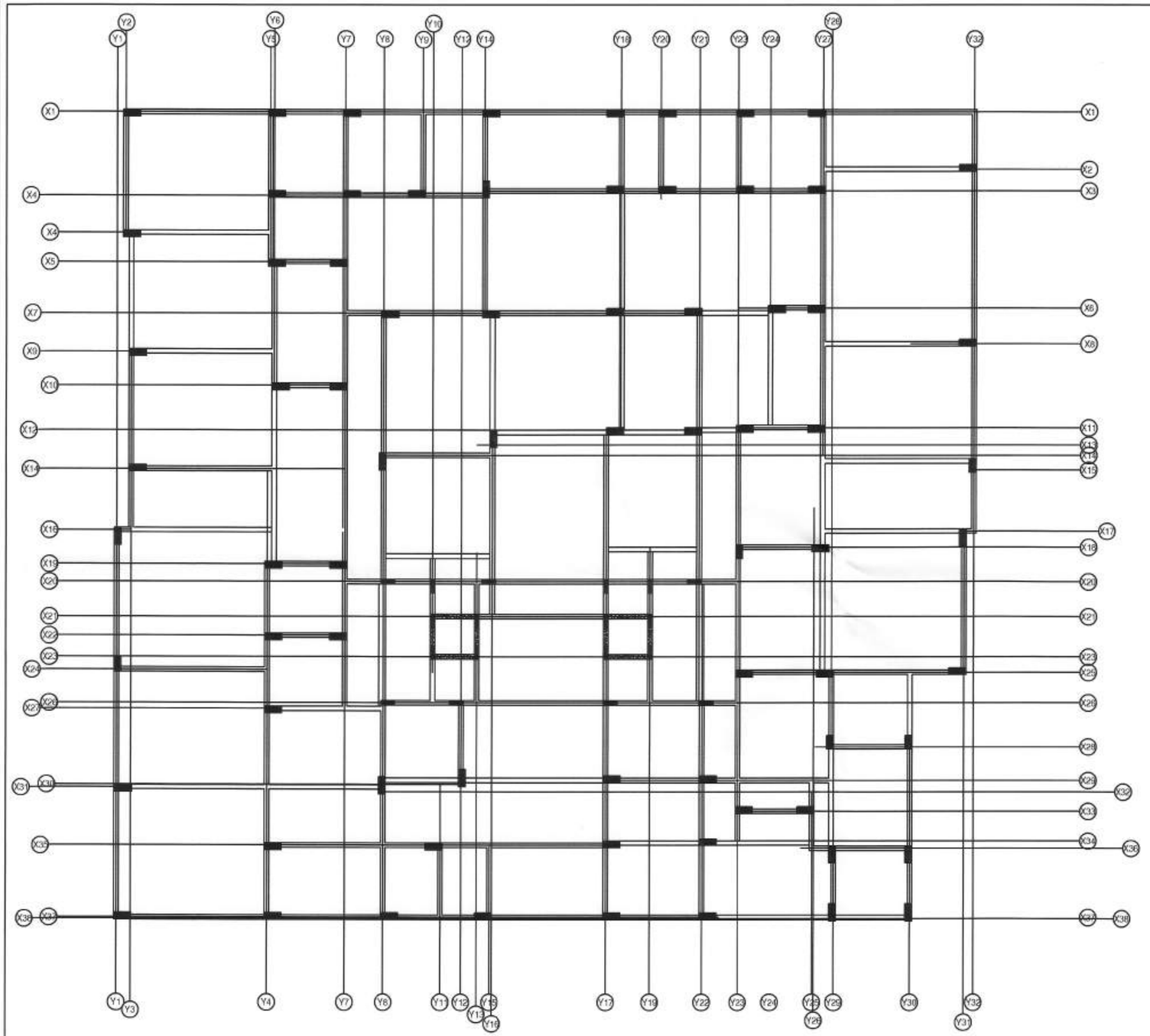
12.1 ROD EQUAL AND ABOVE 20mm DOUBLE BINDING TO BE DONE.

