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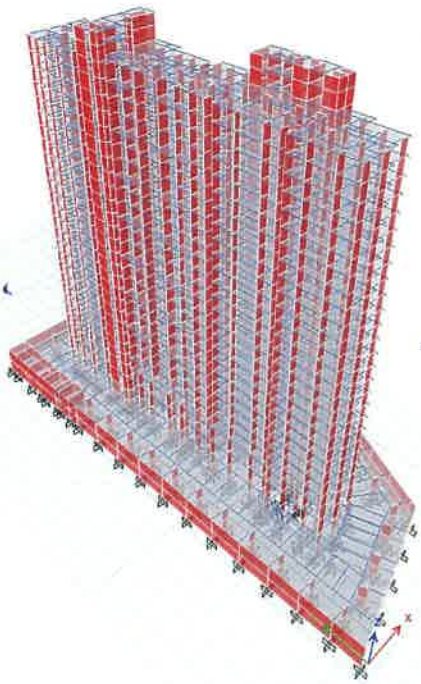
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DIGITALLY VERIFIED RECORD

STRUCTURAL DESIGN BASIS REPORT

PROPOSED CONSTRUCTION OF HIGH RISE BUILDING CONSISTING OF EXTENDED BASEMENT FLOOR (01) + BASEMENT FLOOR (02) FOR STP PUMP ROOM + STILT FLOOR (PT)/GROUND FLOOR (WAITING LOBBY, CO-WORKING SPACE & ASSOCIATION ROOM) + MEZZANINE @ GROUND FLOOR (KIDS PLAY AREA, CRECHE, MULTIPURPOSE HALL, INDORE GAMES, HOME THEATRE, GUEST ROOM, ASSOCIATION ROOM) + 1ST FLOOR TO 21ST FLOOR + 22ND FLOOR PART, 101 DWELLING UNITS RESIDENTIAL BUILDING (HEIGHT 78.0M) WITH REFUGE AREA, UNISEX SALOON/SPA & GYM AT 18TH FLOOR AND OPEN SWIMMING POOL/CHANGE ROOMS & PUMP ROOM AT 22ND FLOOR PART AVAILING WITH PREMIUM FSI AT PLOT NO:1 TO 12, NELSON MANICKAM ROAD, VADA AGARAM, CHENNAI - 600 029 COMPRISED IN T.S.NO. 11/3, BLOCK NO.11, VADA AGARAM VILLAGE, AMINJIKARAI TALUK WITHIN THE LIMITS OF GREATER CHENNAI CORPORATION



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ARCHITECT: **ARCHITECTURE DIALOGUE,** Bangalore.

STRUCTURAL CONSULTANT: **BURO ENGINEERS (INDIA) PRIVATE LIMITED,** Chennai.

R1	27-04-2026	Design Basis Report	OK	CHARUMATHI	AVINASH	PERAM
R0	03-10-2025	Design Basis Report	OK	AVINASH	PERAM	PERAM
REV NO.	DATE	DESCRIPTION	STATUS	PREPARED BY	REVIEWED BY	APPROVED. BY

Index

- Design Information and Criteria
- Analysis summary report
- Design of Column/Shear wall
- Design of RCC Beam
- Design of RCC Slab

Appendix (Refer drawings)

a. Structural Framing Plans

b. Footing Details

30/12/25

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DESIGN INFORMATION AND CRITERIA

1.0 INTRODUCTION

The M/s. RATTHA REALTY & INFRASTRUCTURE PVT., LTD, proposed to construct a Residential Building at Nelson manickam road, Chennai. This building has 1 Basement + Ground & Mezzanine Floor + 1st to 21st Floors (Residential units) + Terrace. In which the Basement is designed to accommodate Car and bike parking whereas the Ground & Mezzanine are designed to accommodate amenities like Gym, Business Lounge, Meeting rooms, Mini theatre and party hall. First (1st) to twenty first (21st) floors are designed to accommodate Residential units. Part of Terrace Floor is designed with a Swimming Pool with a deck around the pool and an outdoor cafe.

1.1 SCOPE OF THE REPORT

This report provides the information on Codes of Practice, Design loads, Materials considered for the Design and Analysis of the building. In addition, this report summaries the main design criteria, Structural system, Foundation system, Parameters & Methodology to be adopted in the design.

1.2 PROJECT OVERVIEW

The proposed development is a Multi storied High Rise Residential building which comprises of 1 Basement + Ground & Mezzanine floor + 21 floors + Terrace. Plan dimension of the building at the Ground floor level is 120.528m X 44.686m and above ground floor (Mezz/typical floors) is 86.6mx15.95m. Vertical access systems like Lift & Staircases are provided adequately in order to fulfil the NBC norms and it satisfies the functional requirements as well. The no. of blocks and its storey details are as follows,

Sl.No.	No. Of storey	Building Height	Plan dimension In the basement Below Ground Level	Plan dimension at Ground Level
1	Basement 1 + Ground & Mezzanine Floor +1st to 21st floors + Terrace	76.30m (From EGL)	120.53mx39.13m	86.6mx15.95m

Building Floor Height Details	**1 Basement + Ground Floor + Mezzanine Floor + 1st to 21st floors + Roof**	**Usage**
Basement - 1	4.2m	Car and Bike parking
Ground Floor	3.25m	Car/Bike parking & Club Amenities
Mezzanine Floor	4.75m	Club amenities
1st Floor to 21st Floor	3.2m	Residential Units
Head room/LMR	2.55m/4.5m	N/A

1.3 PROPOSED STRUCTURES AND ITS USAGE

1.3.1 Structural Type

The structural system comprises shear walls predominantly in the Tower structure & Columns in the Non-Tower structure. RC Shear Lift core shear walls & Shear walls around the Staircase along with the other vertical RC wall elements forms the vertical/lateral load supporting structural elements with the conventional RC beam-slab as the floor system. The underground structure's basement walls and vertical supporting structural elements are connected by non-tower areas & tower areas with varying depths as per the Architectural & services drawings.

1.3.2 Foundation Type

Bored Cast In-situ Pile foundation is designed as foundation system considering the sub-soil condition prevailing below the basement. Since the sub-soil condition encountered at a depth below the basement is not suitable for designing the Raft Foundation and as per the recommendation laid down in the Soil Investigation Report No. MSGTPL/SI-6541/25-26 dated July 12, 2025. Hence the Building both Tower/Non-tower has been designed with Bored Cast In-situ Pile foundation with the length adequately socketed in to the hard layer. The sub-structure includes Basement slab & the basement Retaining wall shall be designed with the uplift pressure estimated considering the Ground Water Table up to the NGL.

Table 1.3.1.1 Building Configuration

1 BASEMENT FLOOR + GROUND + MEZZANINE + 21 RESIDENTIAL FLOORS + ROOF				
Sl. No.	**Description**	**Floor Structural system**	**Usage**	**Lateral Force Resisting structural system**
1.	Basement 1	Pile & Pile Cap with connecting base slab	Car & Bike parking	**Buildings with Ductile RC Structural Walls**
2.	Ground & Mezzanine	RC Beam-Slab System	Amenities	
3.	1st Floor to 21st Floor	RC Beam-Slab System	Residential Units	
4.	Roof Terrace	RC Beam-Slab System	Swimming Pool & Outdoor Cafe	

1.4 CONCRETE

Characteristic concrete strength (concrete grade) for the project shall be based on exposure condition and forces to be supported by specified structural elements. The minimum cement content and maximum water–cement ratio shall be as per IS code 456:2000. The minimum 28-day compressive strength of concrete for specified structural elements shall be as follows

Table 1.4.1 Grade of Concrete for Individual Structural elements of Tower/Non-Tower areas

Sl.No.	**Structural Elements**	**Grade of Concrete**
1.	Pile & Pile Cap	M35
3.	Basement Slab	M35

3.	Basement Wall	M35
4.	RC Columns	M50
5.	RC Shear wall (up to 6th Floor)	M50
6.	RC Shear wall (From 7th Floor level to Roof)	M40
7.	RC Beams	M35
8.	RC Slabs	M35
9.	UG Tank	M35

Table 1.4.2 Concrete Properties

Young's Modulus of Elasticity of Concrete	$5000\sqrt{fck}$
Poisson Ratio's Ratio v =	0.2
Coefficient of Thermal expansion	5.5x10-6

1.5 REINFORCEMENT

The characteristic tensile properties of steel used in design shall be as follows.

Reinforcement Characteristic yield strength f_{yk} (N/mm^2)	550 N/mm^2
Young's Modulus E (kN/mm^2)	200 kN/mm^2
Poisson's ratio	0.3
Coefficient of Thermal expansion, α ($^oC^{-1}$)	$12x10^{-6}$

1.5.1 Structural steel

All structural steel shall conform to Indian standard IS: 2062-2011.

