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05-08-2022

CERTIFICATE

THE PROPOSED CONSTRUCITON OF HIGH-RISE BUILDING (HRB) RESIDENTIAL PURPOSE CONSISTING OF EXTENDED BASEMENT FLOOR + STILT FLOOR + 9 FLOORS WITH 54 DU AVAILING WITH PREMIUM FSI, AT TNHB BLOCK NOS. 400, 401, 402 & 403, MANASA APPARTMETNS, SECOND AVENUE, ANNA NAGAR, CHENNAI-600 040. COMPRISED IN SURVEY NO. 207 PART AS PER DOCUMENT AND T.S.NO.91 AS PER PATTA, BLOCK NO. 17 OF KOYAMBEDU VILLAGE, AMINJIKARAI TALUK, GREATER CHENNAI CORPORATION, ZONE-VIII, DIVISION – 99

1. Minimum grade of concrete is M30
2. The design and analysis using the code of practice for loading standards as per IS456, IS875 Part I to V and seismic forces as per code IS 1893, is carried out.

The building will be sound and stable when used for the purpose for which it is designed

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SE / GR-I / 19 / 04 / 087
CMDA Registered Structural Engineer Grade - I
Design Group Engineering Consultants Private Limited
New No.33, Old No. 115, 2nd Floor, Padmanabha Nagar,
5th Street, Adyar, Chennai - 600 020

DESIGN GROUP ENGINEERING CONSULTANTS PRIVATE LTD CHENNAI

THE PROPOSED CONSTRUCITON OF HIGH-RISE BUILDING (HRB) RESIDENTIAL PURPOSE CONSISTING OF EXTENDED BASEMENT FLOOR + STILT FLOOR + 9 FLOORS WITH 54 DU AVAILING WITH PREMIUM FSI, AT TNHB BLOCK NOS. 400, 401, 402 & 403, MANASA APPARTMETNS, SECOND AVENUE, ANNA NAGAR, CHENNAI-600 040. COMPRISED IN SURVEY NO. 207 PART AS PER DOCUMENT AND T.S.NO.91 AS PER PATTA, BLOCK NO. 17 OF KOYAMBEDU VILLAGE, AMINJIKARAI TALUK, GREATER CHENNAI CORPORATION, ZONE-VIII, DIVISION – 99

GENERAL NOTES ON STRUCTURAL DESING

1.0 GENERAL

1.1 DESING BASIS

Residential building having Basement-1 + Stilt + 9 floors.

The design of the building is carried out based on frame analysis using ETABS software.

1.2 CODES AND STANDARDS

All structural design is carried out conforming to the provisions in National building code of India and other relevant Indian Codes and Standards.

1. IS 456 : 2000
2. IS 875 : Part I to V
3. IS 1893 : Part-I 2016
4. IS 13920

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2.0 Design Loads

2.1 Imposed Loads

The imposed loads that are envisaged to act permanently (wherever applicable) are as following: -

Items	Intensity in KN/m² of plan area
Floor Finish + Floor Screed*	1.20
False ceiling + M&E Services (including supporting system)	0.50
325mm Sunken portions in toilets	5.85
Weatherproof course	3.50

*Floor Finish Load due to Tile (12.5mm thick), bedding mortar (12.50mm thick) and 25mm thick screed for all rooms

Self-Weight of Structural Members:

Materials	Unit Weight in kN/m³
Steel	78.50
Plain Concrete	24.00
Reinforced Concrete	25.00
Soil (dry)	18.00
Soil (wet)	20.00
Water	10.00
Porotherm block with plastering	10.00
Block masonry with plastering	22.00
Glass	28.00
Filling for sunken portion with sinder or brick bat where ever filling is required	10.00

The superimposed load or otherwise live load assessed based on the occupancy classifications as per IS: 875 (Part 2) – 1987 is listed as follows: -

Sl.No.	Occupancy classification	UDL kN/m²
1.	Living Room	2.0
2.	Kitchen & Dining	2.0
3.	Foyer & Dressing Room	2.0
4.	Toilet area and bath rooms	2.0
5.	Corridors, balconies & Staircases	3.0
6.	Terrace	1.50

2.2 Wind Load

Wind Loads for structure and elements shall be calculated in accordance with provisions laid in IS: 875-2015(part-3) & basic data as follows.

Description	Data	Remarks
Basic Wind Speed, Vb	50 m/s	IS 875-Part 3 2005 Cl 6.2
Probability factor (Risk co-efficient), k1	1.00	Residential buildings & Structures (for a return period of 50 years)
Terrain Category	2	Exposed Open terrain with Few or No Obstruction
Terrain, height and structure size factor, k2	K2 = 1.0 up to 10m height, k2= 1.07 at 20m height k2= 1.16 at 30m height	As per Structure class & height of structure
Topography factor, k3	1.00	Upwind slope is lesser than 3°
Importance factor for cyclonic region k4	1.00	Clause 6.3.4, IS 875-2015

Design Wind Speed at the height Z Vz = Vb * k1* k2 * k3 * k4

Design Wind pressure at the height Z Pz = 0.6 * Vz2

Wind Directionality Factor Kd =1.0 (Clause 7.2.1)

Area Averaging Factor Ka =0.8 (Clause 7.2.2)

Combination Factor Kc =1.0(Clause7.3.3.13)

Design Wind pressure, Pd = Max ((Kd * Ka * Kc * Pz) or 0.7Pz)

Calculated Wind loads are applied over structure in 0°, 90°,180° and 270° Wind Directions. Application of Wind load shall be as per IS 875-2015.

Force coefficients as per IS 875-part3 2015 Cl 7.4.2.1

Force coefficient (Cf_x) along X direction = 0.95

Force coefficient (Cf_y) along Y direction = 1.15

Floor	Floor height (m)	z	k2	Pd	Pd Ax	Pd Ay	Fx (kN)	Fy (kN)
				kN/m²	(kN)	(kN)	Pd Ax Cfx	Pd Ay Cfy
Parapet	1.2	-	-	-	-	-	-	-
TF	3.01	30.00	1.120	1.505	66.49	252.45	63.17	290.32
9F	3.01	26.99	1.105	1.465	72.01	273.42	68.41	314.43
8F	3.01	23.98	1.090	1.425	70.07	266.02	66.56	305.92
7F	3.01	20.97	1.075	1.386	68.14	258.72	64.74	297.53
6F	3.01	17.96	1.062	1.353	66.50	252.50	63.18	290.37
5F	3.01	14.95	1.050	1.322	64.97	246.66	61.72	283.66
4F	3.01	11.94	1.019	1.247	61.29	232.72	58.23	267.62
3F	3.01	8.93	1.000	1.200	58.98	223.94	56.03	257.54
2F	3.01	5.92	1.000	1.200	58.98	223.94	56.03	257.54
1F	2.91	2.91	1.000	1.200	58.00	220.22	55.10	253.26
GF	0	0.00	1.000	1.200	28.51	108.25	27.09	124.49

2.3 Earthquake Load

Structure and foundation shall be designed to resist the effects of earthquakes in accordance with IS: 1893 (Part-1) - 2016

Structure shall be designed for Design Basis Earthquake (DBE).

Response spectrum method will be used to carry out seismic analysis.

Design acceleration due to earthquake

Horizontal acceleration values of the spectra are obtained from IS: 1893(Part 4) - 2015.

The horizontal seismic co-efficient (Ah) = (Z / 2) x (I / R) x (Sa / g)

Seismic parameters Z, I, R and (Sa/g) are obtained as per table below.

Total horizontal design base shear shall be calculated (VB) = (Ah x W)

Where:

W- Total seismic weight of the building

Seismic Parameters

Item	Office building	
	Value	Reference
Seismic Zone	Zone – III	Annex–E IS : 1893(Part 1)-2016
Zone Factor (z)	0.16	Table 3 Clause 6.4.2 IS : 1893(Part 1)-2016
Importance Factor (I)	1.2	Table 8 IS : 1893(Part 1)-2016
Damping	5 %	Clause 7.2.4 IS : 1893(Part 1)-2016
Design acceleration coefficient	1+15T, T < 0.10 s 2.5, 0.10 s <0.40 s 1.00/T, 0.40 s < T<4.00s 0.25 T > 4.00 s	Clause 6.4.2 For rock and hard stiff soil sites IS: 1893(Part 1)-2016
Response reduction factor (R)	4 (Buildings with RC Ductile Shear Walls with RC OMRFs))	Table 9 Clause 7.2.6 IS: 1893(Part 1)-2016

Fundamental natural time period shall be based on clause 7.6.2(b) of IS 1893(Part 1)2016.

$T_a = 0.075h^{0.75}/\sqrt{A_w} \geq 0.09h/\sqrt{d}$

A_w - Total effective area of walls in the first story of the building.

h – Height of the building as per Cl 7.6.2(a)

d – Basic dimension of the building at the plinth level along the considered direction of earthquake.

Structure with ductile detailing is considered as per IS: 13920 –2016

As footing is supported on rock and hard stiff soil and as per clause 6.3.5.2 and Table 1 of IS 1893 (Part 1): 2016 the increase in Net bearing pressure by 50% for seismic load combination.

2.4 Load Combinations

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

Values of Partial Safety Factor for Loads

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

$ This value is to be considered when stability against overturning or stress reversal is critical Wind load and earthquake load shall be considered for both x & y directions.

DL - Dead load

LL - Live load

WL - Wind load

EL - Earthquake load

Whenever imposed load is combined with earthquake load the appropriate part of imposed load as specified in IS: 1893 – 2016 will be used both for evaluating earthquake effect and for combined load effects used in such combination.

2.5 Serviceability Consideration

2.5.1 Deflection and Sway

For RCC Structure/Elements:

Type	Description	Limit
Vertical Deflection of building elements	Due to all loads including the effects of temperature, creep and shrinkage and measured from as-cast level of the supports of the floors, roofs and all other horizontal members	Span/250
Vertical Deflection of building elements	Due to all loads including the effects of temperature, creep and shrinkage occurring **after** erection of partition and application of finishes	Span/350 or 20mm whichever is less
Lateral Sway of building	Under transient Wind Load sway at top of building (H= Total height of the building)	H /500
Drift	Earthquake force with scale safety factor 1.0	0.001 * Storey height

2.5.2 Crack Width

In general, RCC Superstructure Structures, width of surface crack shall be limited to 0.3mm. For RCC Structural elements which are in contact with Soil and for Water tanks, width of surface crack shall be limited to 0.2mm considering all the elements contact with soil will have membrane water proofing.

3.0 Analysis Methods

3D analysis of the structures is carried out using the ETABS v.17.0.1 for both vertical and lateral load with appropriate loads and its combinations, as per relevant clauses in IS codes, for most unfavorable effects are chosen for design. For earthquake response spectrum dynamic analysis is considered. Pile foundation shall be designed using code IS: 2911-1-2010. Crack width shall be limited to 0.2 mm as mentioned above. Analysis and design shall be carried out using ETABS software as per relevant clauses in IS: 456-2000

4.0 Design Life

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

5.0 Design Methodology

Individual members shall be designed for worst combination of forces such as Axial force, Shear Force, Bending Moment, torsion etc.

RCC structural elements shall be designed using Limit State Method as specified in IS: 456-2000. Ductile detailing shall be as per IS 13920-2016.

6.0 Foundation

Foundation system shall be selected based on the recommendations of detailed soil report. As per the report, Pile Foundation is recommended. Water table is located at 2.40m below NGL level.

Piles of 600mm diameter, 21m length and vertical capacity of 1350kN, horizontal capacity of 75.0kN is considered in the design.

7.0 Materials

7.1 Concrete

Concrete item	Grade	Max. Size of Aggregate (mm)	Type of cement
Pile / Pile cap	M30	20	OPC/PPC
Column/Shear wall	M30	20	OPC/PPC
Retaining wall	M30	20	OPC/PPC
Conventional Beams	M30	20	OPC/PPC
Conventional Slab	M30	20	OPC/PPC
Lintels, mullions & nonstructural elements	M30	20	OPC/PPC

Normal weight aggregates shall be considered for all concrete works.

7.2 Nominal cover to Reinforcement

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

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

Moderate - 30mm

However, for Two-hour fire resistance requirement, the nominal cover to reinforcement for various elements shall be as follows: -

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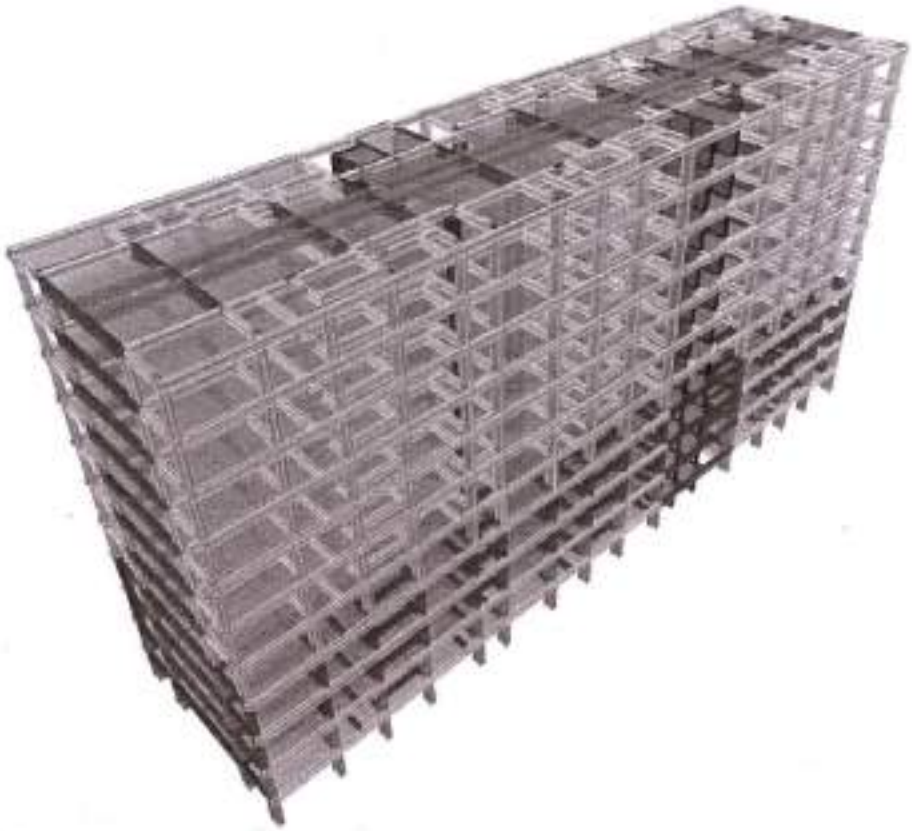
Slabs	-	35 mm for simply supported
		25 mm for continuous
Beams	-	40 mm for simply supported
		30 mm for continuous
Retaining wall	-	30 mm
Columns / Shear wall	-	40 mm or diameter of largest bar,
		Whichever is greater

The Nominal cover to main reinforcement in footings shall be as 50mm. For any other elements not specified above, clear cover shall be as per the clause 26.4 of IS: 456-2000.

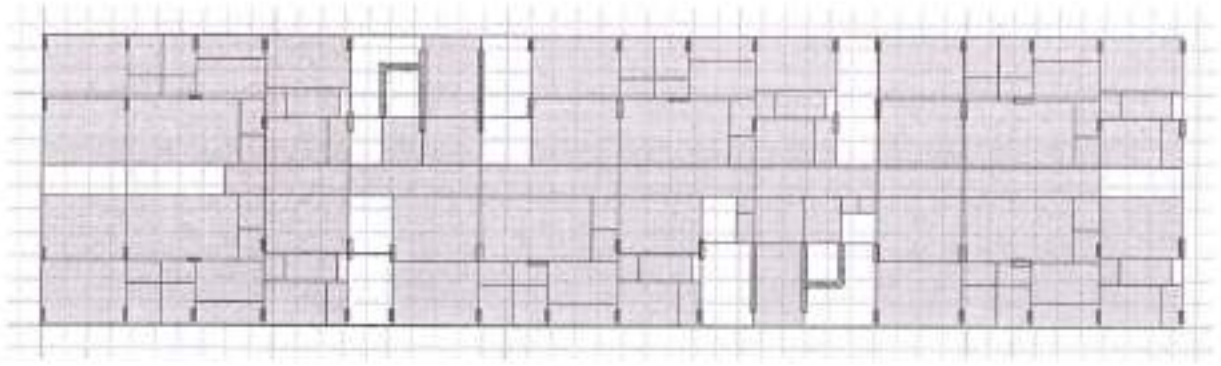
On behalf of CMDA HRB Panel committee, the Structural design calculations are generally reviewed.

29/8/22

Superintending Engineer, P.W.D.
Planning and Designs Circle,
Chepauk, Chennai-5.



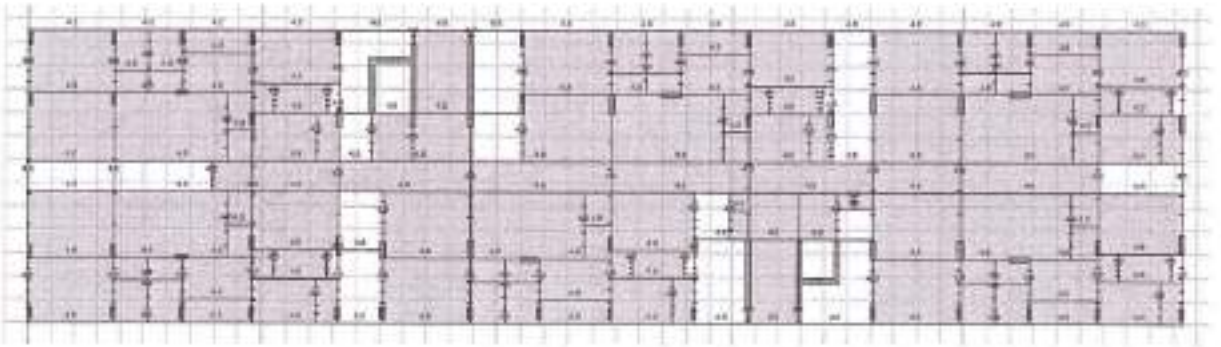
3D- View of MANASA Apartment – ETABS model



ETABS - TYPICAL FRAMING PLAN



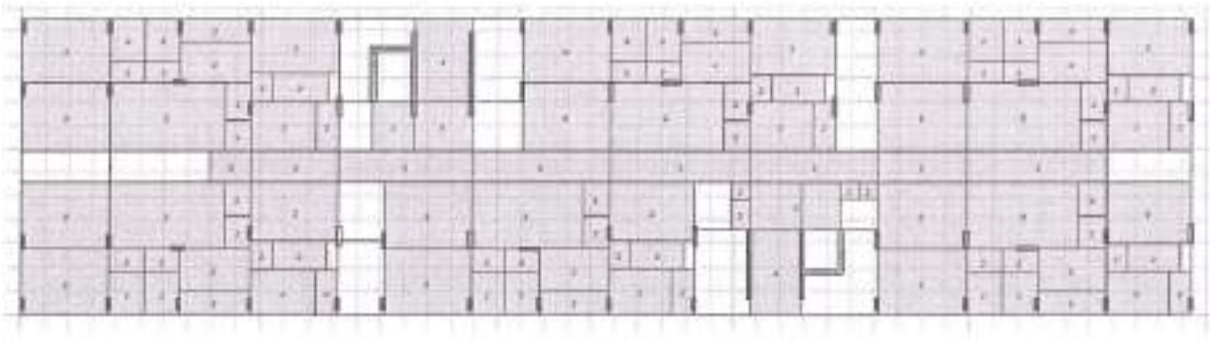
ETABS - TYPICAL FRAMING SECTIONS



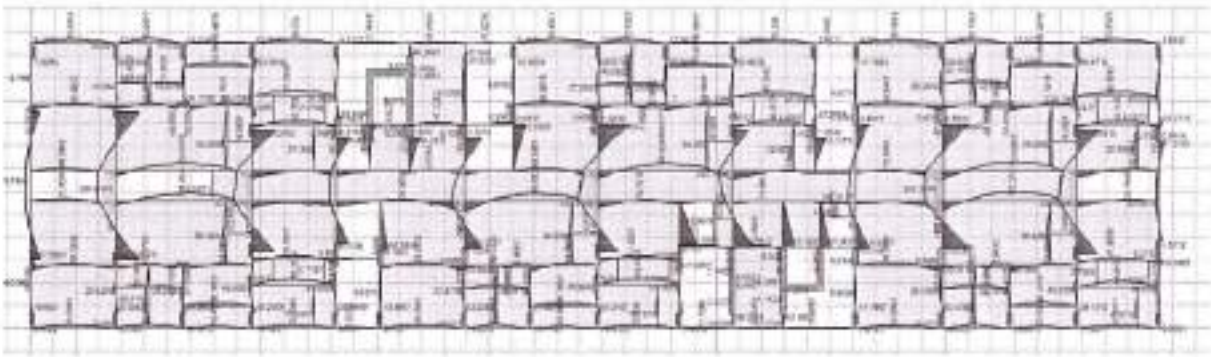
ETABS - TYPICAL WALL LOADS APPLIED



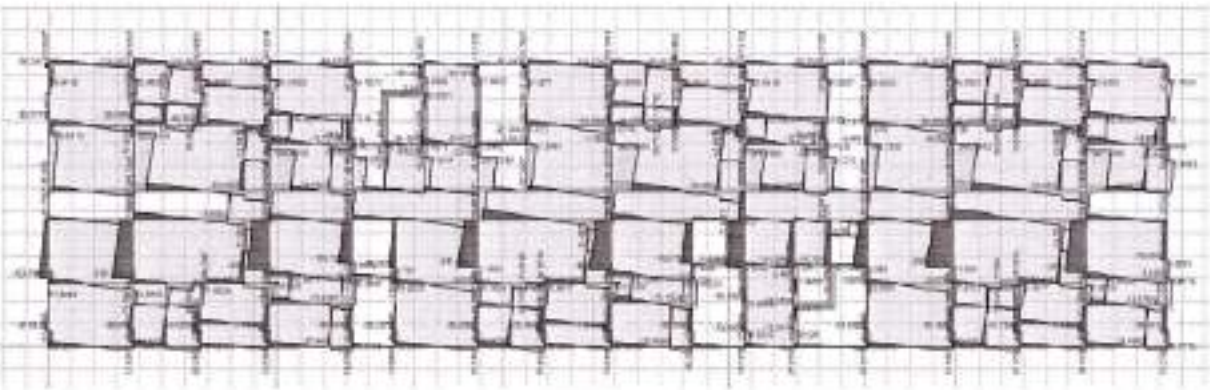
ETABS - TYPICAL DEAD IMPOSED LOADS APPLIED



ETABS – TYPICAL LIVE LOAD APPLIED



ETABS - BENDING MOMENT DIAGRAM



ETABS - SHEAR FORCE DIAGRAM

TYPICAL PILE CAP DESIGN CALCULATION

PILECAP DESIGN SUMMARY

Design Code : IS 456 : 2000 + IS 13920 : 2016

Pile Cap:	PC28 Etabs ID, Numeration Id - PC2
Column:	C28 (300 x 750)
No. of Piles:	1
Piles Dia:	600
Concrete Grade:	M30
Steel Grade:	Fe500
Max load on Pile (Compression):	1350 kN
Max load on Pile (Tension):	600 kN
Max load on Pile (Shear):	75 kN

Size (LxBxD)	Bot @ L	Bot @ B	Top @ L	Top @ B	Shear @ L	Shear @ B	SFR
900 x 900 x 600	T10 @ 130	T10 @ 130	T10 @ 215	T10 @ 215	-	-	2-T10

Pile Cap:	PC29
Column:	C29,C30,C31,C34,C35,C36,C39,C40,C41,C25,C16,C2,C3,C4,C7,C8,C9,C12,C13,C14 (300 x 750)
No. of Piles:	2
Piles Dia:	600
Concrete Grade:	M30
Steel Grade:	Fe500
Max load on Pile (Compression) :	1350 kN
Max load on Pile (Tension):	600 kN
Max load on Pile (Shear):	75 kN

Size (LxBxD)	Bot @ L	Bot @ B	Top @ L	Top @ B	Shear @ L	Shear @ B	SFR
2400 x 900 x 600	T32 @ 140	T10 @ 130	T10 @ 215	T10 @ 215	-	-	2-T10

Pile Cap:	PC32
Column:	C32 (300 x 750)
No. of Piles:	1
Piles Dia:	600
Concrete Grade:	M30
Steel Grade:	Fe500
Max load on Pile (Compression):	1350 kN

Max load on Pile (Tension): 600 kN

Max load on Pile (Shear): 75 kN

Size (LxBxD)	Bot @ L	Bot @ B	Top @ L	Top @ B	Shear @ L	Shear @ B	SFR
900 x 900 x 600	T10 @ 130	T10 @ 130	T10 @ 215	T10 @ 215	-	-	2-T10

Pile Cap: PC33

Column: C33 (300 x 750)

No. of Piles: 1

Piles Dia: 600

Concrete Grade: M30

Steel Grade: Fe500

Max load on Pile (Compression): 1350 kN

Max load on Pile (Tension): 600 kN

Max load on Pile (Shear): 75 kN

Size (LxBxD)	Bot @ L	Bot @ B	Top @ L	Top @ B	Shear @ L	Shear @ B	SFR
900 x 900 x 600	T10 @ 130	T10 @ 130	T10 @ 215	T10 @ 215	-	-	2-T10

Pile Cap: PC37

Column: C37 (300 x 750)

No. of Piles: 1

Piles Dia: 600

Concrete Grade: M30

Steel Grade: Fe500

Max load on Pile (Compression): 1350 kN

Max load on Pile (Tension): 600 kN

Max load on Pile (Shear): 75 kN

Size (LxBxD)	Bot @ L	Bot @ B	Top @ L	Top @ B	Shear @ L	Shear @ B	SFR
900 x 900 x 600	T10 @ 130	T10 @ 130	T10 @ 215	T10 @ 215	-	-	2-T10

Pile Cap: PC38

Column: C38 (300 x 750)

No. of Piles: 1

Piles Dia: 600

Concrete Grade: M30

Steel Grade: Fe500

Max load on Pile (Compression): 1350 kN

Max load on Pile (Tension):	600 kN
Max load on Pile (Shear):	75 kN

Size (LxBxD)	Bot @ L	Bot @ B	Top @ L	Top @ B	Shear @ L	Shear @ B	SFR
900 x 900 x 600	T10 @ 130	T10 @ 130	T10 @ 215	T10 @ 215	-	-	2-T10

Pile Cap:	PC42
Column:	C42 (300 x 750)
No. of Piles:	1
Piles Dia:	600
Concrete Grade:	M30
Steel Grade:	Fe500
Max load on Pile (Compression):	1350 kN
Max load on Pile (Tension):	600 kN
Max load on Pile (Shear):	75 kN

Size (LxBxD)	Bot @ L	Bot @ B	Top @ L	Top @ B	Shear @ L	Shear @ B	SFR
900 x 900 x 600	T10 @ 130	T10 @ 130	T10 @ 215	T10 @ 215	-	-	2-T10

Pile Cap:	PC26
Column:	C26,C23,C20,C21,C19,C17 (300 x 750)
No. of Piles:	3
Piles Dia:	600
Concrete Grade:	M30
Steel Grade:	Fe500
Max load on Pile (Compression):	1350 kN
Max load on Pile (Tension):	600 kN
Max load on Pile (Shear):	75 kN

Size (LxBxD)	Bot @ L	Bot @ B	Top @ L	Top @ B	Shear @ L	Shear @ B	SFR
2019.62 tri x 1200	T25 @ 135	T20 @ 105	T10 @ 215	T10 @ 215	-	-	4-T10

Pile Cap:	PC27
Column:	C27 (300 x 750)
No. of Piles:	2
Piles Dia:	600
Concrete Grade:	M30
Steel Grade:	Fe500
Max load on Pile (Compression):	1350 kN

Max load on Pile (Tension):	600 kN
Max load on Pile (Shear):	75 kN

Size (LxBxD)	Bot @ L	Bot @ B	Top @ L	Top @ B	Shear @ L	Shear @ B	SFR
2400 x 900 x 600	T32 @ 125	T10 @ 130	T10 @ 215	T10 @ 215	-	-	2-T10

Pile Cap:	PP27
Column:	P27 (230 x 1000)
No. of Piles:	2
Piles Dia:	600
Concrete Grade:	M30
Steel Grade:	Fe500
Max load on Pile (Compression):	1350 kN
Max load on Pile (Tension):	600 kN
Max load on Pile (Shear):	75 kN

Size (LxBxD)	Bot @ L	Bot @ B	Top @ L	Top @ B	Shear @ L	Shear @ B	SFR
2400 x 900 x 600	T25 @ 130	T10 @ 130	T10 @ 215	T10 @ 215	-	-	2-T10

Pile Cap:	PP30
Column:	P30 (300 x 1000)
No. of Piles:	2
Piles Dia:	600
Concrete Grade:	M30
Steel Grade:	Fe500
Max load on Pile (Compression):	1350 kN
Max load on Pile (Tension):	600 kN
Max load on Pile (Shear):	75 kN

Size (LxBxD)	Bot @ L	Bot @ B	Top @ L	Top @ B	Shear @ L	Shear @ B	SFR
2400 x 900 x 600	T25 @ 135	T10 @ 130	T10 @ 215	T10 @ 215	-	-	2-T10

Pile Cap:	PP25
Column:	P25 (230 x 980)
No. of Piles:	2
Piles Dia:	600
Concrete Grade:	M30
Steel Grade:	Fe500
Max load on Pile (Compression):	1350 kN

Max load on Pile (Tension): 600 kN

Max load on Pile (Shear): 75 kN

Size (LxBxD)	Bot @ L	Bot @ B	Top @ L	Top @ B	Shear @ L	Shear @ B	SFR
2400 x 900 x 600	T20 @ 100	T10 @ 130	T10 @ 215	T10 @ 215	-	-	2-T10

Pile Cap: PP29

Column: P29 (230 x 980)

No. of Piles: 2

Piles Dia: 600

Concrete Grade: M30

Steel Grade: Fe500

Max load on Pile (Compression): 1350 kN

Max load on Pile (Tension): 600 kN

Max load on Pile (Shear): 75 kN

Size (LxBxD)	Bot @ L	Bot @ B	Top @ L	Top @ B	Shear @ L	Shear @ B	SFR
2400 x 900 x 600	T25 @ 135	T10 @ 130	T10 @ 215	T10 @ 215	-	-	2-T10

Pile Cap: PP3

Column: P3 (300 x 980)

No. of Piles: 3

Piles Dia: 600

Concrete Grade: M30

Steel Grade: Fe500

Max load on Pile (Compression): 1350 kN

Max load on Pile (Tension): 600 kN

Max load on Pile (Shear): 75 kN

Size (LxBxD)	Bot @ L	Bot @ B	Top @ L	Top @ B	Shear @ L	Shear @ B	SFR
2019.62 tri x 700	3#T32 @ 130	2#T25 @ 100	T10 @ 185	T10 @ 185	-	-	3-T10

Pile Cap: PP26

Column: P26 (300 x 1000)

No. of Piles: 4

Piles Dia: 600

Concrete Grade: M30

Steel Grade: Fe500



Max load on Pile (Compression): 1350 kN

Max load on Pile (Tension): 600 kN

Max load on Pile (Shear): 75 kN

Size (LxBxD)	Bot @ L	Bot @ B	Top @ L	Top @ B	Shear @ L	Shear @ B	SFR
2400 x 2400 x 700	T20 @ 130	2#T32 @ 125	T10 @ 185	T10 @ 185	-	-	3-T10

Pile Cap: PC22

Column: C22,C24 (300 x 750)

No. of Piles: 4

Piles Dia: 600

Concrete Grade: M30

Steel Grade: Fe500

Max load on Pile (Compression): 1350 kN

Max load on Pile (Tension): 600 kN

Max load on Pile (Shear): 75 kN

Size (LxBxD)	Bot @ L	Bot @ B	Top @ L	Top @ B	Shear @ L	Shear @ B	SFR
2400 x 2400 x 700	T25 @ 105	2#T32 @ 115	T10 @ 185	T10 @ 185	-	-	3-T10

Pile Cap: PP21

Column: P21 (230 x 1000)

No. of Piles: 2

Piles Dia: 600

Concrete Grade: M30

Steel Grade: Fe500

Max load on Pile (Compression): 1350 kN

Max load on Pile (Tension): 600 kN

Max load on Pile (Shear): 75 kN

Size (LxBxD)	Bot @ L	Bot @ B	Top @ L	Top @ B	Shear @ L	Shear @ B	SFR
2400 x 900 x 600	T25 @ 105	T10 @ 130	T10 @ 215	T10 @ 215	-	-	2-T10

Pile Cap: PP28

Column: P28 (230 x 1000)

No. of Piles: 2

Piles Dia: 600

Concrete Grade: M30

Steel Grade: Fe500
Max load on Pile (Compression): 1350 kN
Max load on Pile (Tension): 600 kN
Max load on Pile (Shear): 75 kN

Size (LxBxD)	Bot @ L	Bot @ B	Top @ L	Top @ B	Shear @ L	Shear @ B	SFR
2400 x 900 x 600	T25 @ 115	T10 @ 130	T10 @ 215	T10 @ 215	-	-	2-T10

Pile Cap: PP31
Column: P31 (230 x 1000)
No. of Piles: 2
Piles Dia: 600
Concrete Grade: M30
Steel Grade: Fe500
Max load on Pile (Compression): 1350 kN
Max load on Pile (Tension): 600 kN
Max load on Pile (Shear): 75 kN

Size (LxBxD)	Bot @ L	Bot @ B	Top @ L	Top @ B	Shear @ L	Shear @ B	SFR
2400 x 900 x 600	T25 @ 130	T10 @ 130	T10 @ 215	T10 @ 215	-	-	2-T10

Pile Cap: PP20
Column: P20 (230 x 1000)
No. of Piles: 2
Piles Dia: 600
Concrete Grade: M30
Steel Grade: Fe500
Max load on Pile (Compression): 1350 kN
Max load on Pile (Tension): 600 kN
Max load on Pile (Shear): 75 kN

Size (LxBxD)	Bot @ L	Bot @ B	Top @ L	Top @ B	Shear @ L	Shear @ B	SFR
2400 x 900 x 600	T20 @ 105	T10 @ 130	T10 @ 215	T10 @ 215	-	-	2-T10

Pile Cap: PP10
Column: P10 (230 x 1000)
No. of Piles: 2
Piles Dia: 600
Concrete Grade: M30

Steel Grade:	Fe500
Max load on Pile (Compression):	1350 kN
Max load on Pile (Tension):	600 kN
Max load on Pile (Shear):	75 kN

Size (LxBxD)	Bot @ L	Bot @ B	Top @ L	Top @ B	Shear @ L	Shear @ B	SFR
2400 x 900 x 600	T32 @ 145	T10 @ 130	T10 @ 215	T10 @ 215	-	-	2-T10

Pile Cap:	PP14
Column:	P14 (230 x 1000)
No. of Piles:	2
Piles Dia:	600
Concrete Grade:	M30
Steel Grade:	Fe500
Max load on Pile (Compression):	1350 kN
Max load on Pile (Tension):	600 kN
Max load on Pile (Shear):	75 kN

Size (LxBxD)	Bot @ L	Bot @ B	Top @ L	Top @ B	Shear @ L	Shear @ B	SFR
2400 x 900 x 600	T25 @ 110	T10 @ 130	T10 @ 215	T10 @ 215	-	-	2-T10

Pile Cap:	PP12
Column:	P12 (300 x 1000)
No. of Piles:	3
Piles Dia:	600
Concrete Grade:	M30
Steel Grade:	Fe500
Max load on Pile (Compression):	1350 kN
Max load on Pile (Tension):	600 kN
Max load on Pile (Shear):	75 kN

Size (LxBxD)	Bot @ L	Bot @ B	Top @ L	Top @ B	Shear @ L	Shear @ B	SFR
2019.62 tri x 650	3#T32 @ 115	2#T25 @ 110	T10 @ 200	T10 @ 200	-	-	3-T10

Pile Cap:	PP18
Column:	P18 (230 x 1000)
No. of Piles:	2
Piles Dia:	600

Concrete Grade: M30
Steel Grade: Fe500
Max load on Pile (Compression): 1350 kN
Max load on Pile (Tension): 600 kN
Max load on Pile (Shear): 75 kN

Size (LxBxD)	Bot @ L	Bot @ B	Top @ L	Top @ B	Shear @ L	Shear @ B	SFR
2400 x 900 x 600	T20 @ 100	T10 @ 130	T10 @ 215	T10 @ 215	-	-	2-T10

Pile Cap: PP19
Column: P19 (300 x 1000)
No. of Piles: 4
Piles Dia: 600
Concrete Grade: M30
Steel Grade: Fe500
Max load on Pile (Compression): 1350 kN
Max load on Pile (Tension): 600 kN
Max load on Pile (Shear): 75 kN

Size (LxBxD)	Bot @ L	Bot @ B	Top @ L	Top @ B	Shear @ L	Shear @ B	SFR
2400 x 2400 x 700	T20 @ 110	2#T32 @ 100	T10 @ 185	T10 @ 185	-	-	3-T10

Pile Cap: PP11
Column: P11 (230 x 890)
No. of Piles: 2
Piles Dia: 600
Concrete Grade: M30
Steel Grade: Fe500
Max load on Pile (Compression): 1350 kN
Max load on Pile (Tension): 600 kN
Max load on Pile (Shear): 75 kN

Size (LxBxD)	Bot @ L	Bot @ B	Top @ L	Top @ B	Shear @ L	Shear @ B	SFR
2400 x 900 x 600	T20 @ 105	T10 @ 130	T10 @ 215	T10 @ 215	-	-	2-T10

Pile Cap: PC18
Column: C18 (300 x 750)
No. of Piles: 2

Piles Dia:	600
Concrete Grade:	M30
Steel Grade:	Fe500
Max load on Pile (Compression):	1350 kN
Max load on Pile (Tension):	600 kN
Max load on Pile (Shear):	75 kN

Size (LxBxD)	Bot @ L	Bot @ B	Top @ L	Top @ B	Shear @ L	Shear @ B	SFR
2400 x 900 x 600	T32 @ 130	T10 @ 130	T10 @ 215	T10 @ 215	-	-	2-T10

Pile Cap:	PP13
Column:	P13 (230 x 1000)
No. of Piles:	2
Piles Dia:	600
Concrete Grade:	M30
Steel Grade:	Fe500
Max load on Pile (Compression):	1350 kN
Max load on Pile (Tension):	600 kN
Max load on Pile (Shear):	75 kN

Size (LxBxD)	Bot @ L	Bot @ B	Top @ L	Top @ B	Shear @ L	Shear @ B	SFR
2400 x 900 x 600	T25 @ 135	T10 @ 130	T10 @ 215	T10 @ 215	-	-	2-T10

Pile Cap:	PP2
Column:	P2 (300 x 1000)
No. of Piles:	2
Piles Dia:	600
Concrete Grade:	M30
Steel Grade:	Fe500
Max load on Pile (Compression):	1350 kN
Max load on Pile (Tension):	600 kN
Max load on Pile (Shear):	75 kN

Size (LxBxD)	Bot @ L	Bot @ B	Top @ L	Top @ B	Shear @ L	Shear @ B	SFR
2400 x 900 x 600	T25 @ 130	T10 @ 130	T10 @ 215	T10 @ 215	-	-	2-T10

Pile Cap:	PC1
Column:	C1 (300 x 750)
No. of Piles:	1

Piles Dia: 600
Concrete Grade: M30
Steel Grade: Fe500
Max load on Pile (Compression): 1350 kN
Max load on Pile (Tension): 600 kN
Max load on Pile (Shear): 75 kN

Size (LxBxD)	Bot @ L	Bot @ B	Top @ L	Top @ B	Shear @ L	Shear @ B	SFR
900 x 900 x 600	T10 @ 130	T10 @ 130	T10 @ 215	T10 @ 215	-	-	2-T10

Pile Cap: PC5
Column: C5 (300 x 750)
No. of Piles: 1
Piles Dia: 600
Concrete Grade: M30
Steel Grade: Fe500
Max load on Pile (Compression): 1350 kN
Max load on Pile (Tension): 600 kN
Max load on Pile (Shear): 75 kN

Size (LxBxD)	Bot @ L	Bot @ B	Top @ L	Top @ B	Shear @ L	Shear @ B	SFR
900 x 900 x 600	T10 @ 130	T10 @ 130	T10 @ 215	T10 @ 215	-	-	2-T10

Pile Cap: PC6
Column: C6 (300 x 750)
No. of Piles: 1
Piles Dia: 600
Concrete Grade: M30
Steel Grade: Fe500
Max load on Pile (Compression): 1350 kN
Max load on Pile (Tension): 600 kN
Max load on Pile (Shear): 75 kN

Size (LxBxD)	Bot @ L	Bot @ B	Top @ L	Top @ B	Shear @ L	Shear @ B	SFR
900 x 900 x 600	T10 @ 130	T10 @ 130	T10 @ 215	T10 @ 215	-	-	2-T10

Pile Cap: PC10
Column: C10 (300 x 750)
No. of Piles: 1

Piles Dia:	600
Concrete Grade:	M30
Steel Grade:	Fe500
Max load on Pile (Compression):	1350 kN
Max load on Pile (Tension):	600 kN
Max load on Pile (Shear):	75 kN

Size (LxBxD)	Bot @ L	Bot @ B	Top @ L	Top @ B	Shear @ L	Shear @ B	SFR
900 x 900 x 600	T10 @ 130	T10 @ 130	T10 @ 215	T10 @ 215	-	-	2-T10

Pile Cap:	PC11
Column:	C11 (300 x 750)
No. of Piles:	1
Piles Dia:	600
Concrete Grade:	M30
Steel Grade:	Fe500
Max load on Pile (Compression):	1350 kN
Max load on Pile (Tension):	600 kN
Max load on Pile (Shear):	75 kN

Size (LxBxD)	Bot @ L	Bot @ B	Top @ L	Top @ B	Shear @ L	Shear @ B	SFR
900 x 900 x 600	T10 @ 130	T10 @ 130	T10 @ 215	T10 @ 215	-	-	2-T10

Pile Cap:	PC15
Column:	C15 (300 x 750)
No. of Piles:	1
Piles Dia:	600
Concrete Grade:	M30
Steel Grade:	Fe500
Max load on Pile (Compression):	1350 kN
Max load on Pile (Tension):	600 kN
Max load on Pile (Shear):	75 kN

Size (LxBxD)	Bot @ L	Bot @ B	Top @ L	Top @ B	Shear @ L	Shear @ B	SFR
900 x 900 x 600	T10 @ 130	T10 @ 130	T10 @ 215	T10 @ 215	-	-	2-T10

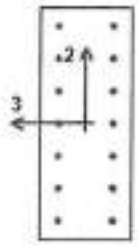


TYPICAL COLUMN DESIGN

CALCULATION FROM ETABS

ETABS Concrete Frame Design

IS 456:2000 Column Section Design



Column Element Details Type: Ductile Frame (Summary)

Level	Element	Unique Name	Section ID	Combo ID	Station Loc	Length (mm)	LLRF
GF	C26	424	C300X750-M40	Comb1	2260	2910	0.6

Section Properties

b (mm)	h (mm)	dc (mm)	Cover (Torsion) (mm)
300	750	60	30

Material Properties

E_c (MPa)	f_{ck} (MPa)	Lt.Wt Factor (Unitless)	f_y (MPa)	f_{ys} (MPa)
31622	40	1	500	415

Design Code Parameters

γ_c	γ_s
1.5	1.15

Axial Force and Biaxial Moment Design For P_u , M_{u2} , M_{u3}

Design P_u kN	Design M_{u2} kN-m	Design M_{u3} kN-m	Minimum M_2 kN-m	Minimum M_3 kN-m	Rebar Area mm²	Rebar % %
5012.801	146.1775	-183.5314	100.256	147.9779	7015	3.12

Axial Force and Biaxial Moment Factors

	K Factor Unitless	Length mm	Initial Moment kN-m	Additional Moment kN-m	Minimum Moment kN-m
Major Bend(M3)	1.75	2260	-73.4125	0	147.9779
Minor Bend(M2)	1.75	2260	-0.348	45.9215	100.256

Shear Design for V_{u2} , V_{u3}

	Shear V_u kN	Shear V_c kN	Shear V_s kN	Shear V_p kN	Rebar A_{sv} /s mm²/m
Major, V_{u2}	126.4213	257.3712	82.8002	247.7184	332.53
Minor, V_{u3}	0.7231	235.3618	72.0006	36.5759	831.33

Joint Shear Check/Design

	Joint Shear Force kN	Shear V_{Top} kN	Shear $V_{u,Tot}$ kN	Shear V_c kN	Joint Area cm^2	Shear Ratio Unitless
Major Shear, V_{u2}	N/A	N/A	N/A	N/A	N/A	N/A
Minor Shear, V_{u3}	N/A	N/A	N/A	N/A	N/A	N/A

(1.4) Beam/Column Capacity Ratio

Major Ratio	Minor Ratio
N/A	N/A

Additional Moment Reduction Factor k (IS 39.7.1.1)

A_g cm^2	A_{sc} cm^2	P_{uz} kN	P_b kN	P_u kN	k Unitless
2250	70	6675.9479	1942.9418	5012.801	0.351393

Additional Moment (IS 39.7.1)

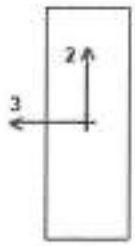
	Consider M_s	Length Factor	Section Depth (mm)	KL/Depth Ratio	KL/Depth Limit	KL/Depth Exceeded	M_s Moment (kN-m)
Major Bending (M_3)	Yes	0.777	750	5.273	12	No	0
Minor Bending (M_2)	Yes	0.777	300	13.183	12	Yes	130.6639

TYPICAL BEAM DESIGN

CALCULATION FROM ETABS

ETABS Concrete Frame Design

IS 456:2000 Beam Section Design



Beam Element Details Type: Ordinary Frame (Summary)

Level	Element	Unique Name	Section ID	Combo ID	Station Loc	Length (mm)	LLRF
2F	B143	4421	B230X650-M30	Comb7	0	6060	1

