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STABILITY CERTIFICATE

(To be furnished while filing application for registration of building)

The detailed engineering and structure design of the proposed office building at old door no: 11-g, new door no. 13, mount poonamallee road, nandambakkam, chennai - 600 069. comprised in old s.nos: 33/2 & 33/3 (as per document), new survey no: 33/2c2b, 33/2c2c & 33/3c2, nandambakkam village, alandur taluk, kancheepuram district, greater chennai corporation zone: 12, division: 158 has been done by me/us based on the report of geotechnical investigation (soil test) done by M/s Prasad Armstrong YEN GEC (P) Ltd Report No. 053/GI/16-17. Dated May 27, 2016 and considering the functional requirement of the building.

It is certified that among other factors, the proposed building has been designed to resist earthquake. I/We have checked various parameters and found that the proposed building would be safe.

I/We further certify that:

- The minimum grade of concrete is M25.
- The design and analysis has been done using the code of practice for plain and reinforced concrete as per IS 456, design loads as per IS Codes No IS 875 and design of earthquake resistant structure as per IS Code No 1893 - 2016.
- The building will be safe and sound when used for the purpose for which it is designed.

N. Chandru.

Stamp and Signature

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Proposed Office Building for

ASV CONSTUCTIONS

CHENNAI

Structural design brief

STRUCTURAL CONSULTANT

N.CHANDRU

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Chennai - 600061

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1.0 INTRODUCTION

1.1 GENERAL PROJECT INFORMATION

Project Title

Proposed office Building at Nandambakkam, Chennai.

Location of Project

Old door no: 11-g, new door no. 13, Mount Poonamallee road, Nandambakkam, Chennai - 600 069. Comprised in old s.nos: 33/2 & 33/3 (as per document), new survey no: 33/2c2b, 33/2c2c & 33/3c2, Nandambakkam village, Alandur taluk, kancheepuram district, Greater Chennai Corporation zone: 12, division: 158.

Description of Project

The Client is proposing to build a multi storeyed office building.
It consists of Basement + Stilt + 9 floors. Basement and Stilt floor are used for car parking and upper floors for office use.

Purpose of Basis of Design Document

This document details the input data, principles, methods and performance criteria to be used in the structural engineering design of the Project.
The document serves as a plan for the basis of justification and calculations associated with the design and are a repository for all relevant structural information, including references and computer programs pertaining to the project. The contents of this brief is based on the drawings available at time of design and actual structural working drawings may change to suit latest architectural design at time of construction.

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2.0 STRUCTURAL SYSTEM

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

2.1 IT BUILDING –REINFORCED CONCRETE STRUCTURES

2.1.1 Foundations

The design options for Foundation shall be worked out based on the Soil test report. The foundations are to comprise of Independent / Combined footings. Since basement is proposed, raft slab is designed by considering water pressure.

2.1.2 Superstructure – Gravity System

The load resisting system is to be framed utilising PT Flat Slabs and RC Beams on periphery and utility areas, which frame into RC columns. Since this is a fast track project, Post tensioned flat slab system is selected for need of speed of construction. For one shuttering set, time saving will in the order of about 10 days per slab compared to conventional method of construction. Structurally, it is also more crack resistant compared to RCC Flat slab. Frames are classified as special Moment–Resisting Frames (SMRF). The service areas are in RCC conventional slab and beam.

2.1.3 Column Grids

The column grids in the Office area are considered as 11.00 m c/c in both directions. This is to facilitate efficient car parking in the cellar. Spans beyond this consideration will increase the depth of the beams and thickness of the slab which will affect the desired height of the floor. Subsequently the volume of the concrete required will be more which in turn will cause an increase in cost. Hence the above mentioned grid has been considered for better efficiency both in terms of design and cost.

2.1.4. Note on Expansion joint

The Thermal Stresses are considered for design, No Expansion joints are provided.

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3.0 DESIGN CODES, STANDARDS AND REFERENCE DOCUMENTS

3.1 CODES, STANDARDS AND COMMENTARIES

a) IS 456 – 2000 Plain and Reinforced Concrete structures
b) IS 875 – 1987 (Part I to III & Part IV) Design Loads
c) IS 1893 – 2016 Earthquake Resistant Design of Structures
d) IS 13920 – 2016 Ductile Detailing of Reinforced Concrete structures
e) IS 3370 Part I, Part II and Part IV Concrete Structures for storage of liquids
f) SP 16 Design aids for Reinforced Concrete structures
g) SP 34 Concrete Reinforced & Detailing
h) IS 1786 Specification for high strength deformed bars
i) IS 4326 – 1993 Earthquake Resistant Design and construction
j) IS 2911 – 1979 – Part-I Design and Construction of Pile Foundations.
k) National Building Code of India 2016

3.2 DESIGN REFERENCES AND GUIDES

a) Reinforced Concrete Design –SP 16 BIS handbook
b) Reinforced Concrete Designers Handbook - Fourth Edition, Reynolds & Steedman

3.3 COMPUTER PROGRAMS

Name	Version	Purpose	Producer
ETABS	16.2	Analysis and Design of Building Structures	CSInc.
MS Excel	2003	Calculations.	Microsoft
SAFE	15.0	Design of Flat and raft Slabs	CSInc.

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4.0 LOAD CRITERIA

It should be noted that no extra provision of floors has been made in the design of foundation and vertical structural elements.