Structural steel	Grade E=250	Grade E-350
Tensile strength	410 N/mm^2	490 N/mm^2
Yield stress t<20mm	250 N/mm^2	350 N/mm^2
Yield stress t = 20mm to 40mm	240 N/mm^2	330 N/mm^2
Yield stress t> 40mm	230 N/mm^2	320 N/mm^2
Young's Modulus (E)	200,000 N/mm^2	200,000 N/mm^2
Density	78.5 kN/m^3	78.5 kN/m^3

1.6 SUB-SOIL CONDITION

Soil investigation report No. MSGTPL/SI-6541/25-26 dated July 12, 2025 investigated by M/s. Mars Synergy Geotech Pvt Ltd, a Geo technical consultant based out of Chennai. As per the soil investigation report, there are Four (4) boreholes have been carried out to ascertain subsoil condition at the proposed site and with existing excavation levels recorded between -2.072 m and -2.342 m from the road level. All boreholes are terminated at Slate rock layer at a depth of 23.5m from EGL where SPT (N) value is more than 100.The subsurface profile generally consists of a top layer of filled-up soil or loose clayey sand extending to depths of approximately 1.5 to 2.5 meters. Below this, layers of medium stiff clay, loose to medium dense clayey sand, and dense to very dense clayey sand were encountered across most boreholes. Stiff to hard clay

layers were observed from depths of around 12.0 m to 21.0 m, transitioning into weathered shale or fractured rock. Shale layers were found at depths ranging from 21.0 m to 23.50 m in all boreholes, with variable core recovery ranging between 4% and 16.66%, indicating partially weathered and weak rock conditions. Ground water table is reported during the investigation period of July 2025 is at a depth of 4.5m measured below EGL. However, the water table likely to raises up to ground during peak monsoon which will be considered in the sub-structure designs appropriately.

2.0 DESIGN CRITERIA

2.1 DESIGN LIFE

The design life of the building is assumed as 50 years. This requirement is applicable only for concrete works and not applicable to replaceable finishing materials, water proofing and thermal insulation, facades etc. Hence periodic maintenance/refurbishment is required for all replaceable materials.

2.2 CODES, STANDARDS & REFERENCES

All design of structures shall comply with the requirements specified in the following.

a. Relevant Indian Standard Codes of Practice
b. National Building Code.
c. Local Building regulations.
d. Other relevant international codes where required.

All applicable latest editions of codes and standards will be referred and adopted in the analysis of structures and the design and detailing of structural members. All structural elements design shall be carried out primarily based on Indian Standards and Codes with latest revision, with amendments if any, as on date. In addition, other international codes and standards shall also be referred when required and relevant.

In the analysis, design and detailing of the building, the following Indian Standard codes of latest amendment will be used.

Table 2.2.1 Codes and Standards for Design Loads (Other Than Earthquake loads)

IS Code	Description
IS 875 (Part 1): 1987	Dead Loads (Unit Weight of Building Material and Stored Material)
IS 875 (Part 2): 1987	Imposed Load
IS 875 (Part 3): 2015	Wind Load
IS 875 (Part 5): 1987	Special Loads and Combinations

Table 2.2.2 Codes and Standards for Design of Earthquake Resistance structures

IS Code	Description
IS 1893(Part-1) :2016 Amendment No.2-2020	Criteria for Earthquake Resistance design of structures.

IS 4326: 1993	Earthquake Resistant Design and Construction of Buildings – Code of Practice
IS 13920: 2023	Ductile Detailing of Reinforced Concrete Structures subject to Seismic Forces - Code of Practice.

Table 2.2.3 Codes and Standards for Design of Concrete Structures.

IS Code	Description
IS 456: 2000	Plain and Reinforced Concrete - Code of practice
IS 6403 -1981	Code of practice for determination of bearing capacities of shallow foundations.
IS 8009-1976 (Part I):	Code of practice for calculation of settlement of foundations – Shallow foundation
IS 1904-1986(RA-2015)	Indian Standard Code of practice for design & construction foundations in Soil: General Requirements
IS 2950-1981(RA-2018)	Code of practice for design and construction of raft foundations : Part 1 Design (second revision).
IS 2911-(Part1-Sec2)	Indian Standard Code of Practice for Design and Construction of Pile Foundation-Bored Cast In situ Piles
IS 2911-Part-4	Design and Construction of Pile Foundation - Code of practice -Load Tests on Pile
IS 2974	Code of practice for design & construction of machine foundation
IS 1343-2012	Pre-stressed Concrete code of Practice
SP 34	Hand book on Concrete Reinforcement & Detailing
SP 7(Part IV)	National Building code of India
IS 1786-2008(RA-2018)	Specification for high strength deformed bars and wires for concrete Reinforcement.
IS 432 (Part 2) 1982	Specification for Mild Steel and Medium Tensile Steel Bars and Hard Drawn Steel Wire for concrete reinforcement – Hard Drawn Steel Wire
IS 3370 (part I)-2009	Code of practice for concrete structure for the storage of liquids

Table 2.2.4 Design of Steel Structural Elements

IS Code	Description
IS 800: 2007(RA-2017)	Code of Practice for General Construction in Steel
IS 2062: 2011(RA-2016)	Steel for General structural purposes

Table 2.2.5 Design of Concrete Elements - International codes

IS Code	Description
BS 8110: 1997	Structural use of concrete. Code of Practice for design and construction
ACI 318	Building Code requirements for Structural Concrete

The building is a RCC structure designed as Buildings with Ductile RC Structural Wall System with the RC Beams-Slab as floor system. The main Lift/Staircase Core wall is located at a functionally suitable locations as per the Architectural plan. However, it is structurally termed to be asymmetrical. Hence there are shear walls provided on both the orthogonal direction to make the structure behaves under seismic forces within the IS-1893 stipulated manner. These shear walls are rigidly connected by floor system. The slabs of all floor used as diaphragms in redistribution of lateral forces.

Materials specified will conform to the latest edition of the relevant Indian Standard or other accepted standard. Specifications for materials will include sampling and testing as stipulated in the design standards. Detailed material specifications will be included in the Technical Specification.

2.3 LOADS

Table A: Unit Weight of Materials:

Material	Density
Reinforced Cement Concrete	25.00 kN/m^3
Plain Cement Concrete	24.00 kN/m^3
Screed Concrete	24.00 kN/m^3
Cement Mortar	20.00 kN/m^3
AAC Block (Infill walls)	**07.50 kN/m^3**
Structural Steel	78.50 kN/m^3
Cinder Concrete (Filling material)	08.00 kN/m^3
Dry soil	18.00 kN/m^3
Wet Soil	22.00 kN/m^3
Landscape soil	16.00 kN/m^3
Glass	28.00 kN/m^3
water	10.00 kN/m^3

Table B – wall loading with AAC block

100mm thick wall with 15mm plaster on each side per meter height of wall	1.4 kN/m^2
200mm thick wall with 15mm plaster on each side per meter height of wall	2.2 kN/m^2

2.3.1 Superimposed Dead Loads and Live Loads

The following are the imposed loads such as SDL and LL to be considered for the design of floor system depending usage floor. In addition to these loads, self-weight of structural elements will be considered depending on member sizes shown in the floor plans.

Basement 1		
Car and Bike Parking	**SDL (kN/Sq.mt.)**	**LL (kN/Sq.mt.)**
Finishes	2.4	0.0
Services load (ceiling)	0.5	0.0
Live Load	0.0	3.0
Partition Load	0.0	0.0
Total	**2.9**	**3.0**

STP (Equalization Tank / Aeration Tank)	**SDL (kN/Sq.mt.)**	**LL (kN/Sq.mt.)**
Finishes	2.4	0.0
Services load (ceiling)	0.5	0.0
Live Load	0.0	2.0
Liquid Load (Liquid Depth 5.1m)	51.0	0.0
Total	**53.9**	**2.0**
U.G.Sump / Pump room/ Electrical Room	**SDL (kN/Sq.mt.)**	**LL (kN/Sq.mt.)**
Finishes	2.4	0.0
Services load (ceiling)	0.5	0.0
Live Load	0.0	2.0
Pump Room machines	7.5	0.0
Total	**10.4**	**2.0**
Ground Floor & First Floor		
Gym/ party hall/ business lounge/ store	**SDL (kN/Sq.mt.)**	**LL (kN/Sq.mt.)**
Finishes	1.8	0.0
Services load (ceiling)	0.5	0.0
Live Load	4.0	2.0
Partition Load	0.0	0.0
Total	**6.3**	**2.0**
Firetruck Driveway	**SDL (kN/Sq.mt.)**	**LL (kN/Sq.mt.)**
Finishes	2.4	0.0
Services load (ceiling)	0.0	0.0
Live Load	0.0	15.0
Filling Load	9.0	0.0
Total	**11.4**	**15.0**
Meeting/Guest Room	**SDL (kN/Sq.mt.)**	**LL (kN/Sq.mt.)**
Finishes	1.8	0.0
Services load (ceiling)	0.5	0.0
Live Load	0.0	4.0
Partition Load	0.0	0.0
Total	**2.3**	**4.0**
1st Floor to 21st Floor		
Kitchen/Dining/Living/Puja/ Bed room	**SDL (kN/Sq.mt.)**	**LL (kN/Sq.mt.)**
Finishes	1.8	0.0
Services load (ceiling)	0.5	0.0
Live Load	0.0	2.0
Partition Load	0.0	0.0