Section Properties

b (mm)	h (mm)	b_f (mm)	d_s (mm)	d_{ct} (mm)	d_{cb} (mm)
230	650	230	0	50	50

Material Properties

E_c (MPa)	f_{ck} (MPa)	LtWt Factor (Unitless)	f_y (MPa)	f_{ys} (MPa)
27386	30	1	500	415

Design Code Parameters

γ_C	γ_S
1.5	1.15

Factored Forces and Moments

Factored M_{u3} kN-m	Factored T_u kN-m	Factored V_{u2} kN	Factored P_u kN
-394.3157	0.0304	265.7395	0

Design Moments, M_{u3} & M_t

Factored Moment kN-m	Factored M_t kN-m	Positive Moment kN-m	Negative Moment kN-m
-394.3157	0.0683	0	-394.384

Design Moment and Flexural Reinforcement for Moment, M_{u3} & T_u

	Design -Moment kN-m	Design +Moment kN-m	-Moment Rebar mm²	+Moment Rebar mm²	Minimum Rebar mm²	Required Rebar mm²
Top (+2 Axis)	-394.384		1834	0	1834	235
Bottom (-2 Axis)		0	277	0	277	0

Shear Force and Reinforcement for Shear, V_{u2} & T_u

Shear V_e kN	Shear V_c kN	Shear V_s kN	Shear V_p kN	Rebar A_{sv} /s mm²/m
265.7395	100.1565	165.7941	107.4983	785.72

Torsion Force and Torsion Reinforcement for Torsion, T_u & V_{u2}

T_u kN-m	V_u kN	Core b_1 mm	Core d_1 mm	Rebar A_{svt} /s mm²/m
0.0193	265.7395	150	570	0

TYPICAL SLAB DESIGN

CALCULATION

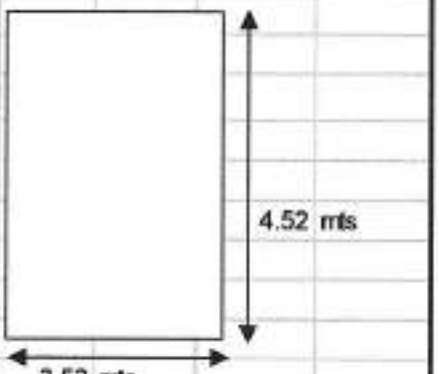
Project:	MANASA APARTMENTS				Date:	05.08.2022
Designed:	KALAI	Checked:	MP	Comments:		

DESIGN OF TWO WAY SLAB

SLAB ID: S1

Clear dimensions:

Short span	S=	3.52	mts	3.43	
Long span	L=	4.52	mts	4.43	
Assumed slab thickness	t=	0.125	mts	greater than 'min. eff depth reqd'. Hence ok	
Grade of concrete	fck=	30	N/mm^2		
Grade of reinforcement	fy=	500	N/mm^2		



Type of panel	Two adjacent sides discontinuo				
Loads					
Self weight of slab	w1=	3.13	kN/m^2		
Floor finish	w2=	1.70	kN/m^2		
Live load	w3=	2.00	kN/m^2		
Wall load	w4=		kN/m^2		
Filling Load	w5=		kN/m^2	TOTAL	
Miscellaneous	w6=		kN/m^2	6.83	
				kN/m^2	
Ratio of long span to short span			R=	1.3	
Design Load with load factor of 1.5			Wu=	10.24	kN/m^2

Design

	Coeff	BM	k	pt	Ast	Dia	Spacing	d
Short span direction								
Negative moment at continuous edge	0.065	8.25	0.90	0.21	205	8	245	96
Positive moment at midspan	0.049	6.22	0.67	0.16	153	8	329	96
Long span direction								
Negative moment at continuous edge	0.047	5.97	0.77	0.18	161	8	313	88
Positive moment at midspan	0.035	4.44	0.57	0.13	150	8	335	88

Minimum effective depth reqd	dre=	44.64	mm	
Clear cover to top reinforcement	c=	25	mm	
Clear cover to bottom reinforcement	c=	25	mm	
Minimum effective depth provided	dpr=	88	mm	greater than 'min. eff depth reqd'. Hence ok
Minimum reinforcement	Amin=	150	mm^2	

Deflection check

Reinf provided at midspan along short direction		335.10	mm^2	Dia	8	at	150	mm
Stress in reinforcement	fs=	132.41	N/mm^2					
Percentage of reinforcement provided	pt=	0.35	%					
Modification factor as per fig 4 of IS:456-2000	MF=	2.000						
Basic span to effective depth ratio		23.7						
Minimum effective depth reqd from deflection criteria		74.28	mm					
Effective depth provided		96	mm	greater than 'min. eff depth reqd'. Hence ok				

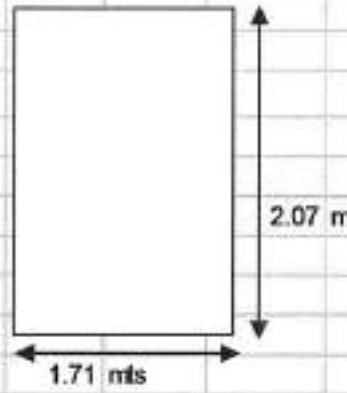
Project:	MANASA APARTMENTS				Date:	05.08.2022
Designed:	KALAI	Checked:	MP	Comments:		

DESIGN OF TWO WAY SLAB

SLAB ID: S2

Clear dimensions:

Short span	S=	1.71	mts	1.62	
Long span	L=	2.07	mts	1.98	
Assumed slab thickness	t=	0.125	mts	greater than 'min. eff depth reqd'. Hence ok	
Grade of concrete	fck=	30	N/mm^2		
Grade of reinforcement	fy=	500	N/mm^2		



Type of panel Four edges discontinuous

Loads

Self weight of slab	w 1=	3.13	kN/m^2		
Floor finish	w 2=	7.70	kN/m^2		
Live load	w 3=	2.00	kN/m^2		
Wall load	w 4=		kN/m^2		
Filling Load	w 5=		kN/m^2	TOTAL	
Miscellaneous	w 6=		kN/m^2	12.83	
				kN/m^2	
Ratio of long span to short span			R=	1.25	
Design Load with load factor of 1.5			Wu=	19.24	kN/m^2

Design

	Coeff	BM	k	pt	Ast	Dia	Spacing	d
Short span direction								
Negative moment at continuous edge	0	0.00	0.00	0.00	150	8	335	96
Positive moment at midspan	0.076	4.28	0.46	0.11	150	8	335	96
Long span direction								
Negative moment at continuous edge	0	0.00	0.00	0.00	150	8	335	88
Positive moment at midspan	0.056	3.15	0.41	0.10	150	8	335	88

Minimum effective depth reqd	dre=	32.15	mm	
Clear cover to top reinforcement	c=	25	mm	
Clear cover to bottom reinforcement	c=	25	mm	
Minimum effective depth provided	dpr=	88	mm	greater than 'min. eff depth reqd'. Hence ok
Minimum reinforcement	Amin=	150	mm^2	

Deflection check

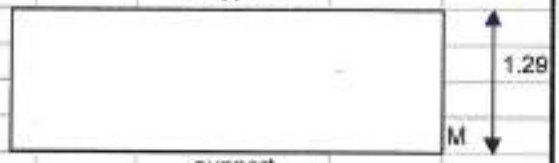
Reinf provided at midspan along short direction	251.33	mm^2	Dia	8	at	200	mm
Stress in reinforcement	fs=	173.08	N/mm^2				
Percentage of reinforcement provided	pt=	0.26	%				
Modification factor as per fig 4 of IS:456-2000	MF=	2.000					
Basic span to effective depth ratio		20					
Minimum effective depth reqd from deflection criteria		42.78	mm				
Effective depth provided		96	mm	greater than 'min. eff depth reqd'. Hence ok			

Project:	MANASA APARTMENTS					Date:	05.08.2022
Designed:	KALAI	Checked:	MP	Comments:			

DESIGN OF ONE WAY SLAB

SLAB ID: S21

		Clear span		Effe. Span	
One way span	S=	1.29	mts	1.39	
Assumed slab thickness	t=	0.125	mts		
Grade of concrete	fck=	30	N/mm^2		
Grade of reinforcement	fy=	500	N/mm^2		



Loads

Self weight of slab	w1=	3.13	kN/m^2		
Floor finish	w2=	7.70	kN/m^2		
Live load	w3=	2.00	kN/m^2		
Wall load	w4=		kN/m^2		
Filling Load	w5=		kN/m^2	TOTAL	
Miscellaneous	w6=		kN/m^2	12.83	
				kN/m^2	
Design Load with load factor of 1.5			Wu=	19.24	kN/m^2

Design

	Coeff	Calculated BM	Final BM	k	pt	Ast	Dia	Spacing	d
Negative moment at support	0.000		0.00	0.00	0.00	150	8	335	96
Positive moment at span	0.125		4.62	0.50	0.12	150	8	335	96
Distribution Steel =	0.12					150	8	335	

Minimum effective depth reqd	dre=	0.00	mm	
Clear cover to top reinforcement	c=	25	mm	
Clear cover to bottom reinforcement	c=	25	mm	
Minimum effective depth provided	dpr=	96	mm	greater than 'min. eff depth reqd'. Hence ok
Minimum reinforcement	Amin=	150	mm^2	

Deflection check

Reinf provided at midspan along short direction	251	mm^2	Dia	8	at	200	mm
Stress in reinforcement	fs=	173	N/mm^2				
Percentage of reinforcement provided	pt=	0.26	%				
Modification factor as per fig 4 of IS:456-2000	MF=	2.00					
Type of slab for deflection check							
Basic span to effective depth ratio		20					
Minimum effective depth reqd from deflection criteria		34.65	mm				
Effective depth provided		96	mm	greater than 'min. eff depth reqd'. Hence ok			

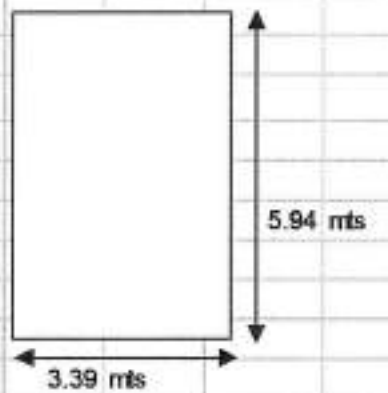
Project:	MANASA APARTMENTS				Date:	05.08.2022
Designed:	KALAI	Checked:	MP	Comments:		

DESIGN OF TWO WAY SLAB

SLAB ID: S33

Clear dimensions:

Short span	S=	3.39	mts	3.29	
Long span	L=	5.94	mts	5.85	
Assumed slab thickness	t=	0.125	mts	greater than 'min. eff depth reqd'. Hence ok	
Grade of concrete	fck=	30	N/mm^2		
Grade of reinforcement	fy=	500	N/mm^2		



Type of panel Interior panel

Loads

Self weight of slab	w1=	3.13	kN/m^2		
Floor finish	w2=	1.70	kN/m^2		
Live load	w3=	2.00	kN/m^2		
Wall load	w4=		kN/m^2		
Filling Load	w5=		kN/m^2	TOTAL	
Miscellaneous	w6=		kN/m^2	6.83	
				kN/m^2	
Ratio of long span to short span			R=	1.8	
Design Load with load factor of 1.5			Wu=	10.24	kN/m^2

Design

	Coeff	BM	k	pt	Ast	Dia	Spacing	d
Short span direction								
Negative moment at continuous edge	0.061	7.16	0.78	0.18	177	8	284	96
Positive moment at midspan	0.046	5.40	0.59	0.14	150	8	335	96
Long span direction								
Negative moment at continuous edge	0.032	3.76	0.49	0.11	150	8	335	88
Positive moment at midspan	0.024	2.82	0.36	0.08	150	8	335	88

Minimum effective depth reqd	dre=	41.59	mm	
Clear cover to top reinforcement	c=	25	mm	
Clear cover to bottom reinforcement	c=	25	mm	
Minimum effective depth provided	dpr=	88	mm	greater than 'min. eff depth reqd'. Hence ok
Minimum reinforcement	Amin=	150	mm^2	

Deflection check

Reinf provided at midspan along short direction	251.33	mm^2	Dia	8	at	200	mm
Stress in reinforcement	fs=	173.08	N/mm^2				
Percentage of reinforcement provided	pt=	0.26	%				
Modification factor as per fig 4 of IS:456-2000	MF=	2.000					
Basic span to effective depth ratio		26					
Minimum effective depth reqd from deflection criteria		65.12	mm				
Effective depth provided		96	mm	greater than 'min. eff depth reqd'. Hence ok			

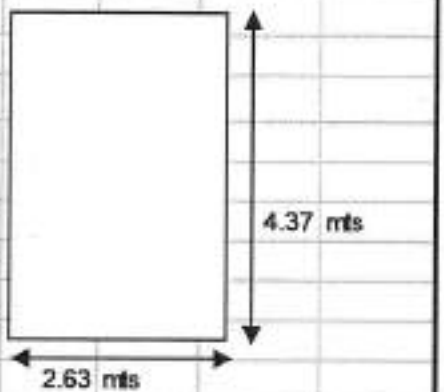
Project:	MANASA APARTMENTS				Date:	05.08.2022
Designed:	KALAI	Checked:	MP	Comments:		

DESIGN OF TWO WAY SLAB

SLAB ID: S6

Clear dimensions:

Short span	S=	2.63	mts	2.54	
Long span	L=	4.37	mts	4.28	
Assumed slab thickness	t=	0.125	mts	greater than 'min. eff depth reqd'. Hence ok	
Grade of concrete	fck=	30	N/mm^2		
Grade of reinforcement	fy=	500	N/mm^2		



Type of panel Four edges discontinuous

Loads

Self weight of slab	w 1=	3.13	kN/m^2		
Floor finish	w 2=	1.70	kN/m^2		
Live load	w 3=	4.00	kN/m^2		
Wall load	w 4=		kN/m^2		
Filling Load	w 5=		kN/m^2	TOTAL	
Miscellaneous	w 6=		kN/m^2	8.83	
				kN/m^2	
Ratio of long span to short span			R=	1.7	
Design Load with load factor of 1.5			Wu=	13.24	kN/m^2

Design

	Coeff	BM	k	pt	Ast	Dia	Spacing	d
Short span direction								
Negative moment at continuous edge	0	0.00	0.00	0.00	150	8	335	96
Positive moment at midspan	0.098	8.98	0.97	0.23	224	8	225	96
Long span direction								
Negative moment at continuous edge	0	0.00	0.00	0.00	150	8	335	88
Positive moment at midspan	0.056	5.13	0.66	0.16	150	8	335	88

Minimum effective depth reqd	dre=	46.57	mm	
Clear cover to top reinforcement	c=	25	mm	
Clear cover to bottom reinforcement	c=	25	mm	
Minimum effective depth provided	dpr=	88	mm	greater than 'min. eff depth reqd'. Hence ok
Minimum reinforcement	Amin=	150	mm^2	

Deflection check

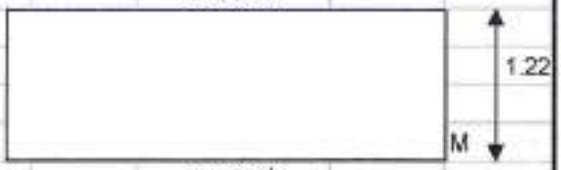
Reinf provided at midspan along short direction	287.23	mm^2	Dia	8	at	175	mm
Stress in reinforcement	fs=	225.93	N/mm^2				
Percentage of reinforcement provided	pt=	0.30	%				
Modification factor as per fig 4 of IS:456-2000	MF=	1.600					
Basic span to effective depth ratio		20					
Minimum effective depth reqd from deflection criteria		82.22	mm				
Effective depth provided		96	mm	greater than 'min. eff depth reqd'. Hence ok			

Project:	MANASA APARTMENTS				Date:	05.08.2022
Designed:	KALAI	Checked:	MP	Comments:		

DESIGN OF ONE WAY SLAB

SLAB ID: S4

		Clear span		Effe. Span						
One way span	S=	1.22	mts	1.32						
Assumed slab thickness	t=	0.125	mts							
Grade of concrete	fck=	30	N/mm^2							
Grade of reinforcement	fy=	500	N/mm^2							



Loads										
Self weight of slab	w1=	3.13	kN/m^2							
Floor finish	w2=	4.10	kN/m^2							
Live load	w3=	2.00	kN/m^2							
Wall load	w4=		kN/m^2							
Filling Load	w5=		kN/m^2	TOTAL						
Miscellaneous	w6=		kN/m^2	9.23						
				kN/m^2						
Design Load with load factor of 1.5			Wu=	13.84	kN/m^2					

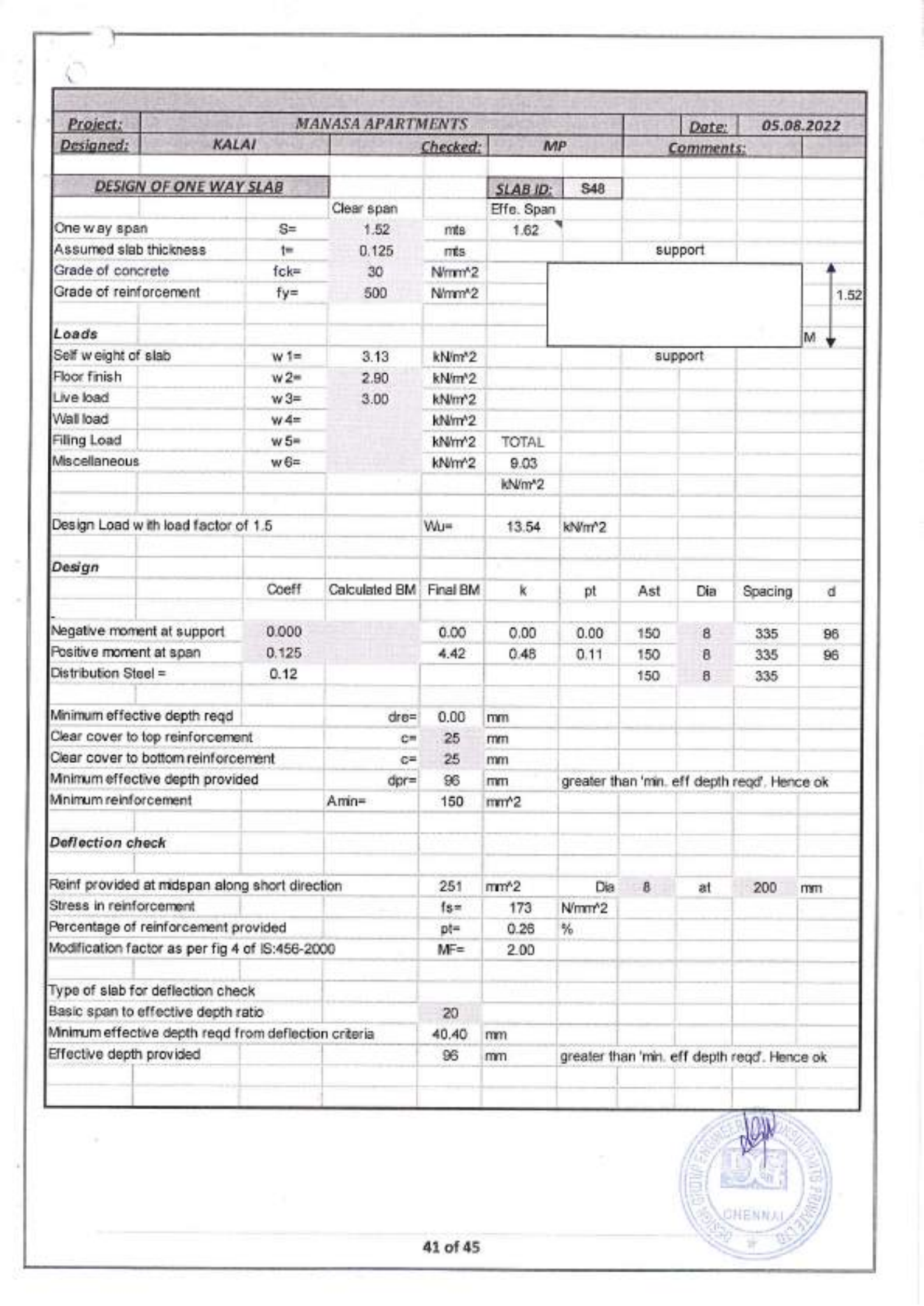
Design	Coeff	Calculated BM	Final BM	k	pt	Ast	Dia	Spacing	d
Negative moment at support	0.000		0.00	0.00	0.00	150	8	335	96
Positive moment at span	0.125		3.00	0.33	0.08	150	8	335	96
Distribution Steel =	0.12					150	8	335	

Minimum effective depth reqd	dre=	0.00	mm		
Clear cover to top reinforcement	c=	25	mm		
Clear cover to bottom reinforcement	c=	25	mm		
Minimum effective depth provided	dpr=	96	mm	greater than 'min. eff depth reqd'. Hence ok	
Minimum reinforcement	Amin=	150	mm^2		

Deflection check									
Reinf provided at midspan along short direction		251	mm^2	Dia	8	at	200	mm	
Stress in reinforcement		fs=	173	N/mm^2					
Percentage of reinforcement provided		pt=	0.26	%					
Modification factor as per fig 4 of IS:456-2000		MF=	2.00						
Type of slab for deflection check									
Basic span to effective depth ratio		20							
Minimum effective depth reqd from deflection criteria		32.90	mm						
Effective depth provided		96	mm	greater than 'min. eff depth reqd'. Hence ok					

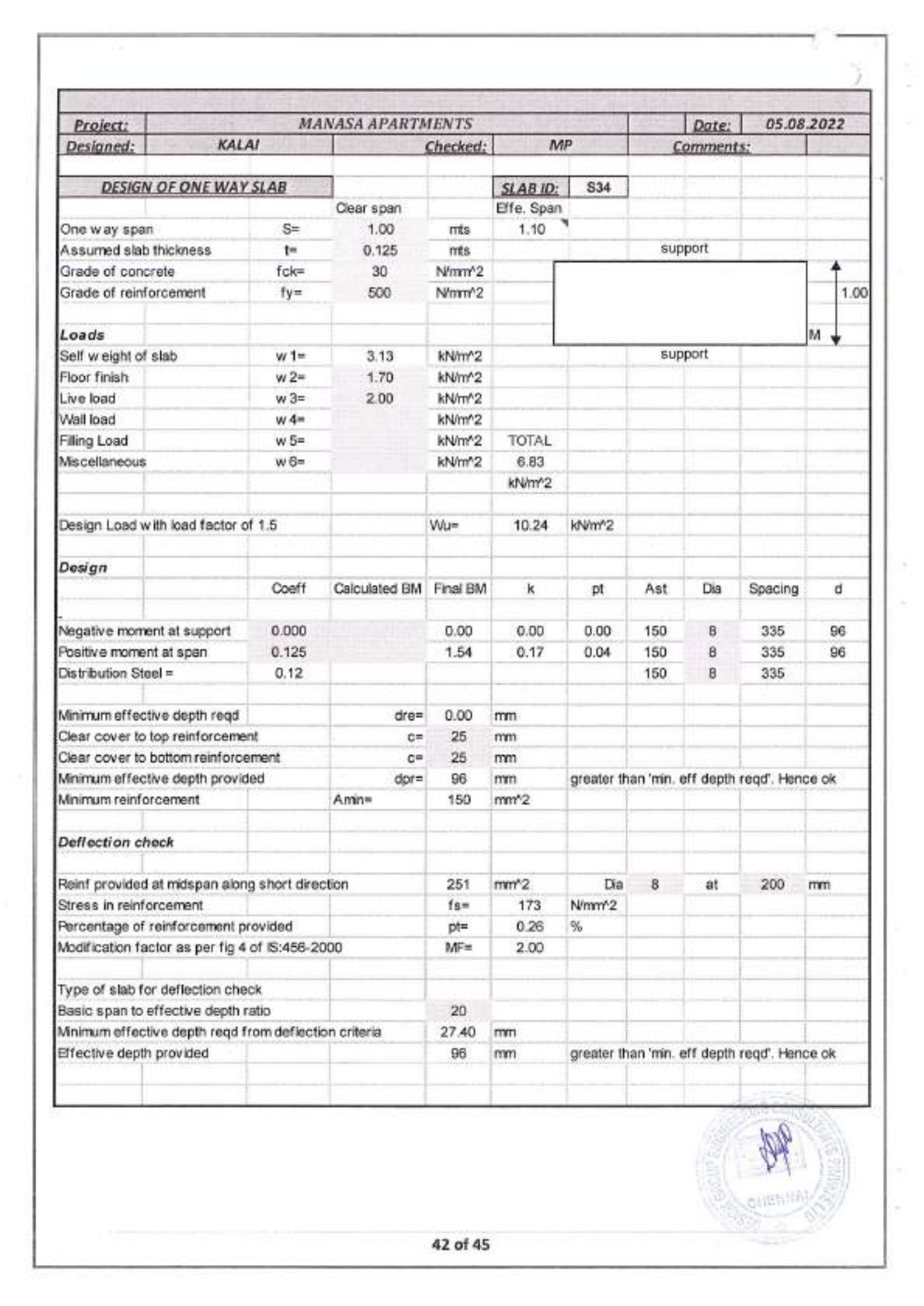
Project:	MANASA APARTMENTS					Date:	05.08.2022		
Designed:	KALAI		Checked:	MP		Comments:			

DESIGN OF ONE WAY SLAB				SLAB ID:	S48				
		Clear span		Effe. Span					
One way span	S=	1.52	mts	1.62					
Assumed slab thickness	t=	0.125	mts			support			
Grade of concrete	fck=	30	N/mm^2						
Grade of reinforcement	fy=	500	N/mm^2						
Loads									
Self weight of slab	w 1=	3.13	kN/m^2			support			
Floor finish	w 2=	2.90	kN/m^2						
Live load	w 3=	3.00	kN/m^2						
Wall load	w 4=		kN/m^2						
Filling Load	w 5=		kN/m^2	TOTAL					
Miscellaneous	w 6=		kN/m^2	9.03					
				kN/m^2					
Design Load with load factor of 1.5			Wu=	13.54	kN/m^2				
Design									
	Coeff	Calculated BM	Final BM	k	pt	Ast	Dia	Spacing	d
Negative moment at support	0.000		0.00	0.00	0.00	150	8	335	96
Positive moment at span	0.125		4.42	0.48	0.11	150	8	335	96
Distribution Steel =	0.12					150	8	335	
Minimum effective depth reqd		dre=	0.00	mm					
Clear cover to top reinforcement		c=	25	mm					
Clear cover to bottom reinforcement		c=	25	mm					
Minimum effective depth provided		dpr=	96	mm	greater than 'min. eff depth reqd'. Hence ok				
Minimum reinforcement		Amin=	150	mm^2					
Deflection check									
Reinf provided at midspan along short direction			251	mm^2	Dia	8	at	200	mm
Stress in reinforcement			fs=	173	N/mm^2				
Percentage of reinforcement provided			pt=	0.26	%				
Modification factor as per fig 4 of IS:456-2000			MF=	2.00					
Type of slab for deflection check									
Basic span to effective depth ratio			20						
Minimum effective depth reqd from deflection criteria			40.40	mm					
Effective depth provided			96	mm	greater than 'min. eff depth reqd'. Hence ok				



Project:	MANASA APARTMENTS					Date:	05.08.2022		
Designed:	KALAI		Checked:	MP		Comments:			

DESIGN OF ONE WAY SLAB				SLAB ID:	S34				
		Clear span		Effe. Span					
One way span	S=	1.00	mts	1.10					
Assumed slab thickness	t=	0.125	mts						
Grade of concrete	fck=	30	N/mm^2						
Grade of reinforcement	fy=	500	N/mm^2						
Loads									
Self weight of slab	w 1=	3.13	kN/m^2						
Floor finish	w 2=	1.70	kN/m^2						
Live load	w 3=	2.00	kN/m^2						
Wall load	w 4=		kN/m^2						
Filling Load	w 5=		kN/m^2	TOTAL					
Miscellaneous	w 6=		kN/m^2	6.83					
				kN/m^2					
Design Load with load factor of 1.5			Wu=	10.24	kN/m^2				
Design									
	Coeff	Calculated BM	Final BM	k	pt	Ast	Dia	Spacing	d
Negative moment at support	0.000		0.00	0.00	0.00	150	8	335	96
Positive moment at span	0.125		1.54	0.17	0.04	150	8	335	96
Distribution Steel =	0.12					150	8	335	
Minimum effective depth reqd		dre=	0.00	mm					
Clear cover to top reinforcement		c=	25	mm					
Clear cover to bottom reinforcement		c=	25	mm					
Minimum effective depth provided		dpr=	96	mm	greater than 'min. eff depth reqd'. Hence ok				
Minimum reinforcement		Amin=	150	mm^2					
Deflection check									
Reinf provided at midspan along short direction			251	mm^2	Dia	8	at	200	mm
Stress in reinforcement			fs=	173	N/mm^2				
Percentage of reinforcement provided			pt=	0.26	%				
Modification factor as per fig 4 of IS:456-2000			MF=	2.00					
Type of slab for deflection check									
Basic span to effective depth ratio			20						
Minimum effective depth reqd from deflection criteria			27.40	mm					
Effective depth provided			96	mm	greater than 'min. eff depth reqd'. Hence ok				



Project:	MANASA APARTMENTS				Date:	05.08.2022
Designed:	KALAI	Checked:	MP	Comments:		

DESIGN OF TWO WAY SLAB

SLAB ID: S20

				Clear dimensions:
Short span	S=	1.00	mts	0.90
Long span	L=	1.70	mts	1.62
Assumed slab thickness	t=	0.125	mts	greater than 'min. eff depth reqd'. Hence ok
Grade of concrete	fck=	30	N/mm^2	
Grade of reinforcement	fy=	500	N/mm^2	



Type of panel Four edges discontinuous

Loads

Self weight of slab	w1=	3.13	kN/m^2		
Floor finish	w2=	1.70	kN/m^2		
Live load	w3=	2.00	kN/m^2		
Wall load	w4=		kN/m^2		
Filling Load	w5=		kN/m^2	TOTAL	
Miscellaneous	w6=		kN/m^2	6.83	
				kN/m^2	
Ratio of long span to short span			R=	1.75	
Design Load with load factor of 1.5			Wu=	10.24	kN/m^2

Design

	Coeff	BM	k	pt	Ast	Dia	Spacing	d
Short span direction								
Negative moment at continuous edge	0	0.00	0.00	0.00	150	8	335	96
Positive moment at midspan	0.1	1.02	0.11	0.03	150	8	335	96
Long span direction								
Negative moment at continuous edge	0	0.00	0.00	0.00	150	8	335	88
Positive moment at midspan	0.056	0.57	0.07	0.02	150	8	335	88

Minimum effective depth reqd	dre=	15.66	mm	
Clear cover to top reinforcement	c=	25	mm	
Clear cover to bottom reinforcement	c=	25	mm	
Minimum effective depth provided	dpr=	88	mm	greater than 'min. eff depth reqd'. Hence ok
Minimum reinforcement	Amin=	150	mm^2	

Deflection check

Reinf provided at midspan along short direction	251.33	mm^2	Dia	8	at	200	mm
Stress in reinforcement	fs=	173.08	N/mm^2				
Percentage of reinforcement provided	pt=	0.26	%				
Modification factor as per fig 4 of IS:456-2000	MF=	2.000					
Basic span to effective depth ratio		20					
Minimum effective depth reqd from deflection criteria		24.90	mm				
Effective depth provided		96	mm	greater than 'min. eff depth reqd'. Hence ok			

TYPICAL SHEAR WALL DESIGN CALCULATION

ETABS Shear Wall Design

IS 456:2000 Pier Design

Pier Details

Story ID	Pier ID	Centroid X (mm)	Centroid Y (mm)	Length (mm)	Thickness (mm)	LLRF
1F	P23 / LW1	20525	12677.5	4385	230	0.6

Material Properties

E_c (MPa)	f_{ck} (MPa)	Lt.Wt Factor (Unitless)	f_y (MPa)	f_{ys} (MPa)
31622	40	1	500	415

Design Code Parameters

γ_s	γ_c	IP_{MAX}	IP_{MIN}	P_{MAX}	MinEcc Major	MinEcc Minor
1.15	1.5	0.04	0.0025	0.6	Yes	Yes

Pier Leg Location, Length and Thickness

Station Location	ID	Left X_1 mm	Left Y_1 mm	Right X_2 mm	Right Y_2 mm	Length mm	Thickness mm
Top	Leg 1	20525	10485	20525	14870	4385	230
Bottom	Leg 1	20525	10485	20525	14870	4385	230

Flexural Design for P_u, M_{u2} and M_{u3}

Station Location	Required Rebar Area (mm^2)	Required Reinf Ratio	Current Reinf Ratio	Flexural Combo	P_u kN	M_{u2} kN-m	M_{u3} kN-m	Pier A_g mm^2
Top	10994	0.0109	0.003	Comb6	-3331.5826	66.6317	-1925.7606	1008550
Bottom	15877	0.0157	0.003	Comb7	1677.6986	36.3209	-12328.4861	1008550

Shear Design

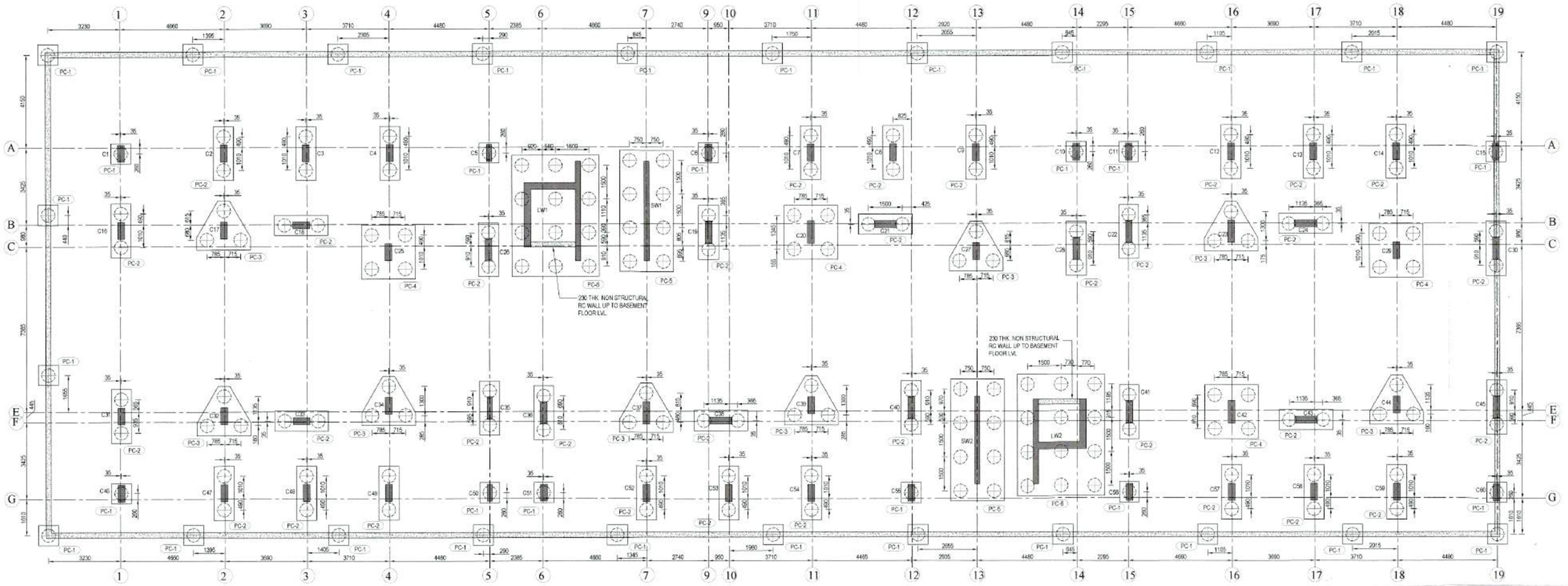
Station Location	ID	Rebar mm^2/m	Shear Combo	P_u kN	M_u kN-m	V_u kN	V_c kN	$V_c + V_s$ kN
Top	Leg 1	678.97	Comb7	1567.6406	7085.767	1586.7821	474.0612	1586.7821
Bottom	Leg 1	814.82	Comb7	1677.6986	10893.0869	1586.7821	555.2744	1586.7821

Boundary Element Check

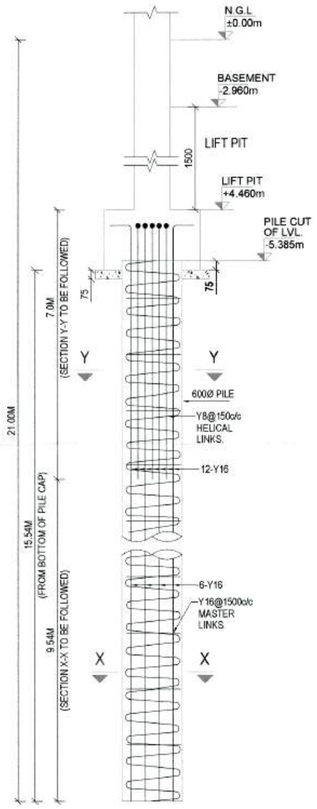
Station Location	ID	Edge Length (mm)	Governing Combo	P_u kN	M_u kN-m	Stress Comp MPa	Stress Limit MPa
Top-Left	Leg 1	805	Comb6	9107.2639	-1925.7606	11.64	8
Top-Right	Leg 1	690	Comb6	9107.2639	228.9706	9.34	8
Bottom-Left	Leg 1	920	Comb7	4318.0987	-12328.4861	21.01	8
Bottom-Right	Leg 1	805	Comb7	9217.322	1139.9272	10.69	8

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New No.33, Old No. 115, 2nd Floor, Padmanabha Nagar,
5th Street, Adyar, Chennai - 600 020

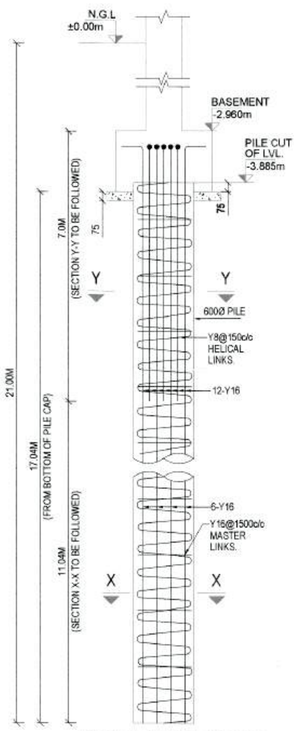
Copy - (3)



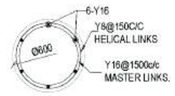
LAYOUT & NUMERATION DETAIL OF PILE & PILE CAP



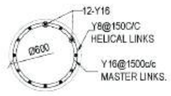
TYPICAL DETAIL OF PILE FOR LIFT PIT (PC6)



TYPICAL DETAIL OF PILE (PC1 TO PC5)

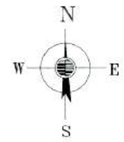


SECTION X-X



SECTION Y-Y

(SHALL BE FOLLOWED FROM NGL. UPTO 7.0M BELOW)



NOTES :-

- REFER ARCH. DWG. FOR CENTER LINE DIMENSIONS.
- ALL DIMENSIONS ARE IN MM
- FOR PILE :-

  CONCRETE MIX SHALL BE M30 FOR RMC WITH PPC CEMENT

  FOR SITE MIX

  M25 WITH MINIMUM CEMENT (PPC) CONTENT OF 400Kg/m

  CONCRETE MIX SHALL BE M40 FOR COLUMN & M25 FOR ALL

  ALL OTHER R.C.C WORKS.
- ALL REINFORCEMENT ARE OF Fe500 GRADE
- CLEAR COVER TO MAIN REINFORCEMENT SHALL BE
  - (i) PILE = 50mm
  - (ii) PILE CAP = 50mm
  - (iii) COLUMN = 40mm
  - (iv) SLAB = 20mm
  - (v) BEAM = 25mm
  - (vi) R.C.C WALL= 25mm
- LAP LENGTH SHALL BE 50 X DIA OF THE BAR

On behalf of CMDA HRB Panel Committee the Structural Drawings are reviewed and found generally in order. It is the responsibility of the site / Structural Engineer Concerned to scrutinise the details and implement at site as per the detailed drawings and specifications.

Superintending Engineer, P.W.D. Planning and Designs Circle, Chepauk, Chennai-5.

SIGNATURE :-

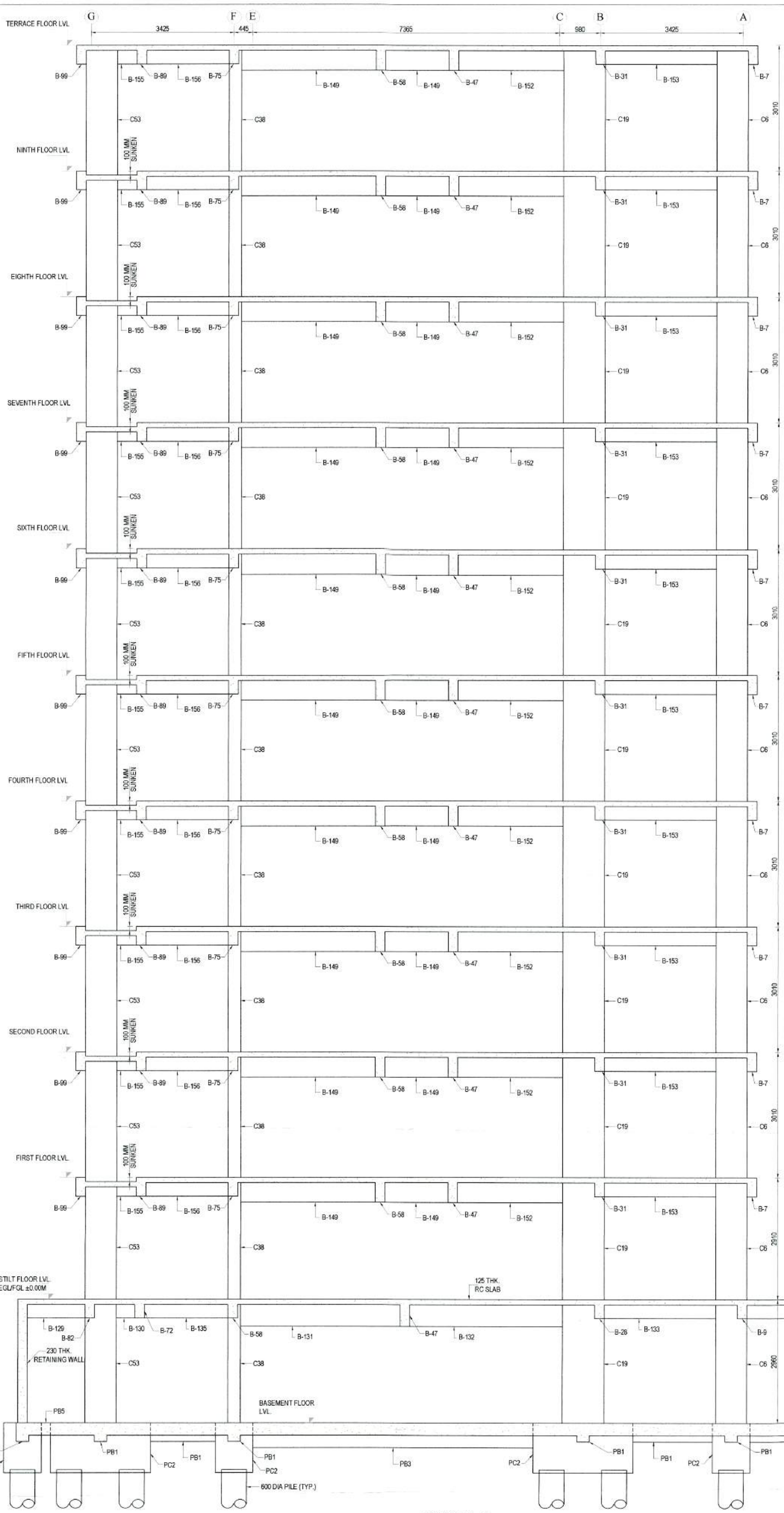
A G V DESIGAN., M.E., (Struc), MIE
SE / GR-I / 119104 / 061
CMDA Registered Structural Engineer Grade - I
Design Group Engineering Consultants Private Limited
New No.33, Old No. 115, 2nd Floor, Padmanabha Nagar,
5th Street, Adyar, Chennai - 600 020

DRAWING TITLE :

PILE FOUNDATION LAYOUT

PROJECT TITLE :

PLAN SHOWING THE PROPOSED CONSTRUCTION OF HIGH RISE BUILDING (HRB) RESIDENTIAL PURPOSE CONSISTING OF EXTENDED BASEMENT FLOOR + STILT FLOOR + 9 FLOORS WITH 54 DU AVAILING WITH PREMIUM FSI, AT TNHB BLOCK NOS. 400, 401, 402 & 403, MANASA APARTMENTS, SECOND AVENUE, ANNA NAGAR, CHENNAI- 600 040. COMPRISED IN SURVEY NO. 207 PART AS PER DOCUMENT AND T.S.NO.91 AS PER PATTA, BLOCK NO.17 OF KOYAMBEDU VILLAGE, AMINJIKARAI TALUK, GREATER CHENNAI CORPORATION, ZONE - VIII, DIVISION - 99.