12.2 CHAIR ROD TO BE PROVIDED AT PROPER SPACING NOT MORE THAN 3'0".

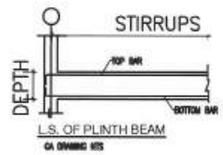
12.3 AT CONSTRUCTION JOINTS A COAT OF SBR-LATEX TO BE APPLIED BEFORE CONCRETING

12.4 COLUMN CAN BE RAISED AFTER 1 COMPLETE DAY FOR CONCRETING.

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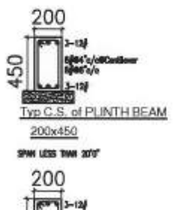


PLINTH BEAM LAYOUT



L.S. OF PLINTH BEAM

CA DRAWING NTS



Typ C.S. of PLINTH BEAM

200x450

SPAN LESS THAN 20'0"



Typ C.S. of PLINTH BEAM

200x600

SPAN GREATER THAN 20'0"

Notes:

1. All drawing should be read along with the relevant Architectural drawings.
2. Grade of R.C.C. Items shall be M30 by design mix confirming to I.S. 456 – 2000 unless otherwise specified
3. All plain and Reinforced Cement Concrete work shall strictly confirm to IS: 456 – 2000
4. Tor 40 steel conforming to I.S 1786 – 1985 Grade – Fe 550
5. Clear cover to steel as follows
   - For footing 50mm
   - For column 40mm
   - For beam 25mm
   - For slab 20mm
6. Lap length for all bars shall be 60 times the dia of the bar unless otherwise Specified
7. Provide 8 ϕ @ 200 c/c as Distribution steel for all top reinforcement
8. Spacer bar to be provided in between two layers of reinforcement of same dia @ every 1000 c/c
9. Cantilever props should not be released until the roof is concreted
10. Removal of Form works
    i) For slabs
    a. Slabs spanning upto 4.5 m – 7days
    b. Slabs spanning over 4.5 m – 14days
    ii) For beams and arches
    a. Beams and arches spanning upto 6m – 14 days
    b. Beams and arches spanning Above 6m – 21 days
11. All reinforcements shall be placed and maintained in the position shown in the drawing (cross section) by proving proper cover Blocks, spacers & supporting bars.
12. First stirrup in the beam is 50mm away from face of support.
13. All dimensions are in Feet and inches unless otherwise specifically stated.
14. Leave dowels wherever necessary.
15. Any discrepancies noted shall be brought to the notice of the structural engineer prior to execution.

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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THE LANDLENS SUITE

Eight ways to know a piece of land before you pay for it.

This report covers one part of the picture. These cover the rest, drawn from the same government records, for any property in Tamil Nadu.

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

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

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

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

PriceMap
What land actually changed hands for around this plot, taken from the registered deeds.
/landlens/pricemap

Build Scope
What you are allowed to build here: floor space, height, coverage and setbacks.
/landlens/build-scope

Property Tracker
Watch a property and hear about it when something new is registered against it.
/landlens/property-tracker

Deal Room
Run the transaction in one place: documents, stamping, signatures and the parties.
/landlens/deal-room

FREE TOOLS · NO ACCOUNT NEEDED

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

Records and verification

The registers themselves, read for you.

- Encumbrance Certificate
- Patta and Chitta
- Field Measurement Sketch
- EC Analyzer
- Bank charge check
- Court case search
- Seller background check
- Approval check by survey

Value and duty

What it is worth and what it costs to register.

- Guideline value by street
- Guideline value by survey
- Stamp duty and registration fees
- Capital gains
- Floor space index
- Area unit converter

Zoning and land use

What the plan says can happen on this land.

- Land use zone finder
- CMDA land use check
- Coastal regulation zone
- Master plan check
- Water bodies finder
- Airport height clearance

Registers and directories

Who holds it, and which office keeps the record.

- Find your registering office
- Temple property check
- Waqf property check
- RERA register

Every free tool
/tools

Services we run for you
/services

The LandLens suite
/landlens/one

Verified RealEstate™

Every claim in this document traces back to a government record.

- Legal opinions, due diligence and title verification
- Building plan, layout and sub-division approvals
- Completion and occupancy certificates, regularisation
- Escrow, negotiation and NRI property management
- Land survey, soil testing, architecture and construction

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