Total	**2.3**	**2.0**
Landscape	**SDL (kN/Sq.mt.)**	**LL (kN/Sq.mt.)**
Finishes	1.8	0.0
Services load (ceiling)	0.0	0.0
Live Load	0.0	2.0
Landscape Filling Load (800mm)	12.8	0.0
Total	**14.6**	**2.0**
Corridor/Lobby	**SDL (kN/Sq.mt.)**	**LL (kN/Sq.mt.)**
Finishes	1.8	0.0
Services load (ceiling)	0.5	0.0
Live Load	0.0	3.0
Filling Load	2.0	0.0
Total	**4.3**	**3.0**
Toilet	**SDL (kN/Sq.mt.)**	**LL (kN/Sq.mt.)**
Finishes	1.2	0.0
Services load (ceiling)	0.5	0.0
Live Load	0.0	2.0
Partition/Filling Load	2.0	0.0
Total	**3.7**	**2.0**
Staircase	**SDL (kN/Sq.mt.)**	**LL (kN/Sq.mt.)**
Finishes	1.8	0.0
Services load (ceiling)	0.5	0.0
Live Load	0.0	3.0
Step Load	3.0	0.0
Total	**5.3**	**3.0**
Terrace	**SDL (kN/Sq.mt.)**	**LL (kN/Sq.mt.)**
Finishes	1.8	0.0
Services load (ceiling)	0.0	0.0
Live Load	0.0	4.0
Filling Load (150mm)	**3.6**	0.0
Total	**5.4**	**4.0**
Terrace Landscape	**SDL (kN/Sq.mt.)**	**LL (kN/Sq.mt.)**
Finishes	1.8	0.0
Services load (ceiling)	0.0	0.0
Live Load	0.0	2.0
Filling Load (450mm)	**7.2**	0.0
Total	**9.0**	**2.0**
Swimming pool	**SDL (kN/Sq.mt.)**	**LL (kN/Sq.mt.)**
Finishes	1.8	0.0
Services load (ceiling)	0.0	0.0

Live Load	0.0	3.0
Water wt. (Liquid depth 1.2m)	12.0	0.0
Total	**13.8**	**3.0**
Balcony	**SDL (kN/Sq.mt.)**	**LL (kN/Sq.mt.)**
Finishes	1.8	0.0
Services load (ceiling)	0.5	0.0
Live Load	0.0	3.0
Filling Load	2.0	0.0
Total	**4.3**	**3.0**
Outdoor cafe	**SDL (kN/Sq.mt.)**	**LL (kN/Sq.mt.)**
Finishes	1.8	0.0
Services load (ceiling)	0.5	0.0
Live Load	0.0	4.0
Filling Load	0.0	0.0
Total	**2.3**	**4.0**
LMR	**SDL (kN/Sq.mt.)**	**LL (kN/Sq.mt.)**
Finishes	2.4	0.0
Live Load	0.0	2.0
Lift Car Load	20.0	0.0
Total	**22.4**	**2.0**
Staircase Head Room	**SDL (kN/Sq.mt.)**	**LL (kN/Sq.mt.)**
Finishes	2.4	0.0
Live Load	0.0	3.0
Partition Load	0.0	0.0
Total	**2.4**	**3.0**

In the analysis and design, reduction to imposed load (Live load) shall be considered as per IS 875 Part (2), clause.3.2 where it is applicable.

2.4 TEMPERATURE EFFECTS

Temperature changes can cause additional stresses to the structure and has potential to increase in loads will be considered in the design of structural elements. Temperature effects will be considered for an ambient temperature variation from temperature during construction.

The maximum and minimum temperature for city of Chennai as recorded by Indian Metro logical Department is as follows,

Maximum mean Temperature	45°C
Minimum mean Temperature	15°C
Average ambient Temperature during construction	30°C

The structural system will be designed for the effect of temperature variation. A temperature variation of **±15° C** will be considered in the structural analysis for consideration of thermal effect on structural elements.

Expansion Joints

No Expansion joints required. However thermal analysis has been carried out by applying the above mentioned temperature differences over the exposed roof terraces.

2.5 WIND LOAD

Design wind load for the buildings shall be estimated as per IS 875 (Part 3): 2015. Design wind speed (Vz) is based on such as location, basic wind speed, terrain, cyclone condition and topography.

Location of the building	Chennai
Basic Wind speed - Vb m/sec	50 m/sec
Risk Coefficient (Probability factor) -k1	1.0
Terrain factor (Terrain-2) – k2 for the height of 76.35m	1.207
Topography factor – k3	1.0
Importance factor (Cyclonic region) – k4	1.0

Design wind speed (Vz) = Vb*k1*k2*k3*k4 =50x1x1.207x1.0x1.0 = 60.35 m/sec

Wind pressure (Pz) = 0.6 Vz^2 = 0.6x 60.35^2 = 2185.27 N/m^2

For design of building wind pressure 2.2 kN/m^2 is considered.

Design wind pressure (P_d) = K_d*K_a*K_c*P_z

Where K_d - Wind Directionality factor = 0.9

Ka – Area averaging factor = 0.8

Kc – Combination factor = 0.9

Design Wind pressure = 2.2x0.9x0.8x0.9 = 1.4256 kN/m^2

2.5.1 Dynamic wind analysis

As per IS 875 (Part 3) - 2015, clause 9.1 Dynamic wind analysis has to be carried out if the buildings meet the following criteria.

a) Buildings & closed structures with a height to min. lateral dimension ratio (H/W_{min}) is more than 5 (or)

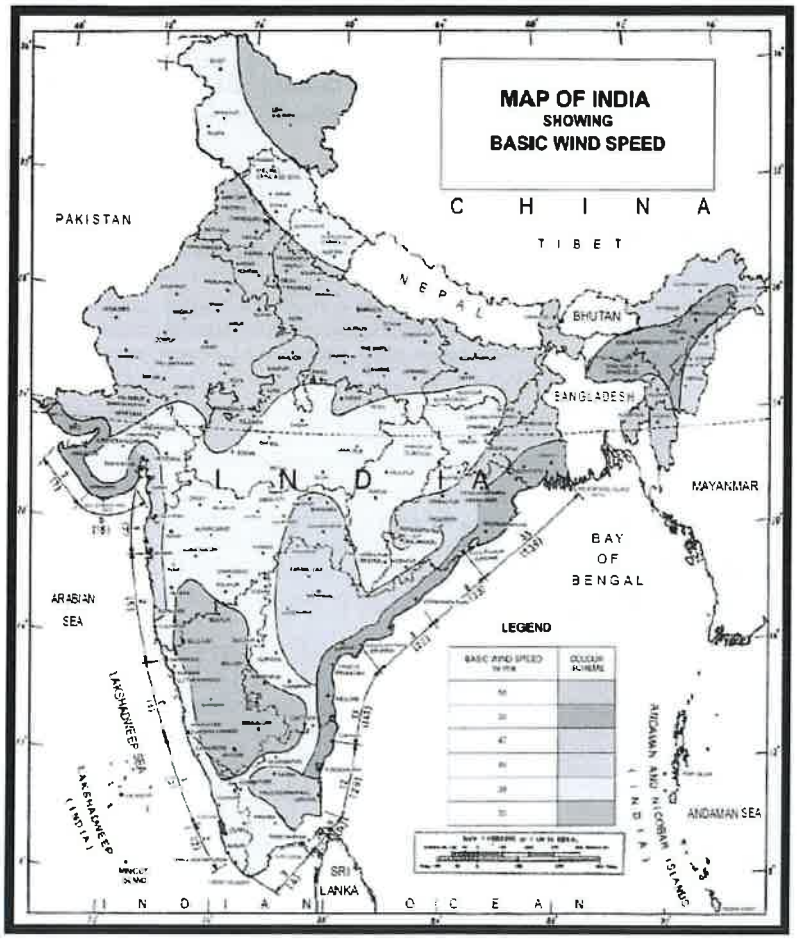
b) Building and structures whose natural frequency in the first mode is less than 1.0 Hz.

Fundamental period of the building = Ta = 0.0672 $H^{0.75}$ = 0.0672*$(76.35)^{0.75}$ = 1.735 Sec

Fundamental natural frequency 1/Ta = 0.57 <1.0

The building ratio of H/W (86.6m/15.95m) is 5.43 > 5

Dynamic wind analysis for the proposed building is carried out.



2.6 SEISMIC LATERAL FORCE

Design of lateral force under seismic condition shall be as per IS1893 – 2016. Total lateral force (base shear) of the building shall be estimated as per clause 7.2.1 of IS1893 – 2016 which provides by

Base shear $V_b = A_h W$

A_h is horizontal seismic coefficient and W is seismic weight of the building, Horizontal seismic coefficient depends on location of the building (Zone factor Z), usage of the building (Importance factor, I), building lateral resisting system (Response reduction factor, R) and design acceleration coefficient (Sa /g) which is based on subsoil condition and fundamental natural period (Ta).

For the proposed development is for Residential use. Considering it, the seismic weight is summation of total dead load and 50% of live load where live load is greater than 3 kN/sq.m.