SECTION 1 - 1

NOTES :-

- REFER ARCH. DWG. FOR CENTER LINE DIMENSIONS.
- ALL DIMENSIONS ARE IN MM
- FOR PILE:-

  CONCRETE MIX SHALL BE M30 FOR RMC WITH PPC CEMENT

  FOR SITE MIX

  M25 WITH MINIMUM CEMENT (PPC) CONTENT OF 400Kg/m

  CONCRETE MIX SHALL BE M40 FOR COLUMN & M25 FOR ALL

  ALL OTHER R.C.C WORKS.
- ALL REINFORCEMENT ARE OF Fe500 GRADE
- CLEAR COVER TO MAIN REINFORCEMENT SHALL BE
  - (i) PILE = 50mm
  - (ii) PILE CAP = 50mm
  - (iii) COLUMN = 40mm
  - (iv) SLAB = 20mm
  - (v) BEAM = 25mm
  - (vi) R.C.C WALL= 25mm
- LAP LENGTH SHALL BE 50 X DIA OF THE BAR

N
W E
S

SIGNATURE :-

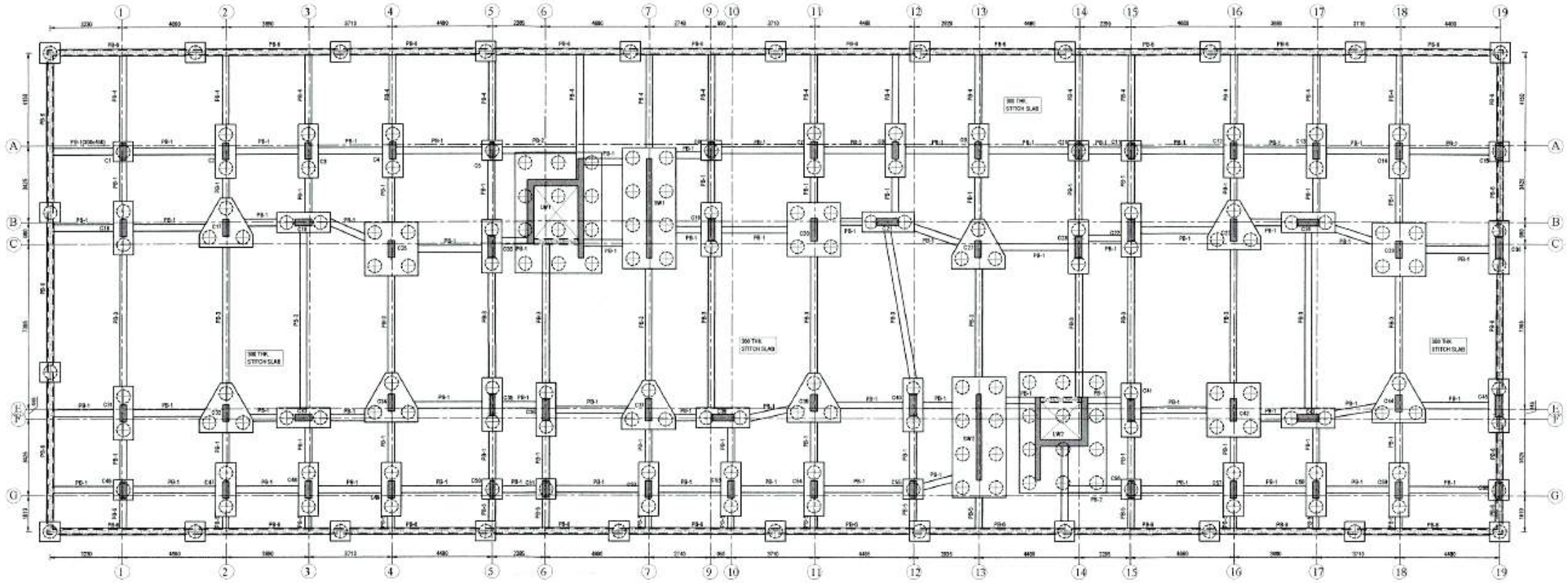
A G V DESIGAN, M.E., (Struc), MIE
SE / OR-I / 19 / 04 / 087
CMDA Registered Structural Engineer Grade - I
Design Group Engineering Consultants Private Limited
New No.33, Old No. 115, 2nd Floor, Padmanabha Nagar,
5th Street, Adyar, Chennai - 600 020

DRAWING TITLE :

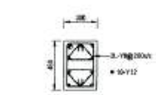
SECTION

PROJECT TITLE :

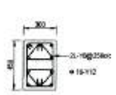
PLAN SHOWING THE PROPOSED CONSTRUCTION OF HIGH RISE BUILDING (HRB) RESIDENTIAL PURPOSE CONSISTING OF EXTENDED BASEMENT FLOOR + STILT FLOOR + 9 FLOORS WITH 54 DU AVAILING WITH PREMIUM FSI, AT TNHB BLOCK NOS. 400, 401, 402 & 403, MANASA APARTMENTS, SECOND AVENUE, ANNA NAGAR, CHENNAI- 600 040. COMPRISED IN SURVEY NO. 207 PART AS PER DOCUMENT AND T.S.NO.91 AS PER PATTA, BLOCK NO.17 OF KOYAMBEDU VILLAGE, AMINJIKARAI TALUK, GREATER CHENNAI CORPORATION, ZONE - VIII, DIVISION - 99.



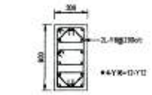
LAYOUT & NUMERATION DETAIL OF BASEMENT FLOOR



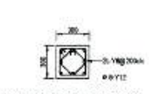
TYPICAL C.S DETAILS OF PLINTH BEAM PB-1 & PB-4



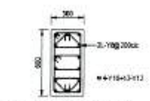
TYPICAL C.S DETAILS OF PLINTH BEAM PB-2



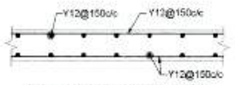
TYPICAL C.S DETAILS OF PLINTH BEAM PB-3



TYPICAL C.S DETAILS OF PLINTH BEAM PB-5



TYPICAL C.S DETAILS OF PLINTH BEAM PB-6



TYPICAL CROSS SECTION DETAIL OF 300THK. STITCH SLAB

NOTES :-

- REFER ARCH. DWG. FOR CENTER LINE DIMENSIONS.
- ALL DIMENSIONS ARE IN MM
- FOR PILE :-
  CONCRETE MIX SHALL BE M30 FOR RMC WITH PPC CEMENT
  FOR SITE MIX
  M25 WITH MINIMUM CEMENT (PPC) CONTENT OF 400Kg/m
  CONCRETE MIX SHALL BE M40 FOR COLUMN & M25 FOR ALL
  ALL OTHER R.C.C WORKS
- ALL REINFORCEMENT ARE OF Fe500 GRADE
- CLEAR COVER TO MAIN REINFORCEMENT SHALL BE
  (i) PILE = 50mm
  (ii) PILE CAP = 50mm
  (iii) COLUMN = 40mm
  (iv) SLAB = 20mm
  (v) BEAM = 25mm
  (vi) R.C.C WALL = 25mm
- LAP LENGTH SHALL BE 50 X DIA OF THE BAR

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SIGNATURE :-

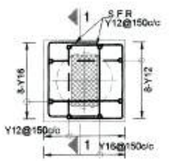
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SE / GR-I / 19 / 04 / 087
CMDA Registered Structural Engineer Grade - I
Design Group Engineering Consultants Private Limited
New No 33, Old No. 115, 2nd Floor, Padmanabha Nagar,
5th Street, Adyar, Chennai - 600 020

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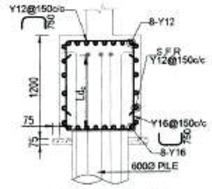
LAYOUT & NUMERATION DETAIL OF BASEMENT FLOOR

PROJECT TITLE :

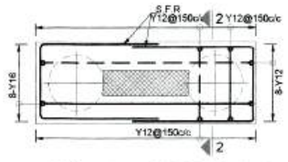
PLAN SHOWING THE PROPOSED CONSTRUCTION OF HIGH RISE BUILDING (HRB) RESIDENTIAL PURPOSE CONSISTING OF EXTENDED BASEMENT FLOOR + STILT FLOOR + 9 FLOORS WITH 54 DU AVAILING WITH PREMIUM FSI AT TNHB BLOCK NOS. 400, 401, 402 & 403, MANASA APARTMENTS, SECOND AVENUE, ANNA NAGAR, CHENNAI- 600 040, COMPRISED IN SURVEY NO. 207 PART AS PER DOCUMENT AND T.S.NO.91 AS PER PATTA, BLOCK NO.17 OF KOYAMBEDU VILLAGE, AMINJIKARAI TALUK, GREATER CHENNAI CORPORATION, ZONE - VIII, DIVISION - 99.



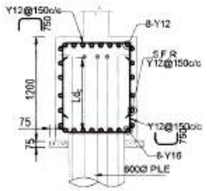
RC DETAIL OF PC-1



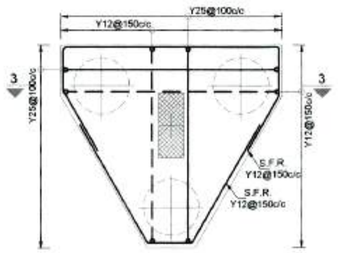
SECTION 1 - 1



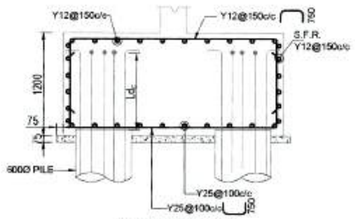
RC DETAIL OF PC-2,2a & 2b



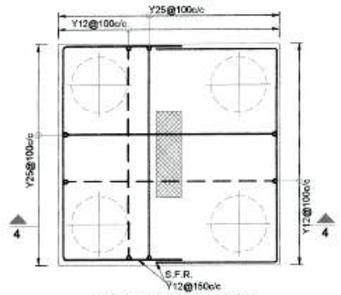
SECTION 2 - 2



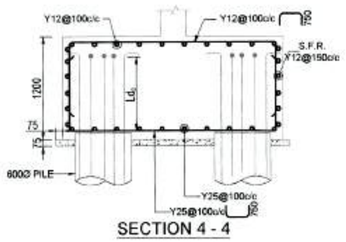
RC DETAIL OF PC-3



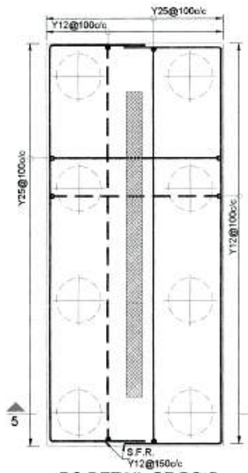
SECTION 3 - 3



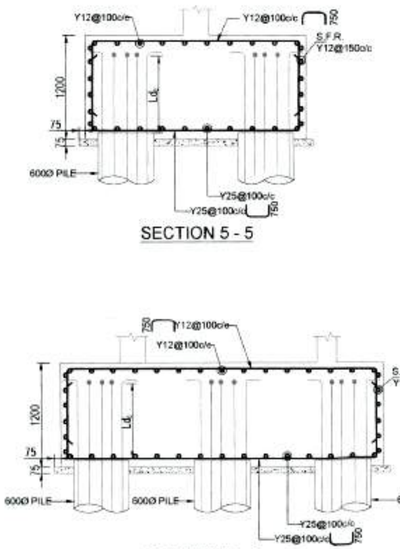
RC DETAIL OF PC-4



SECTION 4 - 4

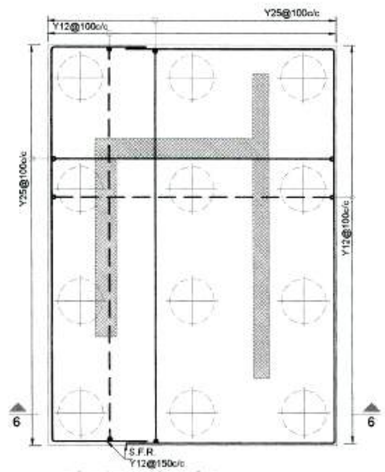


RC DETAIL OF PC-5



SECTION 5 - 5

SECTION 6 - 6



RC DETAIL OF PC-6



NOTES :-

- REFER ARCH. DWG. FOR CENTER LINE DIMENSIONS.
- ALL DIMENSIONS ARE IN MM
- FOR PILE :-

  CONCRETE MIX SHALL BE M30 FOR RMC WITH PPC CEMENT

  FOR SITE MIX

  M25 WITH MINIMUM CEMENT (PPC) CONTENT OF 400Kg/m

  CONCRETE MIX SHALL BE M40 FOR COLUMN & M25 FOR ALL

  ALL OTHER R.C.C WORKS.
- ALL REINFORCEMENT ARE OF Fe500 GRADE
- CLEAR COVER TO MAIN REINFORCEMENT SHALL BE

  (i) PILE = 50mm

  (ii) PILE CAP = 50mm

  (iii) COLUMN = 40mm

  (iv) SLAB = 20mm

  (v) BEAM = 25mm

  (vi) R.C.C WALL= 25mm
- LAP LENGTH SHALL BE 50 X DIA OF THE BAR

SIGNATURE :-

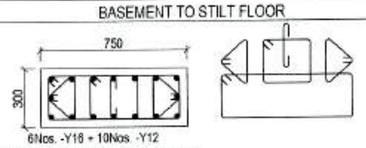
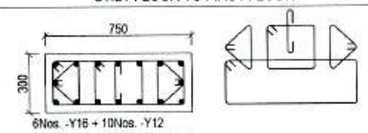
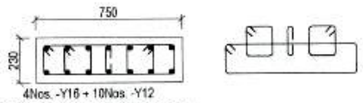
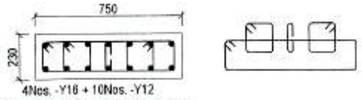
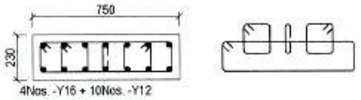
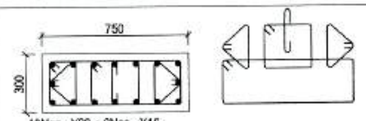
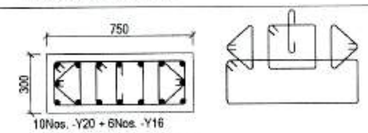
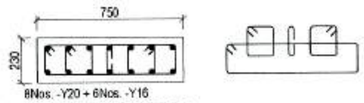
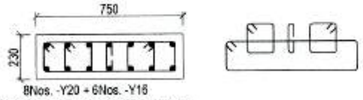
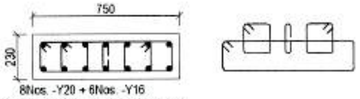
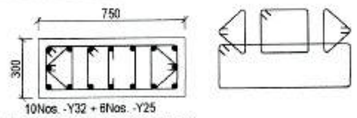
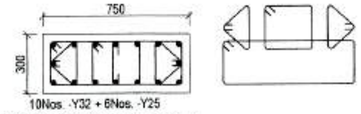
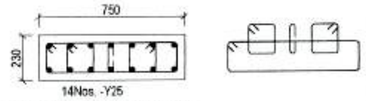
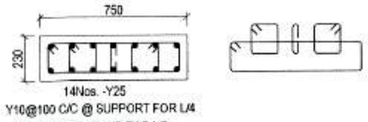
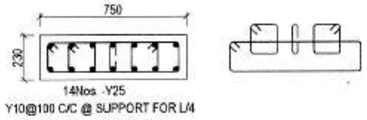
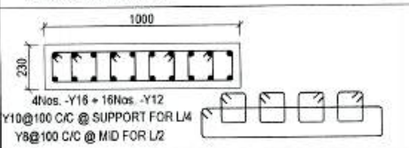
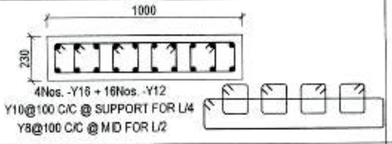
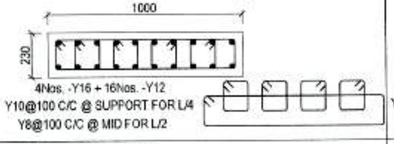
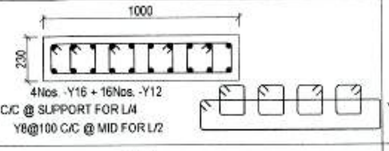
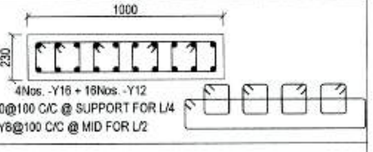
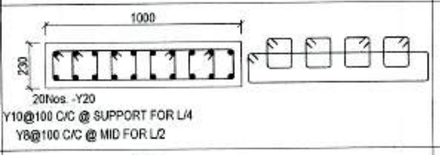
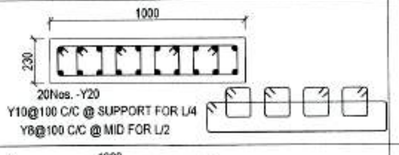
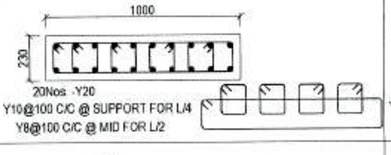
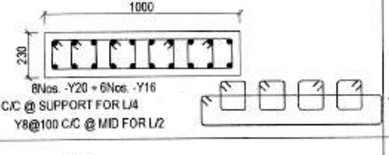
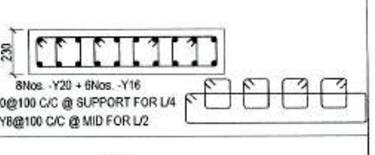
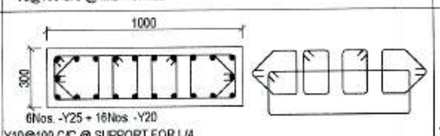
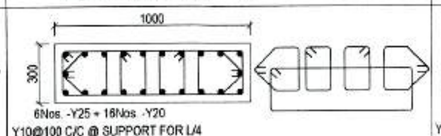
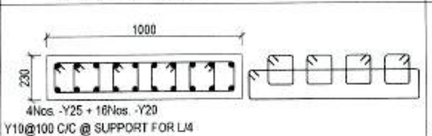
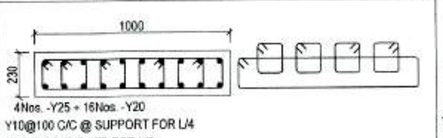
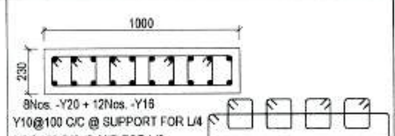
A G V DESIGAN., M.E., (Struc), MIE
SE I GR-I / 19 / 04 / 087
CMDA Registered Structural Engineer Grade - I
Design Group Engineering Consultants Private Limited
New No.33, Old No. 115, 2nd Floor, Padmanabha Nagar,
5th Sreet, Adyar, Chennai - 600 020

DRAWING TITLE :

RC DETAIL OF PILE CAP

PROJECT TITLE :

PLAN SHOWING THE PROPOSED CONSTRUCTION OF HIGH RISE BUILDING (HRB) RESIDENTIAL PURPOSE CONSISTING OF EXTENDED BASEMENT FLOOR + STILT FLOOR + 9 FLOORS WITH 54 DU AVAILING WITH PREMIUM FSI, AT TNHB BLOCK NOS. 400, 401, 402 & 403, MANASA APARTMENTS, SECOND AVENUE, ANNA NAGAR, CHENNAI- 600 040. COMPRISED IN SURVEY NO. 207 PART AS PER DOCUMENT AND T.S.NO.91 AS PER PATTA, BLOCK NO.17 OF KOYAMBEDU VILLAGE, AMINJIKARAI TALUK, GREATER CHENNAI CORPORATION, ZONE - VIII, DIVISION - 99.

COLUMN/ WALL MARK	COLUMN / WALL REINFORCEMENT DETAILS				
	BASEMENT TO STILT FLOOR	STILT FLOOR TO FIRST FLOOR	FIRST FLOOR TO THIRD FLOOR	THIRD FLOOR TO SEVENTH FLOOR	SEVENTH FLOOR TO TERRACE FLOOR
C1, C5,C6,C10, C11,C15, C18,C33, C46,C57,C55, C60,C56	 6Nos. -Y16 + 10Nos. -Y12 Y10@100 C/C @ SUPPORT FOR L/4 Y8@100 C/C @ MID FOR L/2	 6Nos. -Y16 + 10Nos. -Y12 Y10@100 C/C @ SUPPORT FOR L/4 Y8@100 C/C @ MID FOR L/2	 4Nos. -Y16 + 10Nos. -Y12 Y10@100 C/C @ SUPPORT FOR L/4 Y8@100 C/C @ MID FOR L/2	 4Nos. -Y16 + 10Nos. -Y12 Y10@100 C/C @ SUPPORT FOR L/4 Y8@100 C/C @ MID FOR L/2	 4Nos. -Y16 + 10Nos. -Y12 Y10@100 C/C @ SUPPORT FOR L/4 Y8@100 C/C @ MID FOR L/2
C2, C3,C4,C7, C16,C8, C9,C12, C13,C14,C31, C47,C48,C49, C50,C51,C52, C53, C54,C58,C59	 10Nos. -Y20 + 6Nos. -Y16 Y10@100 C/C @ SUPPORT FOR L/4 Y8@100 C/C @ MID FOR L/2	 10Nos. -Y20 + 6Nos. -Y16 Y10@100 C/C @ SUPPORT FOR L/4 Y8@100 C/C @ MID FOR L/2	 8Nos. -Y20 + 6Nos. -Y16 Y10@100 C/C @ SUPPORT FOR L/4 Y8@100 C/C @ MID FOR L/2	 8Nos. -Y20 + 6Nos. -Y16 Y10@100 C/C @ SUPPORT FOR L/4 Y8@100 C/C @ MID FOR L/2	 8Nos. -Y20 + 6Nos. -Y16 Y10@100 C/C @ SUPPORT FOR L/4 Y8@100 C/C @ MID FOR L/2
C17, C25,C27, C29, C31,C32, C34,C44,	 10Nos. -Y32 + 6Nos. -Y25 Y10@100 C/C @ SUPPORT FOR L/4 Y8@100 C/C @ MID FOR L/2	 10Nos. -Y32 + 6Nos. -Y25 Y10@100 C/C @ SUPPORT FOR L/4 Y8@100 C/C @ MID FOR L/2	 14Nos. -Y25 Y10@100 C/C @ SUPPORT FOR L/4 Y8@100 C/C @ MID FOR L/2	 14Nos. -Y25 Y10@100 C/C @ SUPPORT FOR L/4 Y8@100 C/C @ MID FOR L/2	 14Nos. -Y25 Y10@100 C/C @ SUPPORT FOR L/4 Y8@100 C/C @ MID FOR L/2
C36,C38, C41, C45,C49, C21,C26,C22, C24,C30	 4Nos. -Y16 + 16Nos. -Y12 Y10@100 C/C @ SUPPORT FOR L/4 Y8@100 C/C @ MID FOR L/2	 4Nos. -Y16 + 16Nos. -Y12 Y10@100 C/C @ SUPPORT FOR L/4 Y8@100 C/C @ MID FOR L/2	 4Nos. -Y16 + 16Nos. -Y12 Y10@100 C/C @ SUPPORT FOR L/4 Y8@100 C/C @ MID FOR L/2	 4Nos. -Y16 + 16Nos. -Y12 Y10@100 C/C @ SUPPORT FOR L/4 Y8@100 C/C @ MID FOR L/2	 4Nos. -Y16 + 16Nos. -Y12 Y10@100 C/C @ SUPPORT FOR L/4 Y8@100 C/C @ MID FOR L/2
C35,C40, C23,C26	 20Nos. -Y20 Y10@100 C/C @ SUPPORT FOR L/4 Y8@100 C/C @ MID FOR L/2	 20Nos. -Y20 Y10@100 C/C @ SUPPORT FOR L/4 Y8@100 C/C @ MID FOR L/2	 20Nos. -Y20 Y10@100 C/C @ SUPPORT FOR L/4 Y8@100 C/C @ MID FOR L/2	 8Nos. -Y20 + 6Nos. -Y16 Y10@100 C/C @ SUPPORT FOR L/4 Y8@100 C/C @ MID FOR L/2	 8Nos. -Y20 + 6Nos. -Y16 Y10@100 C/C @ SUPPORT FOR L/4 Y8@100 C/C @ MID FOR L/2
C20,C42	 6Nos. -Y25 + 16Nos. -Y20 Y10@100 C/C @ SUPPORT FOR L/4 Y8@100 C/C @ MID FOR L/2	 6Nos. -Y25 + 16Nos. -Y20 Y10@100 C/C @ SUPPORT FOR L/4 Y8@100 C/C @ MID FOR L/2	 4Nos. -Y25 + 16Nos. -Y20 Y10@100 C/C @ SUPPORT FOR L/4 Y8@100 C/C @ MID FOR L/2	 4Nos. -Y25 + 16Nos. -Y20 Y10@100 C/C @ SUPPORT FOR L/4 Y8@100 C/C @ MID FOR L/2	 8Nos. -Y20 + 12Nos. -Y16 Y10@100 C/C @ SUPPORT FOR L/4 Y8@100 C/C @ MID FOR L/2

NOTES :-

- REFER ARCH. DWG. FOR CENTER LINE DIMENSIONS.
- ALL DIMENSIONS ARE IN MM
- FOR PILE:-

  CONCRETE MIX SHALL BE M30 FOR RMC WITH PPC CEMENT

  FOR SITE MIX

  M25 WITH MINIMUM CEMENT (PPC) CONTENT OF 400Kg/m

  CONCRETE MIX SHALL BE M40 FOR COLUMN & M25 FOR ALL

  ALL OTHER R.C.C WORKS.
- ALL REINFORCEMENT ARE OF Fe500 GRADE
- CLEAR COVER TO MAIN REINFORCEMENT SHALL BE
  - (i) PILE = 50mm
  - (ii) PILE CAP = 50mm
  - (iii) COLUMN = 40mm
  - (iv) SLAB = 20mm
  - (v) BEAM = 25mm
  - (vi) R.C.C WALL= 25mm
- LAP LENGTH SHALL BE 50 X DIA OF THE BAR

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W E
S

SIGNATURE :-

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SE / GR-I / 19 / 04 / 087
CMDA Registered Structural Engineer Grade - I
Design Group Engineering Consultants Private Limited
New No.33, Old No. 115, 2nd Floor, Padmanabha Nagar,
5th Street, Adyar, Chennai - 600 020

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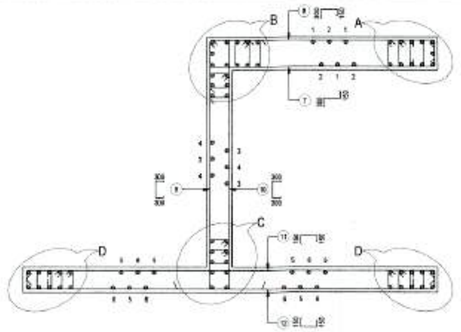
COLUMN SCHEDULE

PROJECT TITLE :

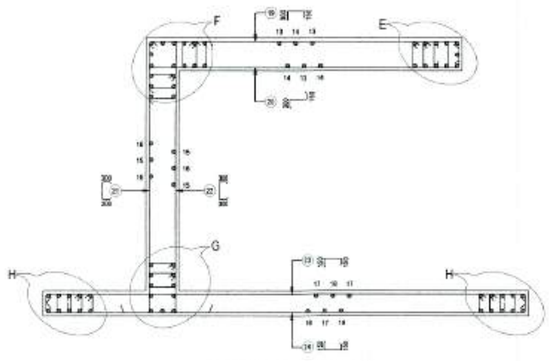
PLAN SHOWING THE PROPOSED CONSTRUCTION OF HIGH RISE BUILDING (HRB) RESIDENTIAL PURPOSE CONSISTING OF EXTENDED BASEMENT FLOOR + STILT FLOOR + 9 FLOORS WITH 54 DU AVAILING WITH PREMIUM FSI, AT TNHB BLOCK NOS. 400, 401, 402 & 403, MANASA APARTMENTS, SECOND AVENUE, ANNA NAGAR, CHENNAI- 600 040 COMPRISED IN SURVEY NO. 207 PART AS PER DOCUMENT AND T.S.NO.91 AS PER PATTA, BLOCK NO.17 OF KOYAMBEDU VILLAGE, AMINJIKARAI TALUK, GREATER CHENNAI CORPORATION, ZONE - VIII, DIVISION - 99.

SHEAR WALL_SW-1,SW2,LW1 & LW2 REINFORCEMENT DETAILS

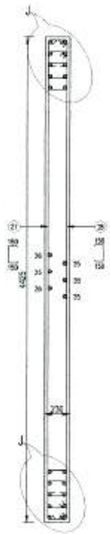
DETAIL ID	BASEMENT TO STILT FLOOR	STILT TO FIRST FLOOR	FIRST TO THIRD FLOOR	THIRD TO SEVENTH FLOOR	SEVENTH FLOOR TO TERRACE FLOOR
DETAIL - A	10Nos. -Y25 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	10Nos. -Y25 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	10Nos. -Y20 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	10Nos. -Y16 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	10Nos. -Y12 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2
DETAIL - B	15Nos. -Y25 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	15Nos. -Y25 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	15Nos. -Y20 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	15Nos. -Y16 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	15Nos. -Y12 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2
DETAIL - C	10Nos. -Y20 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	10Nos. -Y20 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	10Nos. -Y16 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	10Nos. -Y12 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	10Nos. -Y12 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2
DETAIL - D	4Nos. -Y20 + 6Nos. -Y16 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	4Nos. -Y20 + 6Nos. -Y16 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	10Nos. -Y16 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	10Nos. -Y12 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	10Nos. -Y12 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2
DETAIL - E	11Nos. -Y25 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	11Nos. -Y25 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	11Nos. -Y20 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	11Nos. -Y16 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	11Nos. -Y12 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2
DETAIL - F	15Nos. -Y25 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	15Nos. -Y25 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	15Nos. -Y20 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	15Nos. -Y16 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	15Nos. -Y12 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2
DETAIL - G	11Nos. -Y20 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	11Nos. -Y20 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	11Nos. -Y16 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	11Nos. -Y12 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	11Nos. -Y12 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2
DETAIL - H	4Nos. -Y20 + 6Nos. -Y16 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	4Nos. -Y20 + 6Nos. -Y16 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	10Nos. -Y16 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	10Nos. -Y12 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	10Nos. -Y12 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2
DETAIL - J	4Nos. -Y20 + 6Nos. -Y16 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	4Nos. -Y20 + 6Nos. -Y16 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	10Nos. -Y16 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	10Nos. -Y12 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	10Nos. -Y12 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2
DETAIL - K	4Nos. -Y20 + 6Nos. -Y16 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	4Nos. -Y20 + 6Nos. -Y16 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	10Nos. -Y16 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	10Nos. -Y12 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	10Nos. -Y12 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2



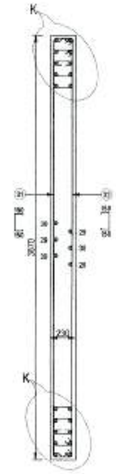
RC DETAILS OF LIFT WALL (LW2)



RC DETAILS OF LIFT WALL (LW1)



RC DETAILS OF SHEAR WALL (SW1)



RC DETAILS OF SHEAR WALL (SW2)

SCHEDULE OF REINF. IN WEB ELEMENT FOR LW-1,LW2,SW1 & SW2

LW ID	BAR ID	BASEMENT TO STILT FLOOR	STILT FLOOR TO FIRST FLOOR	FIRST FLOOR TO THIRD FLOOR	THIRD FLOOR TO SEVENTH FLOOR	SEVENTH FLOOR TO TERRACE FLOOR
LW2	1 2	Y20@200c/c + Y20@200c/c (NET SPACING 100mm)	Y20@200c/c + Y16@200c/c (NET SPACING 100mm)	Y16@200c/c + Y16@200c/c (NET SPACING 100mm)	Y12@200c/c + Y12@200c/c (NET SPACING 100mm)	Y10@200c/c + Y10@200c/c (NET SPACING 100mm)
	3 4	Y20@200c/c + Y20@200c/c (NET SPACING 100mm)	Y20@200c/c + Y16@200c/c (NET SPACING 100mm)	Y16@200c/c + Y16@200c/c (NET SPACING 100mm)	Y12@200c/c + Y12@200c/c (NET SPACING 100mm)	Y10@200c/c + Y10@200c/c (NET SPACING 100mm)
	5 6	Y20@200c/c + Y20@200c/c (NET SPACING 100mm)	Y20@200c/c + Y16@200c/c (NET SPACING 100mm)	Y16@200c/c + Y16@200c/c (NET SPACING 100mm)	Y12@200c/c + Y12@200c/c (NET SPACING 100mm)	Y10@200c/c + Y10@200c/c (NET SPACING 100mm)
LW2	13 14	Y20@200c/c + Y20@200c/c (NET SPACING 100mm)	Y20@200c/c + Y16@200c/c (NET SPACING 100mm)	Y16@200c/c + Y16@200c/c (NET SPACING 100mm)	Y12@200c/c + Y12@200c/c (NET SPACING 100mm)	Y10@200c/c + Y10@200c/c (NET SPACING 100mm)
LW2	15 16	Y20@200c/c + Y20@200c/c (NET SPACING 100mm)	Y20@200c/c + Y16@200c/c (NET SPACING 100mm)	Y16@200c/c + Y16@200c/c (NET SPACING 100mm)	Y12@200c/c + Y12@200c/c (NET SPACING 100mm)	Y10@200c/c + Y10@200c/c (NET SPACING 100mm)
	17 18	Y20@200c/c + Y20@200c/c (NET SPACING 100mm)	Y20@200c/c + Y16@200c/c (NET SPACING 100mm)	Y16@200c/c + Y16@200c/c (NET SPACING 100mm)	Y12@200c/c + Y12@200c/c (NET SPACING 100mm)	Y10@200c/c + Y10@200c/c (NET SPACING 100mm)
SW1	25 26	Y16@200c/c + Y16@200c/c (NET SPACING 100mm)	Y16@200c/c + Y16@200c/c (NET SPACING 100mm)	Y12@200c/c + Y12@200c/c (NET SPACING 100mm)	Y12@200c/c + Y12@200c/c (NET SPACING 100mm)	Y12@200c/c + Y12@200c/c (NET SPACING 100mm)
SW2	29 30	Y16@200c/c + Y16@200c/c (NET SPACING 100mm)	Y16@200c/c + Y16@200c/c (NET SPACING 100mm)	Y12@200c/c + Y12@200c/c (NET SPACING 100mm)	Y12@200c/c + Y12@200c/c (NET SPACING 100mm)	Y12@200c/c + Y12@200c/c (NET SPACING 100mm)

SCHEDULE OF WEB ELEMENT SHEAR REINF. FOR LW-1,LW2,SW1 & SW2

LW ID	BAR ID	BASEMENT TO STILT FLOOR	STILT FLOOR TO FIRST FLOOR	FIRST FLOOR TO THIRD FLOOR	THIRD FLOOR TO SEVENTH FLOOR	SEVENTH FLOOR TO TERRACE FLOOR
LW 2	7	Y12@100c/c	Y8@100c/c	Y8@125c/c	Y8@125c/c	Y8@125c/c
	8	Y12@100c/c	Y8@100c/c	Y8@125c/c	Y8@125c/c	Y8@125c/c
	9	Y12@100c/c	Y8@100c/c	Y8@125c/c	Y8@125c/c	Y8@125c/c
	10	Y12@100c/c	Y8@100c/c	Y8@125c/c	Y8@125c/c	Y8@125c/c
	11	Y12@100c/c	Y8@100c/c	Y8@125c/c	Y8@125c/c	Y8@125c/c
	12	Y12@100c/c	Y8@100c/c	Y8@125c/c	Y8@125c/c	Y8@125c/c
LW 1	19	Y12@100c/c	Y8@100c/c	Y8@125c/c	Y8@125c/c	Y8@125c/c
	20	Y12@100c/c	Y8@100c/c	Y8@125c/c	Y8@125c/c	Y8@125c/c
	21	Y12@100c/c	Y8@100c/c	Y8@125c/c	Y8@125c/c	Y8@125c/c
	22	Y12@100c/c	Y8@100c/c	Y8@125c/c	Y8@125c/c	Y8@125c/c
	23	Y12@100c/c	Y8@100c/c	Y8@125c/c	Y8@125c/c	Y8@125c/c
	24	Y12@100c/c	Y8@100c/c	Y8@125c/c	Y8@125c/c	Y8@125c/c
SW 1	27	Y12@100c/c	Y8@100c/c	Y8@125c/c	Y8@125c/c	Y8@125c/c
	28	Y12@100c/c	Y8@100c/c	Y8@125c/c	Y8@125c/c	Y8@125c/c
SW 2	31	Y12@100c/c	Y8@100c/c	Y8@125c/c	Y8@125c/c	Y8@125c/c
	32	Y12@100c/c	Y8@100c/c	Y8@125c/c	Y8@125c/c	Y8@125c/c

NOTES :-

- REFER ARCH. DWG. FOR CENTER LINE DIMENSIONS.
- ALL DIMENSIONS ARE IN MM
- FOR PILE :-

  CONCRETE MIX SHALL BE M30 FOR RMC WITH PPC CEMENT

  FOR SITE MIX

  M25 WITH MINIMUM CEMENT (PPC) CONTENT OF 400Kg/m

  CONCRETE MIX SHALL BE M40 FOR COLUMN & M25 FOR ALL

  ALL OTHER R.C.C WORKS
- ALL REINFORCEMENT ARE OF Fe500 GRADE
- CLEAR COVER TO MAIN REINFORCEMENT SHALL BE
  - (i) PILE = 50mm
  - (ii) PILE CAP = 50mm
  - (iii) COLUMN = 40mm
  - (iv) SLAB = 20mm
  - (v) BEAM = 25mm
  - (vi) R.C.C WALL = 25mm
- LAP LENGTH SHALL BE 50 X DIA OF THE BAR

SIGNATURE :-

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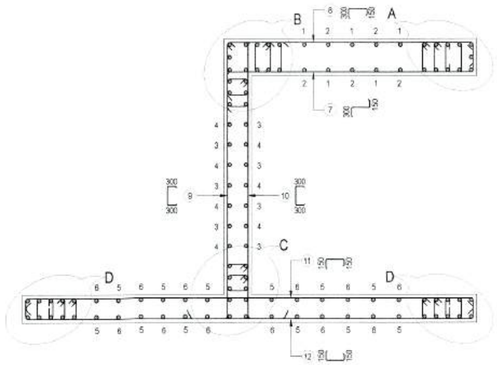
RC DETAILS OF WALLS

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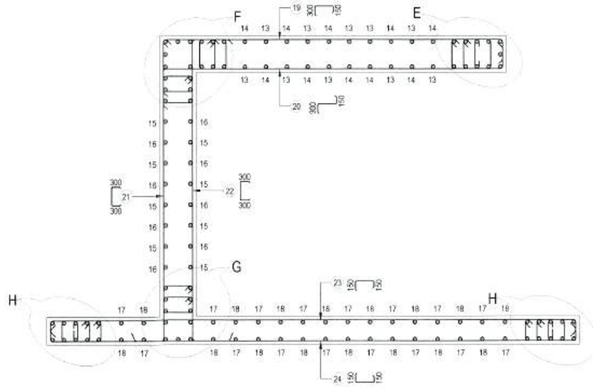
PLAN SHOWING THE PROPOSED CONSTRUCTION OF HIGH RISE BUILDING (HRB) RESIDENTIAL PURPOSE CONSISTING OF EXTENDED BASEMENT FLOOR + STILT FLOOR + 9 FLOORS WITH 54 DU AVAILING WITH PREMIUM FSI, AT TNHB BLOCK NOS. 400, 401, 402 & 403, MANASA APARTMENTS, SECOND AVENUE, ANNA NAGAR, CHENNAI- 600 040. COMPRISED IN SURVEY NO. 207 PART AS PER DOCUMENT AND T.S.NO.91 AS PER PATTA, BLOCK NO.17 OF KOYAMBEDU VILLAGE, AMINJIKARAI TALUK, GREATER CHENNAI CORPORATION, ZONE - VIII, DIVISION - 99

SHEAR WALL_SW-1,SW2,LW1 & LW2 REINFORCEMENT DETAILS

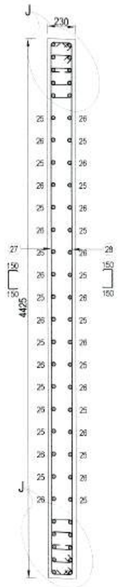
DETAIL ID	BASEMENT TO STILT FLOOR	STILT TO FIRST FLOOR	FIRST TO THIRD FLOOR	THIRD TO SEVENTH FLOOR	SEVENTH FLOOR TO TERRACE FLOOR
DETAIL - A	10Nos. -Y25 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	10Nos. -Y25 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	10Nos. -Y20 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	10Nos. -Y16 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	10Nos. -Y12 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2
DETAIL - B	15Nos. -Y25 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	15Nos. -Y25 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	15Nos. -Y20 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	15Nos. -Y16 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	15Nos. -Y12 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2
DETAIL - C	10Nos. -Y20 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	10Nos. -Y20 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	10Nos. -Y16 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	10Nos. -Y12 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	10Nos. -Y12 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2
DETAIL - D	4Nos. -Y20 + 6Nos. -Y16 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	4Nos. -Y20 + 6Nos. -Y16 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	10Nos. -Y16 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	10Nos. -Y12 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	10Nos. -Y12 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2
DETAIL - E	11Nos. -Y25 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	11Nos. -Y25 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	11Nos. -Y20 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	11Nos. -Y16 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	11Nos. -Y12 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2
DETAIL - F	15Nos. -Y25 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	15Nos. -Y25 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	15Nos. -Y20 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	15Nos. -Y16 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	15Nos. -Y12 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2
DETAIL - G	11Nos. -Y20 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	11Nos. -Y20 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	11Nos. -Y16 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	11Nos. -Y12 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	11Nos. -Y12 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2
DETAIL - H	4Nos. -Y20 + 6Nos. -Y16 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	4Nos. -Y20 + 6Nos. -Y16 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	10Nos. -Y16 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	10Nos. -Y12 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	10Nos. -Y12 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2
DETAIL - J	4Nos. -Y20 + 6Nos. -Y16 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	4Nos. -Y20 + 6Nos. -Y16 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	10Nos. -Y16 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	10Nos. -Y12 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	10Nos. -Y12 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2
DETAIL - K	4Nos. -Y20 + 6Nos. -Y16 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	4Nos. -Y20 + 6Nos. -Y16 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	10Nos. -Y16 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	10Nos. -Y12 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2	10Nos. -Y12 Y8@150 C/C @ SUPPORT FOR L/4 Y8@150 C/C @ MID FOR L/2



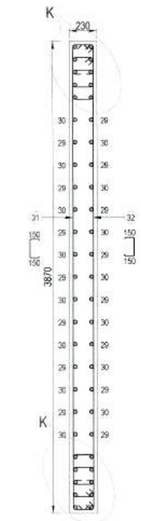
RC DETAILS OF LIFT WALL (LW2)



RC DETAILS OF LIFT WALL (LW1)



RC DETAILS OF SHEAR WALL (SW1)



RC DETAILS OF SHEAR WALL (SW2)

SCHEDULE OF REINF. IN WEB ELEMENT FOR LW-1,LW2,SW1 & SW2

LW ID	BAR ID	BASEMENT TO STILT FLOOR	STILT FLOOR TO FIRST FLOOR	FIRST FLOOR TO THIRD FLOOR	THIRD FLOOR TO SEVENTH FLOOR	SEVENTH FLOOR TO TERRACE FLOOR
LW2	1 2	Y20@200c/c + Y20@200c/c (NET SPACING 100mm)	Y20@200c/c + Y16@200c/c (NET SPACING 100mm)	Y16@200c/c + Y16@200c/c (NET SPACING 100mm)	Y12@200c/c + Y12@200c/c (NET SPACING 100mm)	Y10@200c/c + Y10@200c/c (NET SPACING 100mm)
	3 4	Y20@200c/c + Y20@200c/c (NET SPACING 100mm)	Y20@200c/c + Y16@200c/c (NET SPACING 100mm)	Y16@200c/c + Y16@200c/c (NET SPACING 100mm)	Y12@200c/c + Y12@200c/c (NET SPACING 100mm)	Y10@200c/c + Y10@200c/c (NET SPACING 100mm)
	5 6	Y20@200c/c + Y20@200c/c (NET SPACING 100mm)	Y20@200c/c + Y16@200c/c (NET SPACING 100mm)	Y16@200c/c + Y16@200c/c (NET SPACING 100mm)	Y12@200c/c + Y12@200c/c (NET SPACING 100mm)	Y10@200c/c + Y10@200c/c (NET SPACING 100mm)
LW2	13 14	Y20@200c/c + Y20@200c/c (NET SPACING 100mm)	Y20@200c/c + Y16@200c/c (NET SPACING 100mm)	Y16@200c/c + Y16@200c/c (NET SPACING 100mm)	Y12@200c/c + Y12@200c/c (NET SPACING 100mm)	Y10@200c/c + Y10@200c/c (NET SPACING 100mm)
	15 16	Y20@200c/c + Y20@200c/c (NET SPACING 100mm)	Y20@200c/c + Y16@200c/c (NET SPACING 100mm)	Y16@200c/c + Y16@200c/c (NET SPACING 100mm)	Y12@200c/c + Y12@200c/c (NET SPACING 100mm)	Y10@200c/c + Y10@200c/c (NET SPACING 100mm)
	17 18	Y20@200c/c + Y20@200c/c (NET SPACING 100mm)	Y20@200c/c + Y16@200c/c (NET SPACING 100mm)	Y16@200c/c + Y16@200c/c (NET SPACING 100mm)	Y12@200c/c + Y12@200c/c (NET SPACING 100mm)	Y10@200c/c + Y10@200c/c (NET SPACING 100mm)
SW1	25 26	Y16@200c/c + Y16@200c/c (NET SPACING 100mm)	Y16@200c/c + Y16@200c/c (NET SPACING 100mm)	Y12@200c/c + Y12@200c/c (NET SPACING 100mm)	Y12@200c/c + Y12@200c/c (NET SPACING 100mm)	Y12@200c/c + Y12@200c/c (NET SPACING 100mm)
SW2	29 30	Y16@200c/c + Y16@200c/c (NET SPACING 100mm)	Y16@200c/c + Y16@200c/c (NET SPACING 100mm)	Y12@200c/c + Y12@200c/c (NET SPACING 100mm)	Y12@200c/c + Y12@200c/c (NET SPACING 100mm)	Y12@200c/c + Y12@200c/c (NET SPACING 100mm)