4.1 MATERIAL DEAD LOADS

Item	Density (kN/m^3)
Dense Concrete	25
Steelwork	78.5
Soil	18.0
Water	10.0
Concrete hollow Blocks with 15 mm plaster	20.0
Brick work 230 thk with 20mm plaster	20.0

4.2 MINIMUM IMPOSED LOADS

The following table defines minimum dead loads, superimposed dead loads and live loads to be used in the structural design. The loads include the loads of the cooling towers proposed in the terrace which will rest on supports taken from the columns and not on the slab.
The live loads used are in accordance *with National Building Code of India, 1983* – Minimum Uniformly Distributed Live Load.

Legend:
DL Dead Load (Structural Self Weight) (G) LL Live Load (Q)
SDL Superimposed Dead Load (G)

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4.2.1

Item	Type	Pressure Load (kN/m^2)
A. IT/ITES building		
A1. All floors	SDL +LL	7
Podium areas	SDL+LL	25
C. UPS areas		
B1. Specified areas in each floor	SDL+LL	12.0
D. Terrace area		
D1. Live Load	LL	3.0
D2. Weathering Course	SDL	4.0

4.3 WIND LOADING

Wind is not considered for analysis since the building is wide and the building is only 4m in height. However the building facade will be designed to withstand wind forces in accordance with IS: 875 Part 3, with a 50 year return period using the following parameters:

Basic wind speed	50 m/s in chennai
Risk Coefficient K1	1.0
Terrain, height and structure size factor K2	Based on 'terrain Category, Category 2/ Class b" 1.1
Topography Factor K3	1.0
Importance factor S_3	1.0
Wind Pressure Coefficient	CP = 0.7

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4.4 EARTHQUAKE LOADING

The structure requires a consideration of earthquake loading.

Design Earthquake	10% chance of being exceeded within a 50 year return period
Seismic Zone	Zone III
Seismic Zone Factor	Z = 0.16
Soil Profile Type	Type I – HARD strata
Type of Building	Symmetrical type building
Seismic Importance Factor I	I = 1.2 (Occupancy more than 200 Persons)
System Co-efficient R ,SMRF	R = 5.0 Refer to Table 7, IS 1893
Fundamental Period of Vibration	By frequency analysis but not less than T= 0.075h^0.75
Seismic Building Weight	To include all components of Self Weight, Superimposed Dead Load and 50% of LL

4.5 DYNAMIC LOADINGS

The dynamic loads are due to Generators to be placed in Ground floor in specified areas and loads given by vendors are taken to design the slab and beams.

5.0 CONCRETE STRENGTHS

Concrete design grades are specified cube strengths to BIS

Elements	**Concrete Grade fcu (MPa)**
Columns/Shear Walls	45
Footings / Sub-structure & Retaining walls	30
Beams/Slabs/FLAT Slabs	35
Lean Concrete	10

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5.1 REINFORCEMENT

Reinforcement Yield Strengths used in the design of concrete elements:

Deformed Bars	500 Mpa
Mild Steel Plain Bars	250 Mpa

6. GEOTECHNICAL

6.1 BASIS oF GEOTECHNICAL DESIGN

Geotechnical Model and recommendations are based on report submitted by M/s Prasad Armstrong yen gec (p) Ltd, Chennai. The foundation was recommended at 4 m below EGL and at least 2m below basement floor bottom. Minimum footing width of 2m is considered in the analysis. Recommended allowable bearing capacity is **30 t / m^2.**

7 DESIGN LIMIT STATES

7.1.1 Reinforced Concrete

For reinforced concrete design, the individual loads will be combined in accordance with the loading combinations specified in IS 456 to achieve the applicable limit state. These are listed below:

Case	D	L	EQ
1	1.5	1.5	
2	1.2	1.2	
3	1.2	1.2	1.2
4	1.5		
5	1.5		1.5
6	0.9		
7	0.9		1.5

8. FIRE RATING: The building is designed for 1.5 hour fire rating.

9. EXPOSURE: The building is exposed to Moderate environmental conditions.

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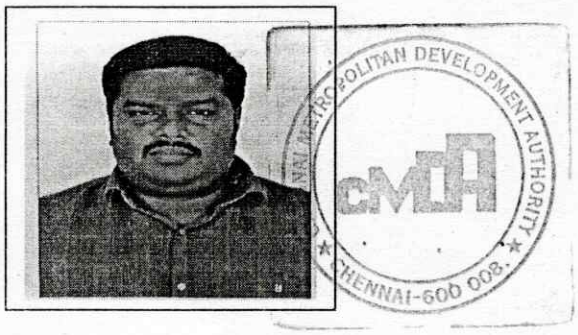
CHENNAI METROPOLITAN DEVELOPMENT AUTHORITY
'ThalamuthuNatarajan Building', No.1, Gandhi Irwin Road,
Egmore, Chennai-600 008.

PROFESSIONAL REGISTRATION CERTIFICATE

This is to certify that the **Thiru. N. CHANDRU** has enrolled as **Registered Structural Engineer Grade-I (SE)** with Chennai Metropolitan Development Authority (CMDA) who has the qualification of **M.E.,(Structural Engg.)** and experience in the relevant field for **8 years**.

He has been given the Registration No.**SE/GR-I/2019/04/090** Renewed on **12.04.2024.** He shall be required to comply with the duties and responsibilities prescribed by the Government of Tamil Nadu in Part-V, "Registration of Professionals", Tamil Nadu Combined Development and Building Rules, 2019 approved vide G.O.(Ms) No.18 MAWS (MA1) Dept. dated 04.02.2019.

This Registration is valid upto **11.04.2029**.



12/4/24

(A. MEGANATHAN)
Superintendent