The fundamental natural period (Ta) for building, as per IS 16700:2023. The fundamental translation natural period Ta (in Sec) of oscillation, estimated by following expression:

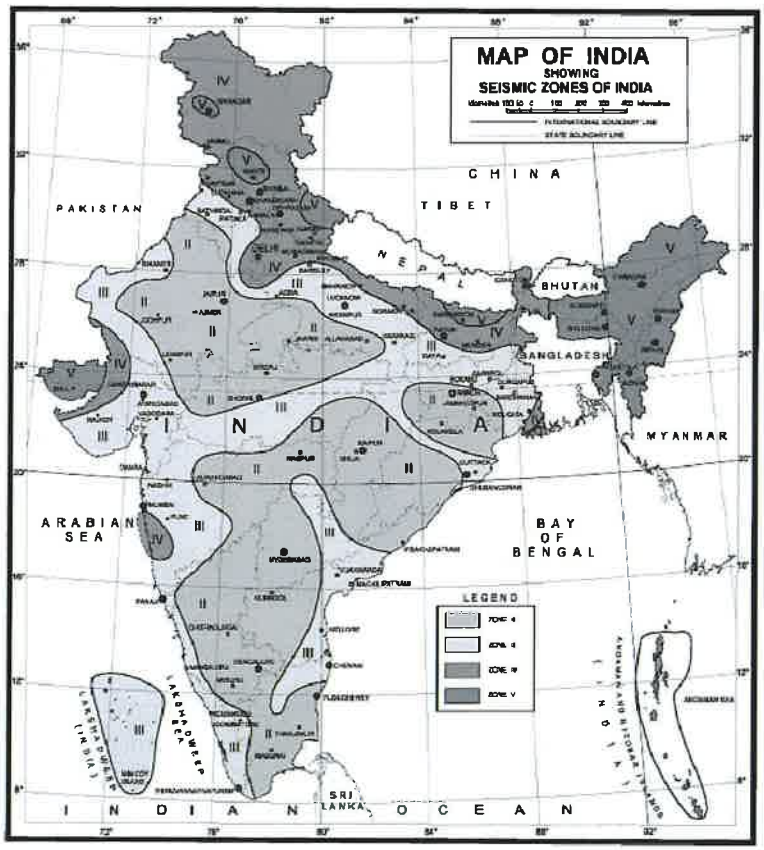
$Ta = 0.0672\ H^{0.75}$

H = Height of the building from Ground level

Hence the fundamental natural period has been arrived as per formula $0.0672\ H^{0.75}$ as this formula governs.

2.6.1 Design Parameters for estimation of seismic loading

Sl.No.	Description	Parameters as per IS-1893-2016
1.	Location - Chennai	Seismic zone III
2.	Seismic Zone Factor	0.16
3.	Response Reduction Factor: **Buildings with Ductile Structural wall System**	4.0
4	Importance factor (Residential building)	1.2
5	Type of Soil (Hard)	Type I
6	Damping coefficient	5%



2.7 BASE SHEAR

Height of the building (h) = 76.30m (measured from EGL)
d (along the length of the building) = 86.6m
b (along the breadth of the building) = 15.95m

a) Ta (along x) = $0.0672\ H^{0.75}$
= 1.735 Sec

b) Ta (along y) = $0.0672\ H^{0.75}$
= 1.735 Sec

From IS 1893: 2016, Clause 6.4.2, Design horizontal seismic coefficient

$$Ah = \frac{Z}{2} x \frac{I}{R} x \frac{Sa}{g}$$

Where,

Z for Zone III = 0.16

I for Residential Building = 1.2 (Refer to IS 1893-2016, Table.9)

R for Buildings with Ductile RC Structural Wall System = 4.0 as per (Table 9)

Sa/g (For Rocky) x direction = 1.0/T (Refer to IS 1893-2016, page 13, Fig 1)

= 0.576

Sa/g (For Rocky) y direction = 1.0/T (Refer to IS 1893-2016, page 13, Fig 1)

= 0.576

Design horizontal seismic coefficient and base shear

X- direction A_{hx} = 0.014 Vbx = 0.014W

Y- direction A_{hy} = 0.014 Vby = 0.014W

From IS 1893: 2016, Clause 6.4.6, Design Vertical seismic coefficient

$$Av = \frac{\left(\frac{2}{3} x \frac{Z}{2}\right) x(2.5)}{\left(\frac{R}{I}\right)} = 0.04$$

2.8 DYNAMIC ANALYSIS

Response spectrum method of Dynamic Analysis carried out with following parameters pertaining to dynamic analysis.

Time period	: Calculated as per IS 16700:2023
Number of modes Considered	: 30 Numbers
Modal Combination Method Used	: Complete Quadratic combination (CQC).
Spatial Combination Method used	: Square root of the sum of Square (SRSS).
Modal case type	: Ritz vector Method

3.0 STRUCTURAL ANALYSIS AND DESIGN

3.1 ASSUMPTIONS CONSIDERED IN THE DESIGN

The assumptions for structural analysis and design are as below

- Elastic analysis (plane remains plane).
- Structure shall be analysed for the most adverse load conditions and envelope of forces shall be designed for.

- Cracked section properties of structural RC structural elements are used in the analysis as per IS 16700-2017, clause 7.2, Table 6.

3.2 CONCRETE COVER

Concrete cover to the reinforcement in structural elements is based on durability and fire rating. The fire rating of 2hrs is considered for structural elements for the commercial development.

Sl. No.	Structural Elements	Cover in mm
1.	Pile & Pile cap	75
2.	Shear wall	30
3.	Column	40
4.	Beams	30
5.	Slabs	25
6.	Basement Slab & Wall internal face	30
7.	Basement wall / Retaining wall Face in contact with soil(external)	40
8.	UG Tank Base Slab/Wall	40

3.3 METHOD FOR ANALYSIS

Computer-aided analysis using finite element method (FEM) shall be carried out for the design of structural elements. For 3D or 2D structural frame analysis latest version of software ETABS, SAFE shall be used, Prokon, RCDC and verified in-house spread sheets will be used for the design of reinforced concrete (RC) and steel elements in consideration of flexure, shear and axial forces. RAPT will be used for the design of pre-stressed concrete elements.

3.4 ASSUMPTIONS FOR 3D MODEL ANALYSIS USING ETABS

Column: Frame Element
RC Wall: Wall (Shell) Element
Beam Element: Frame Element
Slab: Shell Element

The following are general parameters adopted in the analysis and design,

Modulus of Elasticity of Concrete -5000√fck

Consideration of Diaphragm - Rigid Diaphragm.

Slab/Wall element considered as Shell element

Stiffness modification factors are adopted in the analysis as per IS -16700-2023, Table.5,

Table 5 Cracked Section Properties of RC members

(*Clauses* 5.5.2,7.3.6, 8.1.3.2.1 *and* 7.2)

Sl No.	Structural Element	Serviceability Design		Strength Design	
		Cross-Sectional Area	Moment of Inertia	Cross-Sectional Area	Moment of Inertia
(1)	(2)	(3)	(4)	(5)	(6)
i)	Slabs	$1.0A_g$	$0.35I_g$	$1.00A_g$	$0.25\ I_g$
ii)	Beams	$1.0\ A_g$	$0.7\ I_g$	$1.00\ A_g$	$0.35\ I_g$
iii)	Columns	$1.0\ A_g$	$0.9\ I_g$	$1.00\ A_g$	$0.70\ I_g$
iv)	Walls	$1.0\ A_g$	$0.9\ I_g$	$1.00\ A_g$	$0.70\ I_g$

The following parameters and methods are adopted in creating ETABS 3D model for the buildings and design of structural elements.

- The 3D ETABS model generated based on the preliminary floor plans (shuttering drawings) prepared using preliminary sizes.
- Sectional properties are assigned to all the structural elements as per the preliminary floor plans (shuttering drawings).
- External & Internal in fill wall loads are assigned as uniformly distributed line load on beams and as area load if the wall is intended to distribute on slab directly. These loads are assigned under SIDL type load case.
- Slabs are modelled as shell element and slabs are assigned with horizontal diaphragms.
- Live Load reduction is considered in the design of Foundation and Column as per the Code: IS 875-1987 (Part-II), clause.3.2.1.
- Area design load i.e. Live load/SIDL or any other load is applied at floor relevant to its usage.
- All lateral loads & parameters are assigned as per Codes IS 1893-2016 & IS 875-2015.
- Temperature loads are applied on to the terraces and to areas directly exposed to sun.
- Beams under Torsion is required to maintain Equilibrium will be designed for Torsion in accordance with IS 456-2000, clause 41.1 to 41.4 and for all other beams torsional stiffness is neglected in the analysis by applying stiffness modifier as 0.001 to torsional constant "J". Hence no specific design for Torsion is required for these beams.
- Chennai is zone-III. Hence ductile detailing is followed in the design and detailing of structural elements.
- Concrete cover to reinforcement complied accordance with IS 456-2000, Table 16 & 16A.
- UG Sump is designed for 0.2mm and STP is designed for the crack width of 0.2mm.
- Secondary beams are not designed for ductile detailing.
- Long term deflections are checked by manual calculation using excel spread sheet wherever necessary. Crack width calculation will be done using spread sheet wherever necessary.

Area Load & Application: Applied as uniformly distributed area load with intensity proportionate to its usage as mentioned in the Loading items in the DBR.