SCHEDULE OF WEB ELEMENT SHEAR REINF. FOR LW-1,LW2,SW1 & SW2

LW ID	BAR ID	BASEMENT TO STILT FLOOR	STILT FLOOR TO FIRST FLOOR	FIRST FLOOR TO THIRD FLOOR	THIRD FLOOR TO SEVENTH FLOOR	SEVENTH FLOOR TO TERRACE FLOOR
LW 2	7	Y10@100c/c	Y8@100c/c	Y8@125c/c	Y8@125c/c	Y8@125c/c
	8	Y10@100c/c	Y8@100c/c	Y8@125c/c	Y8@125c/c	Y8@125c/c
	9	Y10@100c/c	Y8@100c/c	Y8@125c/c	Y8@125c/c	Y8@125c/c
	10	Y10@100c/c	Y8@100c/c	Y8@125c/c	Y8@125c/c	Y8@125c/c
	11	Y10@100c/c	Y8@100c/c	Y8@125c/c	Y8@125c/c	Y8@125c/c
	12	Y10@100c/c	Y8@100c/c	Y8@125c/c	Y8@125c/c	Y8@125c/c
	19	Y10@100c/c	Y8@100c/c	Y8@125c/c	Y8@125c/c	Y8@125c/c
	20	Y10@100c/c	Y8@100c/c	Y8@125c/c	Y8@125c/c	Y8@125c/c
LW 1	21	Y10@100c/c	Y8@100c/c	Y8@125c/c	Y8@125c/c	Y8@125c/c
	22	Y10@100c/c	Y8@100c/c	Y8@125c/c	Y8@125c/c	Y8@125c/c
	23	Y10@100c/c	Y8@100c/c	Y8@125c/c	Y8@125c/c	Y8@125c/c
	24	Y10@100c/c	Y8@100c/c	Y8@125c/c	Y8@125c/c	Y8@125c/c
SW 1	27	Y10@100c/c	Y8@100c/c	Y8@125c/c	Y8@125c/c	Y8@125c/c
	28	Y10@100c/c	Y8@100c/c	Y8@125c/c	Y8@125c/c	Y8@125c/c
SW 2	31	Y10@100c/c	Y8@100c/c	Y8@125c/c	Y8@125c/c	Y8@125c/c
	32	Y10@100c/c	Y8@100c/c	Y8@125c/c	Y8@125c/c	Y8@125c/c

NOTES :-

- REFER ARCH. DWG. FOR CENTER LINE DIMENSIONS.
- ALL DIMENSIONS ARE IN MM
- FOR PILE:-

  CONCRETE MIX SHALL BE M30 FOR RMC WITH PPC CEMENT

  FOR SITE MIX

  M25 WITH MINIMUM CEMENT (PPC) CONTENT OF 400Kg/m

  CONCRETE MIX SHALL BE M40 FOR COLUMN & M25 FOR ALL

  ALL OTHER R.C.C WORKS.
- ALL REINFORCEMENT ARE OF Fe500 GRADE
- CLEAR COVER TO MAIN REINFORCEMENT SHALL BE
  - (i) PILE = 50mm
  - (ii) PILE CAP = 50mm
  - (iii) COLUMN = 40mm
  - (iv) SLAB = 20mm
  - (v) BEAM = 25mm
  - (vi) R.C.C WALL= 25mm
- LAP LENGTH SHALL BE 50 X DIA OF THE BAR

SIGNATURE :-

AGV DESIGAN., M.E., (Struc), MIE
SE/GR-I/119/04/087
CMDA Registered Structural Engineer Grade - I
Design Group Engineering Consultants Private Limited
New No.33, Old No. 115, 2nd Floor, Padmavathy Nagar,
5th Street, Adyar, Chennai - 600 020

DRAWING TITLE :

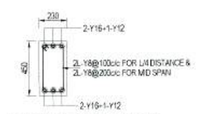
RC DETAILS OF WALLS

PROJECT TITLE :

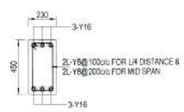
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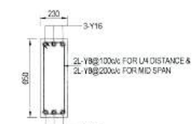
LAYOUT & NUMERATION DETAIL OF GROUND FLOOR



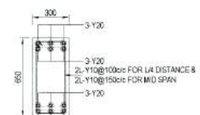
TYPICAL C.S DETAILS OF
B1-17, 19-35, 50-70,
74-90,114a&114



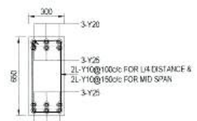
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B91,92,94-97,99-102,104,
105,108,109,111-113,116-119,
122,124-126,128-130,133,134,136,
137,139-142,145,146,148,
150-153,155-158,160-163,
165-168,171-176



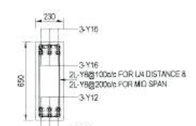
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B41-45



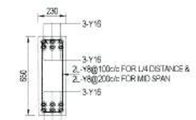
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B93,98,103,149



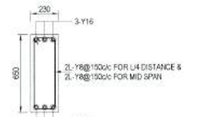
TYPICAL C.S DETAILS OF
B138



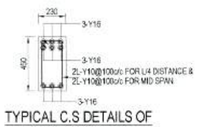
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B46-49,115,154



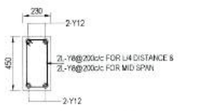
TYPICAL C.S DETAILS OF
B127,110



TYPICAL C.S DETAILS OF
B120,121,123



TYPICAL C.S DETAILS OF
B159,164,170,168a



TYPICAL C.S DETAILS OF
B18,18a,107,147,106,71&72,135,73

SLAB NO	SHORTER DIRECTION REINFRCEMENT	LONGER DIRECTION REINFRCEMENT	SLAB THICK
S42,S43,S48,S49,S55,S56,S58,S60&S61	Y8@ 125mm C/C	Y8@ 125mm C/C	125mm
S1,S2,S3,S4,S5,S6,S9,S10,S11,S12,S14,S15,S16,S17,S19,S20,S21,S22,S23,S24,S25,S27,S28,S29,S30,S32,S33,S35,S40,S41,S51,S53,S54,S63,S64,S66,S67,S70,S71,S72,S73,S76,S79,S80,S81&S82	Y8@ 150mm C/C	Y8@ 150mm C/C	125mm
S7,S8,S13,S18,S26,S39,S46,S47,S50,S52,S57,S59,S62,S65,S68,S74,S77&S78	Y8@ 175mm C/C	Y8@ 175mm C/C	125mm
S31,S34,S36,S37,S38,S44,S45,S69,S75&S83	Y8@ 175mm C/C	Y8@ 175mm C/C	125mm

NOTES :-

- REFER ARCH. DWG. FOR CENTER LINE DIMENSIONS.
- ALL DIMENSIONS ARE IN MM
- FOR PILE:-

  CONCRETE MIX SHALL BE M30 FOR RMC WITH PPC CEMENT

  FOR SITE MIX

  M25 WITH MINIMUM CEMENT (PPC) CONTENT OF 400Kg/m

  CONCRETE MIX SHALL BE M40 FOR COLUMN & M25 FOR ALL

  ALL OTHER R.C.C WORKS.
- ALL REINFORCEMENT ARE OF Fe500 GRADE
- CLEAR COVER TO MAIN REINFORCEMENT SHALL BE
  - (i) PILE = 50mm
  - (ii) PILE CAP = 50mm
  - (iii) COLUMN = 40mm
  - (iv) SLAB = 20mm
  - (v) BEAM = 25mm
  - (vi) R.C.C WALL= 25mm
- LAP LENGTH SHALL BE 50 X DIA OF THE BAR



SIGNATURE :-

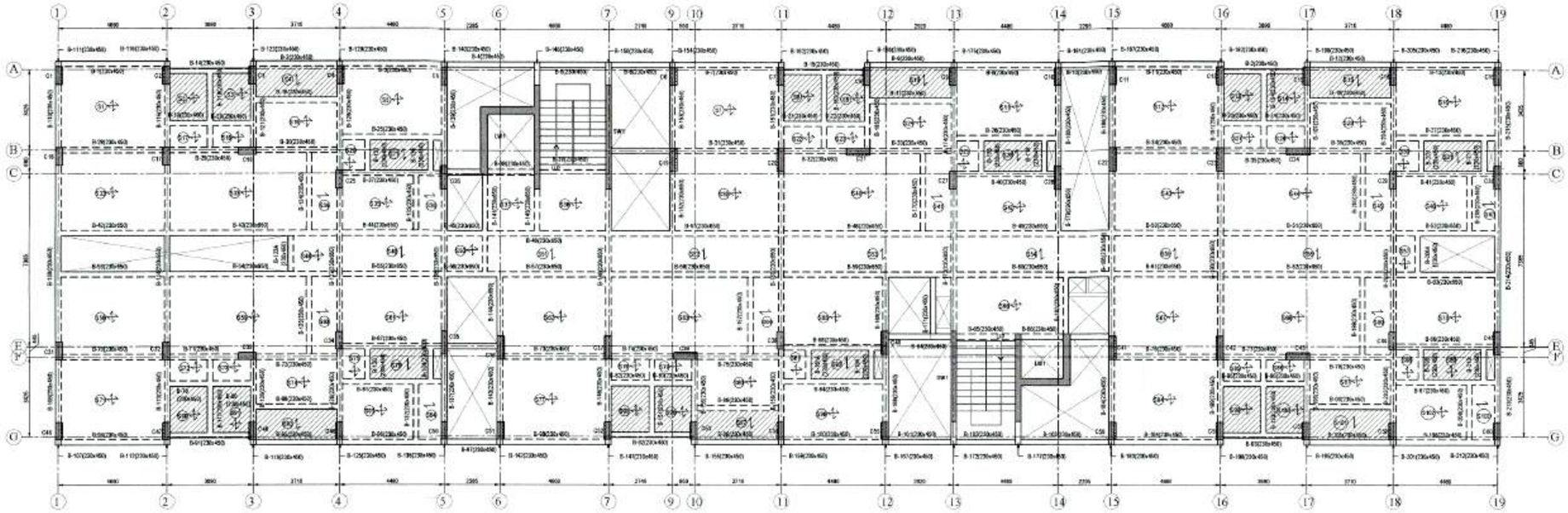
A G V DESIGAN., M.E., (Struc), MIE
SE / CGR-I / 19104 / 007
CMDA Registered Structural Engineer Grade - I
Design Group Engineering Consultants Private Limited
New No.33, Old No. 115, 2nd Floor, Padmanabha Nagar,
6th Street, Adyar, Chennai - 600 020

DRAWING TITLE :

LAYOUT & NUMERATION DETAIL OF GROUND FLOOR

PROJECT TITLE :

PLAN SHOWING THE PROPOSED CONSTRUCTION OF HIGH RISE BUILDING (HRB) RESIDENTIAL PURPOSE CONSISTING OF EXTENDED BASEMENT FLOOR + STILT FLOOR + 9 FLOORS WITH 54 DU AVAILING WITH PREMIUM FSI, AT TNHB BLOCK NOS. 400, 401, 402 & 403, MANASA APARTMENTS, SECOND AVENUE, ANNA NAGAR, CHENNAI- 600 040. COMPRISED IN SURVEY NO. 207 PART AS PER DOCUMENT AND T.S.NO.91 AS PER PATTA, BLOCK NO.17 OF KOYAMBEDU VILLAGE, AMINJIKARAI TALUK, GREATER CHENNAI CORPORATION, ZONE - VIII, DIVISION - 99.



LAYOUT & NUMERATION DETAIL OF FIRST FLOOR

SLAB NO	SHORTER DIRECTION REINFORCEMENT	LONGER DIRECTION REINFORCEMENT	SLAB THICK
S1,S5,S7,S11,S12,S16,S24,S32,S35,S37,S38,S42,S43,S46,S58,S61,S62,S65,S67,S70,S71,S74,S77,S80,S84,S87,S93,S98,S102	Y8@ 150mm C/C	Y8@ 200mm C/C	125mm
S2,S3,S6,S9,S13,S14,S90,S91,S95,S96,S99,S100	Y8@ 200mm C/C	Y8@ 200mm C/C	125mm
S21,S26,S335,S76,S82,S89	Y8@ 200mm C/C	Y8@ 200mm C/C	125mm
S33,S40,S44,S59,S66,S88	Y8@ 150mm C/C	Y8@ 200mm C/C	125mm
S8,S83	Y8@ 175mm C/C	Y8@ 200mm C/C	125mm
S4,S10,S15,S92,S97,S101	Y8@ 200mm C/C	Y8@ 200mm C/C	125mm
S48,S49,S50,S51,S52,S53,S54,S55,S56,S57	Y8@ 200mm C/C	Y8@ 200mm C/C	125mm
S20,S25,S30,S22,S23,S28,S27,S28,S2,S73,S75,S78,S79,S81,S85,S86,S88	Y8@ 200mm C/C	Y8@ 200mm C/C	125mm
S34,S41,S45,S60,S94,S69,S94,S103,S36,S41,S47	Y8@ 200mm C/C	Y8@ 200mm C/C	125mm

NOTES :-

- REFER ARCH DWG. FOR CENTER LINE DIMENSIONS
- ALL DIMENSIONS ARE IN MM
- FOR PILE :-

  CONCRETE MIX SHALL BE M30 FOR RMC WITH PPC CEMENT

  FOR SITE MIX

  M25 WITH MINIMUM CEMENT (PPC) CONTENT OF 400Kg/m

  CONCRETE MIX SHALL BE M40 FOR COLUMN & M25 FOR ALL

  ALL OTHER R.C.C WORKS
- ALL REINFORCEMENT ARE OF Fe500 GRADE
- CLEAR COVER TO MAIN REINFORCEMENT SHALL BE
  - (i) PILE = 50mm
  - (ii) PILE CAP = 50mm
  - (iii) COLUMN = 40mm
  - (iv) SLAB = 20mm
  - (v) BEAM = 25mm
  - (vi) R.C.C WALL = 25mm
- LAP LENGTH SHALL BE 50 X DIA OF THE BAR

N
W E
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SIGNATURE :-

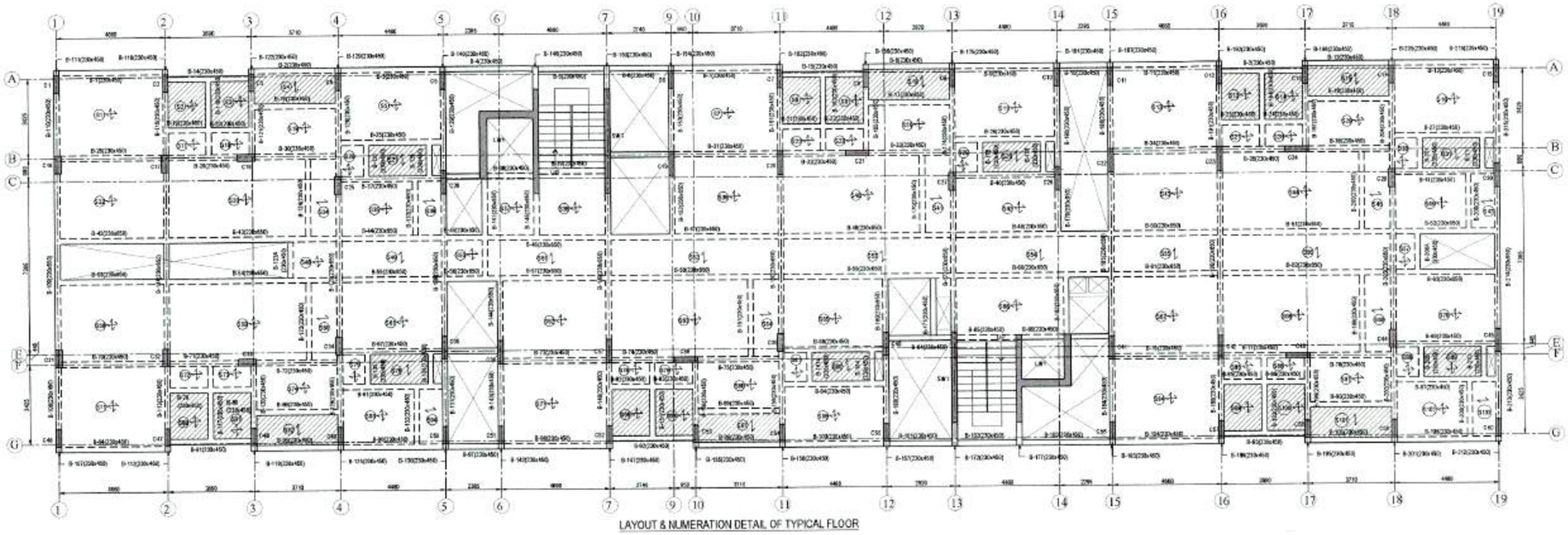
A G V DESIGAN., M.E., (Struc), MIE
SE / GR-I / 19 / 04 / 087
CMDA Registered Structural Engineer Grade - 1
Design Group Engineering Consultants Private Limited
New No 33, Old No. 115, 2nd Floor, Padmanabha Nagar,
5th Street, Adyar, Chennai - 600 020

DRAWING TITLE :

LAYOUT & NUMERATION DETAIL OF FIRST FLOOR

PROJECT TITLE :

PLAN SHOWING THE PROPOSED CONSTRUCTION OF HIGH RISE BUILDING (HRB) RESIDENTIAL PURPOSE CONSISTING OF EXTENDED BASEMENT FLOOR + STILT FLOOR + 9 FLOORS WITH 54 DU AVAILING WITH PREMIUM FSI AT TNHB BLOCK NOS. 400, 401, 402 & 403, MANASA APARTMENTS, SECOND AVENUE, ANNA NAGAR, CHENNAI- 600 040, COMPRISED IN SURVEY NO. 207 PART AS PER DOCUMENT AND T.S.NO.91 AS PER PATTA, BLOCK NO.17 OF KOYAMBEDU VILLAGE, AMINJIKARAI TALUK, GREATER CHENNAI CORPORATION, ZONE - VIII, DIVISION - 99.



LAYOUT & NUMERATION DETAIL OF TYPICAL FLOOR

SLAB NO	SHORTER DIRECTION REINFORCEMENT	LONGER DIRECTION REINFORCEMENT	SLAB THICK
S1,S5,S7,S11,S12,S28,S24,S42,S45,S47,S38,S42,S43,S46,S58,S61,S82,S65,S67,S70,S71,S74,S77,S80,S86,S87,S93,S98,S102	Y8@ 150mm C/C	Y8@ 200mm C/C	125mm
S2,S3,S8,S9,S23,S24,S90,S91,S95,S96,S99,S100	Y8@ 200mm C/C	Y8@ 200mm C/C	125mm
S21,S26,S615,S76,S82,S89	Y8@ 300mm C/C	Y8@ 200mm C/C	125mm
S53,S60,S63,S59,S61,S68	Y8@ 150mm C/C	Y8@ 200mm C/C	125mm
S6,S85	Y8@ 175mm C/C	Y8@ 200mm C/C	125mm
S4,S10,S13,S92,S97,S102	Y8@ 200mm C/C	Y8@ 200mm C/C	125mm
S48,S49,S94,S31,S32,S33,S34,S55,S56,S57	Y8@ 250mm C/C	Y8@ 200mm C/C	125mm
S20,S25,S30,S22,S25,S29,S27,S36,S2,S73,S75,S78,S79,S81,S83,S86,S88	Y8@ 200mm C/C	Y8@ 200mm C/C	125mm
S34,S42,S43,S90,S64,S69,S84,S103,S36,S41,S47	Y8@ 200mm C/C	Y8@ 200mm C/C	125mm

NOTES :-

- REFER ARCH. DWG. FOR CENTER LINE DIMENSIONS.
- ALL DIMENSIONS ARE IN MM
- FOR PILE:
  CONCRETE MIX SHALL BE M30 FOR RMC WITH PPC CEMENT
  FOR SITE MIX
  M25 WITH MINIMUM CEMENT (PPC) CONTENT OF 400Kg/m
  CONCRETE MIX SHALL BE M40 FOR COLUMN & M25 FOR ALL
  ALL OTHER R.C.C WORKS
- ALL REINFORCEMENT ARE OF Fe500 GRADE
- CLEAR COVER TO MAIN REINFORCEMENT SHALL BE
  (i) PILE = 50mm
  (ii) PILE CAP = 50mm
  (iii) COLUMN = 40mm
  (iv) SLAB = 20mm
  (v) BEAM = 25mm
  (vi) R.C.C WALL = 25mm
- LAP LENGTH SHALL BE 50 X DIA OF THE BAR

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SIGNATURE :-

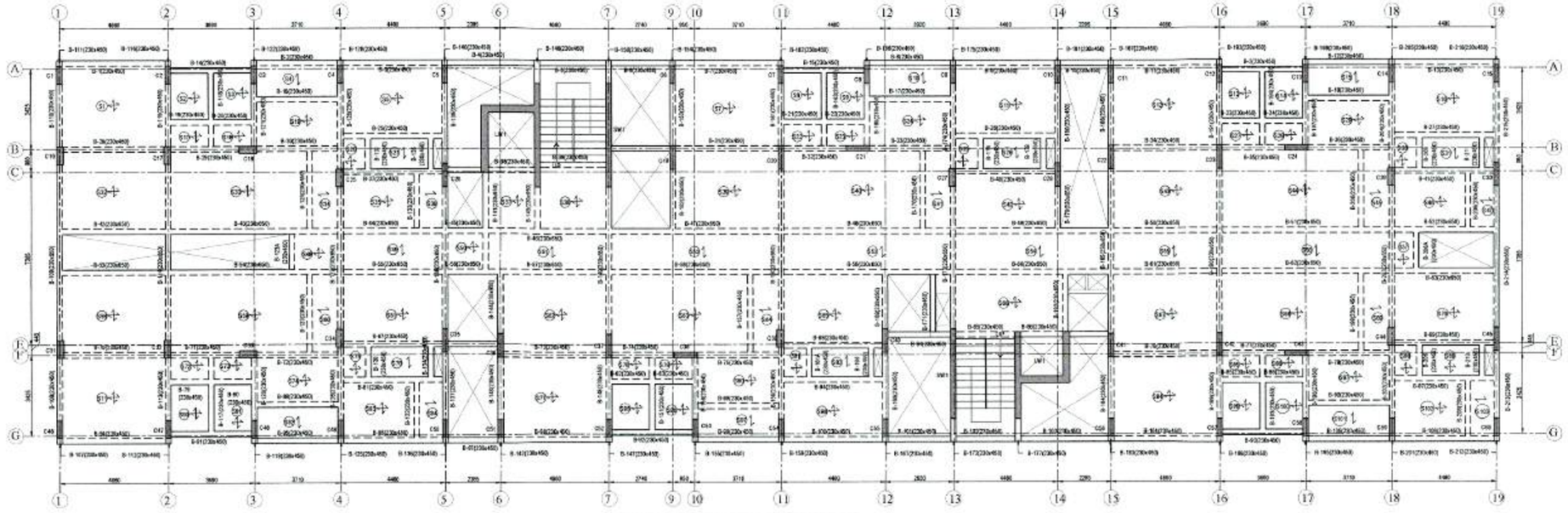
A G V DESIGAN., M.E., (Struc), MIE
SE / CR / 1 / 10 / 04 / 097
CMDA Registered Structural Engineer Grade - I
Design Group Engineering Consultants Private Limited
New No 33, Old No 116, 2nd Floor, Pammalmana Nagar,
5th Street, Adyar, Chennai - 600 020

DRAWING TITLE :

LAYOUT & NUMERATION DETAIL OF TYPICAL FLOOR

PROJECT TITLE :

PLAN SHOWING THE PROPOSED CONSTRUCTION OF HIGH RISE BUILDING (HRB) RESIDENTIAL PURPOSE CONSISTING OF EXTENDED BASEMENT FLOOR + STILT FLOOR + 9 FLOORS WITH 54 DU AVAILING WITH PREMIUM FSI, AT TNHB BLOCK NOS. 400, 401, 402 & 403, MANASA APARTMENTS, SECOND AVENUE, ANNA NAGAR, CHENNAI- 600 040, COMPRISED IN SURVEY NO. 207 PART AB PER DOCUMENT AND T.S.NO 91 AS PER PATTA, BLOCK NO.17 OF KOYAMBEDU VILLAGE, AMINJIKARAI TALUK, GREATER CHENNAI CORPORATION, ZONE - VIII, DIVISION - 99.



LAYOUT & NUMERATION DETAIL OF TERRACE FLOOR

SLAB NO	SHORTER DIRECTION REINFRCEMENT	LONGER DIRECTION REINFRCEMENT	SLAB THICK
S1,S3,S7,S11,S12,S16,S24,S32,S35,S37,S38,S42,S45,S46,S56,S61,S62,S65,S67,S70,S71,S74,S77,S80,S84,S87,S93,S98,S102	10@ 150mm C/C	Y8@ 200mm C/C	125mm
S2,S4,S8,S9,S13,S14,S40,S91,S95,S96,S99,S100	10@ 200mm C/C	Y8@ 200mm C/C	125mm
S21,S26,S31,S76,S82,S83	10@ 200mm C/C	Y8@ 200mm C/C	125mm
S59,S60,S64,S69,S63,S68	Y8@ 150mm C/C	Y8@ 200mm C/C	125mm
S5,S81	Y8@ 175mm C/C	Y8@ 200mm C/C	125mm
S6,S10,S15,S92,S97,S101	Y8@ 200mm C/C	Y8@ 200mm C/C	125mm
S66,S49,S50,S51,S52,S53,S54,S55,S36,S57	Y8@ 200mm C/C	Y8@ 200mm C/C	125mm
S20,S25,S30,S22,S23,S25,S27,S28,S2,S73,S75,S78,S79,S81,S85,S86,S88	Y8@ 200mm C/C	Y8@ 200mm C/C	125mm
S44,S41,S43,S60,S44,S49,S94,S103,S86,S43,S47	Y8@ 200mm C/C	Y8@ 200mm C/C	125mm

NOTES :-

- REFER ARCH. DWG. FOR CENTER LINE DIMENSIONS.
- ALL DIMENSIONS ARE IN MM
- FOR PILE :-

  CONCRETE MIX SHALL BE M30 FOR RMC WITH PPC CEMENT

  FOR SITE MIX

  M25 WITH MINIMUM CEMENT (PPC) CONTENT OF 400Kg/m

  CONCRETE MIX SHALL BE M40 FOR COLUMN & M25 FOR ALL

  ALL OTHER R.C.C WORKS.
- ALL REINFORCEMENT ARE OF Fe500 GRADE
- CLEAR COVER TO MAIN REINFORCEMENT SHALL BE
  - (i) PILE = 50mm
  - (ii) PILE CAP = 50mm
  - (iii) COLUMN = 40mm
  - (iv) SLAB = 20mm
  - (v) BEAM = 25mm
  - (vi) R.C.C WALL = 25mm
- LAP LENGTH SHALL BE 50 X DIA OF THE BAR

N

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SIGNATURE :-

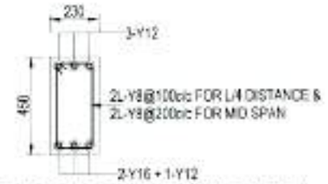
A G V DESIGAN., M.E., (Struc), MIE
SE / GR-I / 19 / 04 / 087
CMDA Registered Structural Engineer Grade - I
Design Group Engineering Consultants Private Limited
New No 33, Old No. 115, 2nd Floor, Padmanabha Nagar,
6th Street, Adyar, Chennai - 600 020

DRAWING TITLE :

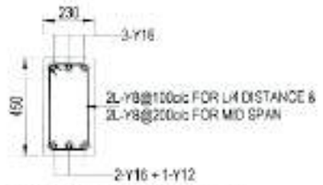
LAYOUT & NUMERATION DETAIL OF TERRACE FLOOR

PROJECT TITLE :

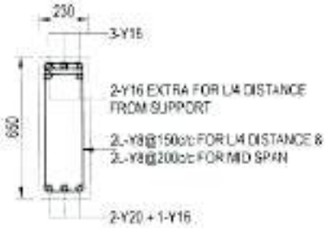
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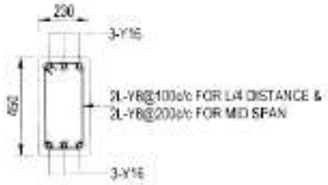
TYPICAL C.S DETAILS OF B-1 TO 27 & 79 TO 106



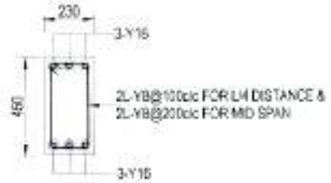
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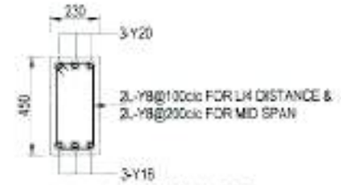
TYPICAL C.S DETAILS OF B-42 TO 63



TYPICAL C.S DETAILS OF B-107,108,111,212,213,215 & 216



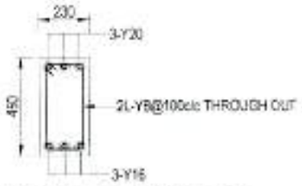
TYPICAL C.S DETAILS OF B-112,113,115,116,201, 202,204 & 205



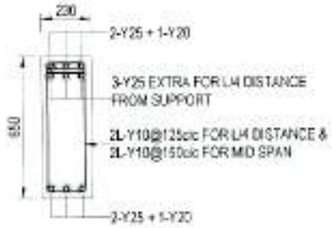
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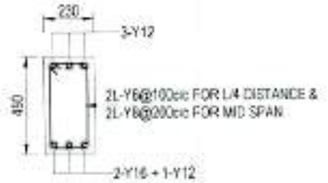
TYPICAL C.S DETAILS OF B-142,143,153,154, 167,168,180 & 181



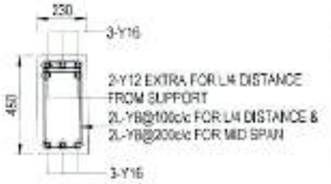
TYPICAL C.S DETAILS OF B-145,146,150,172 & 177



TYPICAL C.S DETAILS OF B-160 & 173



TYPICAL C.S DETAILS OF B-117,118,123,123A,124, 130 TO 135,151,157,161A,163, 164,170,171,176,178,193,194, 199,200,206,206A,207,208, 209,210 & 211



TYPICAL C.S DETAILS OF B-28 TO 36 & 70 TO 78



TYPICAL C.S DETAILS OF B-64,65 & 66



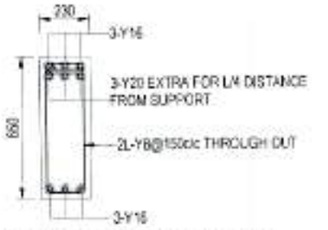
TYPICAL C.S DETAILS OF B-109 & 214



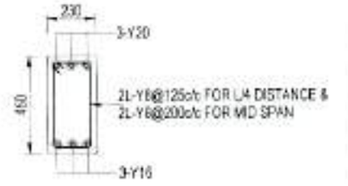
TYPICAL C.S DETAILS OF B-114 & 203



TYPICAL C.S DETAILS OF B-127,138,185 & 190



TYPICAL C.S DETAILS OF B-144,152,169 & 179



TYPICAL C.S DETAILS OF B-148,159,161,174 & 175

NOTES :-

- REFER ARCH. DWG. FOR CENTER LINE DIMENSIONS.
- ALL DIMENSIONS ARE IN MM
- FOR PILE:-
  CONCRETE MIX SHALL BE M30 FOR RMC WITH PPC CEMENT
  FOR SITE MIX
  M25 WITH MINIMUM CEMENT (PPC) CONTENT OF 400Kg/m
  CONCRETE MIX SHALL BE M40 FOR COLUMN & M25 FOR ALL
  ALL OTHER R.C.C WORKS.
- ALL REINFORCEMENT ARE OF Fe500 GRADE
- CLEAR COVER TO MAIN REINFORCEMENT SHALL BE

(i) PILE = 50mm
(ii) PILE CAP = 50mm
(iii) COLUMN = 40mm
(iv) SLAB = 20mm
(v) BEAM = 25mm
(vi) R.C.C WALL= 25mm

- LAP LENGTH SHALL BE 50 X DIA OF THE BAR

SIGNATURE :-

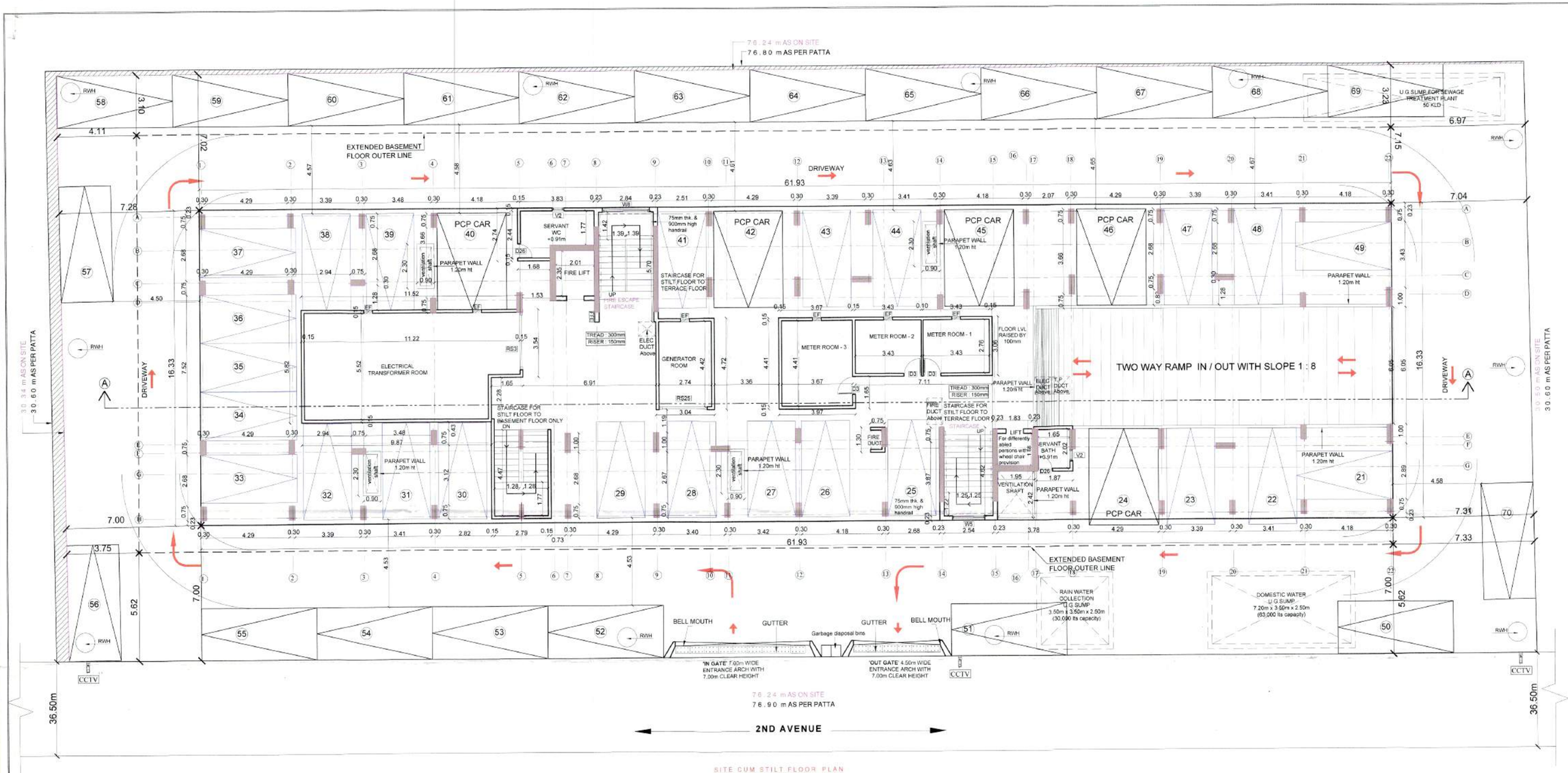
AGV DESIGAN., M.E., (Struc), MIE
SE / GR-I / 19 / 04 / 087
CMDA Registered Structural Engineer Grade - I
Design Group Engineering Consultants Private Limited
New No.33, Old No. 115, 2nd Floor, Padmanabha Nagar,
5th Street, Adyar, Chennai - 600 020

DRAWING TITLE :

RC DETAIL OF BEAMS

PROJECT TITLE :

PLAN SHOWING THE PROPOSED CONSTRUCTION OF HIGH RISE BUILDING (HRB) RESIDENTIAL PURPOSE CONSISTING OF EXTENDED BASEMENT FLOOR + STILT FLOOR + 9 FLOORS WITH 54 DU AVAILING WITH PREMIUM FSI, AT TNHB BLOCK NOS. 400, 401, 402 & 403, MANASA APARTMENTS, SECOND AVENUE, ANNA NAGAR, CHENNAI- 600 040. COMPRISED IN SURVEY NO. 207 PART AS PER DOCUMENT AND T.S.NO.91 AS PER PATTA, BLOCK NO.17 OF KOYAMBEDU VILLAGE, AMINJIKARAI TALUK, GREATER CHENNAI CORPORATION, ZONE - VIII, DIVISION - 99.



SCHEDULE OF JOINERY

TYPE	DESCRIPTION	SIZE
D3	DOOR	0.915 X 2.130
D26	DOOR	0.750 X 2.130
W8	WINDOW	2.400 X 1.220
W26	WINDOW	1.500 X 1.220
V2	VENTILATOR	0.600 X 0.915

NOTE

1. ALL LEVELS MENTIONED IN THIS DWG ARE R.C.C LEVELS ONLY AS OTHERWISE SPECIFIED.
2. ANY DISCREPANCY IN THIS DRAWING SHALL BE BROUGHT TO THE NOTICE OF THE ARCHITECT/CLIENT OR THE CONCERN PERSON BEFORE EXECUTING THE SAME.
3. ALL DUCT TO BE BUILT AFTER COMPLETION OF PLUMBING & SANITARY WORKS.
4. SILL LEVEL SHALL BE 965mm FOR REGULAR WINDOW, 350mm FOR FRENCH WINDOW & LINTEL LEVEL 2185mm FROM R.C TOP LEVEL FOR ALL WINDOWS & DOORS. (ASSUMED 50mm THK FLOOR FINISH LEVEL)
5. ALL TOILET STUB WALLS ARE 115mm THK., UP TO 1200mmHT. (Refer separate detail)
6. KITCHEN WINDOW SILL LEVEL SHALL BE 1270mm & LINTEL LEVEL 2185mm FROM R.C TOP LEVEL

NOTE

1) All external dummy portions should be plastered before constructing the outer wall of dummy portions and floor also to be plastered. junction corners in the floor & walls should be neatly finished as round corners.
2) Unless otherwise specified,plastering for 200mm thk. porotherm wall to be done as usual.(Need not to align with beam plastering)
3) All balconies door frame should be fixed on balcony outer side flush.
4) General flooring tiles in Living, Dining, Bedrooms and Balconies are to be laid with 3mm spacer joint with Cementicus grouting using - NITOTILE GROUT (OR) EQUIVALENT BRAND.
5) Flooring tiles for all Toilet & Utility are to be laid with 2mm spacer joint with EPOXY GROUTING USING FUGAITE ECO (or) EQUIVALENT BRAND.(spacer joint not required for wall dado)
6) Cooking platform level should be of 915mm (2'-9") ht., from finished floor level and 65mm (2.5") ht. Granite skirting should be provided above the platform & then wall dadoo upto 600mm ht., to be laid.
7) Exhaust fan provision in ventilator itself in all toilets.
8) Duct covering with flat-type aluminium anodized louvers to detail.
9) In utility & S.B.wet with granite slab.
10) Unless otherwise specified,all sunshades are 530mm wide.

GENERAL NOTES FOR CEILING PLASTERING :

- Any parking area ceilings like basement, still or 1st floor should not be plastered.
- Kitchen, Toilet, Balcony and Utility areas (Sunken areas) will be provided with Cement mortar plastering and areas other than that will have Gypsum plastering including the final floor.
- The Ceiling Gypsum plastering should be done first before plastering the walls, this will prevent Gypsum getting glued to the plastered walls.

NOTE :

- In case of Cement mortar plastering for ceiling, plastering should be done in double coat and Nitobond SBR Admixture should be used in the Cement mortar.

SIGNATURE:

P.V. DILIPRAJ, B.E. (CIVIL)
CMDA REGN NO - RE/GR-1/19/34034
GCC REGN NO - RE/100/2019
No 10, GOVINDASAMY STREET
KATTABOMMAN BLOCK
JAFFERKHANPET, CHENNAI- 600 083
MOBILE 9941269153

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REV.NO.	DATE	DESCRIPTIONS

PROJECT TITLE:

RAMANIYAM MANASA

MANASA APARTMENTS, 2ND AVENUE, ANNA NAGAR, CHENNAI - 40.

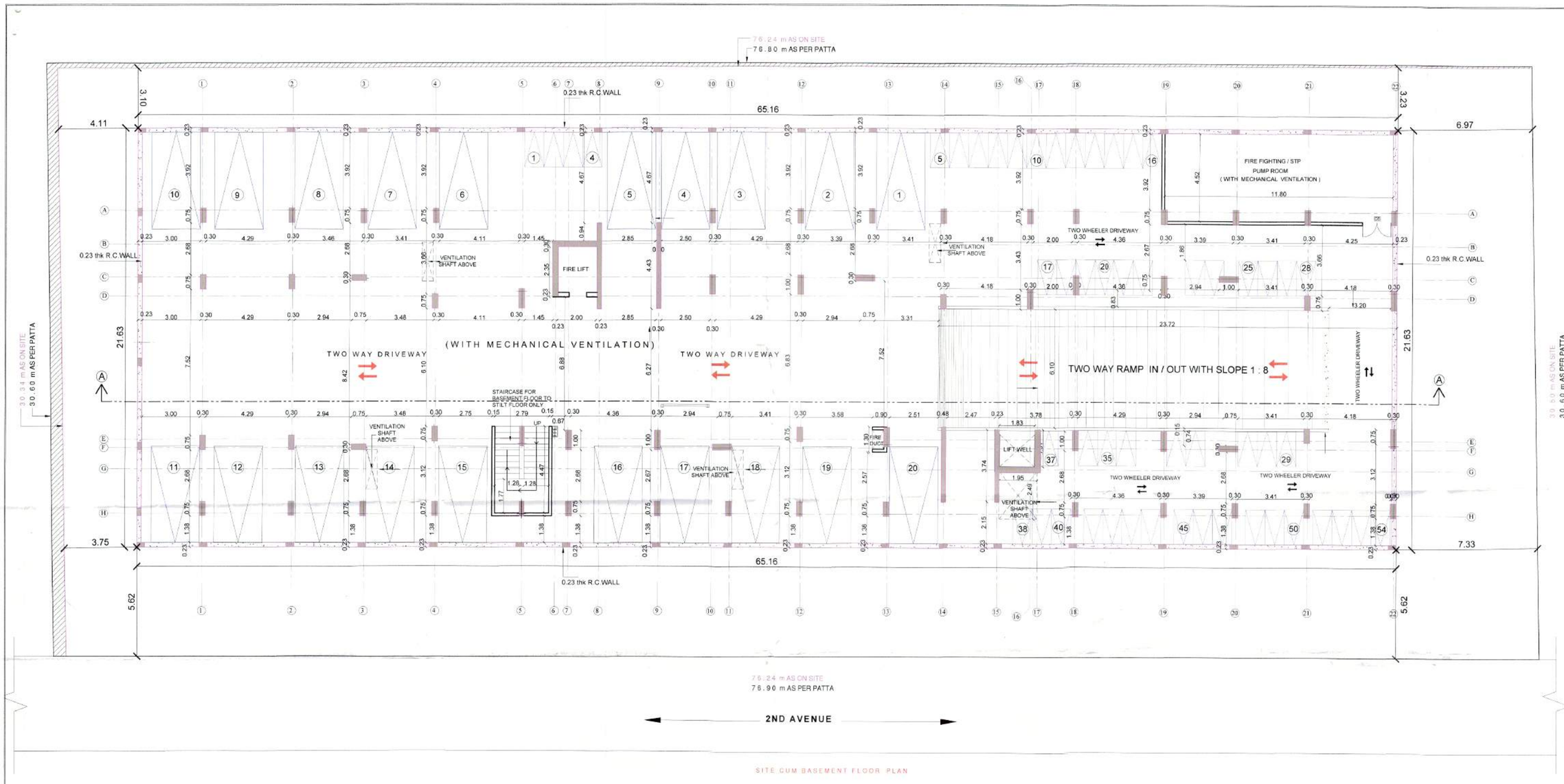
DRAWING TITLE:

SITE CUM STILT FLOOR PLAN

ARCHITECT	STRUCTURAL CONSULTANT
IN HOUSE DESIGN	IN HOUSE DESIGN

Drawing No.	Sheet No	Date	Scale
3/3	1 OF 1	09.08.2022	1 : 100
Drawn By	Checked By	Approved By	Revision No.
S.KOLAVISHI	Ms.Nagasakunthi	Mr.Dilip raj	R0

RAMANIYAM REALTORS LLP
No - 17 / 3E, 2nd MAIN ROAD, GANDHI NAGAR ADYAR, CHENNAI - 600 020.
PH : 044 - 43447500 (100 LINES)



SITE CUM BASEMENT FLOOR PLAN

SCHEDULE OF JOINERY

TYPE	DESCRIPTION	SIZE
D3	DOOR	0.915 X 2.130
D26	DOOR	0.760 X 2.130
W8	WINDOW	2.400 X 1.220
W26	WINDOW	1.500 X 1.220
V2	VENTILATOR	0.600 X 0.915

NOTE

1. ALL LEVELS MENTIONED IN THIS DWG. ARE R.C.C LEVELS. (UNLESS OTHERWISE SPECIFIED)
2. ANY DISCREPANCY IN THIS DRAWING SHALL BE BROUGHT TO THE NOTICE OF THE ARCHITECT/CLIENT OR THE CONCERN PERSON BEFORE EXECUTING THE SAME.
3. ALL DUCT TO BE BUILT AFTER COMPLETION OF PLUMBING & SANITARY WORKS.
4. SILL LEVEL SHALL BE 965mm FOR REGULAR WINDOW, 350mm FOR FRENCH WINDOW & LINTEL LEVEL 2185mm FROM R.C TOP LEVEL FOR ALL WINDOWS & DOORS. (ASSUMED 50mm THK. FLOOR FINISH LEVEL)
5. ALL TOILET STUB WALLS ARE 115mm THK. UP TO 1200mmHT. (Refer separate detail)
9. KITCHEN WINDOW SILL LEVEL SHALL BE +270mm & LINTEL LEVEL 2185mm FROM R.C TOP LEVEL.

NOTE

1) All external dummy portions should be plastered before constructing the outer wall of dummy portions and floor also to be plastered. Junction corners in the floor & walls should be neatly finished as round corners.
2) Unless otherwise specified,plastering for 200mm thk., partotherm wall to be done as usual.(Need not to align with beam plastering)
3) All balconies door frame should be fixed on balcony outer side flush.
4) General flooring tiles in Living, Dining, Bedrooms and Balconies are to be laid with 2mm spacer joint with Cementious grouting using - NITOTILE GROUT (CR) EQUIVALENT BRAND.
5) Flooring tiles for all Toilet & Utility are to be laid with 2mm spacer joint with EPOXY GROUTING USING FLXALITE ECO (or) EQUIVALENT BRAND.(spacer joint not required for wall dado)
6) Cooking platform level should be of 815mm (2'-8") lvl. from finished floor lvl. and 65mm (2.5") lvl. Granite skirting should be provided above the platform & then wall dadoo upto 600mm lvl. to be laid.
7) Exhaust fan provision in ventilator itself in all toilets
8) Duct covering with flat-type aluminium anodized louvers to detail.
9) In utility S.S bowl with granite slab.
10) Unless otherwise specified,all sunshades are 600mm wide.

GENERAL NOTES FOR CEILING PLASTERING :

- Any parking area ceilings like basement, stilt or 1st floor should not be plastered.
- Kitchen, Toilet, Balcony and Utility areas (Sunken areas) will be provided with Cement mortar plastering and areas other than that will have Gypsum plastering including the final floor.
- The Ceiling Gypsum plastering should be done first before plastering the walls, this will prevent Gypsum getting glued to the plastered walls.

NOTE :

- In case of Cement mortar plastering for ceiling, plastering should be done in double coat and Nitobond SBR Admixture should be used in the Cement mortar.

SIGNATURE:

P.V. DILIPRAJ, B.E (CIVIL)
CIDA REGN NO - DESGN-11/0402/034
GCC REGN NO - AL1/0035/2019
No.16, GOVINDASAMY STREET
KATTABOMMAN BLOCK,
AYYERKHANPET, CHENNAI- 600 083
MOBILE: 9841269153

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REV NO.	DATE	DESCRIPTIONS

PROJECT TITLE:

RAMANIYAM MANASA

MANASA APARTMENTS 2ND AVENUE,
ANNA NAGAR, CHENNAI - 40.

DRAWING TITLE:

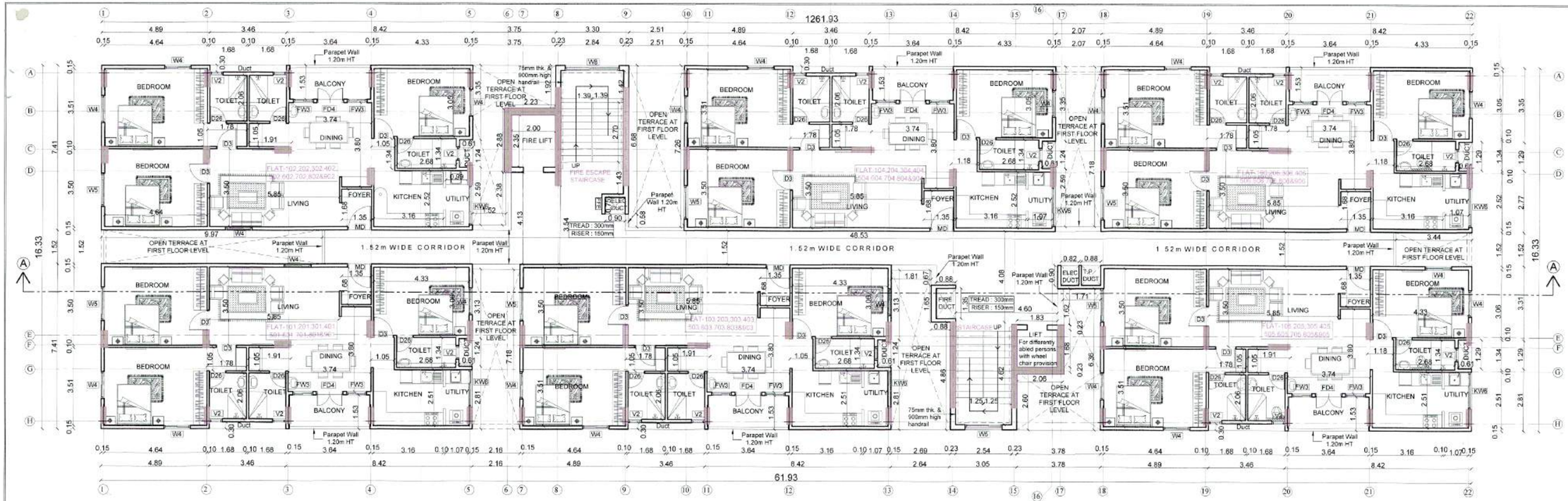
SITE CUM BASEMENT FLOOR PLAN

ARCHITECT	STRUCTURAL CONSULTANT
IN HOUSE DESIGN	IN HOUSE DESIGN

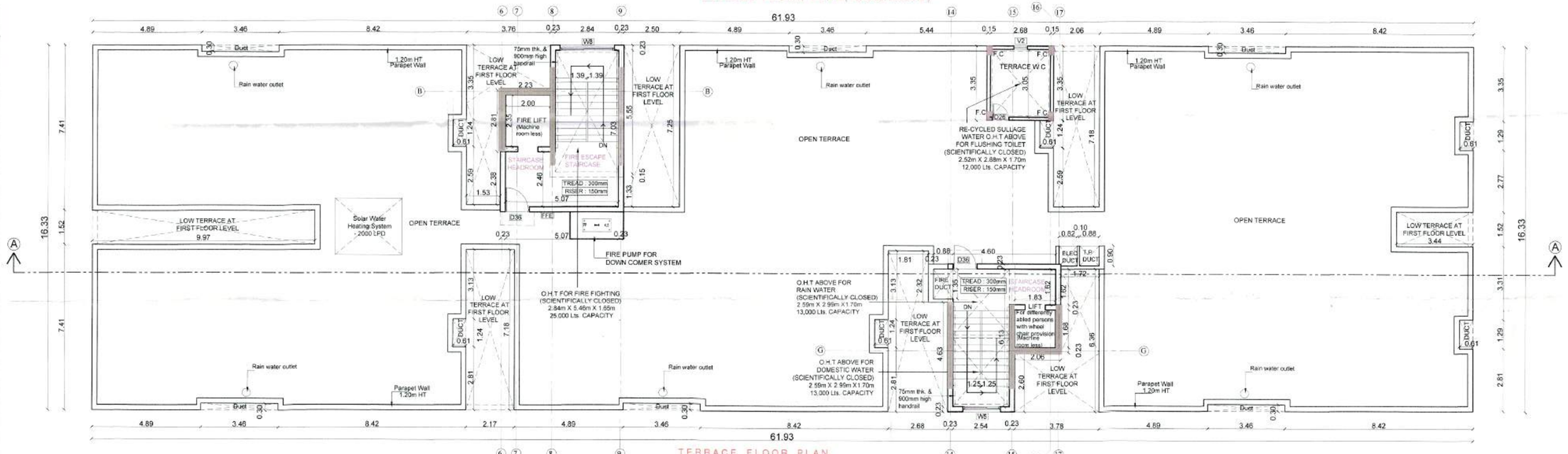
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313	2 OF 7	09.06.2022	1 : 100
Drawn By	Checked By	Approved By	Revision No.
S.KOLAVERI	Ms.Nagalakshmi	Mr.Dilip raj	R0

N

RAMANIYAM REALTORS LLP,
No : 17 / 36 , 2nd MAIN ROAD , GANDHI NAGAR
ADYAR , CHENNAI - 600 020.
PH : 044 - 45447900 (100 LINES)



TYPICAL FLOOR PLAN (1st to 9th FLOORS)



TERRACE FLOOR PLAN

SCHEDULE OF JOINERY :

TYPE	DESCRIPTION	SIZE
D5	DOOR	1.500 X 2.135
D26	DOOR	1.070 X 2.135
MD	MAIN DOOR	1.070 X 2.135
D3	DOOR	0.915 X 2.135
D26	DOOR	0.760 X 2.135
FD4	FRENCH DOOR	1.220 X 2.135
W5	WINDOW	1.500 X 1.200
W4	WINDOW	1.220 X 1.200
FW3	WINDOW	0.915 X 1.065
KW6	WINDOW	1.680 X 0.915
V2	VENTILATOR	0.600 X 0.915
RS3	ROLLING SHUTTER	3.000 X 2.130
RS35	ROLLING SHUTTER	2.900 X 2.130
FD	FIRE RATED DOOR	1.050 X 2.150

NOTE

1. ALL LEVELS MENTIONED IN THIS DWG. ARE R.C.C LEVELS. (Refer Structural Drawing No. S-1101)
2. ANY DISCREPANCY IN THIS DRAWING SHALL BE BROUGHT TO THE NOTICE OF THE ARCHITECT/CLIENT OR THE CONCERN PERSON BEFORE EXECUTING THE SAME.
3. ALL DUCT TO BE BUILT AFTER COMPLETION OF PLUMBING & SANITARY WORKS.
4. SILL LEVEL SHALL BE 965mm FOR REGULAR WINDOW 350mm FOR FRENCH WINDOW & LINTEL LEVEL 2185mm FROM R.C TOP LEVEL FOR ALL WINDOWS & DOORS. (ASSUMED 50mm THK. FLOOR FINISH LEVEL)
5. ALL TOILET STUB WALLS ARE 115mm THK. UP TO 1200mmFT. (Refer separate detail)
6. KITCHEN WINDOW SILL LEVEL SHALL BE 1270mm & LINTEL LEVEL 2185mm FROM R.C TOP LEVEL.

NOTE

1) All external dummy portions should be plastered before constructing the outer wall of dummy portions and floor also to be plastered. Junction corners in the floor & walls should be neatly finished as round corners.
2) Unless otherwise specified plastering for 200mm thk., porotherm wall to be done as usual (Need not to align with beam plastering)
3) All balconies door frame should be fixed on balcony outer side flush.
4) General flooring tiles in Living, Dining, Bedrooms and Balconies are to be laid with 3mm spacer joint with Cementious grouting using - NITOTILE GROUT (OR) EQUIVALENT BRAND.
5) Flooring tiles for all Toilet & Utility are to be laid with 2mm spacer joint with EPOXY GROUTING USING FUGALITE ECO (or) EQUIVALENT BRAND.(spacer joint not required for wall dado).
6) Cooking platform level should be of 915mm (3'-0") Ht., from finished floor lvl. and 65mm (2.5") Ht. Granite skirting should be provided above the platform & then wall dadoo upto 600mm ht., to be laid.
7) Exhaust fan provision in ventilator itself in all toilets.
8) Duct covering with fly type aluminium anodized louvers to detail.
9) In utility S.S bowl with granite slab.
10) Unless otherwise specified,all sunshades are 530mm wide.

GENERAL NOTES :

1. FOR TOILET PLUMBING DETAILS REFER SEPERATE DRAWING.
2. FOR ARCHITECTURAL FEATURES, BALCONY GRILLS & SUNSHADE DETAILS REFER THE ELEVATION DRAWINGS.
3. FOR STAIRCASE DETAILS REFER SEPERATE DRAWINGS.
4. PROVIDE 50mm THK., CHIPS CONCRETE WITH MS PERFORATED SHEETS AT SILL LEVEL & LINTEL LEVEL FOR THE 100mm THK. POROTHERM WALLS.
5. PROVIDE MS PERFORATED SHEET FOR EVERY TWO LAYERS IN ELECTRICAL & FIRE DUCT WALLS.
6. ALL CHIMNEY PROVIDE 150mm Ø HOLE FOR KITCHEN ONLY & IT SHOULD BE AT 2400 LVL. (PIPE CENTRLN.)
7. LOFTS SHOULD BE PROVIDED ONLY WHEREVER WRITTEN IN THE DRAWING AS LOFT ABOVE. DRILL LOFT RODS INTO THE COLUMN FOR BEARING WHEREVER COLUMN IS PRESENT.
8. IF THERE IS NO WALL SUPPORT FOR LOFT (LIKE IN OPEN KITCHEN LOFT) PROVIDE VERTICAL SUPPORT RODS ANCHORED FROM ROOF BEAM/ROOF SLAB.

GENERAL NOTES FOR CEILING PLASTERING :

- Any parking area ceilings like basement, stilt or 1st floor should not be plastered.
- Kitchen, Toilet, Balcony and Utility areas (Sunken areas) will be provided with Cement mortar plastering and areas other than that will have Gypsum plastering including the final floor.
- The Ceiling Gypsum plastering should be done first before plastering the walls, this will prevent Gypsum getting glued to the plastered walls.

NOTE :

- In case of Cement mortar plastering for ceiling, plastering should be done in double coat and Nitobond SBR Admixture should be used in the Cement mortar.

SIGNATURE:

P.V. DILIPRAJ, B.E (CIVIL)
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PROJECT TITLE:

RAMANIYAM MANASA

MANASA APARTMENTS, 2ND AVENUE, ANNA NAGAR , CHENNAI - 40.

DRAWING TITLE:

TYPICAL FLOOR PLAN(1st to 9th FLOORS) & TERRACE FLOOR PLAN

ARCHITECT	STRUCTURAL CONSULTANT
IN HOUSE DESIGN	IN HOUSE DESIGN

Drawing No:	Sheet No:	Date	Scale
313	3 OF 7	29.08.2022	1 : 100
Drawn By	Checked By	Approved By	Revision No.
S.KOLAVZHI	Ms. Nagalakshmi	Mr.Dilip raj	R0

RAMANIYAM REALTORS LLP.,
No : 17 / 35 , 2nd MAIN ROAD , GANDHI NAGAR
ADYAR , CHENNAI - 600 020.
PH : 044 - 43467500 (100 LINES)



SOUTH SIDE ELEVATION (FRONT)

NOTE

1. ALL LEVELS MENTIONED IN THIS DWG. ARE R.C.C LEVELS. (UNLESS OTHERWISE SPECIFIED)
2. ANY DISCREPANCY IN THIS DRAWING SHALL BE BROUGHT TO THE NOTICE OF THE ARCHITECT/CLIENT OR THE CONCERN PERSON BEFORE EXECUTING THE SAME.
3. ALL DUCT TO BE BUILT AFTER COMPLETION OF PLUMBING & SANITARY WORKS.
4. SILL LEVEL SHALL BE 965mm FOR REGULAR WINDOW, 350mm FOR FRENCH WINDOW & LINTEL LEVEL 2185mm FROM R.C TOP LEVEL FOR ALL WINDOWS & DOORS. (ASSUMED 50mm THK. FLOOR FINISH LEVEL)
5. ALL TOILET STUB WALLS ARE 115mm THK., UP TO 1200mmHT. (Refer separate detail)
6. KITCHEN WINDOW SILL LEVEL SHALL BE 1270mm & LINTEL LEVEL 2185mm FROM R.C TOP LEVEL.

NOTE

1) All external dummy portions should be plastered before constructing the outer wall of dummy portions and floor also to be plastered. junction corners in the floor & walls should be neatly finished as round corners.
2) Unless otherwise specified plastering for 200mm thk. porotherm wall to be done as usual.(Need not to align with beam plastering)
3) All balconies door frame should be fixed on balcony outer side flush.
4) General flooring tiles in Living, Dining, Bedrooms and Balconies are to be laid with 3mm spacer joint with Cementious grouting using - NITOTILE GROUT (OR) EQUIVALENT BRAND.
5) Flooring tiles for all Toilet & Utility are to be laid with 2mm spacer joint with EPOXY GROUTING USING FUGALITE ECO (or) EQUIVALENT BRAND.(spacer joint not required for wall dado)
6) Cooking platform level should be of 815mm (2'-8") lvl , from finished floor lvl and 65mm (2.5") ht. Granite skirting should be provided above the platform & then wall dado upto 600mm ht., to be laid.
7) Exhaust fan provision in ventilator itself in all toilets.
8) Duct covering with flat-type aluminium anodized louvers to detail.
9) In utility S.S bowl with granite slab.
10) Unless otherwise specified,all sunshades are 530mm wide.

GENERAL NOTES :

1. FOR TOILET PLUMBING DETAILS REFER SEPERATE DRAWING.
2. FOR ARCHITECTURAL FEATURES, BALCONY GRILLS & SUNSHADE DETAILS REFER THE ELEVATION DRAWINGS.
3. FOR STAIRCASE DETAILS REFER SEPERATE DRAWINGS.
4. PROVIDE 50mm THK. CHIPS CONCRETE WITH MS PERFORATED SHEETS AT SILL LEVEL & LINTEL LEVEL FOR THE 100mm THK., POROTHERM WALLS.
5. PROVIDE MS PERFORATED SHEET FOR EVERY TWO LAYERS IN ELECTRICAL & FIRE DUCT WALLS.
6. ALL CHIMNEY PROVIDE 150mm Ø HOLE FOR KITCHEN ONLY & IT SHOULD BE AT 2400 LVL (PIPE CENTRLVL)
7. LOFTS SHOULD BE PROVIDED ONLY WHEREVER WRITTEN IN THE DRAWING AS 'LOFT ABOVE' DRILL LOFT RODS INTO THE COLUMN FOR BEARING WHEREVER COLUMN IS PRESENT.
8. IF THERE IS NO WALL SUPPORT FOR LOFT (LIKE IN OPEN KITCHEN LOFT) PROVIDE VERTICAL SUPPORT RODS ANCHORED FROM ROOF BEAM/ROOF SLAB.

GENERAL NOTES FOR CEILING PLASTERING :

- Any parking area ceilings like basement, stilt or 1st floor should not be plastered.
- Kitchen, Toilet, Balcony and Utility areas (Sunken areas) will be provided with Cement mortar plastering and areas other than that will have Gypsum plastering including the final floor.
- The Ceiling Gypsum plastering should be done first before plastering the walls, this will prevent Gypsum getting glued to the plastered walls.

NOTE :

- In case of Cement mortar plastering for ceiling, plastering should be done in double coat and Nicobond SBR Admixture should be used in the Cement mortar.

SIGNATURE

P.V. DILIPRAJ, B.E. (CIVIL)
CMDA REGN NO - REVGR-I/1993/1034
GCC REGN NO - RE/10609/2019
10,10, GENGUSAMY STREET
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MOBILE 9941259153

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REV.NO	DATE	DESCRIPTIONS

PROJECT TITLE:

RAMANIYAM MANASA

MANASA APARTMENTS, 2ND AVENUE, ANNA NAGAR , CHENNAI - 40.

DRAWING TITLE:

SOUTH SIDE ELEVATION (FRONT)

ARCHITECT	STRUCTURAL CONSULTANT
IN HOUSE DESIGN	IN HOUSE DESIGN

Drawing No.	Sheet No.	Date	Scale
12	2 OF 7	09.08.2021	1 : 100
Drawn By	Checked By	Approved By	Revision No.
S.KOUSALYA	Mr.Nagalakshmi	Mr.Dilip raj	R0

N

RAMANIYAM REALTORS LLP.
No : 11 / 20 , 2nd MAIN ROAD, GANDHI NAGAR
ADYAR , CHENNAI - 600 020.
PH : 244 / 4944F909 (100 LINES)



EAST SIDE ELEVATION

WEST SIDE ELEVATION

NOTE

1. ALL LEVELS MENTIONED IN THIS DWG. ARE R.C.C LEVELS. (UNLESS OTHERWISE SPECIFIED)
2. ANY DISCREPANCY IN THIS DRAWING SHALL BE BROUGHT TO THE NOTICE OF THE ARCHITECT/CLIENT OR THE CONCERN PERSON BEFORE EXECUTING THE SAME.
3. ALL DUCT TO BE BUILT AFTER COMPLETION OF PLUMBING & SANITARY WORKS.
4. SILL LEVEL SHALL BE 965mm FOR REGULAR WINDOW, 350mm FOR FRENCH WINDOW & LINTEL LEVEL 2185mm FROM R.C TOP LEVEL FOR ALL WINDOWS & DOORS. (ASSUMED 50mm THK. FLOOR FINISH LEVEL)
5. ALL TOILET STUB WALLS ARE 115mm THK. UP TO 1200mmHT. (Refer separate detail)
6. KITCHEN WINDOW SILL LEVEL SHALL BE 1270mm & LINTEL LEVEL 2185mm FROM R.C TOP LEVEL.

NOTE

1) All external dummy portions should be plastered before constructing the outer wall of dummy portions and floor also to be plastered. junction corners in the floor & walls should be neatly finished as round corners.
2) Unless otherwise specified plastering for 200mm thk., porotherm wall to be done as usual.(Need not to align with beam plastering)
3) All balconies door frame should be fixed on balcony outer side flush.
4) General flooring tiles in Living, Dining, Bedrooms and Balconies are to be laid with 3mm spacer joint with Cementicus grouting using - NITOTILE GROUT (OR) EQUIVALENT BRAND.
5) Flooring tiles for all Toilet & Utility are to be laid with 2mm spacer joint with EPOXY GROUTING USING FUGALITE ECO (or) EQUIVALENT BRAND.(spacer joint not required for wall dado)
6) Cooking platform level should be of 815mm (2'-8") lvl., from finished floor lvl and 65mm (2.5") ht. Granite skirting should be provided above the platform & then wall dadoo upto 600mm ht., to be laid.
7) Exhaust fan provision in ventilator itself in all toilets.
8) Duct covering with flat-type aluminium anodized louvers to detail.
9) In utility S.S.bowl with granite slab.
10) Unless otherwise specified,all sunshades are 530mm wide.

GENERAL NOTES :

1. FOR TOILET PLUMBING DETAILS REFER SEPERATE DRAWING.
2. FOR ARCHITECTURAL FEATURES, BALCONY GRILLS & SUNSHADE DETAILS REFER THE ELEVATION DRAWINGS.
3. FOR STAIRCASE DETAILS REFER SEPERATE DRAWINGS.
4. PROVIDE 50mm THK., CHIPS CONCRETE WITH MS PERFORATED SHEETS AT SILL LEVEL & LINTEL LEVEL FOR THE 100mm THK., POROTHERM WALLS.
5. PROVIDE MS PERFORATED SHEET FOR EVERY TWO LAYERS IN ELECTRICAL & FIRE DUCT WALLS.
6. ALL CHIMNEY PROVIDE 150mm Ø HOLE FOR KITCHEN ONLY & IT SHOULD BE AT 2400 LVL (PIPE CENTRLVL)
7. LOFTS SHOULD BE PROVIDED ONLY WHEREVER WRITTEN IN THE DRAWING AS 'LOFT ABOVE' DRILL LOFT RODS INTO THE COLUMN FOR BEARING WHEREVER COLUMN IS PRESENT.
8. IF THERE IS NO WALL SUPPORT FOR LOFT (LIKE IN OPEN KITCHEN LOFT) PROVIDE VERTICAL SUPPORT RODS ANCHORED FROM ROOF BEAM/ROOF SLAB.

GENERAL NOTES FOR CEILING PLASTERING :

- Any parking area ceilings like basement, stilt or 1st floor should not be plastered.
- Kitchen, Toilet, Balcony and Utility areas (Sunken areas) will be provided with Cement mortar plastering and areas other than that will have Gypsum plastering including the final floor.
- The Ceiling Gypsum plastering should be done first before plastering the walls, this will prevent Gypsum getting glued to the plastered walls.

NOTE :

- In case of Cement mortar plastering for ceiling, plastering should be done in double coat and Nitobond SBR Admixture should be used in the Cement mortar.

SIGNATURE:

P.V. DILIPRAJ, B.E. (CIVIL)
CMDA REGN NO - REIGR-I/19/03/034
GCC REGN NO RE/100092019
No.10, GOVINDASAMY STREET
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MOBILE 9841269150

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REV. NO.	DATE	DESCRIPTIONS

PROJECT TITLE:
RAMANIYAM MANASA
MANASA APARTMENTS, 2ND AVENUE,
ANNA NAGAR, CHENNAI - 40.

DRAWING TITLE:
EAST & WEST SIDE ELEVATION

ARCHITECT	STRUCTURAL CONSULTANT	
IN HOUSE DESIGN	IN HOUSE DESIGN	
Drawing No: 113	Sheet No: 6 OF 7	Date: 09.08.2022
Drawn By: S.KOLANJIZHI	Checked By: Ms.Nagalakshmi	Approved By: Mr.Dilip raj
		Scale: 1 : 100
		Revision No: 00

N

RAMANIYAM REALTORS LLP,
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ADYAR, CHENNAI - 600 020
PH : 044 - 43447500 (100 LINES)



SECTION - A - A

NOTE

1. ALL LEVELS MENTIONED IN THIS DWG. ARE R.C.C LEVELS. (IN CASE OF FINISHING DO NOT DEDUCT)
2. ANY DISCREPANCY IN THIS DRAWING SHALL BE BROUGHT TO THE NOTICE OF THE ARCHITECT/CLIENT OR THE CONCERN PERSON BEFORE EXECUTING THE SAME.
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4. SILL LEVEL SHALL BE 965mm FOR REGULAR WINDOW, 350mm FOR FRENCH WINDOW & LINTEL LEVEL 2185mm FROM R.C TOP LEVEL FOR ALL WINDOWS & DOORS. (ASSUMED 50mm THK. FLOOR FINISH LEVEL)
5. ALL TOILET STUB WALLS ARE 115mm THK., UP TO 1200mm HT. (Refer separate detail)
6. KITCHEN WINDOW SILL LEVEL SHALL BE 1270mm & LINTEL LEVEL 2185mm FROM R.C TOP LEVEL.

NOTE

1) All external dummy portions should be plastered before constructing the outer wall of dummy portions and floor also to be plastered. junction corners in the floor & walls should be neatly finished as round corners.
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3) All balconies door frame should be fixed on balcony outer side flush.
4) General flooring tiles in Living, Dining, Bedrooms and Balconies are to be laid with 3mm spacer joint with Cementious grouting using - NITOTILE GROUT (OR) EQUIVALENT BRAND.
5) Flooring tiles for all Toilet & Utility are to be laid with 2mm spacer joint with EPOXY GROUTING. USING FUGALITE ECO (or) EQUIVALENT BRAND.(spacer joint not required for wall dado)
6) Cooking platform level should be of 815mm (2'-8") M., from finished floor lvl and 65mm (2.5") ht. Granite skirting should be provided above the platform & then wall dados upto 600mm ht., to be laid.
7) Exhaust fan provision in ventilator itself in all toilets.
8) Duct covering with flat-type aluminium anodized louvers to detail.
9) In utility S.S.bowl with granite slab.
10) Unless otherwise specified,all sunshades are 530mm wide.

GENERAL NOTES :

1. FOR TOILET PLUMBING DETAILS REFER SEPERATE DRAWING.
2. FOR ARCHITECTURAL FEATURES, BALCONY GRILLS & SUNSHADE DETAILS REFER THE ELEVATION DRAWINGS.
3. FOR STAIRCASE DETAILS REFER SEPERATE DRAWINGS.
4. PROVIDE 50mm THK., CHIPS CONCRETE WITH MS PERFORATED SHEETS AT SILL LEVEL & LINTEL LEVEL FOR THE 100mm THK., POROTHERM WALLS.
5. PROVIDE MS PERFORATED SHEET FOR EVERY TWO LAYERS IN ELECTRICAL & FIRE DUCT WALLS.
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8. IF THERE IS NO WALL SUPPORT FOR LOFT (LIKE IN OPEN KITCHEN LOFT) PROVIDE VERTICAL SUPPORT RODS ANCHORED FROM ROOF BEAM/ROOF SLAB.

GENERAL NOTES FOR CEILING PLASTERING :

- Any parking area ceilings like basement, stilt or 1st floor should not be plastered.
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NOTE :

- In case of Cement mortar plastering for ceiling, plastering should be done in double coat and Nitobond SBR Admixture should be used in the Cement mortar.

SIGNATURE:

P.V. DILIPRAJ, B.E. (CIVIL)
CIDA REGN.NO. : REG/L/1793/034
GCC REGN.NO. : RE100052019
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MOBILE : 9841299163

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REV NO.	DATE	DESCRIPTIONS

PROJECT TITLE:

RAMANIYAM MANASA

MANASA APARTMENTS, 2ND AVENUE
ANNA NAGAR , CHENNAI - 40.

DRAWING TITLE:

SECTION - A -A

ARCHITECT	STRUCTURAL CONSULTANT
IN HOUSE DESIGN	IN HOUSE DESIGN

Drawing No.	Sheet No.	Date	Scale
513/	7 OF 7	09.08.2022	1 : 100
Drawn By	Checked By	Approved By	Revision No.
S.SOUNDARYA	Ms.Nagalakshmi	Mr.Dilip raj	00

RAMANIYAM REALTORS LLP.,
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ADYAR , CHENNAI - 600 020.
Ph : 044 - 43447600 (100 LINES)



NORTH SIDE ELEVATION

NOTE

1. ALL LEVELS MENTIONED IN THIS DWG. ARE R.C.C LEVELS. (UNLESS OTHERWISE SPECIFIED)
2. ANY DISCREPANCY IN THIS DRAWING SHALL BE BROUGHT TO THE NOTICE OF THE ARCHITECT/CLIENT OR THE CONCERN PERSON BEFORE EXECUTING THE SAME.
3. ALL DUCT TO BE BUILT AFTER COMPLETION OF PLUMBING & SANITARY WORKS.
4. SILL LEVEL SHALL BE 965mm FOR REGULAR WINDOW, 350mm FOR FRENCH WINDOW & LINTEL LEVEL 2185mm FROM R.C TOP LEVEL FOR ALL WINDOWS & DOORS (ASSUMED 50mm THK. FLOOR FINISH LEVEL)
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7) Exhaust fan provision in ventilator itself in all toilets.
8) Duct covering with flat-type aluminium anodized louvers to detail.
9) In utility S.S.bowl with granite slab.
10) Unless otherwise specified,all sunshades are 530mm wide.

GENERAL NOTES :

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GENERAL NOTES FOR CEILING PLASTERING :

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NOTE :

- In case of Cement mortar plastering for ceiling, plastering should be done in double coat and Nitobond SBR Admixture should be used in the Cement mortar.

SIGNATURE:

P.V. DILIPRAJ, B.E. (CIVIL)
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SOUTH ZONE - REGN.NO.[illegible]
[illegible] MAIN ROAD, GANDHI NAGAR
KATTANKULATHUR, KANCHEEPURAM DISTRICT, TAMILNADU, PINCODE 603 203.
MOBILE : [illegible]

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REV.NO	DATE	DESCRIPTIONS

PROJECT TITLE:

RAMANIYAM MANASA

MANASA APARTMENTS, 2ND AVENUE
ANNA NAGAR, CHENNAI - 40.

DRAWING TITLE:

NORTH SIDE ELEVATION (REAR)

ARCHITECT	STRUCTURAL CONSULTANT
IN HOUSE DESIGN	IN HOUSE DESIGN

Drawing No.	Sheet No.	Date	Scale
313	7 OF 7	09.08.2022	1 : 100
Drawn By	Checked By	Approved By	Revision No.
S.KOLANJIAPPAN	Ms.Nagalakshmi	Mr.Dilip raj	R0

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PH : 044 - 43447500 (10LINES)

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Kottivakkam, Chennai – 600 041.
Ph. No. 044 - 24481485 & 24480305.
drcvp@geomarineindia.com/geotech@geomarineindia.com

PROJECT

GEOTECHNICAL INVESTIGATION FOR THE PROPOSED RESIDENTIAL BUILDING CONSISTING OF ONE BASEMENT + STILT + 9 UPPER FLOOR AT MANASA APARTMENTS, 2nd AVENUE, ANNA NAGAR, CHENNAI – 600 040.

CLIENT

M/s RAMANIYAM REAL ESTATES (P) LTD.,
RAMANIYAM CORPORATE OFFICE,
NO-1735, 2ND MAIN ROAD,
GANDHI NAGAR, ADYAR,
CHENNAI-6000 020.

TITLE

GEOTECHNICAL INVESTIGATION REPORT

REPORT NO.: GT- 2364

DATE	REVISON	DESCRIPTION		AUTHORISED SIGNATORY
25/05/2022	FIRST SUBMISSION	SUBMISSION OF GEOTECHNICAL REPORT	SIGN	Dr.C.VENKATA PRASAD, Registered Geotechnical Engineer, Registration No: GE/03/0063, Chennai Metropolitan Development Authority (CMDA), No.11, 2nd Main Road, Kannappa Nagar Ext, Chennai-41, Phone: 24481485, Email: drcvp@geomarineindia.com, GEO MARINE CONSULTANTS (P) LTD., CHENNAI-41
			DATE	25/05/2022
			DESIGNATION	MANAGING DIRECTOR
			NAME	DR. C.V.PRASAD

CONTENTS

GEO MARINE CONSULTANTS PVT. LTD.
Dr.C.VENKATA PRASAD
Registered Geotechnical Engineer (RGTE)
Registration No: GTE/13/03/003
Chennai Metropolitan Development Authority(CMDA)

GEOMARINE

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	1.1.2	Laboratory Work	1
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REPORT TEXT

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CHAPTER-1

INTRODUCTION

1.0 PROJECT INFORMATION MATRIX:

NATURE OF PROJECT	: **PROPOSED RESIDENTIAL BUILDING**
STRUCTURE	: **1 BASEMENT + STILT + 9 FLOORS**
PROJECT OWNER	: **M/s RAMANIYAM REAL ESTATES (P) LTD**
PROJECT LOCATION	: **12th MAIN ROAD, ANNA NAGAR**
JOB CODE	: **GT-2364**

1.1 SCOPE OF WORK:

1.1.1 FIELD WORK:

- Conducting three soil investigation bore holes of 150 mm diameter in Soil & Overburden. In case of rock formation NX Diameter with Core barrel shall be adopted to progress the drilling up the termination depth.
- Conducting Standard Penetration Test (SPT) within the borehole at:
  - Every 1.0m depth interval up to 6.0m.
  - From 6.0m to 12.0m, SPT is conducted at every 1.5m depth interval
  - From 12.0m to 20.0m SPT is conducted at every 2.0m depth interval
  - Beyond 20.0m SPT is conducted at every 2.5m depth interval till the termination depth.
- Collection of disturbed soil samples at SPT location and undisturbed samples from the clayey strata with SPT-value greater than 2 to less than 15 if met within the investigation depth
- Collection of water samples if groundwater table met within the investigation depth

1.1.2 LABORATORY WORK

- Natural Moisture Content
- Atterberg's limits
- Grain Size Analysis
- Consolidation test on undisturbed samples if applicable
- Chemical Analysis test on soil and water samples to give pH, Chlorides and Sulphates

1.2 STRUCTURE OF THE REPORT:

- Contents
- Introduction
- Investigation Methodology & Test Results
- Sub-Surface Stratification
- Foundation System
- Recommendation
- Annexure

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CHAPTER-2

INVESTIGATION METHODOLOGY & TEST RESULTS

2.0 PREAMBLE:

Three soil investigation boreholes were put as per the planning of the engineer in-charge and these locations are shown in Fig.2.0.The equipment used and the methodology adopted to carry out the fieldwork is described below.

2.1 METHODOLOGY OF FIELD WORK:

2.1.1 EQUIPMENT USED AND METHOD OF DRILLING:

All the boreholes were sunk by conventional rotary drilling rigs. For borehole Methodology followed for boring conformed to IS: 1892 -2000. Boring was progressed by the cutting action of rotating bit with water circulation and stabilizing the side of the boreholes by using casing pipes/bentonite slurry up to required depth to prevent collapse of sidewall. Boring was continued by normal boring process using MS soil cutter in soil. However Tungsten Carbide (TC) bit drilling was resorted to drill in highly weathered rock stratum where the normal boring process became slow. Diamond Core (DC) bit drilling was adopted in moderately weathered rock formations where penetration using TC bit was became slow.

2.1.2 STANDARD PENETRATION TESTS:

This is a field test to determine "Penetration Resistance of Stratum at the Test Depth". This has been conducted in the boreholes generally up to refusal depth using procedures described in IS: 2131- 2002. In this test, split spoon sampler (50.8 mm OD and 35 mm ID) has replaced driving bit. Sampler is then driven by dropping 63.5 kg hammer on top of driving collar with free fall of 75 cm. The length of sampler is 60 cm.

The tests were conducted at the depth intervals indicated in Chapter-1 (Sec.1.1.1).

2.1.3 COLLECTION OF SOIL SAMPLES:

2.1.3.1 DISTURBED SAMPLES:

The SPT-samples collected were used as disturbed soil samples. These samples were used for visual and physical identification and for conducting laboratory classification tests as per I.S.1498-1970.

2.1.3.2 UNDISTURBED SAMPLES:

From the soft to stiff clay layer, representative undisturbed samples were collected. These samples were used primarily to establish the compressibility parameters to estimate the settlements of shallow foundation system wherever applicable.

2.1.4 COLLECTION OF GROUND WATER SAMPLES:

One representative water sample from each borehole was collected after 24 hours of completing the borehole if water table met within the investigated depth.

NOTE ON GROUNDWATER TABLE RECORD:

- Groundwater table observation in geotechnical report is predominantly to arrive at foundation design criteria and shall not be construed as design guidelines for the design of dewatering systems

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- The groundwater level indicated in the bore logs is specific to the duration of investigation and intensity of the monsoon rains during the time of investigation. Hence, the level shall be taken as guidelines only to plan the investigation for the dewatering system
- No foundation excavation or basement excavations if anticipated within the groundwater table zone shall be carried out without implementing groundwater lowering schemes

2.2 LABORATORY TESTING:

2.2.1 ON COARSE GRAINED SOIL:

On the representative samples, sieve analysis tests were conducted to arrive at grain size distribution. These tests were conducted as per I.S.2720 (part 4)-1985 and the results are presented in Tables-2.1 to 2.3. The graphical representation of grainsize distribution curve for the representative samples in each bore is presented in Fig. 2.5 to 2.7.

2.2.2 ON FINE GRAINED SOIL:

On the SPT sample index property tests were conducted to estimate consistency. These test results are presented in Tables-2.1 to 2.3. The graphical representation of hydrometer analyses curve for the representative samples in each bore is presented in Fig. 2.8 to 2.13.

2.2.3 CHEMICAL ANALYSIS TESTS:

On representative soil and water samples chemical analysis tests were conducted to estimate pH, Chloride and Sulphates and these results are presented in Table - 2.4.

2.3 SUMMARY:

The locations of the field investigation boreholes are shown in site plan given in Fig.2.0. The average sub soil profiles encountered at each location along with their classification and engineering properties are presented in Figs.2.1 to 2.3.

Further, the cross sectional variation of the sub surface profile through different bore holes in vertical and horizontal direction longitudinally or transversely are presented in Figs.2.4.

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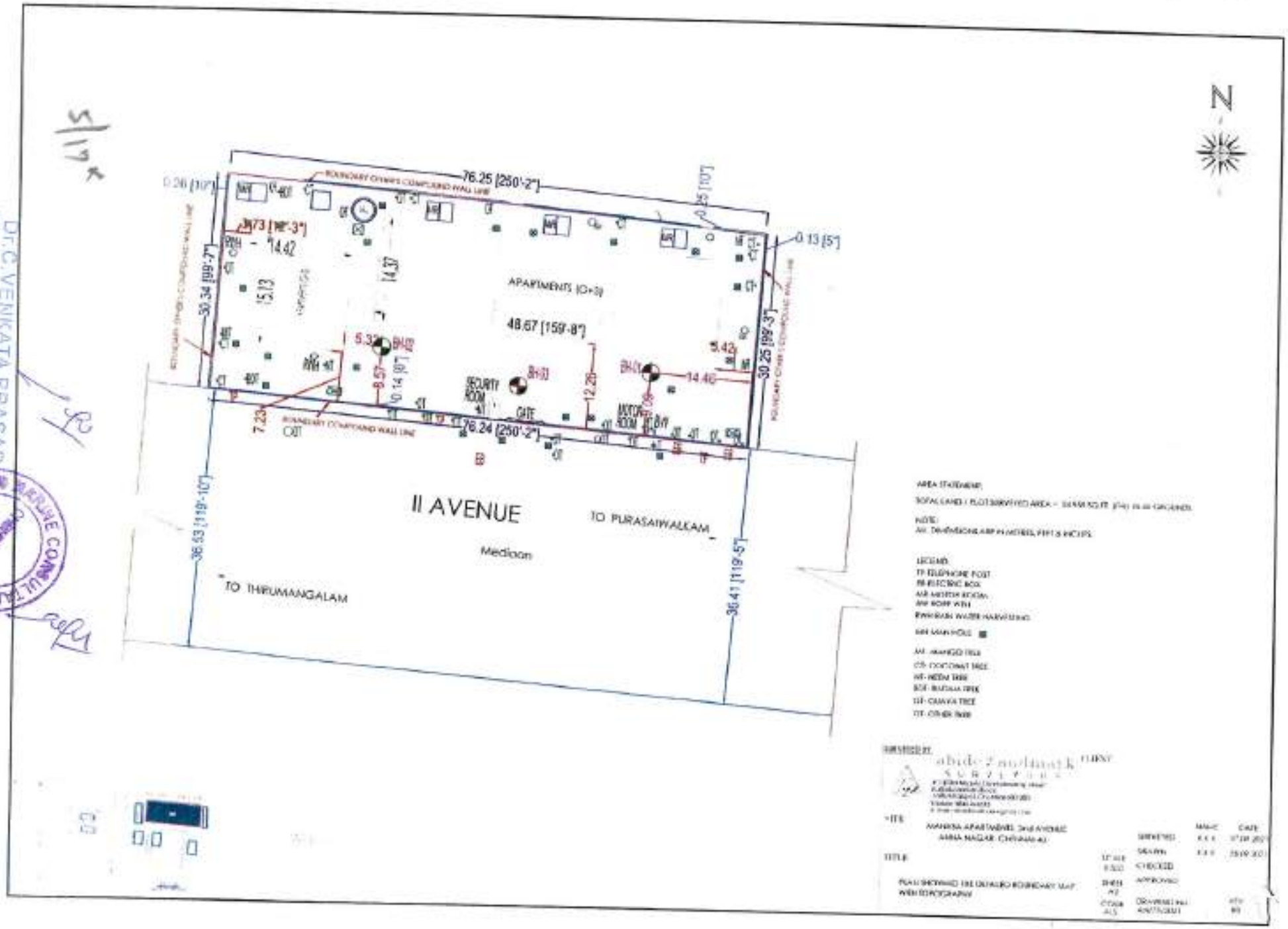
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SITE PLAN

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N
76.25 [250'-2"]
APARTMENTS (G+3)
48.67 [159'-8"]
76.24 [250'-2"]
30.34 [99'-7"]
30.25 [99'-3"]
36.53 [119'-10"]
36.41 [119'-5"]
II AVENUE
Median
TO PURASAIWALKAM
TO THIRUMANGALAM
SECURITY ROOM
GATE
MOTOR ROOM
BOUNDARY COMPOUND WALL LINE
OHT
SHEET NO 1

SOIL PROFILES

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SITE INVESTIGATION RECORD

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BORE HOLE No.	BH-01				
SHEET	1	OF	1		
PROJECT NAME	PROPOSED CONSTRUCTION OF A RESIDENTIAL BUILDING	DIA OF BORE HOLE	150mm ✓ / NX		
LOCATION	12th MAIN ROAD, ANNA NAGAR	MACHINE No.	-	CHAINAGE (m)	-
STRUCTURE	ONE BASEMENT + STILT + 9 FLOORS	DRILLING METHOD	Rotary	CO-ORDINATES N	-
JOB CODE	GT-2364	FLUSHING MEDIUM	Bentonite	CO-ORDINATES E	-
BORE START DATE	18/04/2022				
BORE END DATE	20/04/2022				
TOTAL DRILL DAYS	3				

Depth below E.G.L. (m)	Drilling progress per metre: Date	Time: Hr	Time: Min	Type of Drill Bit (SC / TCB / DB)	Core Details: Total Core Recovery %	Core Details: R.Q.D %	SPT Details: Blows/cm. 0-15	SPT Details: 15-30	SPT Details: 30-45	SPT 'N' Value	Sample Details: Depth	Sample Details: No	Sample Details: Type	Sample Details: RL (m)	Layer Data: Legend	Layer Data: No	Layer Data: Depth	Geotechnical Description
1	18/04/2022	15	09 To 15 10	SC	-	-	7	11	19	30	1.00 to 1.45	1	SS	-1.0				
		15	37 To 15 38	SC	-	-												
2		15	53 To 15 54	SC	-	-	12	13	20	33	2.00 to 2.45	2	SS	-2.0				Brown,Moist,Poorly Graded,Fine & Medium Grains Sand,Medium Dense to Dense,Silty SAND (SM)
3		16	19 To 16 20	SC	-	-	14	21	27	48	3.00 to 3.45	3	SS	-3.0				
4		16	45 To 16 48	SC	-	-	6	7	9	16	4.00 to 4.45	4	SS	-4.0		L1	4.0	
5		10	34 To 10 38	SC	-	-	8	8	9	15	5.00 to 5.45	5	SS	-5.0		L2	6.0	Grey,Moist,Stiff,Silty CLAY (CI) Lean Clay of Medium Plasticity
6		10	53 To 10 58	SC	-	-	17	21	18	39	6.00 to 6.45	6	SS	-6.0				
7	19/04/2022	11	14 To 11 16	SC	-	-	16	24	24	48	7.50 to 7.95	7	SS	-7.5				Gray Brown,Moist,Poorly Graded,Fine & Medium Grains Sand,Dense, Silty SAND (SM)
8																		
9							1	1	2	3	9.00 to 9.45	8	SS	-9.0		L3	9.0	
10		11	32 To 11 34	SC	-	-												Grey,Grey Brown,Moist,Poorly Graded, Fine & Medium Grains Sand,Very Loose,Clayey Silty SAND (SC)

CS - Core Sample	DS - Disturbed Sample	LOGGED	H.Shankar	PROJECT SITE DETAILS	REMARKS
SS - Split Spoon Sample	SC - Soil Cutter	DATE	19/04/2022	GROUND LEVEL (m) 0.00	
UDS - Undisturbed Sample	TCB - Tungsten Carbide Bit	CHECKED	S.Tyagaraj	WATER TABLE (m) 2.40	
WS - Wash Sample	DB - Diamond Bit	DATE	20/04/2022	CASING DEPTH (m) 0.00	