Line (Wall) Load & Application: non load bearing or infill wall loads are calculated appropriately and applied as uniformly distributed line load.

Lateral Load Resisting Systems: The proposed structure is a RC Shear wall/column building which is transferred by the framed structure formed by RC Beam/slab at floor is forming integrated structure would

resist both gravity and lateral loads. In which, the vertical structural systems are sized adequately such that the RC wall/columns is adequately transfer its vertical loads and lateral forces.

4.0 LOAD COMBINATIONS

The various loads shall be combined in accordance with the stipulations in IS 875 (Part 5) 1987 and IS 456: 2000. The structure will be checked for serviceability Limit State and Ultimate Limit State (Limit State of Collapse) conditions. The load factors to be used for the load combinations are shown in the Table below. The structural elements shall be designed and checked for the critical forces from the combinations.

Load Combination	DL	LL	WX	WY	SpX	SpY	SpZ	TL
Ultimate Limit State – Combinations								
01. (DL + LL + TL)	1	1	-	-	-	-	-	1
02. (DL + LL + TL)	1.5	1.5	-	-	-	-	-	1
03. (DL + LL + TL + WX)	1.2	1.2	1.2	-	-	-	-	1
04. (DL + LL + TL - WX)	1.2	1.2	-1.2	-	-	-	-	1
05. (DL + LL + TL + WY)	1.2	1.2	-	1.2	-	-	-	1
06. (DL + LL + TL - WY)	1.2	1.2	-	-1.2	-	-	-	1
07. (DL + TL + WX)	1.5	-	1.5	-	-	-	-	1
08. (DL + TL - WX)	1.5	-	-1.5	-	-	-	-	1
09. (DL + TL + WY)	1.5	-	-	1.5	-	-	-	1
10. (DL + TL - WY)	1.5	-	-	-1.5	-	-	-	1
11. (DL + TL + WX)	0.9	-	1.5	-	-	-	-	1
12. (DL + TL - WX)	0.9	-	-1.5	-	-	-	-	1
13. (DL + TL + WY)	0.9	-	-	1.5	-	-	-	1
14. (DL + TL - WY)	0.9	-	-	-1.5	-	-	-	1
15. (DL + LL + TL + Spec X)	1.2	1.2	-	-	1.2	-	-	1
16. (DL + LL + TL + Spec Y)	1.2	1.2	-	-	-	1.2	-	1
17. (DL + TL + Spec X)	1.5	-	-	-	1.5	-	-	1
18. (DL + TL + Spec Y)	1.5	-	-	-	-	1.5	-	1
19. (DL + TL + Spec X)	0.9	-	-	-	1.5	-	-	1
20. (DL + TL + Spec Y)	0.9	-	-	-	-	1.5	-	1
21. (DL + TL + LL + SpecX + SpecY + SpecZ)	1.2	1.2	-	-	1.2	0.36	0.36	1
22. (DL + TL + LL + SpecY + SpecX + SpecZ)	1.2	1.2	-	-	0.36	1.2	0.36	1
23. (DL + TL + LL + SpecZ + SpecX + SpecY)	1.2	1.2	-	-	0.36	0.36	1.2	1
24. (DL + TL + SpecX + SpecY + SpecZ)	1.5	-	-	-	1.5	0.45	0.45	1
25. (DL + TL + SpecY + SpecX + SpecZ)	1.5	-	-	-	0.45	1.5	0.45	1
26. (DL + TL + SpecZ + SpecX + SpecY)	1.5	-	-	-	0.45	0.45	1.5	1
27. (DL + TL + SpecX + SpecY + SpecZ)	0.9	-	-	-	1.5	0.45	0.45	1
28. (DL + TL + SpecY + SpecX + SpecZ)	0.9	-	-	-	0.45	1.5	0.45	1
29. (DL + TL + SpecZ + SpecX + SpecY)	0.9	-	-	-	0.45	0.45	1.5	1
Serviceability Limit State- combinations								
01. (DL + LL + TL)	1	1	-	-	-	-	-	1
02. (DL + TL + WX)	1	-	1	-	-	-	-	1

03. (DL + TL - WX)	1	-	-1	-	-	-	-	1
04. (DL + TL + WY)	1	-	-	1	-	-	-	1
05. (DL + TL - WY)	1	-	-	-1	-	-	-	1
06. (DL + LL + TL + WX)	1	0.8	0.8	-	-	-	-	1
07. (DL + LL + TL - WX)	1	0.8	-0.8	-	-	-	-	1
08. (DL + LL + TL + WY)	1	0.8	-	0.8	-	-	-	1
09. (DL + LL + TL - WY)	1	0.8	-	-0.8	-	-	-	1
10. (DL + TL + Spec X)	1	-	-	-	1	-	-	1
11. (DL + TL + Spec Y)	1	-	-	-	-	1	-	1
12. (DL + LL + TL + Spec X)	1	0.8	-	-	0.8	-	-	1
13. (DL + LL + TL + Spec Y)	1	0.8	-	-	-	0.8	-	1

DL: Dead Load : Imposed Load TL: Temperature Load
Spec X: Earthquake Load in X-dir., Spec Y: Earthquake Load in Y-dir.,
Spec Z: Earthquake Load in Z-dir., WX: Wind Load in X-dir., WY: Wind Load in Y-dir.

5.0 ACCEPTANCE CRITERIA

Under Serviceability Limit State the limiting structural deflection shall be as follows.

Total deflection under all imposed loads including temperature, creep and shrinkage shall not exceed **L/250.**

In the above limiting value, the deflection contribution due to temperature, creep and shrinkage shall not be more than **L/350**.

Lateral deflection (sway) due to wind shall not exceed **H/500 (.002 H)** where H is the height of the building above ground.

5.1 CRACK WIDTH LIMITS

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

- In general, for slabs and beams, the crack width is limited to 0.3mm.
- For water retaining structures, Basement-1 slab crack width is limited to 0.2mm

6.0 DESIGN OF STRUCTURAL ELEMENTS AND FOUNDATION

6.1 FOUNDATION

The load intensity of RC shear wall/column is quite considerable especially in the Tower Building. Based on the sub-soil condition presented in the soil Investigation report and as per the load intensity of the vertical members Columns/shear walls, the following foundation design is proposed.

Bored Cast In-situ Pile foundation is designed as foundation system considering the sub-soil condition prevailing below the basement. Since the sub-soil condition encountered at a depth below the basement is not suitable for designing the Raft Foundation and as per the recommendation laid down in the Soil Investigation Report No. MSGTPL/SI-6541/25-26 dated July 12, 2025. Hence the Building both Tower/Non-tower has been designed with Bored Cast In-situ Pile foundation with the length adequately socketed in to

the hard layer. The sub-structure includes Basement slab & the basement Retaining wall shall be designed with the uplift pressure estimated considering the Ground Water Table up to the NGL.

6.2 SHEAR WALL/COLUMN

RC Structural Walls & Columns which are supporting both vertical loads and lateral forces are designed for the most adverse load conditions and envelope of the forces which will be the maximum for that structural element from the load combinations considered in the 3D analysis. ETABS or RCDC a design software if required, will be used to design the element for the maximum forces obtained from the load combinations. As the building is located in Zone III, ductile details shall be followed.

6.3 BEAMS

Each Beam will be designed for maximum forces from the 3D analysis and ETABS or RCDC a concrete design software if required, shall be used to design of RC Beams. Also, ductile details will be followed where required as per code provisions.

6.4 SLABS

Conventional RC slabs will be designed using in house spread sheet whereas the basement slab & irregular slab will be designed using SAFE software.

6.5 BASEMENT RETAINING WALL

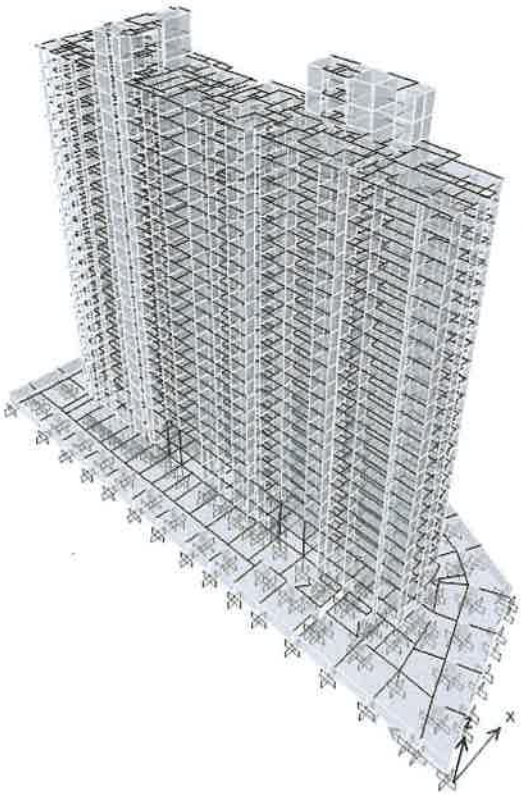
Basement wall shall be designed for soil pressure at rest and water pressure as required. It is designed as retaining structure with limiting crack width to 0.2mm. Approved water proofing shall be applied on both the Basement retaining wall wrapping together with the Pile/Pile cap/Lower Basement slab with the suitable joint treatment.