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SITE INVESTIGATION RECORD

BORE HOLE No.	BH-01		
SHEET	2	OF	3
DIA OF BORE HOLE	150mm	✓	
	NX		
BORE START DATE	18/04/2022		
BORE END DATE	20/04/2022		
TOTAL DRILL DAYS	3		

PROJECT NAME	PROPOSED CONSTRUCTION OF A RESIDENTIAL BUILDING						
LOCATION	12th MAIN ROAD, ANNA NAGAR	MACHINE No.	-	CHAINAGE (m)	-		
STRUCTURE	ONE BASEMENT + STILT + 9 FLOORS	DRILLING METHOD	Rotary	CO-ORDINATES	N	-	
JOB CODE	GT-2364	FLUSHING MEDIUM	Bentonite		E	-	

Depth below E.G.L (m)	Drilling progress per metre: Date	Time: Hr.	Time: Min.	Type of Drill Bit (SC / TCB / DB)	Core Details: Total Core Recovery %	Core Details: R.Q.D %	SPT Details: Blows/cm. 0-15	15-30	30-45	SPT 'N' Value	Sample Details: Depth	No.	Type	RL (m)	Layer Data: Legend	No	Depth	Geotechnical Description
11	19/04/2022	11	49 To 11 51	SC	-	-	3	3	5	8	10.50 to 10.95	9	SS	-10.5				Grey,Grey Brown,Moist,Poorly Graded, Fine & Medium Grains Sand,Very Loose & Loose,Clayey Silty SAND (SC) & Silty SAND (SM)
12							5	7	11	18	12.00 to 12.45	10	SS	-12.0		L4	12.0	
13		12	30 To 12 33	SC	-	-												
14							8	9	14	23	14.00 to 14.45	11	SS	-14.0				Grey,Grey Brown,Moist,Poorly Graded, Fine & Medium Grains Sand,Medium Dense,Clayey Silty SAND (SC)
15		14	05 To 14 18	SC	-	-												
16							8Cm Penete for 50Blows			>100	16.00 to 16.08	-	WS	-16.0		L5	16.0	
17		14	55 To 15 30	SC	-	-												
18							15	21	24	45	18.00 to 18.45	12	SS	-18.0				Grey,Yellow Brown,Moist,Fissile to Sub Fissile,SHALE (CH) Gondwana Formation
19		16	13 To 16 34	SC	-	-												
20							16	10Cm Penete for 50Blows		>100	20.00 to 20.28	13	SS	-20.0				

CS - Core Sample	DS - Disturbed Sample	LOGGED	H.Shankar	PROJECT SITE DETAILS	REMARKS
SS - Split Spoon Sample	SC - Soil Cutter	DATE	18/04/2022	GROUND LEVEL (m) 0.00	
UDS- Undisturbed Sample	TCB - Tungsten Carbide Bit	CHECKED	S.Tyagaraj	WATER TABLE (m) 2.40	
WS - Wash Sample	DB - Diamond Bit	DATE	20/04/2022	CASING DEPTH (m) 0.00	

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SITE INVESTIGATION RECORD

PROJECT NAME	PROPOSED CONSTRUCTION OF A RESIDENTIAL BUILDING					BORE HOLE No.	BH-01
						SHEET	3 OF 3
LOCATION	12th MAIN ROAD, ANNA NAGAR	MACHINE No.	-	CHAINAGE (m)	-	DIA OF BORE HOLE	150mm ✓ / NX
STRUCTURE	ONE BASEMENT + STILT + 9 FLOORS	DRILLING METHOD	Rotary	CO-ORDINATES	N -	BORE START DATE	18/04/2022
JOB CODE	GT-2264	FLUSHING MEDIUM	Bentonite		E -	BORE END DATE	20/04/2022
						TOTAL DRILL DAYS	3

Depth below E.G.L. (m)	Drilling progress per metre: Date	Time: Hr.	Time: Min.	Type of Drill Bit (SC / TCB / DB)	Core Details: Total Core Recovery %	Core Details: R.Q.D %	SPT Details: Blows/cm. 0-15	15-30	30-45	SPT 'N' Value	Sample Details: Depth	No.	Type	RL (m)	Layer Data: Legend	No	Depth	Geotechnical Description
21	20/04/2022	09 To 10	50 26	SC	-	-												Grey,Yellow Brown,Moist,Fissile to Sub Fissile,SHALE (CH) Gondwana Formation
22							29	30	41	71	22.50	14	SS	-22.5		L6	22.5	
23											22.95							
24		11 To 12	50 13	SC	-	-												Grey,Yellow Grey,Moist,Poorly Graded, Fine & Medium Grains Sand,Very Dense,Cemented SAND (SC) Gondwana Formation
25							8Cm Penete for 50Blows			>100	25.00 25.08	15	SS	-25.0		L7	25.0	
26		14 To 14	03 21	SC	-	-												Grey,Grey Green,Moist,Fissile & Sub Fissile,Hard,SHALE (CI) Gondwana Formation
27							10Cm Penete for 50Blows			>100	27.50 27.60	16	SS	-27.5		L8	27.6	
28																		
29																		
30																		

CS - Core Sample	DS - Disturbed Sample	LOGGED	H.Shankar	PROJECT SITE DETAILS	REMARKS
SS - Split Spoon Sample	SC - Soil Cutter	DATE	20/04/2022	GROUND LEVEL (m) 0.00	
UDS- Undisturbed Sample	TCB - Tungsten Carbide Bit	CHECKED	S.Tyagaraj	WATER TABLE (m) 2.40	
WS - Wash Sample	DB - Diamond Bit	DATE	29/04/2022	CASING DEPTH (m) 0.00	

Borehole terminated at 27.5 m depth below E.G.L

FIG.2.1 Sub Soil Profile at BH-01 Location

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SITE INVESTIGATION RECORD

BORE HOLE No.	BH-02						
SHEET	1	OF	3				
DIA OF BORE HOLE	150mm	✓					
	NX						
BORE START DATE	21/04/2022						
BORE END DATE	23/04/2022						
TOTAL DRILL DAYS	3						

PROJECT NAME	PROPOSED CONSTRUCTION OF A RESIDENTIAL BUILDING						
LOCATION	12th MAIN ROAD, ANNA NAGAR	MACHINE No.	-	CHAINAGE (m)	-		
STRUCTURE	ONE BASEMENT + STILT + 9 FLOORS	DRILLING METHOD	Rotary	CO-ORDINATES	N	-	
JOB CODE	GT-2364	FLUSHING MEDIUM	Bentonite		E	-	

Depth below E.G.L. (m)	Drilling progress per metre: Date	Time: Hr.	Time: Min.	Type of Drill Bit (SC / TCB / DB)	Core Details: Total Core Recovery %	Core Details: R.Q.D %	SPT Details: Blows/cm. 0-15	SPT Details: 15-30	SPT Details: 30-45	SPT 'N' Value	Sample Details: Depth	No.	Type	RL (m)	Layer Data: Legend	No	Depth	Geotechnical Description
1	21/04/2022	15	30	SC	-	-	7	8	9	17	1.00	1	SS	-1.0				
		To									1.45							
		15	33															
		15	58	SC	-	-												
2		To					12	18	17	35	2.00	2	SS	-2.0				
		16	02								2.45				L1	2.0		Brown,Moist,Poorly Graded,Fine & Medium Grains Sand,Medium Dense, Silty SAND (SM)
		16	32	SC	-	-												
3		To					18	20	22	42	3.00	3	SS	-3.0				
		16	35								3.45							
		10	12	SC	-	-												
4		To					11	11	13	24	4.00	4	SS	-4.0				
		10	14								4.45							
		10	27	SC	-	-												
5		To					10	15	18	33	5.00	5	SS	-5.0				
		10	29								5.45				L2	5.3		Brown,Moist,Poorly Graded,Fine & Medium Grains Sand,Dense & Medium Dense, Silty SAND (SM)
		10	45	SC	-	-												
6		To					-	-	-	-	5.50	6	UDS	-5.5				
		10	46															
		11	05	SC	-	-												
	22/04/2022	To					6	14	19	33	6.00	7	SS	-6.0				
7		11	08								6.45							
		11	37	SC	-	-												
		To																
		11	40												L3	7.5		Grey,Black,Moist,Hard,Sandy Silty CLAY (CI) Sandy Clay of Medium Plasticity
							3	4	3	7	7.50	8	SS	-7.5				
8		12	00								7.95							
		To		SC	-	-												
		12	04															
9																		Grey,Black,Moist,Medium Stiff,Silty CLAY (CH) Clays of High Plasticity
							2	2	6	8	9.00	9	SS	-9.0	L4	9.0		
		12	18								9.45							
		To																
10		12	22	SC	-	-												

CS - Core Sample	DS - Disturbed Sample	LOGGED	N.Dhanasankar	PROJECT SITE DETAILS		REMARKS	
SS - Split Spoon Sample	SC - Soil Cutter	DATE	22/04/2022	GROUND LEVEL (m)	0.00		
UDS- Undisturbed Sample	TCB - Tungsten Carbide Bit	CHECKED	S.Tyagaraj	WATER TABLE (m)	2.00		
WS - Wash Sample	DB - Diamond Bit	DATE	23/04/2022	CASING DEPTH (m)	0.00		

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SITE INVESTIGATION RECORD

BORE HOLE No.	BH-0						
SHEET	2	OF	3				
PROJECT NAME	PROPOSED CONSTRUCTION OF A RESIDENTIAL BUILDING					DIA OF BORE HOLE	150mm ✓ / NX
LOCATION	12th MAIN ROAD, ANNA NAGAR	MACHINE No.	-	CHAINAGE (m)	-	BORE START DATE	21/04/2022
STRUCTURE	ONE BASEMENT + STILT + 9 FLOORS	DRILLING METHOD	Rotary	CO-ORDINATES	N -	BORE END DATE	23/04/2022
JOB CODE	GT-2364	FLUSHING MEDIUM	Bentonite		E -	TOTAL DRILL DAYS	3

Depth below E.G.L. (m)	Drilling progress per metre: Date	Time: Hr.	Time: Min.	Type of Drill Bit (SC / TCB / DB)	Core Details: Total Core Recovery %	Core Details: R.Q.D %	SPT Details: Blows/cm. 0-15	15-30	30-45	SPT 'N' Value	Sample Details: Depth	No.	Type	RL (m)	Layer Data: Legend	No	Depth	Geotechnical Description
11	22/04/2022	12	44 To 12 47	SC	-	-	5	6	7	13	10.50 / 10.95	10	SS	-10.5				Grey,Grey Brown,Moist,Poorly Graded, Fine & Medium Grains Sand,Loose & Medium Dense, **Clayey Silty SAND (SC)**
12							16	20	26	46	12.00 / 12.45	11	SS	-12.0		L5	12.0	
13		14	26 To 14 33	SC	-	-												
14							11	21	23	44	14.00 / 14.45	12	SS	-14.0				
15		15	03 To 15 10	SC	-	-												Grey,Green Grey,Moist,Poorly Graded, Pred. Fine Grains Sand,Dense to Very Dense,Silty **SAND (SM)**
16							30	39	30	69	16.00 / 16.45	13	SS	-16.0				
17		15	39 To 16 23	SC	-	-												
18							11	15	32	48	18.00 / 18.45	14	SS	-18.0		L6	18.0	
19	23/04/2022	10	15 To 11 20	SC	-	-												Grey,Yellow Brown,Moist,Fissile to Sub Fissile,**SHALE (CH)** Gondwana Formation
20							35	49	29	78	20.00 / 20.45	15	SS	-20.0		L7	20.0	
																		Grey,Yellow Grey,Moist,Poorly Graded, Fine & Medium Grains Sand,Very Dense,Cemented **SAND (SC)**

CS - Core Sample	DS - Disturbed Sample	LOGGED	N.Dhanasankar	PROJECT SITE DETAILS		REMARKS
SS - Split Spoon Sample	SC - Soil Cutter	DATE	23/04/2022	GROUND LEVEL (m)	0.00	
UDS - Undisturbed Sample	TCB - Tungsten Carbide Bit	CHECKED	S.Tyson raj	WATER TABLE (m)	2.60	*(F) - Sample Failed
WS - Wash Sample	DB - Diamond Bit	DATE	25/04/2022	CASING DEPTH (m)	0.00	

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SITE INVESTIGATION RECORD

PROJECT NAME	PROPOSED CONSTRUCTION OF A RESIDENTIAL BUILDING					BORE HOLE No.	BH-02
						SHEET	3 OF 3
						DIA OF BORE HOLE	150mm ✓ / NX
LOCATION	12th MAIN ROAD, ANNA NAGAR	MACHINE No.	-	CHAINAGE (m)	-	BORE START DATE	21/04/2022
STRUCTURE	ONE BASEMENT + STILT + 9 FLOORS	DRILLING METHOD	Rotary	CO-ORDINATES	N -	BORE END DATE	23/04/2022
JOB CODE	GT-2364	FLUSHING MEDIUM	Bentonite		E -	TOTAL DRILL DAYS	3

Depth below E.G.L (m)	Drilling progress per metre: Date	Time: Hr.	Time: Min.	Type of Drill Bit (SC / TCB / DB)	Core Details: Total Core Recovery %	Core Details: R.Q.D %	SPT Details: Blows/cm 0-15	SPT Details: 15-30	SPT Details: 30-45	SPT 'N' Value	Sample Details: Depth	Sample Details: No.	Sample Details: Type	Sample Details: RL (m)	Layer Data: Legend	Layer Data: No	Layer Data: Depth	Geotechnical Description
21		11	47	SC	-	-												
		To																
22		12	05															
							33	38	4Cm Penete for 50Blows	>100	22.50 / 22.84 ▽	16	SS	-22.5				
23	23/04/2022																	
		12	36															
24		To		SC	-	-												Grey,Yellow Grey,Moist,Poorly Graded, Fine & Medium Grains Sand,Very Dense,Cemented SAND (SC) & Silty SAND (SM) With Binder Gondwana Formation
		12	47															
25							40	14Cm Penete for 52Blows		>100	25.00 / 25.29 ▽	17	SS	-25.0				
		14	30															
26		To		SC	-	-												
		15	10															
27																		
								13Cm Penete for 55Blows		>100	27.50 / 27.68 ▽	18	SS	-27.5				
28																L8	27.5	
																L9	27.7	Grey,Grey Green,Moist,Fissile & Sub Fissile,Hard,SHALE (CI) Gondwana Formation
29																		
30																		

				PROJECT SITE DETAILS		REMARKS
CS - Core Sample	DS - Disturbed Sample	LOGGED	N.Dhanasankar	GROUND LEVEL (m)	0.00	
SS - Split Spoon Sample	SC - Split Cutter	DATE	23/04/2022	WATER TABLE (m)	2.80	'IF' - Sample Failed
UDS- Undisturbed Sample	TCB - Tungsten Carbide Bit	CHECKED	S.Tysonraj	CASING DEPTH (m)	0.00	
WS - Wash Sample	DB - Diamond Bit	DATE	23/04/2022			

Borehole terminated at 27.5 m depth below E.G.L

FIG.2.2 Sub Soil Profile at BH-02 Location

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SITE INVESTIGATION RECORD

BORE HOLE No.	BH-07						
SHEET	1	OF	3				
PROJECT NAME	PROPOSED CONSTRUCTION OF A RESIDENTIAL BUILDING					DIA OF BORE HOLE	150mm ✓ / NX
LOCATION	12th MAIN ROAD, ANNA NAGAR	MACHINE No.	-	CHAINAGE (m)	-	BORE START DATE	25/04/2022
STRUCTURE	ONE BASEMENT + STILT + 9 FLOORS	DRILLING METHOD	Rotary	CO-ORDINATES	N -	BORE END DATE	27/04/2022
JOB CODE	GT-2264	FLUSHING MEDIUM	Bentonite		E -	TOTAL DRILL DAYS	3

Depth below E.G.L (m)	Drilling progress per metre: Date	Time: Hr.	Time: Min.	Type of Drill Bit (SC / TCB / DB)	Core Details: Total Core Recovery %	Core Details: R.Q.D %	SPT Details: Blows/cm. 0-15	SPT Details: Blows/cm. 15-30	SPT Details: Blows/cm. 30-45	SPT 'N' Value	Sample Details: Depth	Sample Details: No.	Sample Details: Type	Sample Details: RL. (m)	Layer Data: Legend	Layer Data: No	Layer Data: Depth	Geotechnical Description
1	25/04/2022	14	30 To 14 32	SC	-	-												
		14	42 To 14 44	SC	-	-	9	8	14	22	1.00 / 1.45	1	SS	-1.0				
2		14	54 To 14 56	SC	-	-	8	10	15	25	2.00 / 2.45	2	SS	-2.0				
3		15	07 To 15 08	SC	-	-	21	18	22	40	3.00 / 3.45	3	SS	-3.0				Brown,Moist,Poorly Graded,Fine & Medium Grains Sand,Medium Dense & Dense, **Silty SAND (SM)**
4		15	28 To 15 30	SC	-	-	10	16	22	38	4.00 / 4.45	4	SS	-4.0				
5		15	40 To 15 42	SC	-	-	6	8	15	23	5.00 / 5.45	5	SS	-5.0		L1	5.0	
6		15	56 To 15 58	SC	-	-	7	10	20	30	6.00 / 6.45	6	SS	-6.0		L2	6.0	Brown,Moist,Very Stiff,**Sandy Silty CLAY (Cl)** Sandy Clay of Medium Plasticity
7		16	28 To 16 28	SC	-	-	-	-	-	-	7.50	7	UDS	-7.5		L3	7.5	Grey,Moist,Poorly Graded,Fine Grains Sand,Medium Dense,**Silty SAND (SM)**
8		16	43 To 16 44	SC	-	-	2	2	2	4	9.00 / 9.45	8	SS	-9.0		L4	9.0	Grey,Black,Moist,**Silty CLAY (CH)** Clays of High Plasticity
9																L5	10.5	Grey,Grey Brown,Moist,Poorly Graded, Fine & Medium Grains Sand,Very Loose, **Clayey Silty SAND (SC)**
10																		

CS - Core Sample	DS - Disturbed Sample	LOGGED	N.Dhanasankar	PROJECT SITE DETAILS	REMARKS
SS - Split Spoon Sample	SC - Soil Cutter	DATE	25/04/2022	GROUND LEVEL (m) 9.00	
UDS- Undisturbed Sample	TCB - Tungsten Carbide Bit	CHECKED	S.Tyagaraj	WATER TABLE (m) 2.60	
WS - Wash Sample	DB - Diamond Bit	DATE	29/04/2022	CASING DEPTH (m) 9.00	

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BORE HOLE No.	BH-03						
SHEET	2	OF	3				
DIA OF BORE HOLE	150mm	✓					
	NX						
PROJECT NAME	PROPOSED CONSTRUCTION OF A RESIDENTIAL BUILDING						
LOCATION	12th MAIN ROAD, ANNA NAGAR	MACHINE No.	-	CHAINAGE (m)	-	BORE START DATE	25/04/2022
STRUCTURE	ONE BASEMENT + STILT + 9 FLOORS	DRILLING METHOD	Rotary	CO-ORDINATES	N -	BORE END DATE	27/04/2022
JOB CODE	GT-2364	FLUSHING MEDIUM	Bentonite		E -	TOTAL DRILL DAYS	3

Depth below E.G.L (m)	Date	Drilling progress per metre: Time Hr.	Time Min.	Type of Drill Bit (SC / TCB / DB)	Core Details: Total Core Recovery %	R.Q.D %	SPT Details: Blowsion. 0-15	15-30	30-45	SPT 'N' Value	Sample Details: Depth	No.	Type	RL (m)	Layer Data: Legend	No	Depth	Geotechnical Description
11	26/04/2022	09 To 09	15 23	SC	-	-	6	10	13	23	10.50 / 10.95	9	SS	-10.5				Grey Brown,Moist,Fine & Medium Grains Sand,Medium Dense,Clayey Silty SAND (SC)
12							5	27	25	52	12.00 / 12.45	10	SS	-12.0		L6	12.0	
13		09 To 09	40 52	SC	-	-												
14							8	15	25	40	14.00 / 14.45	11	SS	-14.0				Grey,Brown Grey,Moist,Poorly Graded, Fine & Medium Grains Sand,Dense to Very Dense,Silty SAND (SM)
15		10 To 10	27 35	SC	-	-												
16							14	30	80Cm Penetr for 99Blows	>100	16.00 / 16.38	12	SS	-16.0		L7	16.0	
17		10 To 11	51 30	SC	-	-												
18							11	18	22	40	18.00 / 18.45	13	SS	-18.0				Grey Brown,Yellow Shades,Moist, Fissile to Sub Fissile,SHALE (CH) Gondwana Formation
19		14 To 15	22 03	SC	-	-												
20							17	19	25	44	20.00 / 20.45	14	SS	-20.0		L8	20.0	
																		Grey,Grey Brown,Moist,Poorly Graded, Fine & Medium Grains Sand,Dense, Cemented SAND (SC)

CS - Core Sample	DS - Disturbed Sample	LOGGED	N.Dhanasankar	PROJECT SITE DETAILS		REMARKS
SS - Split Spoon Sample	SC - Soil Cutter	DATE	26/04/2022	GROUND LEVEL (m)	0.00	
UDS - Undisturbed Sample	TCB - Tungsten Carbide Bit	CHECKED	S.Tyagaraj	WATER TABLE (m)	2.60	
WS - Wash Sample	DB - Diamond Bit	DATE	28/04/2022	CASING DEPTH (m)	0.00	

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SITE INVESTIGATION RECORD

BORE HOLE No.	BH-03				
SHEET	3	OF	3		
PROJECT NAME	PROPOSED CONSTRUCTION OF A RESIDENTIAL BUILDING	DIA OF BORE HOLE	150mm ✓ / NX ✓		
LOCATION	12th MAIN ROAD, ANNA NAGAR	MACHINE No.	-	CHAINAGE (m)	-
STRUCTURE	ONE BASEMENT + STILT + 9 FLOORS	DRILLING METHOD	Rotary	CO-ORDINATES N	-
JOB CODE	GT-2384	FLUSHING MEDIUM	Bentonite	CO-ORDINATES E	-
BORE START DATE	25/04/2022				
BORE END DATE	27/04/2022				
TOTAL DRILL DAYS	3				

Depth below E.G.L (m)	Drilling progress per metre: Date	Time: Hr.	Time: Min.	Type of Drill Bit (SC / TCB / DB)	Core Details: Total Core Recovery %	Core Details: R.Q.D %	SPT Details: Blowsfom 0-15	SPT Details: 15-30	SPT Details: 30-45	SPT 'N' Value	Sample Details: Depth	Sample Details: No.	Sample Details: Type	Sample Details: RL (m)	Layer Data: Legend	Layer Data: No	Layer Data: Depth	Geotechnical Description
21	26/04/2022	15	46	SC	-	-	31	36	30	66	22.50	15	SS	-22.5				Grey,Grey Brown,Moist,Poorly Graded, Fine & Medium Grains Sand,Dense & Very Dense,Cemented SAND (SC) Gondwana Formation
22		To 16	01								22.95							
23		16	32	SC	-	-												
24		To 16	40															
25							44	50Cm Penet for 50Blows		>100	25.00	16	SS	-25.0		L9	25.0	
26		Total Drilling time 22 mins		SC	-	-					25.20							Grey Brown,Moist,Poorly Graded, Fine & Medium Grains Sand,Very Dense, Silty SAND (SM) With Binder
27	27/04/2022						30	20Cm Penetr for 50Blows		>100	27.50	17	SS	-27.5		L10	27.5	
28		11	15								27.67							
29		To 11	38	SC	-	-												Grey,Grey Green,Moist,Fissile & Sub Fissile,Hard SHALE (Cl) Gondwana Formation
30								13Cm Penetr for 50Blows		>100	30.00	18	SS	-30.0		L11	30.2	
											30.13							

CS - Core Sample	DS - Disturbed Sample	LOGGED	N.Dhanasankar	PROJECT SITE DETAILS	REMARKS
SS - Split Spoon Sample	SC - Soil Cutter	DATE	27/04/2022	GROUND LEVEL (m) 3.00	
UDS- Undisturbed Sample	TCB - Tungsten Carbide Bit	CHECKED	S.Tyagaraj	WATER TABLE (m) 2.60	
WS - Wash Sample	DB - Diamond Bit	DATE	28/04/2022	CASING DEPTH (m) 6.00	

Borehole terminated at 30 m depth below E.G.L

FIG.2.3 Sub Soil Profile at BH-03 Location

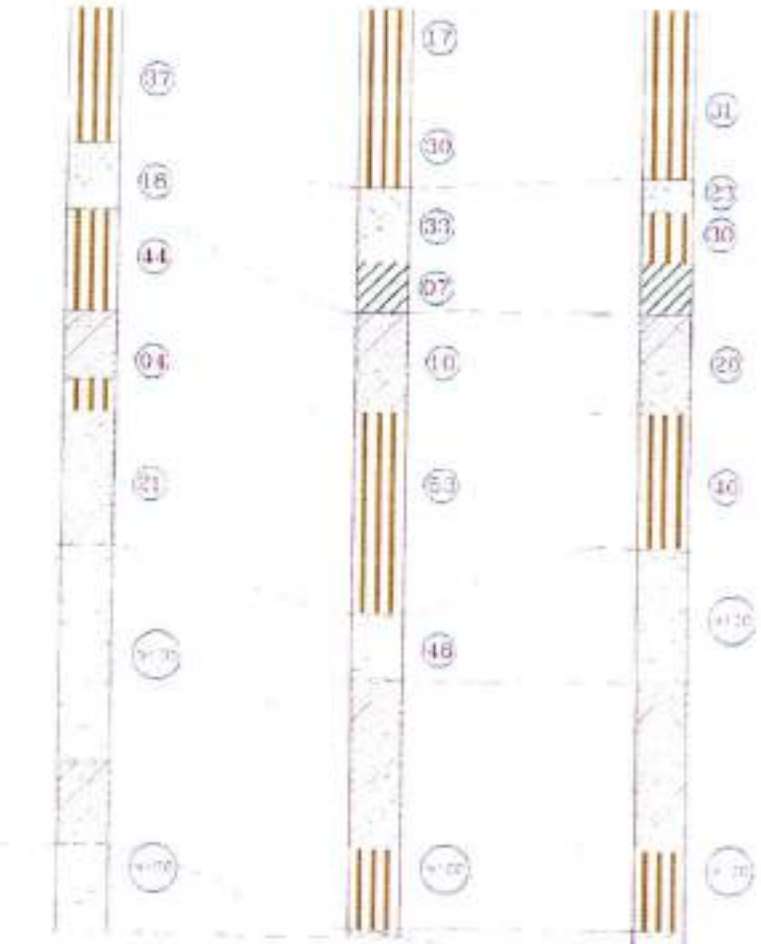
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CROSS SECTION PROFILE

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GRAIN SIZE DISTRIBUTION CURVE

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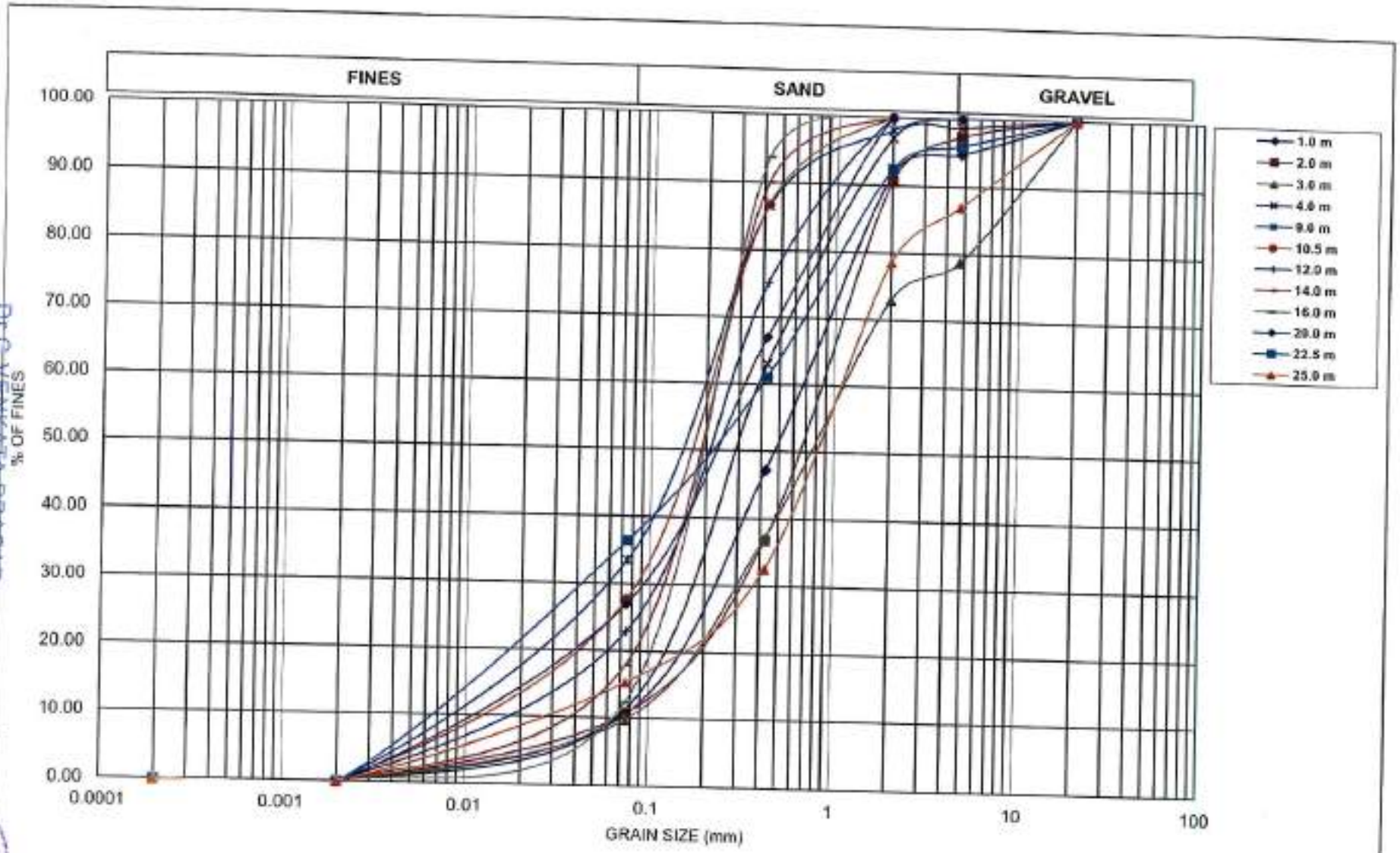


Fig. 2.6 GRAIN SIZE DISTRIBUTION CURVE - BH-02

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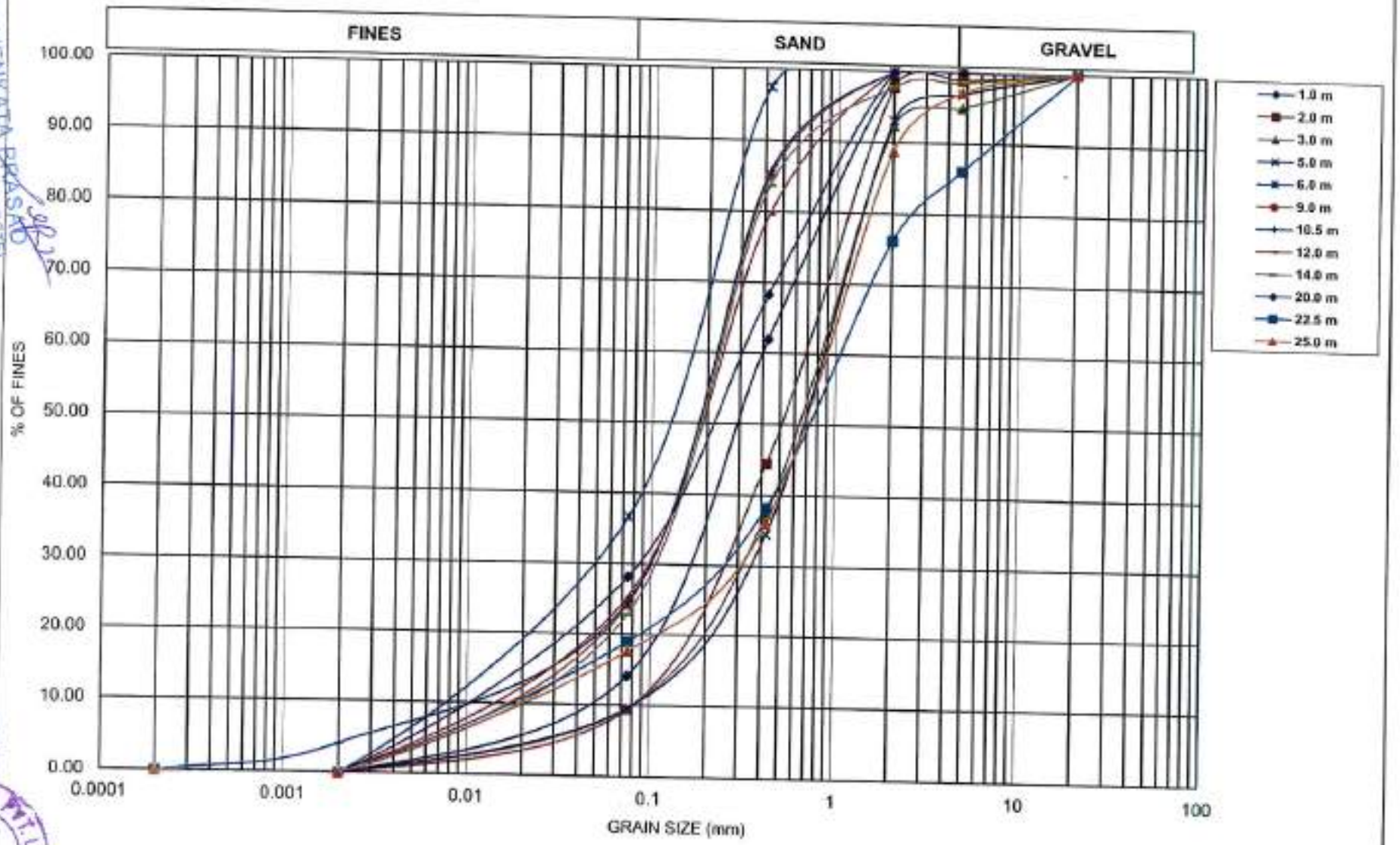


Fig. 2.7 GRAIN SIZE DISTRIBUTION CURVE - BH-03

HYDROMETER ANALYSIS CURVE

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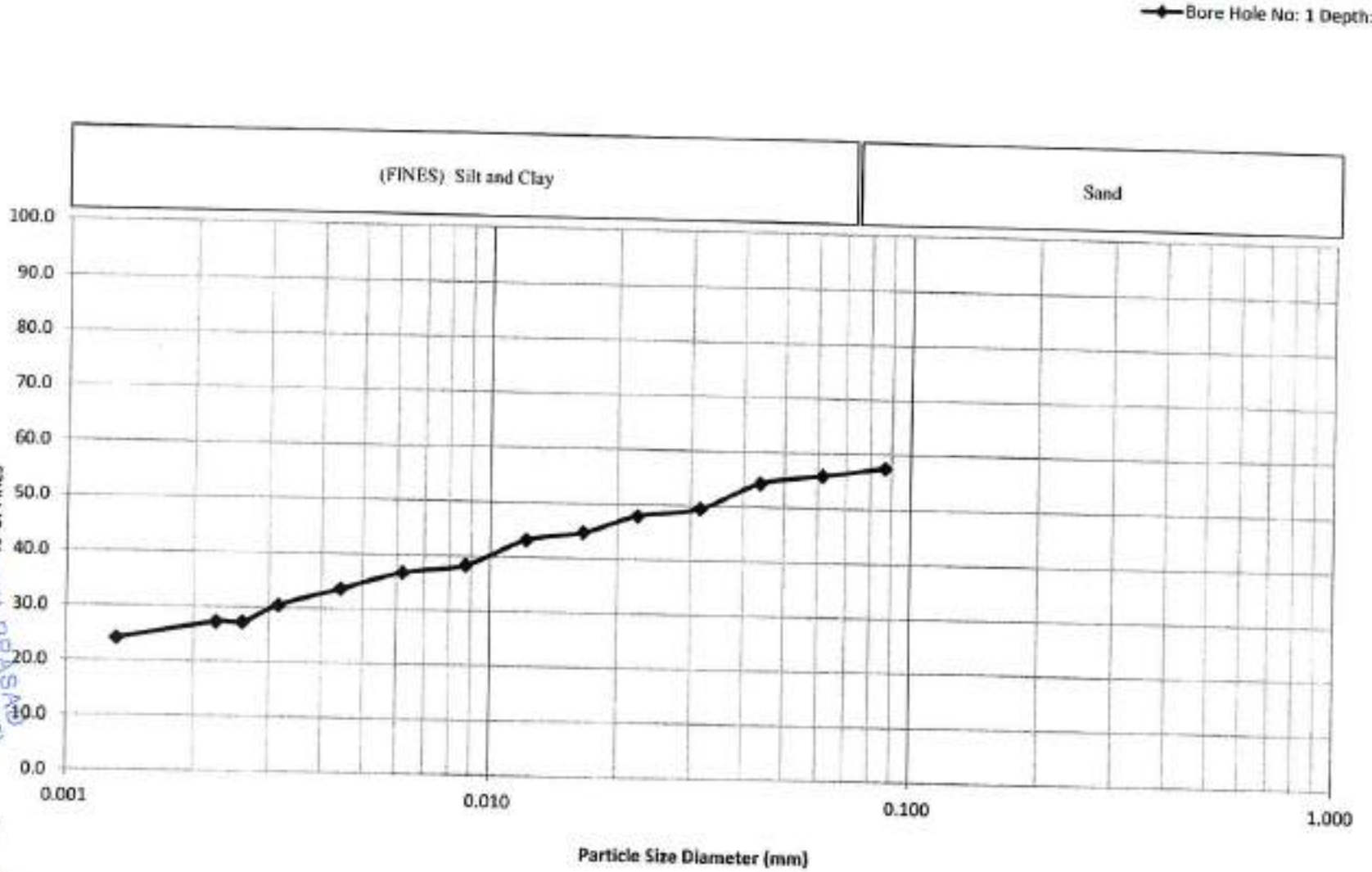


Fig 2.8 Hydrometer Analysis Master Curve

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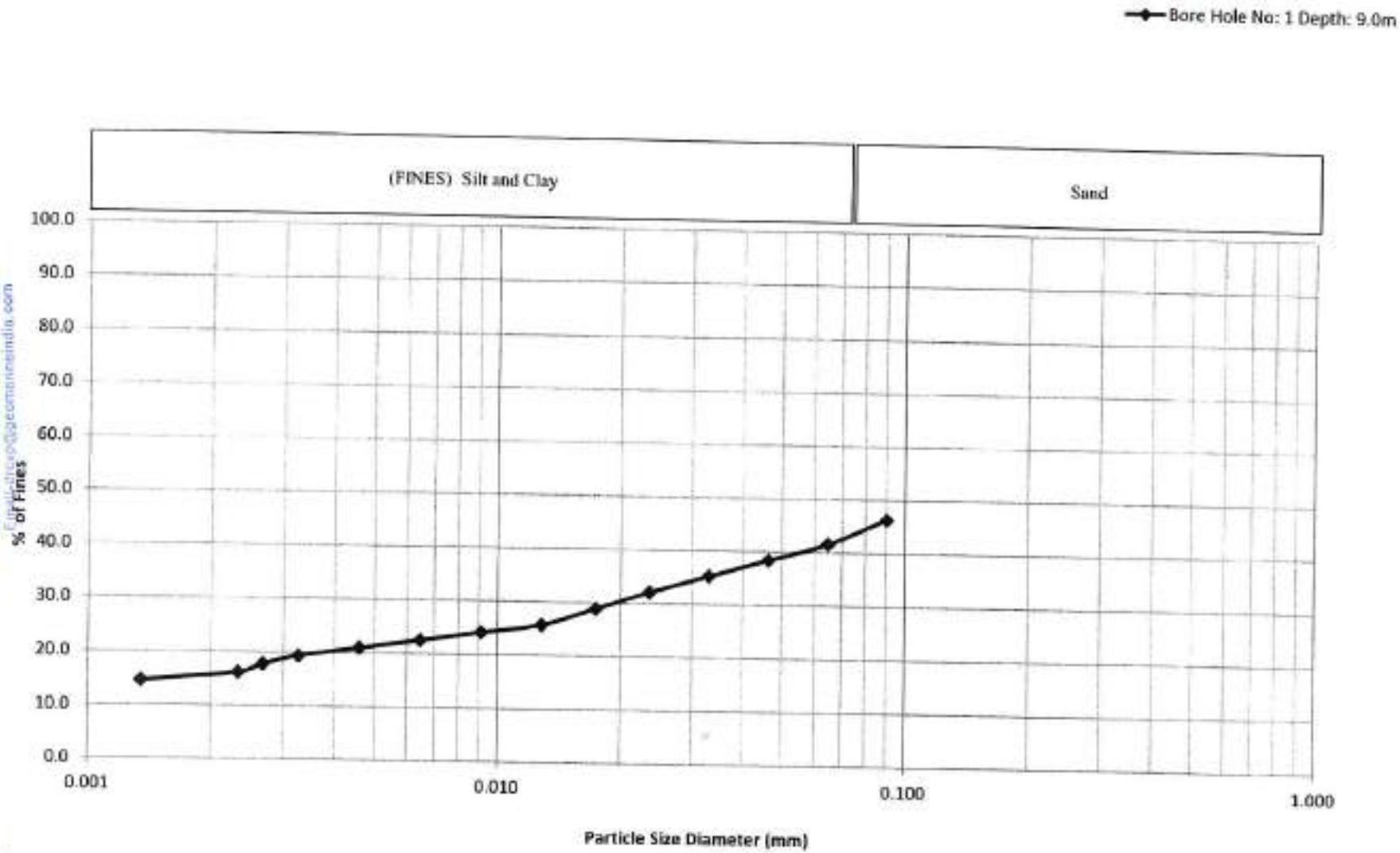


Fig 2.9 Hydrometer Analysis Master Curve

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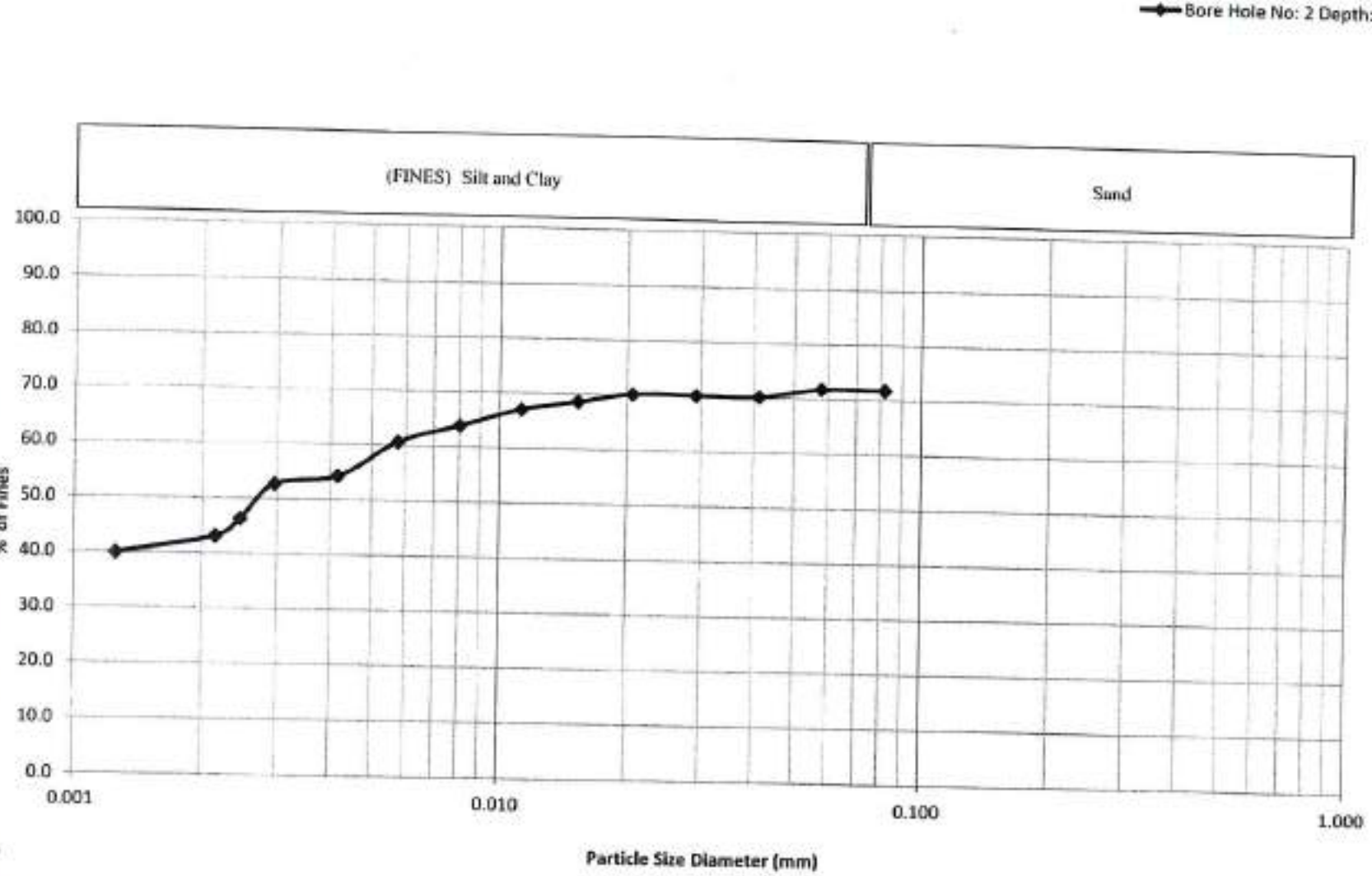


Fig 2.10 Hydrometer Analysis Master Curve

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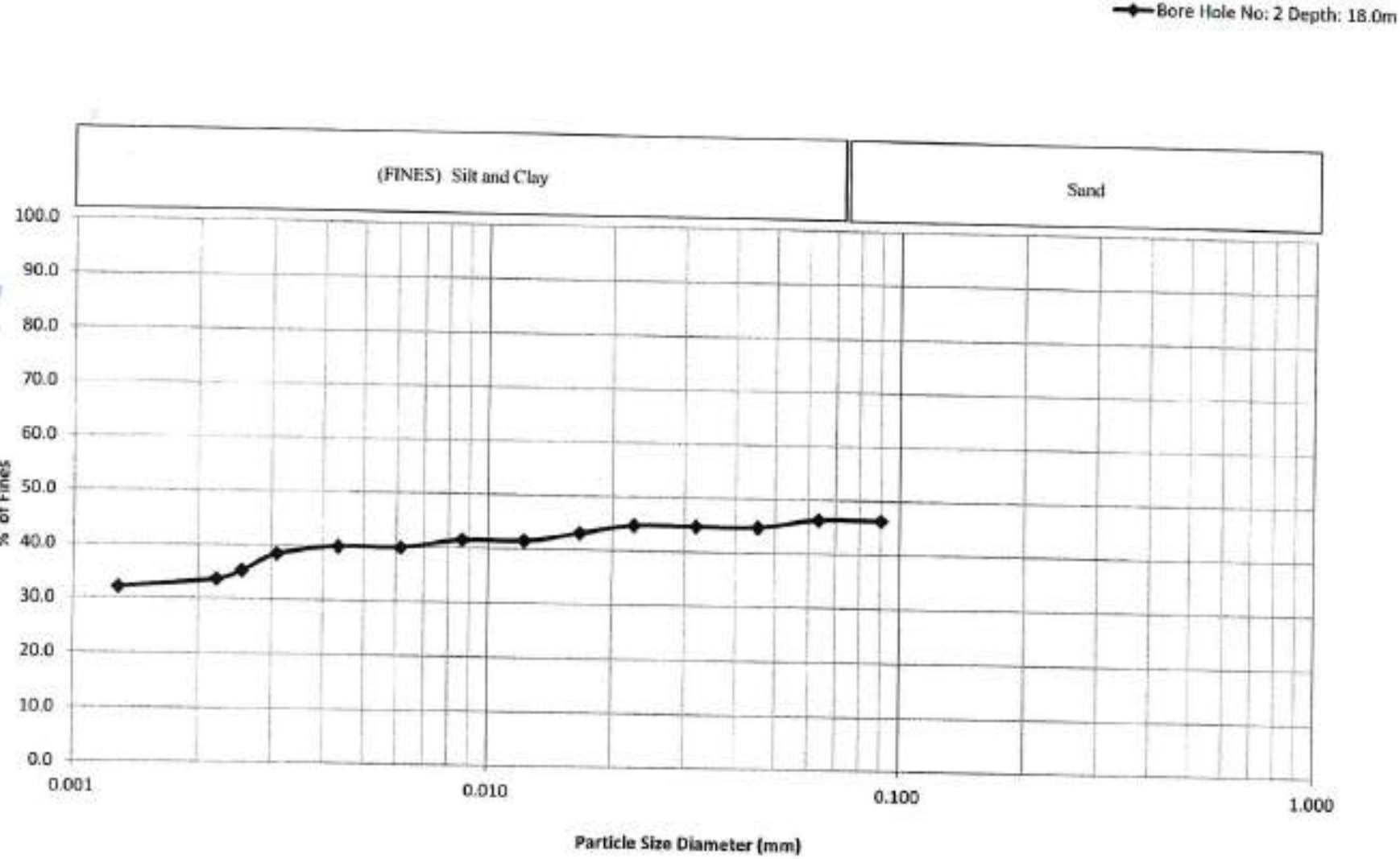


Fig 2.11 Hydrometer Analysis Master Curve

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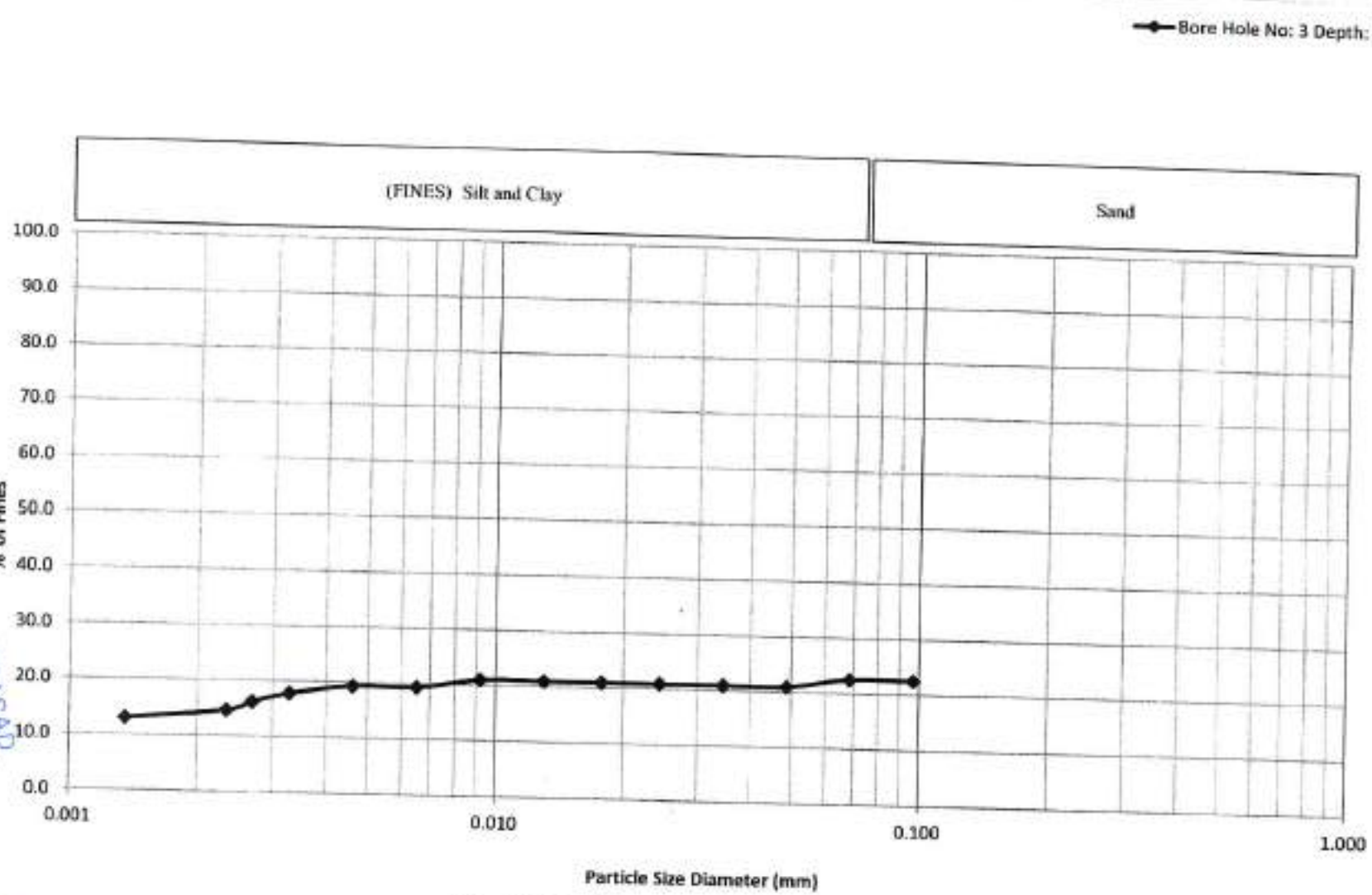


Fig 2.12 Hydrometer Analysis Master Curve

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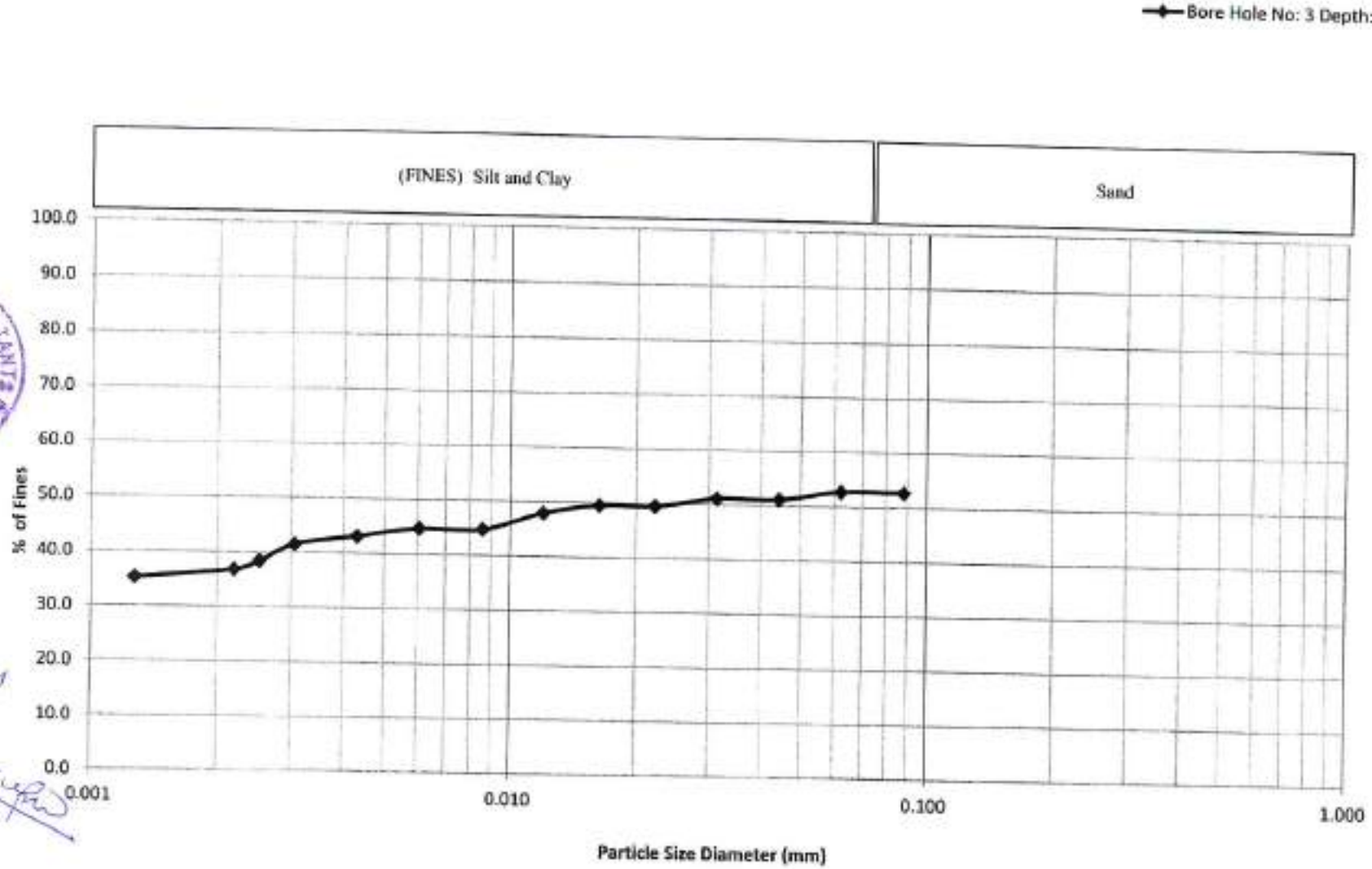


Fig 2.13 Hydrometer Analysis Master Curve

LABORATORY TEST RESULTS

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LABORATORY TEST REPORT

GEOMARINE CONSULTANTS PVT LTD- GEOTECHNICAL LABORATORY
NO.11 2nd MAIN ROAD, KANNAPA NAGAR EXTN,
KOTTIVAKKAM, CHENNAI

Name & Address of the Customer	:	M/s RAMANIYAM REAL ESTATES (P) LTD	**Customer Reference**	: By Email
Sample Description	:	Soil Sample	**Period of Testing**	: 30/04/2022 to 06/05/2022
Source of Sample	:	Customer Supplied- Borehole No. BH-01	**Sample Identification Number**	: SS/GMC/042022/463/BH01
Sample Condition	:	Satisfactory	**Test Report No.**	: GT-2364/BH-01
Test Method	:	As per Bureau of Indian Standards	**Report Date**	: 25/05/2022
Sample Receipt Date	:	30/04/2022	**Test Report Pages**	: One Page

Table-2.1 Laboratory Classification of Soil Samples from BH-01

Sample Depth (m)	SPT- "N" Value	Type of Sample	Fine Grained (FG)										Coarse Grained (CG)													
			Moisture Content (%) AS PER IS 2720 (P-II) - 1973, RA-2015	LIQUID LIMIT (%) AS PER IS 2720 (P-V) - 1985, RA-2015	PLASTIC LIMIT (%) AS PER IS 2720 (P-V) - 1985, RA-2015	Plasticity Index (I_p = LL-PL)	Consistency Index (I_c=LL-NMC/I_p)	SHRINKAGE LIMIT (%) AS PER IS 2720 (P-VI) - 1972, RA-2011	FREE SWELL INDEX (%) AS PER IS 2720 (P-XL) - 1977, RA-2011	Consistancy	Position With Respect to A-Lline	IS Notation	SPECIFIC GRAVITY AS PER IS 2720 (P-III, SEC-1) - 1980, RA-2010	GRAIN SIZE ANALYSIS AS PER IS 2720 (P-IV) - 1985, RA-2015						D_{10} (mm)	D_{30}(mm)	D_{60} (mm)	Uniformity Co-Efficient $C_u=D_{60}/D_{10}$	Co-Efficient of Curvature $C_c=D_{30}^2/(D_{60}xD_{10})$	Relative Density	IS-Notation	
													Gravel (%)	Coarse (%)	Medium (%)	Fine (%)	Silt (%)	Clay (%)							Gravel	Sand
3.0	30	SS	-	-	-	-	-	-	-	CG>50%	-	-	-	2.6	2.6	69.4	19.0	7.1		-	-	-	-	-	M.Dense	<50%	SP-SM
5.0	33	SS	-	-	-	-	-	-	-	CG>50%	-	-	-	2.8	1.1	49.3	38.5	8.3		-	-	-	-	-	Dense	<50%	SP-SM
8.0	48	SS	-	-	-	-	-	-	-	CG>50%	-	-	-	1.7	1.4	46.4	41.1	9.4		-	-	-	-	-	Dense	<50%	SP-SM
10.0	16	SS	17.5	47.7	16.4	29.3	1.0	12.4	3.6	V.Stiff	Above	CI	-	-	-	-	-	72.7	27.3	-	-	-	-	-	FG>50%	FG>50%	FG>50%
13.0	15	SS	19.3	48.5	16.5	28.0	1.0	13.0	12.5	Stiff	Above	CI	-	-	-	-	-	100.0		-	-	-	-	-	FG>50%	FG>50%	FG>50%
5.0	39	SS	-	-	-	-	-	-	-	CG>50%	-	-	-	0.0	0.0	5.9	71.6	22.6		-	-	-	-	-	Dense	<50%	SM
7.5	48	SS	-	-	-	-	-	-	-	CG>50%	-	-	-	0.0	0.0	24.7	63.6	11.7		-	-	-	-	-	Dense	<50%	SP-SM
9.0	3	SS	12.5	21.9	10.8	11.1	0.8	20.0	18.2	CG>50%	Above	-	-	0.0	0.0	13.3	60.3	22.2	4.3	-	-	-	-	-	V.Loose	<50%	SC
10.5	8	SS	-	-	-	-	-	-	-	CG>50%	-	-	-	0.0	0.0	13.1	58.7	28.2		-	-	-	-	-	Loose	<50%	SM
12.0	18	SS	4.2	18.3	Non Plastic				0.0	CG>50%	Above	-	-	0.0	0.0	20.9	52.9	26.2		-	-	-	-	-	M.Dense	<50%	SC
14.0	23	SS	12.2	49.6	23.0	26.6	1.4	19.1	13.3	CG>50%	Above	-	-	0.0	0.0	19.3	55.7	24.9		-	-	-	-	-	M.Dense	<50%	SC
16.0	>100	WS	-	-	-	-	-	-	-	CG>50%	-	-	-	0.0	2.8	49.6	42.6	5.1		-	-	-	-	-	V.Dense	<50%	SP-SM
18.0	45	SS	18.4	80.6	36.0	44.6	1.4	10.8	100.0	Hard	Above	CH	-	-	-	-	-	100.0		-	-	-	-	-	FG>50%	FG>50%	FG>50%
20.0	>100	SS	17.5	63.5	29.6	34.5	1.3	11.8	65.5	Hard	Above	CH	-	-	-	-	-	100.0		-	-	-	-	-	FG>50%	FG>50%	FG>50%
22.5	71	SS	15.3	31.7	17.6	14.7	1.1	17.5	39.1	CG>50%	Above	-	-	0.0	0.8	23.1	30.1	46.0		-	-	-	-	-	V.Dense	<50%	SC
25.0	>100	SS	13.8	47.5	23.0	24.5	1.4	14.5	27.3	Hard	Above	CI	-	-	-	-	-	100.0		-	-	-	-	-	FG>50%	FG>50%	FG>50%
27.5	>100	SS	12.1	45.8	22.0	23.7	1.4	-	0.0	Hard	Above	CI	-	-	-	-	-	100.0		-	-	-	-	-	FG>50%	FG>50%	FG>50%

** END OF REPORT**

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LABORATORY TEST REPORT

GEOMARINE CONSULTANTS PVT LTD- GEOTECHNICAL LABORATORY

NO.11 2ND MAIN ROAD, KANNAPA NAGAR EXTN,

KOTTIVAKKAM, CHENNAI

Name & Address of the Customer	:	**M/s RAMANIYAM REAL ESTATES (P) LTD**	**Customer Reference**	: By Email
Sample Description	:	Soil Sample	**Period of Testing**	: 30/04/2022 to 06/05/2022
Source of Sample	:	Customer Supplied- Borehole No. BH-02	**Sample Identification Number**	: SS/GMC/042022/463/BH02
Sample Condition	:	Satisfactory	**Test Report No.**	: GT-2364/BH-02
Test Method	:	As per Bureau of Indian Standards	**Report Date**	: 25/05/2022
Sample Receipt Date	:	30/04/2022	**Test Report Pages**	: One Page

Table-2.2 Laboratory Classification of Soil Samples from BH-02

Sample Depth (m)	SPT- "N" Value	Type of Sample	Fine Grained (FG)										Coarse Grained (CG)											IS-Notation	
			Moisture Content (%) AS PER IS 2720 (P-II) - 1973, RA-2015	LIQUID LIMIT (%) AS PER IS 2720 (P-V) - 1985, RA-2015	PLASTIC LIMIT (%) AS PER IS 2720 (P-V) - 1985, RA-2015	Plasticity Index (I_p= LL-PL)	Consistency Index (I_c=LL-NMC/I_p)	SHRINKAGE LIMIT (%) AS PER IS 2720 (P-VI) - 1972, RA-2011	FREE SWELL INDEX (%) AS PER IS 2720 (P-XL) - 1977, RA-2011	Consistancy	Position With Respect to A-Aline	IS.Notation	SPECIFIC GRAVITY AS PER IS 2720 (P-III, SEC-1) - 1985, RA-2010	GRAIN SIZE ANALYSIS AS PER IS 2720 (P-IV) - 1985, RA-2015						D_{10} (mm)	D_{30}(mm)	D_{60} (mm)	Uniformly Co-Efficient $C_u=D_{60}/D_{10}$	Co-Efficient of Curvature $C_c=D_{30}^2/(D_{10}\times D_{60})$	Relative Density		
													Gravel (%)	Coarse (%)	Medium (%)	Fine (%)	Silt (%)	Clay (%)							Gravel	Sand
1.0	17	SS	-	-	-	-	-	-	-	CG>50%	-	-	-	5.2	3.0	44.4	36.7	10.6		-	-	-	-	-	M.Dense	<50%	SP-SM
2.0	35	SS	-	-	-	-	-	-	-	CG>50%	-	-	-	2.7	6.7	53.8	28.2	10.8		-	-	-	-	-	Dense	<50%	SP-SM
3.0	42	SS	-	-	-	-	-	-	-	CG>50%	-	-	-	21.2	8.8	35.8	27.5	9.8		-	-	-	-	-	Dense	<50%	SP-SM
4.0	24	SS	-	-	-	-	-	-	-	CG>50%	-	-	-	1.4	1.6	33.9	51.8	11.4		-	-	-	-	-	M.Dense	<50%	SP-SM
6.0	33	SS	13.4	49.0	24.5	24.5	1.5	13.5	0.0	Hard	Above	CI	-	-	-	-	-	100.0		-	-	-	-	-	FG>50%	FG>50%	FG>50%
7.5	7	SS	37.6	62.1	29.2	32.9	0.7	11.2	3.2	M.Stiff	Above	CH	-	-	-	-	-	56.8	43.2	-	-	-	-	-	FG>50%	FG>50%	FG>50%
9.0	8	SS	18.8	25.7	14.7	11.0	0.6	19.2	11.1	CG>50%	Above	-	-	0.0	1.9	11.5	53.1	33.6		-	-	-	-	-	Loose	<50%	SC
10.5	13	SS	16.9	25.0	14.6	10.4	0.8	19.5	10.0	CG>50%	Above	-	-	0.0	0.0	13.1	59.1	27.8		-	-	-	-	-	M.Dense	<50%	SC
12.0	46	SS	-	-	-	-	-	-	-	CG>50%	-	-	-	0.0	0.0	24.8	52.2	23.0		-	-	-	-	-	Dense	<50%	SM
14.0	44	SS	-	-	-	-	-	-	-	CG>50%	-	-	-	0.0	0.0	9.9	72.0	18.1		-	-	-	-	-	Dense	<50%	SM
16.0	69	SS	-	-	-	-	-	-	-	CG>50%	-	-	-	0.0	0.0	6.3	81.3	12.4		-	-	-	-	-	V.Dense	<50%	SM
18.0	48	SS	24.5	62.0	32.9	49.1	1.2	10.4	34.5	Hard	Above	CH	-	-	-	-	-	66.4	33.6	-	-	-	-	-	FG>50%	FG>50%	FG>50%
20.0	78	SS	12.5	27.0	13.7	13.3	1.1	16.8	29.5	CG>50%	Above	-	-	0.0	0.0	32.9	40.0	27.1		-	-	-	-	-	V.Dense	<50%	SC
22.5	>100	SS	9.1	32.0	12.8	19.2	1.2	17.5	35.0	CG>50%	Above	-	-	4.0	3.5	31.3	24.6	36.5		-	-	-	-	-	V.Dense	<50%	SC
25.0	>100	SS	-	-	-	-	-	-	-	CG>50%	-	-	-	13.9	8.4	45.0	17.2	15.5		-	-	-	-	-	V.Dense	<50%	SM
27.5	>100	SS	11.9	40.8	24.2	16.6	1.7	14.5	12.5	Hard	Above	CI	-	-	-	-	-	100.0		-	-	-	-	-	FG>50%	FG>50%	FG>50%

**** END OF REPORT****

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Name & Address of the Customer	: **M/s RAMANIYAM REAL ESTATES (P) LTD**	**Customer Reference**	: By Email
Sample Description	: Soil Sample	**Period of Testing**	: 30/04/2022 to 06/05/2022
Source of Sample	: Customer Supplied- Borehole No. BH-03	**Sample Identification Number**	: SS/GMC/042022/463/BH03
Sample Condition	: Satisfactory	**Test Report No.**	: GT-2364/BH-03
Test Method	: As per Bureau of Indian Standards	**Report Date**	: 25/05/2022
Sample Receipt Date	: 30/04/2022	**Test Report Pages**	: One Page

Table-2.3 Laboratory Classification of Soil Samples from BH-03

Sample Depth (m)	SPT- "N" Value	Type of Sample	Fine Grained (FG)										Coarse Grained (CG)													
			Moisture Content (%) AS PER IS 2720 (P-II) - 1973, RA-2015	LIQUID LIMIT (%) AS PER IS 2720 (P-V) - 1985, RA-2015	PLASTIC LIMIT (%) AS PER IS 2720 (P-V) - 1985, RA-2015	Plasticity Index (Ip= LL-PL)	Consistency Index (Ic=LL-NMC/Ip)	SHRINKAGE LIMIT (%) AS PER IS 2720 (P-VI) - 1972, RA-2011	FREE SWELL INDEX (%) AS PER IS 2720 (P-XL) - 1977, RA-2011	Consistancy	Position With Respect to A-Line	IS-Notation	SPECIFIC GRAVITY AS PER IS 2720 (P-III, SEC-1) - 1980, RA-2016	GRAIN SIZE ANALYSIS AS PER IS 2720 (P-IV) - 1985, RA-2015						D_{10} (mm)	D_{30}(mm)	D_{60} (mm)	Uniformity Co-Efficient $C_u=D_{60}/D_{10}$	Co-Efficient of Curvature $C_c=D_{30}^2/(D_{10}xD_{60})$	Relative Density	IS-Notation	
														Gravel (%)	Coarse (%)	Medium (%)	Fine (%)	Silt (%)	Clay (%)							Gravel	Sand
1.0	22	SS	-	-	-	-	-	-	-	CG>50%	-	-	-	0.0	1.0	37.0	47.8	14.2		-	-	-	-	-	M.Dense	<50%	SM
2.0	25	SS	-	-	-	-	-	-	-	CG>50%	-	-	-	1.1	1.1	53.3	35.1	9.5		-	-	-	-	-	M.Dense	<50%	SP-SM
3.0	40	SS	-	-	-	-	-	-	-	CG>50%	-	-	-	5.6	2.7	55.1	27.7	9.6		-	-	-	-	-	Dense	<50%	SP-SM
4.0	38	SS	-	-	-	-	-	-	-	CG>50%	-	-	-	3.0	3.9	58.6	24.9	9.6		-	-	-	-	-	Dense	<50%	SP-SM
5.0	23	SS	16.1	35.2	16.8	18.4	1.0	15.3	8.3	V.Stiff	Above	CI	-	-	-	-	-	100.0		-	-	-	-	-	FG>50%	FG>50%	FG>50%
6.0	39	SS	-	-	-	-	-	-	-	CG>50%	-	-	-	0.0	0.0	2.5	60.8	36.8		-	-	-	-	-	M.Dense	<50%	SM
9.0	4	SS	10.7	25.9	14.0	11.9	1.3	18.0	14.3	CG>50%	Above	-	-	0.0	0.0	15.0	60.7	24.4		-	-	-	-	-	V.Loose	<50%	SC
10.5	23	SS	24.4	25.8	14.5	11.3	0.1	17.8	23.8	CG>50%	Above	-	-	0.0	0.0	14.3	57.9	23.7	4.1	-	-	-	-	-	M.Dense	<50%	SC
12.0	52	SS	-	-	-	-	-	-	-	CG>50%	-	-	-	0.0	0.0	20.3	54.2	25.5		-	-	-	-	-	V.Dense	<50%	SM
14.0	40	SS	-	-	-	-	-	-	-	CG>50%	-	-	-	1.4	0.8	14.1	60.8	23.0		-	-	-	-	-	Dense	<50%	SM
16.0	>100	SS	17.6	36.5	22.1	14.4	1.3	14.0	27.3	Hard	Above	CI	-	-	-	-	-	100.0		-	-	-	-	-	FG>50%	FG>50%	FG>50%
18.0	40	SS	21.0	73.0	33.2	39.8	1.3	10.8	60.9	Hard	Above	CH	-	-	-	-	-	63.2	36.8	-	-	-	-	-	FG>50%	FG>50%	FG>50%
20.0	44	SS	10.1	30.5	14.8	15.7	1.3	15.6	30.0	CG>50%	Above	-	-	9.0	0.0	31.6	40.1	28.3		-	-	-	-	-	Dense	<50%	SC
22.5	66	SS	11.5	28.2	14.0	14.2	1.2	19.0	44.4	CG>50%	Above	-	-	13.8	9.9	38.0	19.3	19.0		-	-	-	-	-	V.Dense	<50%	SC
25.0	>100	SS	-	-	-	-	-	-	-	CG>50%	-	-	-	2.7	8.4	52.8	18.4	17.7		-	-	-	-	-	V.Dense	<50%	SM
27.5	>100	SS	18.4	49.9	23.0	26.9	1.2	-	0.0	Hard	Above	CI	-	-	-	-	-	100.0		-	-	-	-	-	FG>50%	FG>50%	FG>50%
30.0	>100	SS	Fissile, Shale																								

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Table-2.4 Results of Chemical Analysis									
SL No.	Bore HoleNo.	Water				Soil (2:1)			
		Depth of Sample (m)	pH	Chlorides (ppm)	Sulphates (ppm)	Depth of Sample (m)	pH	Chlorides (ppm)	Sulphates (ppm)
1.0	BH-01	2.40	7.03	225.6	23.3	2.0	7.08	58.6	20.3
2.0	BH-02	2.60	7.02	200.3	20.8	1.0	7.05	49.2	19.3
3.0	BH-03	2.60	6.94	254.1	18.2	2.0	7.06	65.2	27.1

10/17

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GEOMARINE (I) PVT. LTD.

CHAPTER-3

GEOLOGY & SUB-SURFACE STRATIFICATION

3.0 PREAMBLE:

Geotechnical investigation carried out at a specific site provides location specific sub surface engineering characteristics. However in major project sites where the construction activities spread over a very large area location specific sub surface strata characteristics are studied together with the geological mapping data.

This is required to incorporate the impact of any documented macro-level geological characteristics of the region on the foundation design, irrespective of the location specific sub surface strata characteristics.

In view on the above, though it is beyond the scope of the present study to carry out macro-level geological investigation the regional geology based on the published data is presented and discussed.

3.1 CLIMATE AND RAINFALL:

The study area receives the rain under the influence of both southeast and northeast monsoons. Predominantly northeast monsoon contributes rainfall and most of the precipitation occurs in the form of cyclonic storm caused due to the depressions in Bay of Bengal. The north east monsoon occurs between October & December. The southwest monsoon rainfall is highly erratic and summer rains are negligible.

The normal annual rainfall over the study area varies from 1100 mm to 1200mm.

3.2 GEOMORPHOLOGY:

Chennai district forms part of coastal plains of northern Tamil Nadu. Major part of the district is having flat topography with very gentle slope towards east. The altitudes of land surface vary from 10 m above MSL in the west to sea level in the east.

Fluvial, marine and erosional landforms are noticed in the district. Marine transgression and regressions and neo-tectonic activity during the recent past have influenced the morphology and resulted in various present landforms.

Meandering streams with small sand bars are present along the course of Adyar River. The pediment and buried pediment in Guindy area in and around the reserved forest, is the only area where the ecological system is less disturbed, while the other areas are completely disturbed by built up area with large-scale human interference and pollution.

3.3 GEOLOGY OF CHENNAI DISTRICT:

Chennai district is underlain by various geological formations from ancient Archaean to the Recent Alluvium. The geological formations of the district can be grouped into three units, namely

i) Archaean crystalline rocks

ii) Gondwana (Consolidated Clay/Clayey Silt) and Tertiary sediments and

iii) Recent Alluvium.

The Archaean crystalline rocks of the district comprise chiefly of Charnockite, gneisses and the associated basic and ultra-basic intrusive dykes.

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3.4 GEOLOGICAL ORDER OF THE STUDY AREA:

Geologically, the present site is located in a coastal region with sub surface consisting of sedimentary deposits. The top sedimentary deposit is under laid by upper Gondwana system, particularly lower stage of Sriperumpudur. The formation mechanism of the sediments is chiefly due to transportation of surface water and marine deposition.

The above geological characteristics are also observed in the direct borehole investigation, which confirms that the present site does not depict any surprising geological features that are different from that of the region.

3.5 DESIGN SUB SOIL PROFILE: (WRT Foundation Engineering Application)

The sub soil characteristics obtained at the test location are further processed to arrive at the design soil parameters required for the design of sub structure using the following shear strength correlations with respect to the Standard Penetration Test Values of different layers.

- For Coarse Grained Material, Ref. IS: 6403 to estimate Angle of Shearing Resistance (Reproduced and shown in Fig.A1)
- For Fine Grained Material, Ref. Terzaghi & Peck, 1948, to estimate Unconfined Compressive Strength (Reproduced and shown in Fig.A2)

Based on the above, the average design soil characteristics are given below:

REFERENCE BORE HOLE					BH-01	Ref R.L. of G.L. (m):			0.00		
Layer No.	Layer Thk. (m)			Type of Strata	Colour	Ave. Design SPT	Relative Density	Consistency	(γ) kN/m³	Shear Parameters	
	Top BGL	Bottom BGL	Thickness							(C_u) kPa	(ϕ) Deg.
1.0	0.00	4.00	4.00	Silty Sand	Brown	37	Dense	-	19.5	-	37.925
2.0	4.00	6.00	2.00	Silty Clay	Grey	16	-	Very Stiff	20	107	-
3.0	6.00	9.00	3.00	Silty Sand	Grey Brown	44	Dense	-	20	-	39.65
4.0	9.00	12.00	3.00	Clayey Silty Sand	Grey	5	Loose	-	14	-	20.374
5.0	12.00	16.00	4.00	Clayey Silty Sand	Grey, Grey Brown	21	Medium Dense	-	18.5	-	33.3
6.0	16.00	22.50	6.50	Shale	Grey, Yellow	60	-	Hard	22	400	-
7.0	22.50	25.00	2.50	Cemented Sand	Grey, Yellow Brown	71	Very Dense	-	21	-	42.5
8.0	25.00	27.60	2.60	Shale	Grey Green	>100	-	Hard	22	400	-

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REFERENCE BORE HOLE					BH-02	Ref R.L. of G.L. (m):			0.00		
Layer No.	Layer Thk. (m)			Type of Strata	Colour	Ave. Design SPT	Relative Density	Consistency	(γ) kN/m³	Shear Parameters	
	Top BGL	Bottom BGL	Thickness							(Cu) kPa	(ϕ) Deg.
1.0	0.00	2.00	2.00	Silty Sand	Brown	17	Medium Dense	-	18	-	32.1
2.0	2.00	5.30	3.30	Silty Sand	Brown	34	Dense	-	19.5	-	37.1
3.0	5.30	7.50	2.20	Silty Clay	Grey,Black	33	-	Hard	21	220	-
4.0	7.50	9.00	1.50	Silty Clay	Grey	7	-	Medium Stiff	16	47	-
5.0	9.00	12.00	3.00	Clayey Silty Sand	Grey Brown	10	Loose	-	15	-	30
6.0	12.00	18.00	6.00	Silty Sand	Grey, Green Grey	53	Very Dense	-	20.5	-	41.45
7.0	18.00	20.00	2.00	Shale	Grey,Yellow Brown	48	-	Hard	21	320	-
8.0	20.00	27.50	7.50	Cemented Sand	Grey Yellow	>100	Very Dense	-	21	-	42.5
9.0	27.50	27.70	0.20	Shale	Grey,Green Grey	>100	-	Hard	22	400	-

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REFERENCE BORE HOLE					BH-03	Ref R.L. of G.L. (m):			0.00		
Layer No.	Layer Thk. (m)			Type of Strata	Colour	Ave. Design SPT	Relative Density	Consistency	(γ) kN/m³	Shear Parameters	
	Top BGL	Bottom BGL	Thickness							(C_u) kPa	(ϕ) Deg.
1.0	0.00	5.00	5.00	Silty Sand	Brown	31	Dense	-	19.5	-	36.275
2.0	5.00	6.00	1.00	Silty Clay	Brown	23	-	Very Stiff	20.5	153	-
3.0	6.00	7.50	1.50	Silty Sand	Grey	30	Medium Dense	-	19	-	36
4.0	7.50	9.00	1.50	Silty Clay	Grey,Black	-	-	-	-	-	-
5.0	9.00	10.50	1.50	Clayey Silty Sand	Grey, Grey Brown	4	Very Loose	-	13.5	-	20.221
6.0	10.50	12.00	1.50	Clayey Silty Sand	Grey Brown	23	Medium Dense	-	18.5	-	33.9
7.0	12.00	16.00	4.00	Silty Sand	Grey Brown	46	Dense	-	20	-	40.1
8.0	16.00	20.00	4.00	Shale	Grey Brown	60	-	Hard	22	400	-
9.0	20.00	25.00	5.00	Cemented Sand	Grey	50	Dense	-	20.5	-	41
10.0	25.00	27.50	2.50	Silty Sand	Grey Brown	>100	Very Dense	-	21	-	42.5
11.0	27.50	30.20	2.70	Shale	Grey, Grey Green	>100	-	Hard	22	400	-

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FOUNDATION SYSTEM



CHAPTER-4

FOUNDATION SYSTEM

4.0 PREAMBLE:

In the design of foundation system, the stress-strain compatibility of the super structure, sub structure and the bearing strata should be satisfied both individually and as a combined system. In view of this, the following data are needed for the design of foundation system, defined in terms of the type of sub structure and the bearing strata characteristics.

- The super structure characteristics along with the loading pattern on the sub structure
- The sub soil characteristics that define the required substructure configuration for a safe transfer of super-structural loads to the bearing strata

Considering the above aspects of the foundation design, the suitable type of foundation system is presented below.

4.1 PROPOSED STRUCTURES:

An understanding of the proposed construction and the order of loads on the foundations is needed for choosing the appropriate foundation system. In the present case, the proposed structure is configured with one basement floors and ten upper floors, and is meant for residential building. For this kind of structure, the column loads could vary between 3,000 kN to 5,000 kN.

The above mentioned loads have no bearing on the design of either sub or super structures and are mentioned just to provide an insight to choose an appropriate foundation system with respect to subsoil conditions.

4.2 SUB SOIL STRATIFICATION:

The stratigraphically succession in the project site consists of:

Layer-I	0.0m to 5.0m	Medium Dense to Dense, Sand
Layer-II	5.0m to 9.0m	Stiff to Medium Stiff, Clay & Medium Dense, Sand
Layer-III	9.0m to 12.0m	Very Loose to Loose, Clayey Sand/Sand with Binder
Layer-IV	12.0m to 16.0m	Dense to Very Dense, Sand
Layer-V	16.0m to 20.0m	Hard, Shale
Layer-VI	20.0m to 25.0m	Very Dense, Cemented Sand
Layer-VII	>25.0m	Hard, Shale (at Location Very Dense Cemented Sand up to 27.5m)

4.3 FOUNDATION SYSTEM:

4.3.1 PREAMBLE:

It is proposed to construct one basement floors, hence the overall depth of excavation up to the bottom of foundation is considered as 4.0m below the existing ground level.

4.3.2 FOUNDATION SYSTEM:

Taking into account of the superstructure configuration and sub soil conditions it is not possible to adopt any kind of open foundation system from both shear, settlement and liquefaction considerations of underlying very loose sand. Hence, it is advisable to adopt deep pile foundation system.

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The piles can be installed by drilling with direct mud circulation technique **(Bored Cast Insitu Piles)** and the recommended safe load carrying capacity of bored cast insitu piles in compression, tension and lateral for different diameters is worked out as per IS 2911-Part-I-Section-2 and are presented in Table 4.1.

Typical computations are presented in Annexure-I

TABLE:- 4.1 RECOMMENDED SAFE LOAD CARRYING CAPACITIES OF BORED CAST-IN SITU PILES

Sl.No	Reference Bore hole No.	Length of Pile below E.G.L	Assumed Length of Cut-Off Below E.G.L	Length of Pile below Cut-off	Dia.of Pile in (mm)	SAFE LOAD CARRYING CAPACITY (kN)		
						Vertical Load Carrying Capacity	Pull Out Capacity	Lateral Load Carrying Capacity
1.0	BH-01 to BH-03	21.0	4.0	17.0	500	1050	500	55
2.0					600	1350	600	75
3.0					750	1900	750	90
4.0					800	2100	850	110
5.0					900	2500	950	130
6.0					1000	3000	1050	150

4.4 BASEMENT EXCAVATION:

For carrying out basement excavation contiguous pile with clear gap of 50mm is an option. Since the set back is close to the boundary no back anchoring is possible. For structural design cantilever lever system is a viable option.

The design soil profile presents the requisite design data for the estimation of lateral earth pressures and the same hold good for the analysis and design of contiguous piles.

To prevent escape of sand particles from the gap between the piles provide 4mm welded mesh and shotcrete the same.

4.5 GROUND WATER LOWERING:

For ground water lowering multiple well point system is suitable. For providing safe construction condition, lower ground water table up to 6.0m. The data for well point system is presented in Annexure-II

4.6 BASEMENT SLAB UPLIFT:

Basement floor experience uplift pressure during monsoon rains, raising ground water table at ground level. Hence, basement floor slab needs design check for uplift pressure.

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RECOMMENDATIONS

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CHAPTER-5

RECOMMENDATIONS

5.1 *Recommendation for Pile foundation system:*

- For the kind of proposed structure Bored Cast in situ piles are recommended as the suitable foundation system.
- The allowable safe load carrying capacities of different diameters of piles as given in Table-4.1 can be adopted as provisional design loads, as the load carrying capacity of piles is not only depends upon the sub soil properties, but also depends on the care and experience of installation piles.
- The theoretical load carrying estimates of piles shall be confirmed by conducting pile loads tests as per the guide lines laid down in IS: 2911-Part-IV.
- The boring shall be carried out using direct mud circulation prepared out of sodium bentonite.
- After reaching the borehole termination depth, the borehole shall be cleaned using mud circulation for a minimum period of 30min or till the return mud is relatively clear of soil particles.
- After ensuring the borehole is clean, the tremie pipe shall be lowered and concreting can be done.

5.1.1 *Construction method statement of pile foundation:*

- For the bored cast in situ piles, a guide casing of suitable length can be adopted.
- The mud used shall be made out of sodium bentonite with minimum frees swell index of more than 300% and liquid limit more than 100%. The silt content in bentonite shall not more than 5%.
- The mud was prepared using sodium bentonite with a density of 1.10 to 1.15 g/cc.