6.6 RETAINING SYSTEM FOR BASEMENT EXCAVATION/CONSTRUCTION

Suitable permanent Retaining system such as Secant Pile wall or D-wall shall be proposed. Qualified contractor shall be employed to design & built the approved retaining system which shall be designed for all the possible pressure including Soil, Water & with the suitable surcharge loads.

3D MODEL
&
ANALYSIS SUMMARY REPORT

ETABS®



User Report 1

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1 Structure Data

This chapter provides model geometry information, including items such as story levels, point coordinates, and element connectivity.

1.1 Story Data

Table 1.1 - Story Definitions

Tower	Name	Height m	Master Story	Similar To	Splice Story	Color
T1	OHT COVER	3.55	No	None	No	Yellow
T1	OHT BASE/HEAD ROOM	3.2	No	None	No	Blue
T1	ROOF	3.2	No	2	No	Cyan
T1	21	3.2	No	2	No	Magenta
T1	20	3.2	No	2	No	Gray8Dark
T1	19	3.2	No	2	No	Green
T1	18	3.2	No	2	No	Red
T1	17	3.2	No	2	No	Yellow
T1	16	3.2	No	2	No	Blue
T1	15	3.2	No	2	No	Cyan
T1	14	3.2	No	2	No	Magenta
T1	13	3.2	No	2	No	Gray8Dark
T1	12	3.2	No	2	No	Green
T1	11	3.2	No	2	No	Red
T1	10	3.2	No	2	No	Yellow
T1	9	3.2	No	2	No	Blue
T1	8	3.2	No	2	No	Cyan
T1	7	3.2	No	2	No	Magenta
T1	6	3.2	No	2	No	Gray8Dark
T1	5	3.2	No	2	No	Green
T1	4	3.2	No	2	No	Red
T1	3	3.2	No	2	No	Yellow
T1	2	3.2	Yes	None	No	Blue
T1	1	5.25	No	None	No	Cyan
T1	MEZZ	4.2	No	None	No	Magenta
T1	GROUND	3.2	Yes	None	No	Gray8Dark
T1	B1	3.2	No	GROUND	No	Green

2 Properties

This chapter provides property information for materials, frame sections, shell sections, and links.

2.1 Materials

Table 2.1 - Material Properties - General

Material	Type	SymType	Grade	Color	Notes
DUMMY	Other	Isotropic	Unknown	Green	
HYSD415	Rebar	Uniaxial	HYSD Grade 415	Red	
HYSD550	Rebar	Uniaxial	HYSD Grade 550	Red	
M35	Concrete	Isotropic	M35	Gray8Dark	
M40	Concrete	Isotropic	M40	Blue	
M50	Concrete	Isotropic	M50	Cyan	
Tendon	Tendon	Uniaxial	Unknown	Yellow	

2.2 Frame Sections

Table 2.2 - Frame Section Property Definitions - Summary (Part 1 of 3)

Name	Material	Shape	Color	Area cm2	J cm4	I33 cm4	I22 cm4	I23 cm4
B - 600 x 600 - T1	M35	Concrete Rectangular	Cyan	3600	1825874.6	1080000	1080000	0
B 1000X600	M35	Concrete Rectangular	Cyan	6000	4514793.6	1800000	5000000	0
B 200X1150	M35	Concrete Rectangular	Gray8Dark	2300	273435.1	2534791.7	76666.7	0
B 200X450	M35	Concrete Rectangular	Gray8Dark	900	86596.1	151875	30000	0
B 200X500	M35	Concrete Rectangular	Magenta	1000	99917.8	208333.3	33333.3	0
B 200X600	M35	Concrete Rectangular	Magenta	1200	126597.2	360000	40000	0
B 200X750	M35	Concrete Rectangular	Green	1500	166638.5	703125	50000	0
B 300X600	M35	Concrete Rectangular	Yellow	1800	371118.1	540000	135000	0
B 400X600	M35	Concrete Rectangular	Magenta	2400	753193.8	720000	320000	0
B 450X600	M35	Concrete Rectangular	Green	2700	988600.1	810000	455625	0
B 500X600	M35	Concrete Rectangular	Gray8Dark	3000	1248479.7	900000	625000	0
B 500X750 - T1	M35	Concrete Rectangular	Gray8Dark	3750	1838852	1757812.5	781250	0
B 600X600	M35	Concrete Rectangular	Cyan	3600	1825874.6	1080000	1080000	0
B 600X750	M35	Concrete Rectangular	Yellow	4500	2787867	2109375	1350000	0
B 750X600	M35	Concrete Rectangular	Red	4500	2787867	1350000	2109375	0
B 800X600	M35	Concrete Rectangular	Magenta	4800	3124464.4	1440000	2560000	0
B 800X800	M35	Concrete Rectangular	Red	6400	5770665.5	3413333.3	3413333.3	0
C 1000X1200	M50	Concrete Rectangular	Blue	12000	19975674.6	14400000	10000000	0
C 1000X1500	M50	Concrete Rectangular	Blue	15000	29421632.5	28125000	12500000	0
C 1000X2000	M50	Concrete Rectangular	Green	20000	45817046.6	66666666.7	16666666.7	0
C 1200X1600	M50	Concrete Rectangular	Red	19200	49991431.2	23040000	40960000	0
C 300X1000	M50	Concrete Rectangular	Cyan	3000	731032.4	2500000	225000	0
C 450X750	M50	Concrete Rectangular	Gray8Dark	3375	1428508.9	569531.3	1582031.3	0
C 450X900	M50	Concrete Rectangular	Blue	4050	1878785.3	683437.5	2733750	0
C 500	M40	Concrete Circle	Blue	1963.5	598094.5	306796.2	306796.2	0
C 500X1800	M50	Concrete Rectangular	Blue	9000	6196677	1875000	24300000	0
C 800 X 1600	M50	Concrete Rectangular	Cyan	12800	18766662.3	6826666.7	27306666.7	0
dummy	DUMMY	Concrete Rectangular	Green	0	0	0	0	0

Table 2.2 - Frame Section Property Definitions - Summary (Part 1 of 3, continued)

Name	Material	Shape	Color	Area cm2	J cm4	I33 cm4	I22 cm4	I23 cm4
TB - 1000X1200	M35	Concrete Rectangular	Yellow	12000	19975674.6	14400000	10000000	0
TB - 1075X1200	M35	Concrete Rectangular	Yellow	12900	23311051.8	15480000	12422968.8	0
TB - 1200 X 1200 - T1	M35	Concrete Rectangular	Green	14400	29213993.9	17280000	17280000	0
TB - 1200X1200	M35	Concrete Rectangular	Yellow	14400	29213993.9	17280000	17280000	0
TB - 1400X1200	M35	Concrete Rectangular	Red	16800	39323812.5	20160000	27440000	0
TB - 1500X1200	M35	Concrete Rectangular	Red	18000	44605872.2	21600000	33750000	0
TB - 1600X1200	M35	Concrete Rectangular	Green	19200	49991431.2	23040000	40960000	0
TB - 850X1200	M35	Concrete Rectangular	Magenta	10200	13882959.8	12240000	6141250	0

Table 2.2 - Frame Section Property Definitions - Summary (Part 2 of 3)

Name	As2 cm2	As3 cm2	S33Pos cm3	S33Neg cm3	S22Pos cm3	S22Neg cm3	Z33 cm3	Z22 cm3	R33 mm	R22 mm	CG Offset 3 mm
B - 600 x 600 - T1	3000	3000	36000	36000	36000	36000	54000	54000	173.2	173.2	0
B 1000X600	5000	5000	60000	60000	100000	100000	90000	150000	173.2	288.7	0
B 200X1150	1916.7	1916.7	44083.3	44083.3	7666.7	7666.7	66125	11500	332	57.7	0
B 200X450	750	750	6750	6750	3000	3000	10125	4500	129.9	57.7	0
B 200X500	833.3	833.3	8333.3	8333.3	3333.3	3333.3	12500	5000	144.3	57.7	0
B 200X600	1000	1000	12000	12000	4000	4000	18000	6000	173.2	57.7	0
B 200X750	1250	1250	18750	18750	5000	5000	28125	7500	216.5	57.7	0
B 300X600	1500	1500	18000	18000	9000	9000	27000	13500	173.2	86.6	0
B 400X600	2000	2000	24000	24000	16000	16000	36000	24000	173.2	115.5	0
B 450X600	2250	2250	27000	27000	20250	20250	40500	30375	173.2	129.9	0
B 500X600	2500	2500	30000	30000	25000	25000	45000	37500	173.2	144.3	0
B 500X750 - T1	3125	3125	46875	46875	31250	31250	70312.5	46875	216.5	144.3	0
B 600X600	3000	3000	36000	36000	36000	36000	54000	54000	173.2	173.2	0
B 600X750	3750	3750	56250	56250	45000	45000	84375	67500	216.5	173.2	0
B 750X600	3750	3750	45000	45000	56250	56250	67500	84375	173.2	216.5	0
B 800X600	4000	4000	48000	48000	64000	64000	72000	96000	173.2	230.9	0
B 800X800	5333.3	5333.3	85333.3	85333.3	85333.3	85333.3	128000	128000	230.9	230.9	0
C 1000X1200	10000	10000	240000	240000	200000	200000	360000	300000	346.4	288.7	0
C 1000X1500	12500	12500	375000	375000	250000	250000	562500	375000	433	288.7	0
C 1000X2000	16666.7	16666.7	666666.7	666666.7	333333.3	333333.3	1000000	500000	577.4	288.7	0
C 1200X1600	16000	16000	384000	384000	512000	512000	576000	768000	346.4	461.9	0
C 300X1000	2500	2500	50000	50000	15000	15000	75000	22500	288.7	86.6	0
C 450X750	2812.5	2812.5	25312.5	25312.5	42187.5	42187.5	37968.8	63281.3	129.9	216.5	0
C 450X900	3375	3375	30375	30375	60750	60750	45562.5	91125	129.9	259.8	0
C 500	1767.1	1767.1	12271.8	12271.8	12271.8	12271.8	20833.3	20833.3	125	125	0
C 500X1800	7500	7500	75000	75000	270000	270000	112500	405000	144.3	519.6	0
C 800 X 1600	10666.7	10666.7	170666.7	170666.7	341333.3	341333.3	256000	512000	230.9	461.9	0
dummy	0	0	0	0	0	0	0	0	0	0	0
TB - 1000X1200	10000	10000	240000	240000	200000	200000	360000	300000	346.4	288.7	0
TB - 1075X1200	10750	10750	258000	258000	231125	231125	387000	346687.5	346.4	310.3	0
TB - 1200 X 1200 - T1	12000	12000	288000	288000	288000	288000	432000	432000	346.4	346.4	0
TB - 1200X1200	12000	12000	288000	288000	288000	288000	432000	432000	346.4	346.4	0

Table 2.2 - Frame Section Property Definitions - Summary (Part 2 of 3, continued)

Name	As2 cm2	As3 cm2	S33Pos cm3	S33Neg cm3	S22Pos cm3	S22Neg cm3	Z33 cm3	Z22 cm3	R33 mm	R22 mm	CG Offset 3 mm
TB - 1400X1200	14000	14000	336000	336000	392000	392000	504000	588000	346.4	404.1	0
TB - 1500X1200	15000	15000	360000	360000	450000	450000	540000	675000	346.4	433	0
TB - 1600X1200	16000	16000	384000	384000	512000	512000	576000	768000	346.4	461.9	0
TB - 850X1200	8500	8500	204000	204000	144500	144500	306000	216750	346.4	245.4	0

Table 2.2 - Frame Section Property Definitions - Summary (Part 3 of 3)

Name	PNA Offset 3 mm	PNA Offset 2 mm	Area Modifier	As2 Modifier	As3 Modifier	J Modifier	I33 Modifier	I22 Modifier	Mass Modifier
B - 600 x 600 - T1	0	0	1	1	1	1	0.35	0.35	1
B 1000X600	0	0	1	1	1	0.001	0.35	0.35	1
B 200X1150	0	0	1	1	1	0.001	0.35	0.35	1
B 200X450	0	0	1	1	1	0.001	0.35	0.35	1
B 200X500	0	0	1	1	1	0.001	0.35	0.35	1
B 200X600	0	0	1	1	1	0.001	0.35	0.35	1
B 200X750	0	0	1	1	1	0.001	0.35	0.35	1
B 300X600	0	0	1	1	1	0.001	0.35	0.35	1
B 400X600	0	0	1	1	1	0.001	0.35	0.35	1
B 450X600	0	0	1	1	1	0.001	0.35	0.35	1
B 500X600	0	0	1	1	1	0.001	0.35	0.35	1
B 500X750 - T1	0	0	1	1	1	1	0.35	0.35	1
B 600X600	0	0	1	1	1	0.001	0.35	0.35	1
B 600X750	0	0	1	1	1	0.001	0.35	0.35	1
B 750X600	0	0	1	1	1	0.001	0.35	0.35	1
B 800X600	0	0	1	1	1	0.001	0.35	0.35	1
B 800X800	0	0	1	1	1	0.001	0.35	0.35	1
C 1000X1200	0	0	1	1	1	1	1	1	1
C 1000X1500	0	0	1	1	1	1	1	1	1
C 1000X2000	0	0	1	1	1	1	1	1	1
C 1200X1600	0	0	1	1	1	1	1	1	1
C 300X1000	0	0	1	1	1	1	1	1	1
C 450X750	0	0	1	1	1	1	1	1	1
C 450X900	0	0	1	1	1	1	1	1	1
C 500	0	0	1	1	1	1	1	1	1
C 500X1800	0	0	1	1	1	1	1	1	1
C 800 X 1600	0	0	1	1	1	1	1	1	1
dummy	0	0	1	1	1	1	1	1	1
TB - 1000X1200	0	0	1	1	1	0.001	0.35	0.35	1
TB - 1075X1200	0	0	1	1	1	0.001	0.35	0.35	1
TB - 1200 X 1200 - T1	0	0	1	1	1	1	0.35	0.35	1
TB - 1200X1200	0	0	1	1	1	0.001	0.35	0.35	1
TB - 1400X1200	0	0	1	1	1	0.001	0.35	0.35	1
TB - 1500X1200	0	0	1	1	1	0.001	0.35	0.35	1

Table 2.2 - Frame Section Property Definitions - Summary (Part 3 of 3, continued)

Name	PNA Offset 3 mm	PNA Offset 2 mm	Area Modifier	As2 Modifier	As3 Modifier	J Modifier	I33 Modifier	I22 Modifier	Mass Modifier
TB - 1600X1200	0	0	1	1	1	0.001	0.35	0.35	1
TB - 850X1200	0	0	1	1	1	0.001	0.35	0.35	1

2.3 Shell Sections

Table 2.3 - Area Section Property Definitions - Summary

Name	Type	Element Type	Material	Total Thickness mm	Deck Material	Deck Depth mm
M 200 - OW	Slab	Membrane	M35	200		
M 200 - TW	Slab	Membrane	M35	200		
S 125	Slab	Shell-Thin	M35	125		
S 150	Slab	Shell-Thin	M35	150		
S 175	Slab	Shell-Thin	M35	175		
S 200	Slab	Shell-Thin	M35	200		
S 400	Slab	Shell-Thin	M35	400		
W 200	Wall	Shell-Thin	M50	200		
W 200-40	Wall	Shell-Thin	M40	200		
W 300-40	Wall	Shell-Thin	M40	300		
W 500	Wall	Shell-Thin	M50	500		
WX 300	Wall	Shell-Thin	M50	300		
WX 400	Wall	Shell-Thin	M50	400		
WX 450	Wall	Shell-Thin	M50	450		
WX 600	Wall	Shell-Thin	M50	600		
WX 800	Wall	Shell-Thin	M50	800		

3 Loads

This chapter provides loading information as applied to the model.

3.1 Load Patterns

Table 3.1 - Load Pattern Definitions

Name	Is Auto Load	Type	Self Weight Multiplier	Auto Load
~LLRF	Yes	Other	0	
~Spx (Ser)ECC	Yes	Other	0	
~SpxECC	Yes	Other	0	
~Spy (Ser)ECC	Yes	Other	0	
~SpyECC	Yes	Other	0	
~SpzECC	Yes	Other	0	
Dead	No	Dead	1	
Eqx	No	Seismic	0	IS 1893:2016
Eqx(1/3)	Yes	Seismic	0	IS 1893:2016
Eqx(2/3)	Yes	Seismic	0	IS 1893:2016
Eqx(3/3)	Yes	Seismic	0	IS 1893:2016
Eqy	No	Seismic	0	IS 1893:2016
Eqy(1/3)	Yes	Seismic	0	IS 1893:2016
Eqy(2/3)	Yes	Seismic	0	IS 1893:2016
Eqy(3/3)	Yes	Seismic	0	IS 1893:2016
Live<3	No	Reducible Live	0	
Live>3	No	Reducible Live	0	
Roof Live	No	Roof Live	0	
Sdl	No	Super Dead	0	
Temp	No	Temperature	0	
Wall	No	Super Dead	0	
Wx	No	Wind	0	User Loads
Wy	No	Wind	0	User Loads

3.2 Load Sets

Table 3.2 - Shell Uniform Load Sets

Name	Load Pattern	Load Value kN/m2
BALCONY	Live>3	3
BALCONY	Sdl	4.8
CAR PARKING	Live>3	3
CAR PARKING	Sdl	3
DECK SLAB	Live>3	4
DECK SLAB	Sdl	7.2
ELEC. ROOM	Live>3	7.5
ELEC. ROOM	Sdl	2.4
FIRE TENDER	Live>3	15
FIRE TENDER	Sdl	14.4
GYM/PARTY/HALL	Live>3	5

Table 3.2 - Shell Uniform Load Sets (continued)