5.2 *General Recommendations:*

- The chloride content in ground water sample is lower than the permissible limit of 500mg/l as per IS 456 Table 1.0. Hence no special steel is required for the construction.
- Corresponding to the sulphate content in 2:1 Water-Soil extract and ground water use Table 4.0 of IS 456 Clause 2.0 for minimum cement content and maximum water cement ratio. In the present case, ordinary Portland cement is suitable for the construction.
- The present project site fall in seismic zone-III as per IS 1893-P-I. The liquefaction analysis of the sub soil formation is presented in Annexure-II

AUTHORISED SIGNATORY

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On behalf of CMDA HRB Panel Committee the Soil Investigation Report is generally Received

Superintending Engineer, P.W.D.,
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ESTIMATION OF SAFE LOAD CARRYING CAPACITY OF BORED CAST-INSITU PILES

Type of Pile			Bored		**Diameter of Pile**			**Length of Pile below G.L. (m)**		21.00	**As Per IS:2911-(P-I,S-2)-2010**									
Reference Bore Hole			BH-01					500	mm	**Surcharge Pressure**		0	kPa							
Layer No.	Layer Thk. (m) Top. R.L	Bot. R.L.	Thickness	Type of Strata	Ave. SPT	(γ) kN/m³ of Layer	Ave. upto Layer	Shear Parameters (C_u) kPa	(ϕ) Deg.	Effective Overburden Pressure (kPa) At top of Layer	At Bot. of Layer	At Mid. of Layer	Adhesion Factor (α)	Earth Pressure Coefficient (k)	Skin Friction (Q_f) kN					
1.0	0.00	4.00	4.00	Cut-Off Level																
2.0	4.00	6.00	2.00	Clay	16	20.0	20.0	107	-	0.0	20.0	10.0	0.4	-	qf	2	137.8			
3.0	6.00	9.00	3.00	Sand	44	20.0	20.0	-	39.7	20.0	50.0	35.0	-	1.5	qf	3	203.5			
4.0	9.00	12.00	3.00	Sand	5	14.0	17.0	-	20.4	50.0	62.0	56.0	-	1.0	qf	4	98.0			
5.0	12.00	16.00	4.00	Sand	21	18.5	16.3	-	33.3	62.0	96.0	79.0	-	1.2	qf	5	380.5			
6.0	16.00	21.00	5.00	Shale	60	22.0	20.3	400	-	96.0	156.0	126.0	0.3	-	qf	6	816.8			

Summation of Positive Skin Resitance (kN) Q_f= 1636.65

Summation of Negative Skin Resistance (kN) -Qf= 0.00

Computation of End Bearing Resistance

Bearing Stratum		SPT	ϕ	C_u	N_q	N_c			
	Shale	60	-	600	-	9	Eff.Ht.of Overburden	8	m
							Effective Overburden Pressure	65.25	kN/m²

End Bearing Resistance (kN) Q_p= 1060.29

Skin Resistance in Clay Layer is $\pi*d*T_i*C_u*\alpha$

Skin Resistance in Sand Layer is $\pi*d*T_i*q_i*K*Tan(\phi)$

End Bearing Resistance in Clay Layer is $\pi*d^2/4*C_u*N_c$

End Bearing Resistance in Sand Layer is $\pi*d^2/4*Q*N_q$

Where

Cu=Undrained Shear Strength of Clay

ϕ=Angle of Shearing Resistance

N_c=Bearing Capacity Factor = 9

Q (i.e) Effecitve Overburden Pressure at pile tip=Effective height of overburden X (γ-10)

K=Coef. Earth Pressure at Rest

q_i=Effecitve Overburden Pressure at middle of Layer

N_q=Bearing Capacity Factor, Ref. Fig.1 of IS: Code Referred above

Ultimate Load Carrying Capacity (Q_{ult})	$Q_u=Q_f-Q_f+Q_p$ (kN)	2696.94
Safe Load Carrying Capacity (Q_{safe})	$Q_u/2.5$ (kN)	1078.78
Allowable Safe Load Carrying Capacity	Q_{A-safe} (kN)	1078.78
Allowable Safe Pull out Capacity	Q_{A-pull}: Qf/3 (kN)	545.55

d=Dia. Of Pile

α=Adhession Factor

T_i=Thickness of Layer

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GEO MARINE

ESTIMATION OF SAFE LOAD CARRYING CAPACITY OF BORED CAST-INSITU PILES

Type of Pile	Bored	Diameter of Pile			Length of Pile below G.L. (m)	21.00	As Per IS:2911-(P-I,S-2)-2010
Reference Bore Hole	BH-02		500	mm	Surcharge Pressure	0	kPa

Layer No.	Layer Thk. (m) Top, R.L.	Bot. R.L.	Thickness	Type of Strata	Ave. SPT	(γ) kN/m³ of Layer	Ave. upto Layer	Shear Parameters (C_u) kPa	(ϕ) Deg.	Effective Overburden Pressure (kPa) At top of Layer	At Bot. of Layer	At Mid. of Layer	Adhesion Factor (α)	Earth Pressure Coefficient (k)	Skin Friction (Q_f) kN			
1.0	0.00	4.00	4.00	Cut-Off Level														
2.0	4.00	5.30	1.30	Sand	29	19.0	19.0	-	35.7	0.0	11.7	5.9	-	1.3	qf	2	11.1
3.0	5.30	7.50	2.20	Clay	33	21.0	20.0	220	-	11.7	35.9	23.8	0.3	-	qf	3	197.7
4.0	7.50	9.00	1.50	Clay	7	16.0	18.5	47	-	35.9	44.9	40.4	0.9	-	qf	4	99.7
5.0	9.00	12.00	3.00	Sand	11	15.5	15.8	-	30.3	44.9	61.4	53.2	-	1.0	qf	5	148.6
6.0	12.00	18.00	6.00	Sand	53	20.5	18.0	-	41.5	61.4	124.4	92.9	-	1.5	qf	6	1159.9
7.0	18.00	20.00	2.00	Shale	48	21.0	20.8	320	-	124.4	146.4	135.4	0.3	-	qf	7	261.4
8.0	20.00	21.00	1.00	Cemented Sand	50	20.5	20.8	-	36.0	146.4	156.9	151.7	-	1.5	qf	8	259.6

Summation of Positive Skin Resitance (kN) Q_f= 2137.87

Summation of Negative Skin Resistance (kN) -Qf= 0.00

Computation of End Bearing Resistance

Bearing Stratum		SPT	ϕ	C_u	N_q	N_c			
	Cemented Sand	50	36.00	-	57.50	-	Eff.Ht.of Overburden	8	m
							Effective Overburden Pressure	78.75	kN/m²

End Bearing Resistance (kN) Q_p= 889.09

Skin Resistance in Clay Layer is $\pi*d*T_i*C_u*\alpha$

Skin Resistance in Sand Layer is $\pi*d*T_i*q_i*K*Tan(\phi)$

End Bearing Resistance in Clay Layer is $\pi*d^2/4*C_u*N_c$

End Bearing Resistance in Sand Layer is $\pi*d^2/4*Q*N_q$

Where

Cu=Undrained Shear Strength of Clay

ϕ=Angle of Shearing Resistance

N_c=Bearing Capacity Factor = 9

Q (i.e) Effective Overburden Pressure at pile tip=Effective height of overburden X (γ-10)

K=Coef. Earth Pressure at Rest

q_i=Effective Overburden Pressure at middle of Layer

N_q=Bearing Capacity Factor, Ref. Fig 1 of IS: Code Refered above

Ultimate Load Carrying Capacity (Q_{ult})	$Q_u=Q_f-Q_f+Q_p$ (kN)	3026.96
Safe Load Carrying Capacity (Q_{safe})	$Q_u/2.5$ (kN)	1210.79
Allowable Safe Load Carrying Capacity	$Q_{A\text{-}safe}$ (kN)	1210.79
Allowable Safe Pull out Capacity	$Q_{A\text{-}pull}$: Qf/3 (kN)	712.62

d=Dia. Of Pile

α=Adhession Factor

T_i=Thickness of Layer

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ESTIMATION OF SAFE LOAD CARRYING CAPACITY OF BORED CAST-INSITU PILES

Type of Pile	Bored	Diameter of Pile			Length of Pile below G.L. (m)	21.00	As Per IS:2911-(P-I,S-2)-2010
Reference Bore Hole	BH-03		500	mm	Surcharge Pressure	0	kPa

Layer No.	Layer Thk. (m) Top. R.L.	Bot. R.L.	Thickness	Type of Strata	Ave. SPT	(γ) kN/m³ of Layer	Ave. upto Layer	Shear Parameters (C_u) kPa	(ϕ) Deg.	Effective Overburden Pressure (kPa) At top of Layer	At Bot. of Layer	At Mid. of Layer	Adhesion Factor (α)	Earth Pressure Coefficient (k)	Skin Friction (Q_f) kN		
1.0	0.00	4.00	4.00	Cut-Off Level													
2.0	4.00	5.00	1.00	Sand	38	19.5	19.5	-	38.2	0.0	9.5	4.8	-	1.4	qf	2	8.3
3.0	5.00	6.00	1.00	Clay	23	20.5	20.0	153	-	9.5	20.0	14.8	0.3	-	qf	3	72.1
4.0	6.00	7.50	1.50	Sand	30	19.0	19.8	-	36.0	20.0	33.5	26.8	-	1.3	qf	4	59.7
5.0	7.50	9.00	1.50	Clay	7	16.0	17.5	47	-	33.5	42.5	38.0	0.9	-	qf	5	99.7
6.0	9.00	10.50	1.50	Sand	4	13.5	14.8	-	20.2	42.5	47.8	45.1	-	1.0	qf	6	39.2
7.0	10.50	12.00	1.50	Sand	23	18.5	16.0	-	33.9	47.8	60.5	54.1	-	1.2	qf	7	102.6
8.0	12.00	16.00	4.00	Sand	46	20.0	19.3	-	40.1	60.5	100.5	80.5	-	1.5	qf	8	638.9
9.0	16.00	20.00	4.00	Shale	50	21.0	20.5	333	-	100.5	144.5	122.5	0.3	-	qf	9	544.0
10.0	20.00	21.00	1.00	Cemented Sand	44	20.0	20.5	-	36.0	144.5	154.5	149.5	-	1.5	qf	10	254.0

Summation of Positive Skin Resitance (kN) Q_f= 1818.43

Summation of Negative Skin Resistance (kN) -Qf= 0.00

Computation of End Bearing Resistance

Bearing Stratum		SPT	ϕ	C_u	N_q	N_c			
	Cemented Sand	50	36.00	-	57.50	-	Eff.Ht.of Overburden	8	m
							Effective Overburden Pressure	75.00	kN/m²

End Bearing Resistance (kN) Q_p= 846.75

Skin Resistance in Clay Layer is $\pi*d*T_i*C_u*\alpha$

Skin Resistance in Sand Layer is $\pi*d*T_i*q_i*K*Tan(\phi)$

End Bearing Resistance in Clay Layer is $\pi*d^2/4*C_u*N_c$

End Bearing Resistance in Sand Layer is $\pi*d^2/4*Q*N_q$

Where

Cu=Undrained Shear Strength of Clay

ϕ=Angle of Shearing Resistance

N_q=Bearing Capacity Factor = 9

Q (i.e) Effective Overburden Pressure at pile tip=Effective height of overburden X (γ-10)

K=Coef. Earth Pressure at Rest

q_i=Effective Overburden Pressure at middle of Layer

N_q=Bearing Capacity Factor, Ref. Fig.1 of IS: Code Referred above

Ultimate Load Carrying Capacity (Q_{ult})	$Q_u=Q_f-Q_f+Q_p$ (kN)	2665.19
Safe Load Carrying Capacity (Q_{safe})	$Q_u/2.5$ (kN)	1066.08
Allowable Safe Load Carrying Capacity	$Q_{A\text{-}safe}$ (kN)	1066.08
Allowable Safe Pull out Capacity	$Q_{A\text{-}pull}$: Qf/3 (kN)	606.14

d=Dia. Of Pile

α=Adhession Factor

T_i=Thickness of Layer

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GEO MARINE CONSULTANTS PVT. LTD. CHENNAI-41

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LATERAL LOAD CARRYING CAPACITY OF BORED CAST- SITU PILES

Reference Bore Hole : BH-01 to BH-03

1.0 Geometrical Data

Type of Pile Head Considered	Fixed	
Diameter of Pile (d)	: 0.50	m
Free standing Length of Pile (e)	: 0	m
Length of Pile below E.G.L (Le)	: 21.0	m
Cut-Off Level From E.G.L	: 4.0	
Length of Pile below Cut-Off Level (Le)	: 17.0	m
Grade of Concrete (M)	: 25	MN/m^2
Young's Modulus of Concrete (E)	: 25000000	kN/m^2
Momemnt of Inertia (I)	: 0.003068	m^4

2.0 Determination of Depth of Fixity

Type of Soil Strata	: Sand	
Ground Water Condition	: Submerged	
Design SPT "N" Value	: 20	
T=(EI/nh)1/5		

(n can be read as h in the above and below equation in case of Sand)

nh=	: 2840	kN/m^3
In Case of Sand	: -	kN/m^4
T=	: 1.93	m
L1/T	: 0.00	
Lf/T	: 2.20	
Depth of Fixity below Cut off (z_f)	: 4.25	m

3.0 Determincation of Lateral Load and Moment Carrying Capacity for 0.005 m Lateral Deflection:

Allowable Lateral Deflection (Y)	: 0.005	m
Lateral Load Carrying Capacity (H)= Y*12EI/(e+zf)^3	: 59.81	kN
Recommended Design Lateral Load carrying Capacity	: **59**	**kN**
Fixed End Moment, M_F=H(e+z_f)/2	127	
Reduction Factor (L_1/T)	: 0.8	m
Actual Moment (Fixed End Moment/Reduction Factor), M_F	**102**	kN-m

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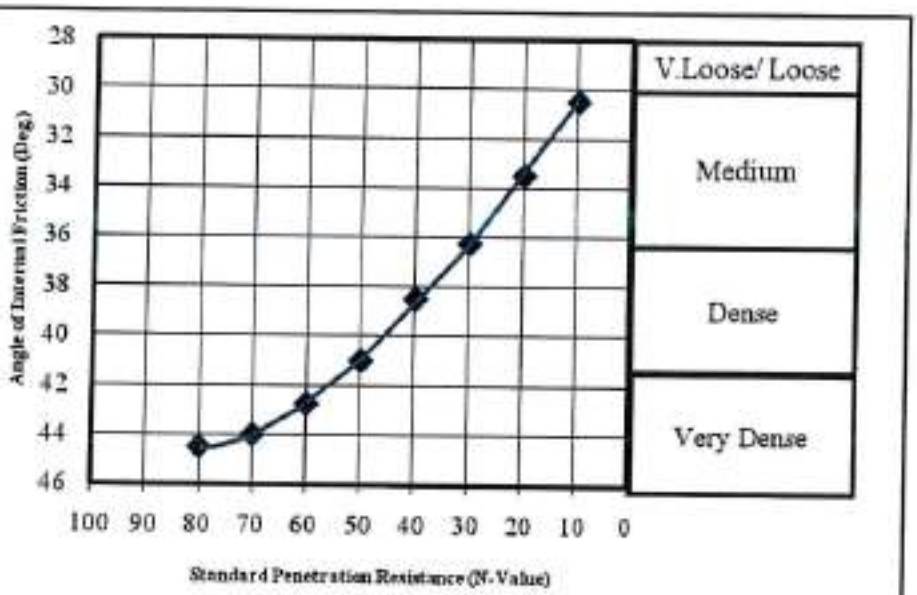


FIG. A1 Relation Ship between Angle of Internal Friction & N-value (Reproduced from IS:6403-1981)

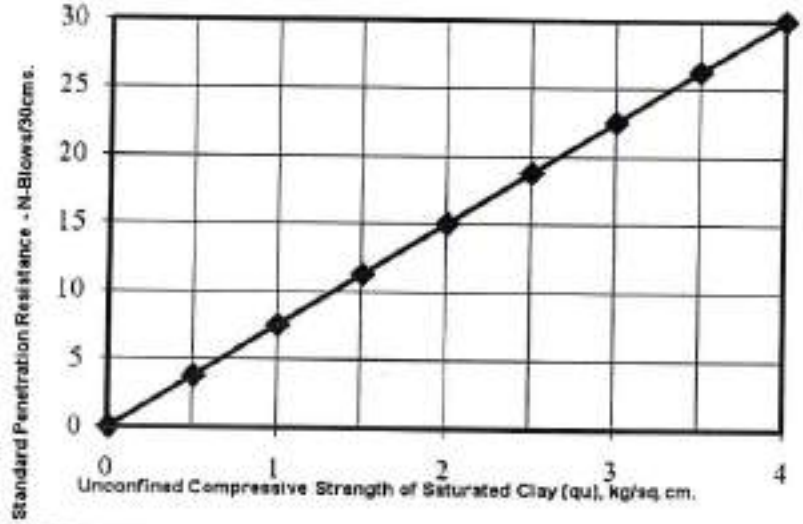


FIG. A2 : Relationship between UCC & SPT-Value (N) of Saturated Clay (AfterTerzhagi & Peck, 1948)

15/17

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ANNEXURE-II



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ANNEXURE-II SIMPLIFIED PROCEDURE FOR EVALUATION OF LIQUEFACTION POTENTIAL AS PER IS 1893 (PART-1)- 2016 BASED ON SPT "N"

Zone Factor / Horizontal ground acceleration (Z or a_{max}/g): 0.16 — Location of Ground Water Table: 0.6 BGL

Atmospheric Pressure: 100.00 kPa — Magnitude, Mw = 6.5 — C_{RR} 1 — C_{ST} 1 — C_{TY} 1 — C_{MM} 1 — C_{RL} 0.75

Borehole: BH-01

Depth (m)	"N" SPT Value	Type of Soil	γ (kN/m3)	Fines Content FC	σ_v (kPa)	σ_v' (kPa)	σ_v/σ_v'	r_d	CSR ($0.65*(a_{max}/g)*(\sigma_v/\sigma_v')*r_d$)	C_{RR}	$N_{1(60)}=NC_N$	C_N	$(N_1)_{60}=C_N.NC_{RR}$	α	β	$(N_1)_{60cs}=\alpha+\beta(N_1)_{60}$	$CRR_{7.5}$	CRR	Factor of Safety FOS=1 CRR/CSR	Possibility of Liquefaction
1.00	50	Sand	19.00	7	19	9	2.07	0.99	0.21	0.75	23	1.70	38	0.13	1.01	38.7	0.07	0.10	0.48	Liquefiable
2.00	33	Sand	19.50	8	39	19	1.99	0.98	0.20	0.75	25	1.70	42	0.37	1.01	43.0	0.20	0.29	1.44	Non-Liquefiable
3.00	48	Sand	20.00	9	59	31	1.91	0.98	0.19	0.75	36	1.70	61	0.68	1.02	63.0	0.43	0.62	3.17	Non-Liquefiable
4.00	16	Clay	20.00	100	79	41	1.93	0.97	0.19	0.75	12	1.57	19	0.50	1.20	23.1	0.26	0.37	1.91	Non-Liquefiable
5.00	15	Clay	20.00	100	99	51	1.93	0.96	0.19	0.75	11	1.40	16	0.50	1.20	19.4	0.21	0.30	1.55	Non-Liquefiable
6.00	39	Sand	18.50	23	118	58	2.03	0.95	0.20	0.75	29	1.31	38	4.03	1.10	46.2	0.26	0.37	1.83	Non-Liquefiable
7.50	48	Sand	20.00	12	148	76	1.94	0.94	0.19	0.75	36	1.14	41	1.45	1.03	43.9	0.32	0.32	1.66	Non-Liquefiable
9.00	3	Sand	13.00	27	168	29	5.83	0.93	0.56	0.75	2	1.70	4	4.43	1.33	8.7	0.30	0.15	0.26	Liquefiable
10.50	8	Sand	14.50	28	189	49	3.84	0.89	0.36	0.75	6	1.43	9	4.58	1.14	14.3	0.15	0.22	0.62	Liquefiable
12.00	18	Sand	18.00	26	215	98	2.20	0.85	0.20	0.75	14	1.01	14	4.41	1.12	19.7	0.21	0.31	1.56	Non-Liquefiable
14.00	25	Sand	18.50	25	253	122	2.08	0.80	0.17	0.75	17	0.91	16	4.28	1.11	21.7	0.24	0.34	1.98	Non-Liquefiable
16.00	100	Sand	21.00	5	295	179	1.65	0.75	0.13	0.75	75	0.75	56	0.00	1.00	56.1	0.37	0.53	4.12	Non-Liquefiable

Borehole: BH-02

Depth (m)	"N" SPT Value	Type of Soil	γ (kN/m3)	Fines Content FC	σ_v (kPa)	σ_v' (kPa)	σ_v/σ_v'	r_d	CSR ($0.65*(a_{max}/g)*(\sigma_v/\sigma_v')*r_d$)	C_{RR}	$N_{1(60)}=NC_N$	C_N	$(N_1)_{60}=C_N.NC_{RR}$	α	β	$(N_1)_{60cs}=\alpha+\beta(N_1)_{60}$	$CRR_{7.5}$	CRR	Factor of Safety FOS=1 CRR/CSR	Possibility of Liquefaction
1.00	17	Sand	18.00	11	18	8	2.20	0.99	0.23	0.75	13	1.70	22	1.07	1.02	23.3	0.26	0.38	1.66	Non-Liquefiable
2.00	35	Sand	19.50	11	38	19	1.99	0.98	0.20	0.75	26	1.70	45	1.14	1.03	48.9	0.27	0.38	1.93	Non-Liquefiable
3.00	42	Sand	20.00	10	58	31	1.88	0.98	0.19	0.75	32	1.70	54	0.80	1.02	55.5	0.36	0.52	2.71	Non-Liquefiable
4.00	24	Sand	18.50	11	76	35	2.19	0.97	0.23	0.75	18	1.70	31	1.35	1.05	32.7	1.04	1.49	6.78	Non-Liquefiable
6.00	33	Clay	21.00	100	117	67	1.74	0.95	0.17	0.75	25	1.22	30	0.50	1.20	36.7	-0.10	-0.14	-	Non-Liquefiable
7.50	7	Clay	16.00	100	141	46	3.04	0.94	0.30	0.75	5	1.67	8	0.50	1.20	9.7	0.11	0.16	-	Non-Liquefiable
9.00	8	Sand	14.50	34	163	42	3.86	0.93	0.37	0.75	6	1.54	9	4.93	1.18	15.9	0.17	0.24	0.65	Liquefiable
10.50	13	Sand	16.50	28	188	70	2.67	0.89	0.25	0.75	10	1.19	12	4.55	1.14	17.8	0.19	0.27	1.10	Non-Liquefiable
14.00	44	Sand	20.00	18	258	143	1.80	0.80	0.15	0.75	33	0.84	28	1.25	1.07	32.7	1.03	1.48	9.87	Non-Liquefiable
16.00	69	Sand	21.00	11	300	179	1.67	0.75	0.13	0.75	52	0.75	39	2.69	1.03	41.7	0.17	0.25	1.92	Non-Liquefiable

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Phone No.: 044-24481485, 044-24480305

LABORATORY TEST REPORT

GEOMARINE CONSULTANTS PVT LTD- GEOTECHNICAL LABORATORY
NO.11 2nd MAIN ROAD, KANNAPA NAGAR EXTN,
KOTTIVAKKAM, CHENNAI

Name & Address of the Customer	:	M/s RAMANIYAM REAL ESTATES (P) LTD	Customer Reference	:	By Email
Sample Description	:	Soil Sample	Period of Testing	:	30/04/2022 to 06/05/2022
Source of Sample	:	Customer Supplied- Borehole No. BH-	Sample Identification Number	:	SS/GMC/042022/463/BH01
Sample Condition	:	Satisfactory	Test Report No.	:	GT-2364/BH-01
Test Method	:	As per Bureau of Indian Standards	Report Date	:	25/05/2022
Sample Receipt Date	:	30/04/2022	Test Report Pages	:	One Page

Table-2.1 Laboratory Classification of Soil Samples from BH-01

Sample Depth (m)	SPT-"N" Value	Type of Sample	Fine Grained (FG)								Coarse Grained (CG)													IS-Notation	
			Moisture Content (%) AS PER IS 2720 (P-II) - 1973, RA-2015	LIQUID LIMIT (%) AS PER IS 2720 (P-V) - 1985, RA-2015	PLASTIC LIMIT (%) AS PER IS 2720 (P-V) - 1985, RA-2015	Plasticity Index (I_p= LL-PL)	Consistency Index (I_c=LL-MMC/I_p)	SHRINKAGE LIMIT (%) AS PER IS 2720 (P-VI) - 1972, RA-2011	FREE SWELL INDEX (%) AS PER IS 2720 (P-XL) - 1977, RA-2011	Consistency	GRAIN SIZE ANALYSIS AS PER IS 2720 (P-IV) - 1985, RA-2015						D_{10} (mm)	D_{30}(mm)	D_{60} (mm)	Uniformity Co-Efficient C_u=D_{60}/D_{10}	Co-Efficient of Curvature C_c=D_{30}^2/(D_{10}xD_{60})	Coefficient of Permeability of (K) m/sec Hazen's Formula (D_{10}^2/100)	Relative Density		
											Gravel (%)	Coarse (%)	Medium (%)	Fine (%)	Silt (%)	Clay (%)								Gravel	Sand
1.0	30	SS	-	-	-	-	-	-	-	CG>50%	2.0	2.6	69.4	19.0	7.1		0.125	0.5	0.9	7.2	2.222	2E-04	M Dense	<50%	SW-SM
2.0	33	SS	-	-	-	-	-	-	-	CG>50%	2.8	1.1	49.3	38.5	8.3		0.09	0.24	0.65	7.222	0.985	8E-05	Dense	<50%	SP-SM
3.0	46	SS	-	-	-	-	-	-	-	CG>50%	1.7	1.4	46.4	41.1	9.4		0.08	0.21	0.6	7.5	0.919	6E-05	Dense	<50%	SP-SM

** END OF REPORT**

Terms and Conditions

(1) The test results furnished corresponds to the sample received
(2) The tested sample will not be retained for more than 45 days from the date of issue of test report except in the case as required by the applicable
(3) Any correction in this reports invalidates the reports

Authorised Signatory

A. VINOTH
(Technical Manager)

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GEOMARINE
THE SURVEY OF ENGINEERING

SITE INVESTIGATION RECORD

BORE HOLE No. 02
PAGE No. 01
DIA OF BORE HOLE 150mm ✓ 100mm
BORE START DATE 25-04-2022
BORE END DATE 27-04-2022
TOTAL DRILLING DAYS 03

PROJECT NAME: RAMANIYAM - ANNA NAGAR (12th Main Road.)
LOCATION: Thiruvanmiyur
MACHINE No.: 92-01
CHAINAGE (m):
STRUCTURE: Site + Bh 9
DRILLING METHOD: Rotary
CO-ORDINATES: N, E
JOB CODE:
FLUSHING MEDIUM: Bentonite

Depth below G.L. (m)	Drilling progress per metre: Date	Time: Hr.	Min.	Type of Drill Bit (SC / TCB / DB)	Core Details: Total Core Recovered %	R.Q.D %	SPT Details: Blows/6in. 0-15	15-30	30-45	SPT 'N' Value	Sample Details: Depth	No.	Type	Layer Data: Thickness	Geotechnical Description
1	25-04-2022	14	30	SC			9	8	14	22	1.00	1	SS		M. dense., Brownish, Sand
		14	32												
2		14	42	SC			9	10	15	25	2.00	2	SS		M.dence. Brownish Sand.
		14	44												
3		14	54	SC			21	18	22	40	3.00	3	SS		dence, Brownish, Sand.
		14	56												
4		15	07	SC			10	16	22	38	4.00	4	SS		dence, Brownish Sand.
		15	08												
5		15	28	SC			6	8	15	23	5.00	5	SS		M.dence Brownish, Slity clay (CH)
		15	30												
6		15	40	SC			7	10	20	30	6.00	6	SS		—— do ——
		15	42												
7		15	56	SC			—	—	—	24	7.50	7	UDS		— — UDS Sample — —
		15	59												
8															
9		16	26	SC			2	2	2	4	9.00	8	SS		Soft clay, Grayish, Slidy clay.
		16	28												
10		16	43	SC			6	10	13	23	10.00	9			M.dense., Grayish, clay, Silt.
		16	44												

CS - Core Sample
SS - Split Spoon Sample
UDS-Undisturbed Sample
WS - Wash Sample
DS - Disturbed Sample
SC - Soil Cutter
TCB - Tungsten Carbide Bit
DB - Diamond Bit

SUPERVISOR NAME: N. Dhanasankar
SIGNATURE:
DATE: 25-04-2022
CLIENT IN-CHARGE:

PROJECT SITE DETAILS
GROUND LEVEL (m):
WATER TABLE (m): 2.60m
CASING DEPTH (m):

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GEOMARINE
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SITE INVESTIGATION RECORD

BORE HOLE No. 03
PAGE No. 27
DIA OF BORE HOLE 150mm / 100mm
BORE START DATE 25-04-2022
BORE END DATE
TOTAL DRILLING DATE

PROJECT NAME: RAMANUJAM – ANNA NAGAR (10th MAIN ROAD)
LOCATION: Thiruvanmiyur
MACHINE No.: 92-01
CHAINAGE (m):
STRUCTURE: Silt Rig
DRILLING METHOD: Rotary
JOB CODE:
FLUSHING MEDIUM: Bentonite
CO-ORDINATES: N, E

Depth below G.L. (m)	Date	Drilling progress per meter: Time Hr.	Time Min.	Type of Drilling Bit (TCB / Dia)	Core Details: Total Core Recovery %	R.Q.D %	SPT Details: Blows/cm. 0-15	15-30	30-45	SPT 'N' Value	Sample Details: Depth	No.	Type	Layer Data: Depth (m)	Geotechnical Description
1	26-04-2022	09	15	SC			15	27	25	52	12.00	10	SS		V. dense Grayish, Silt
		09	23												
2															
3		09	40	SC			8	15	25	40	14.00	11	SS		dense, Grayish, Silt
		09	52												
4															
5		10	27												
		10	35	SC			14	30	50/5cm	>100	16.00	12	SS		V. dense, Greenish Silt
6															
7		10	51												
		11	30	SC			11	18	22	40	18.00	13	SS		V. Hard, Brownish, Grayish Shale.
8															
9		11	22												
		15	03	SC			17	19	25	44	20.00	14	SS		dense, Grayish, yellowish, Silty Sand.
10															

CS - Core Sample
SS - Split Spoon Sample
UDS - Undisturbed Sample
WS - Wash Sample
DS - Disturbed Sample
SC - Soil Cutter
TCB - Tungsten Carbide Bit
DB - Diamond Bit (NOTE)

SUPERVISOR NAME: M. Dhana Sankar
SIGNATURE:
DATE: 26-04-2022
CLIENT IN-CHARGE:

PROJECT SITE DETAILS
GROUND LEVEL (m):
WATER TABLE (m): 9.60m
CASING DEPTH (m):

Registration No: GTE/71/Proposed
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GEOMARINE
THE SPIRIT OF ENGINEERING

SITE INVESTIGATION RECORD

BORE HOLE No. 03
PAGE No. 03
DIA OF BORE HOLE 150mm ✓ / 200mm
BORE START DATE 25-04-22
BORE END DATE 27-04-2022
TOTAL DRILLING DAYS 03

PROJECT NAME: Ramanujan-Adyar Nalaar (12th Main Road)
LOCATION: Tiruvanmiyalam
BOREHOLE No.: SR-03
CHAINAGE (m):
STRUCTURE: Silt+Bt+G
DRILLING METHOD: Rotary
CO-ORDINATES: N / E
JOB CODE:
FLUSHING MEDIUM: Bentonite

Depth from G.L. (m)	Drilling progress per meter: Date	Time: Hr.	Time: Min.	Type of Drill Bit (SC / TCR / DB)	Core Details: Total Core Recovery %	Core Details: R.Q.D %	SPT Details: Blows/6in. 0-15	SPT Details: Blows/6in. 15-30	SPT Details: Blows/6in. 30-45	SPT 'N' Value	Sample Details: Depth	Sample Details: No.	Sample Details: Type	Layer Data: Depth (m)	Geotechnical Description
1	26-04-2022	15	46	SC			31	36	30	66	22.50	15	SS		V.dense, Brownish, Silty Sand with gravels.
2		16	01												
3		16	32					50/5cm							
4		16	40	SC			44		HR	>100	25.00	16	SS		V.dense, Brownish. Sand gravely.
5															
6		17	10												
7		17	22	SC			30	50/5cm	HR	>100	27.50	17	SS		V. Hard, Greyish Shale.
8	27-04-2022	08	15												
9		11	15	SC			50/10cm		HR	>100	30.00	18	SS		V. Hard, Greyish Shale.
10		11	36												

Bore Hole Terminated At (30.00Mts) depth.

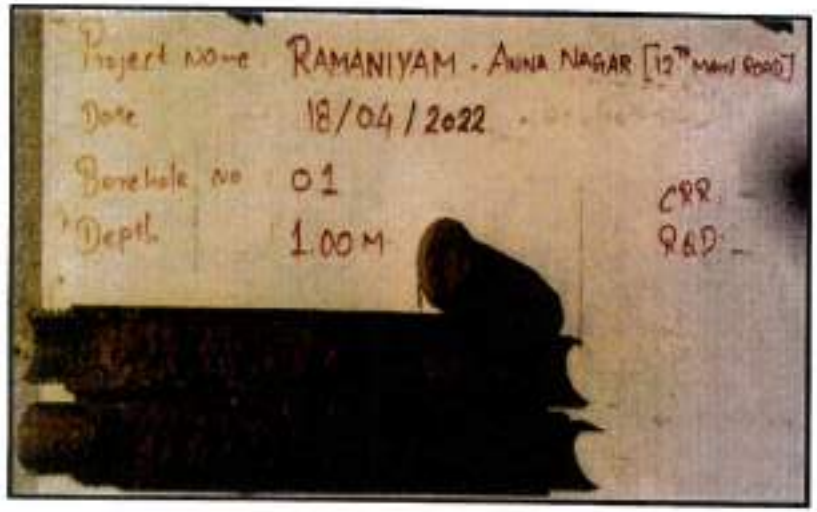
CS - Core Sample	DS - Disturbed Sample	SUPERVISOR NAME	N. Dhana Sankar
SS - Split Spoon Sample	SC - Soil Cutter	SIGNATURE	
UDS-Undisturbed Sample	TCR - Tungsten Carbide Bit	DATE	27-04-2022
WS - Wash Sample	DB - Diamond Bit	CLIENT IN-CHARGE	

PROJECT SITE DETAILS
GROUND LEVEL (m):
WATER TABLE (m): 2.6M
CASING DEPTH (m):

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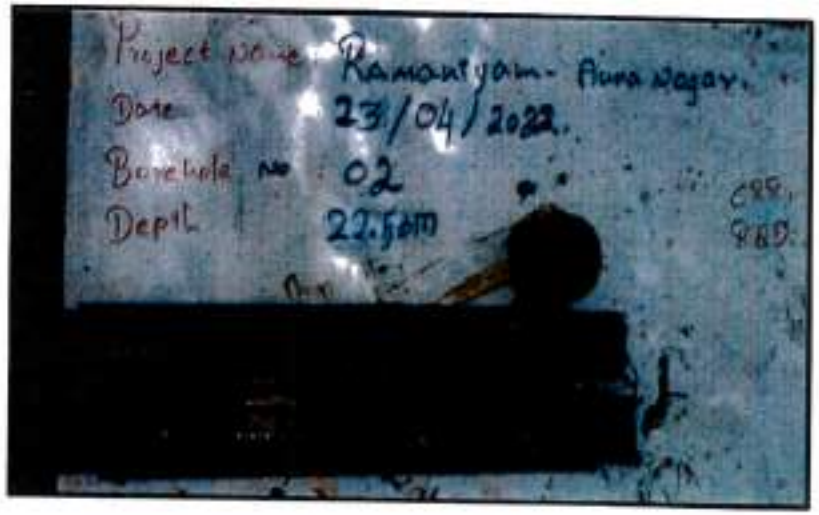
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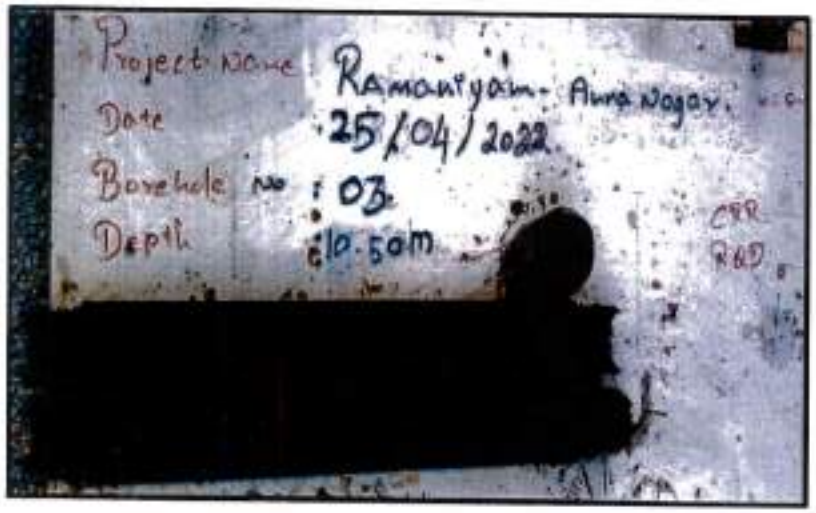


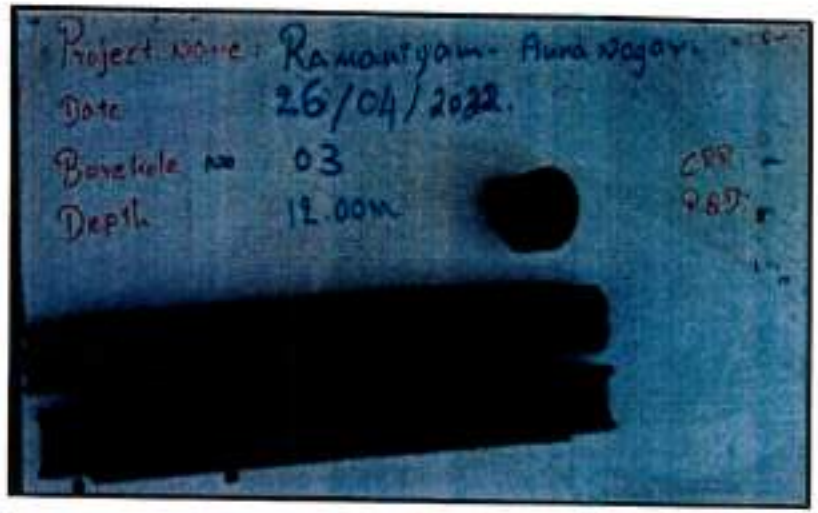


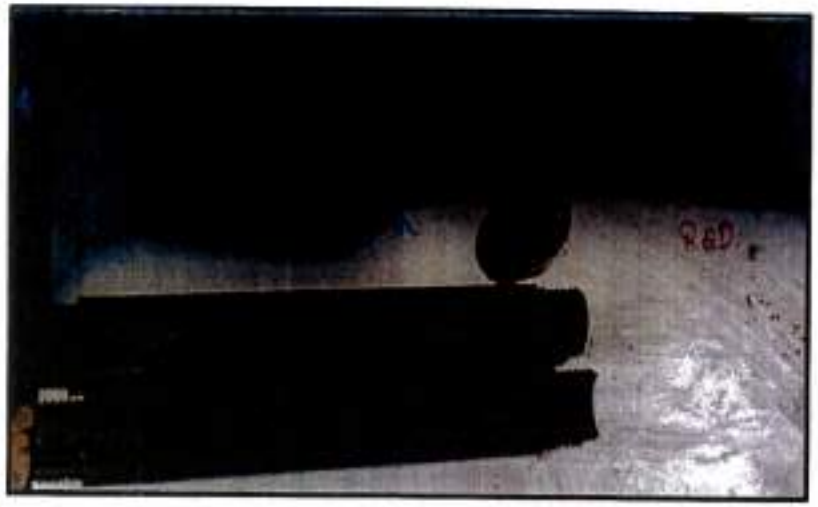
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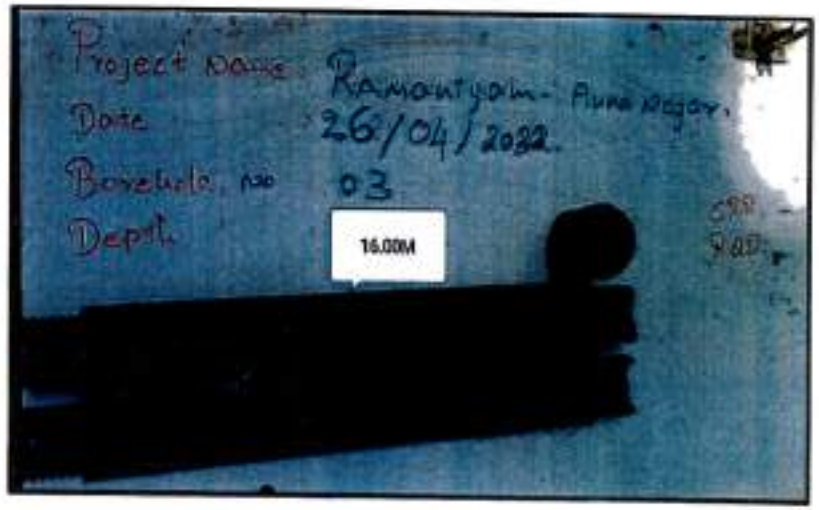
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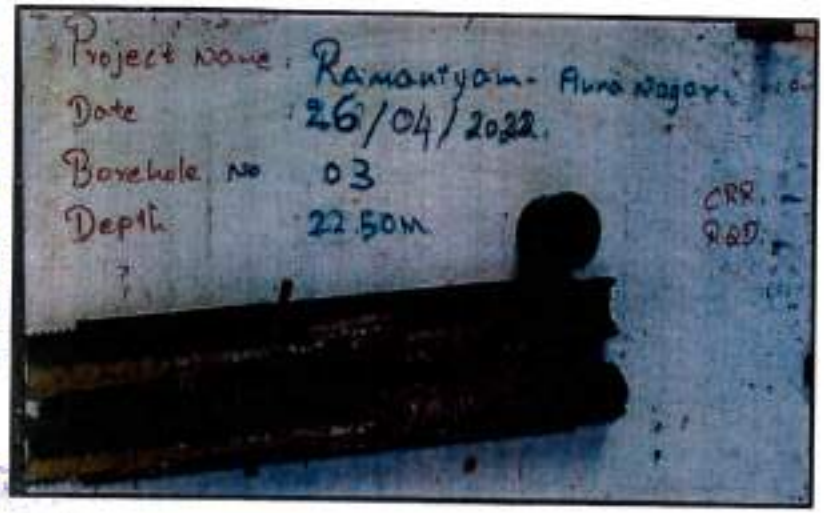
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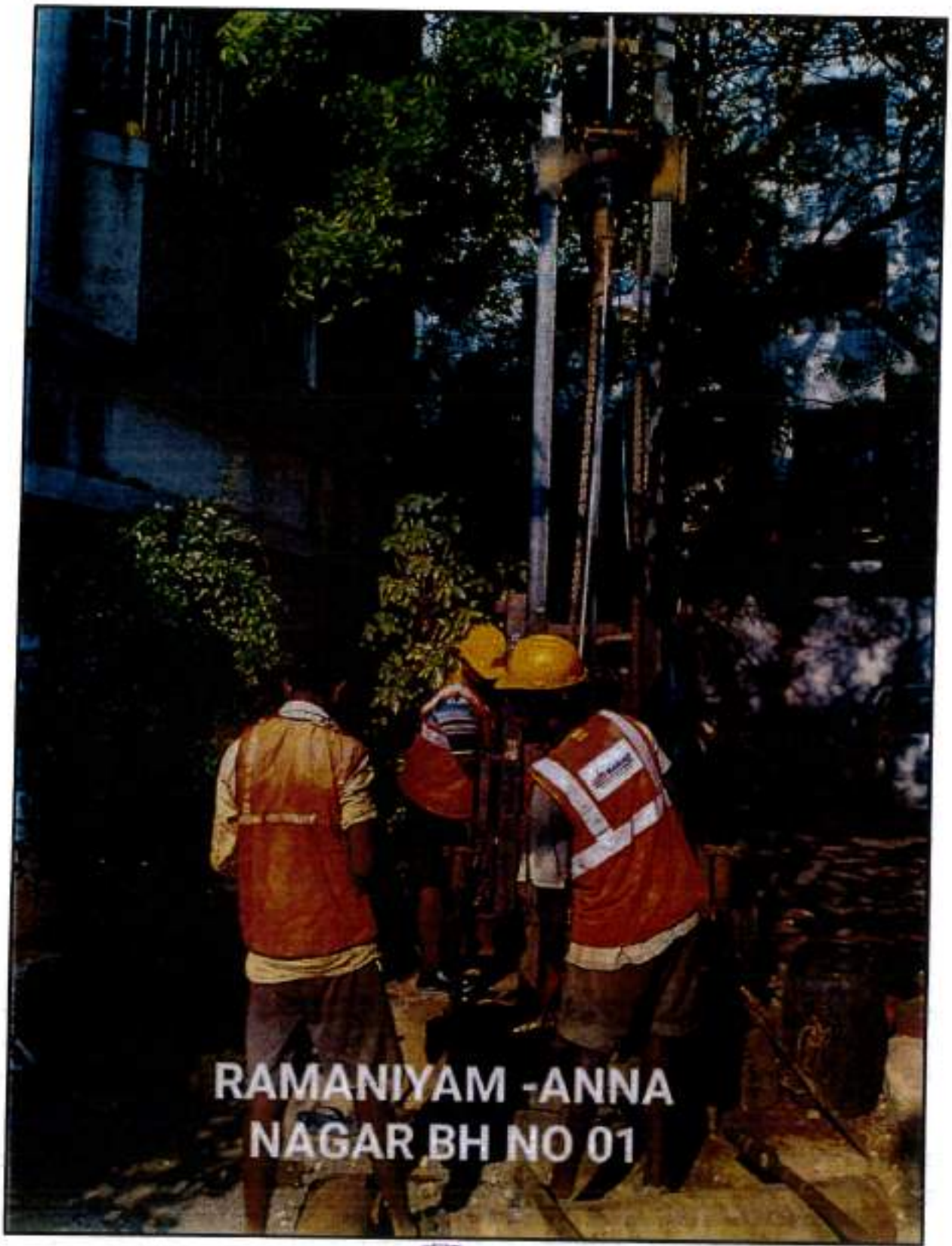






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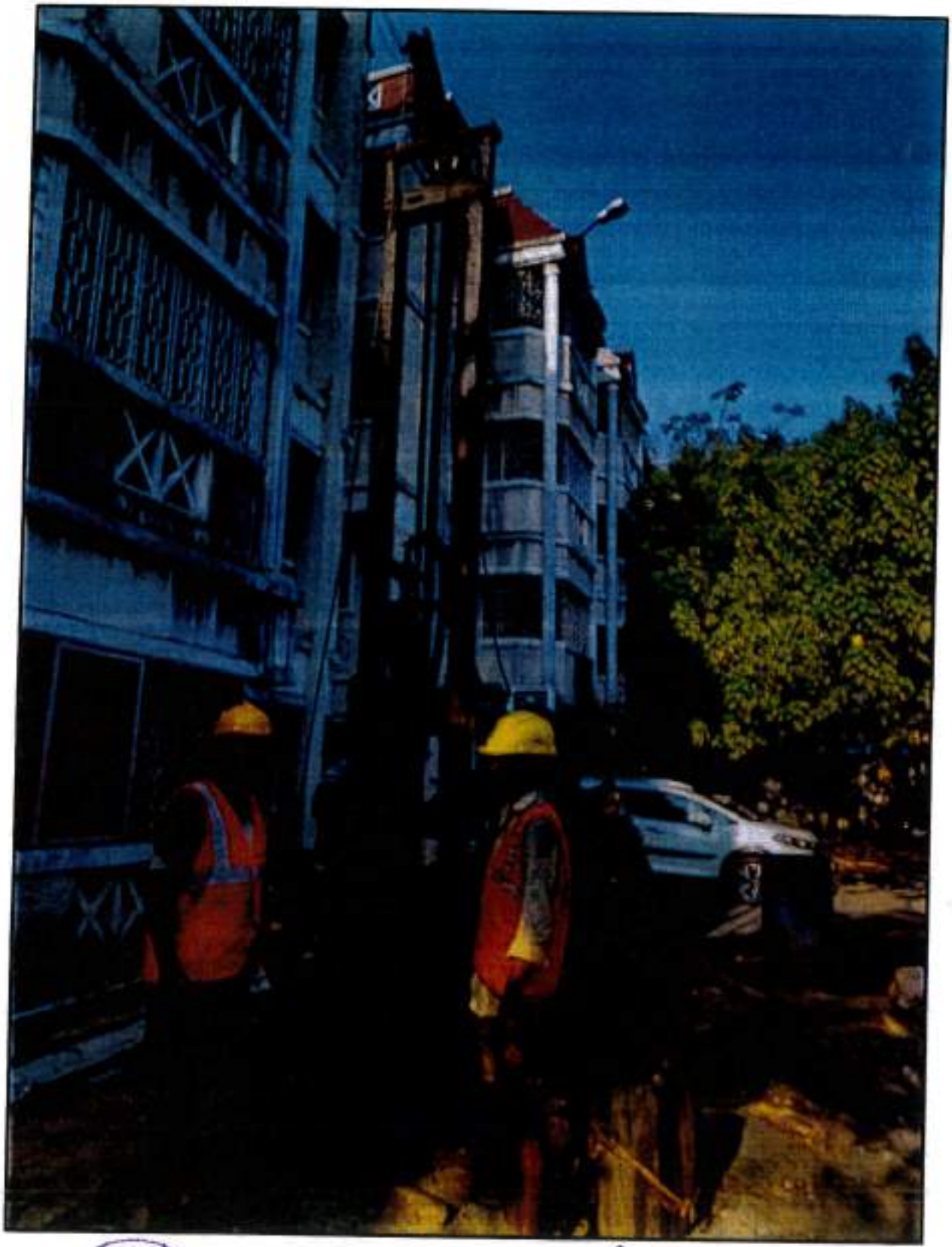
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