Name	Load Pattern	Load Value kN/m2
GYM/PARTY/HALL	Sdl	2.4
KITCHEN	Live<3	2
KITCHEN	Sdl	1.8
LANDSCAPE	Live>3	2
LANDSCAPE	Sdl	14.6
LIV/BED/DINE	Live<3	2
LIV/BED/DINE	Sdl	1.8
LMR/OHT	Live>3	3
LMR/OHT	Sdl	20
LOBBY	Live>3	3
LOBBY	Sdl	2.8
MEETING/COMM. RM.	Live>3	4
MEETING/COMM. RM.	Sdl	2.4
POWDER/GARBAGE	Live<3	2
POWDER/GARBAGE	Sdl	1.8
PUJA	Live<3	2
PUJA	Sdl	1.8
RAMP SLAB	Live>3	3
RAMP SLAB	Sdl	4
ROOF	Live>3	4
ROOF	Sdl	4
SHAFT	Live>3	3
SHAFT	Sdl	3
STAIRCASE	Live>3	3
STAIRCASE	Sdl	5
STP/PUMP	Live>3	3
STP/PUMP	Sdl	9.3
SWIM. POOL	Live>3	3
SWIM. POOL	Sdl	13
TERRACE LANDSCAPE	Live>3	3
TERRACE LANDSCAPE	Sdl	7.2
TOILET	Live<3	2
TOILET	Sdl	3.8
UTILITY	Live>3	3
UTILITY	Sdl	3.8
WORKING/OFFICE RM.	Live>3	4
WORKING/OFFICE RM.	Sdl	2.4

3.3 Load Cases

Table 3.3 - Load Case Definitions - Summary

Name	Type
Modal	Modal - Ritz
Dead	Linear Static
Live<3	Linear Static

Table 3.3 - Load Case Definitions - Summary (continued)

Name	Type
Live>3	Linear Static
Roof Live	Linear Static
Sdl	Linear Static
Wall	Linear Static
Temp	Linear Static
Eqx	Linear Static
Eqy	Linear Static
Wx	Linear Static
Wy	Linear Static
Spx	Response Spectrum
Spy	Response Spectrum
Spz	Response Spectrum
Spx (Ser)	Response Spectrum
Spy (Ser)	Response Spectrum

3.4 Load Combinations

Table 3.4 - Load Combination Definitions

Name	Type	Is Auto	Load Name	SF	Notes
01) DL+LL	Linear Add	No	Dead	1	
01) DL+LL			Live<3	1	
01) DL+LL			Live>3	1	
01) DL+LL			Roof Live	1	
01) DL+LL			Sdl	1	
01) DL+LL			Wall	1	
01) DL+LL			Temp	1	
02) 1.5DL+1.5LL	Linear Add	No	Dead	1.5	
02) 1.5DL+1.5LL			Live<3	1.5	
02) 1.5DL+1.5LL			Live>3	1.5	
02) 1.5DL+1.5LL			Roof Live	1.5	
02) 1.5DL+1.5LL			Sdl	1.5	
02) 1.5DL+1.5LL			Wall	1.5	
02) 1.5DL+1.5LL			Temp	1	
03) 1.2DL+1.2LL+1.2Wx	Linear Add	No	Dead	1.2	
03) 1.2DL+1.2LL+1.2Wx			Live<3	1.2	
03) 1.2DL+1.2LL+1.2Wx			Live>3	1.2	
03) 1.2DL+1.2LL+1.2Wx			Roof Live	1.2	
03) 1.2DL+1.2LL+1.2Wx			Sdl	1.2	
03) 1.2DL+1.2LL+1.2Wx			Wall	1.2	
03) 1.2DL+1.2LL+1.2Wx			Temp	1	
03) 1.2DL+1.2LL+1.2Wx			Wx	1.2	
04) 1.2DL+1.2LL-1.2Wx	Linear Add	No	Dead	1.2	
04) 1.2DL+1.2LL-1.2Wx			Live<3	1.2	
04) 1.2DL+1.2LL-1.2Wx			Live>3	1.2	
04) 1.2DL+1.2LL-1.2Wx			Roof Live	1.2	
04) 1.2DL+1.2LL-1.2Wx			Sdl	1.2	

Table 3.4 - Load Combination Definitions (continued)

Name	Type	Is Auto	Load Name	SF	Notes
04) 1.2DL+1.2LL-1.2Wx			Wall	1.2	
04) 1.2DL+1.2LL-1.2Wx			Temp	1	
04) 1.2DL+1.2LL-1.2Wx			Wx	-1.2	
05) 1.2DL+1.2LL+1.2Wy	Linear Add	No	Dead	1.2	
05) 1.2DL+1.2LL+1.2Wy			Live<3	1.2	
05) 1.2DL+1.2LL+1.2Wy			Live>3	1.2	
05) 1.2DL+1.2LL+1.2Wy			Roof Live	1.2	
05) 1.2DL+1.2LL+1.2Wy			Sdl	1.2	
05) 1.2DL+1.2LL+1.2Wy			Wall	1.2	
05) 1.2DL+1.2LL+1.2Wy			Temp	1	
05) 1.2DL+1.2LL+1.2Wy			Wy	1.2	
06) 1.2DL+1.2LL-1.2Wy	Linear Add	No	Dead	1.2	
06) 1.2DL+1.2LL-1.2Wy			Live<3	1.2	
06) 1.2DL+1.2LL-1.2Wy			Live>3	1.2	
06) 1.2DL+1.2LL-1.2Wy			Roof Live	1.2	
06) 1.2DL+1.2LL-1.2Wy			Sdl	1.2	
06) 1.2DL+1.2LL-1.2Wy			Wall	1.2	
06) 1.2DL+1.2LL-1.2Wy			Temp	1	
06) 1.2DL+1.2LL-1.2Wy			Wy	-1.2	
07) 1.5DL+1.5Wx	Linear Add	No	Dead	1.5	
07) 1.5DL+1.5Wx			Sdl	1.5	
07) 1.5DL+1.5Wx			Wall	1.5	
07) 1.5DL+1.5Wx			Temp	1	
07) 1.5DL+1.5Wx			Wx	1.5	
08) 1.5DL-1.5Wx	Linear Add	No	Dead	1.5	
08) 1.5DL-1.5Wx			Sdl	1.5	
08) 1.5DL-1.5Wx			Wall	1.5	
08) 1.5DL-1.5Wx			Temp	1	
08) 1.5DL-1.5Wx			Wx	-1.5	
09) 1.5DL+1.5Wy	Linear Add	No	Dead	1.5	
09) 1.5DL+1.5Wy			Sdl	1.5	
09) 1.5DL+1.5Wy			Wall	1.5	
09) 1.5DL+1.5Wy			Temp	1	
09) 1.5DL+1.5Wy			Wy	1.5	
10) 1.5DL-1.5Wy	Linear Add	No	Dead	1.5	
10) 1.5DL-1.5Wy			Sdl	1.5	
10) 1.5DL-1.5Wy			Wall	1.5	
10) 1.5DL-1.5Wy			Temp	1	
10) 1.5DL-1.5Wy			Wy	-1.5	
11) 0.9DL+1.5Wx	Linear Add	No	Dead	0.9	
11) 0.9DL+1.5Wx			Sdl	0.9	
11) 0.9DL+1.5Wx			Wall	0.9	
11) 0.9DL+1.5Wx			Temp	1	
11) 0.9DL+1.5Wx			Wx	1.5	
12) 0.9DL-1.5Wx	Linear Add	No	Dead	0.9	

Table 3.4 - Load Combination Definitions (continued)

Name	Type	Is Auto	Load Name	SF	Notes
12) 0.9DL-1.5Wx			Sdl	0.9	
12) 0.9DL-1.5Wx			Wall	0.9	
12) 0.9DL-1.5Wx			Temp	1	
12) 0.9DL-1.5Wx			Wx	-1.5	
13) 0.9DL+1.5Wy	Linear Add	No	Dead	0.9	
13) 0.9DL+1.5Wy			Sdl	0.9	
13) 0.9DL+1.5Wy			Wall	0.9	
13) 0.9DL+1.5Wy			Temp	1	
13) 0.9DL+1.5Wy			Wy	1.5	
14) 0.9DL-1.5Wy	Linear Add	No	Dead	0.9	
14) 0.9DL-1.5Wy			Sdl	0.9	
14) 0.9DL-1.5Wy			Wall	0.9	
14) 0.9DL-1.5Wy			Temp	1	
14) 0.9DL-1.5Wy			Wy	-1.5	
15) 1.2DL+1.2LL+1.2Spx	Linear Add	No	Dead	1.2	
15) 1.2DL+1.2LL+1.2Spx			Live<3	1.2	
15) 1.2DL+1.2LL+1.2Spx			Live>3	1.2	
15) 1.2DL+1.2LL+1.2Spx			Roof Live	1.2	
15) 1.2DL+1.2LL+1.2Spx			Sdl	1.2	
15) 1.2DL+1.2LL+1.2Spx			Wall	1.2	
15) 1.2DL+1.2LL+1.2Spx			Temp	1	
15) 1.2DL+1.2LL+1.2Spx			Spx	1.2	
16) 1.2DL+1.2LL+1.2Spy	Linear Add	No	Dead	1.2	
16) 1.2DL+1.2LL+1.2Spy			Live<3	1.2	
16) 1.2DL+1.2LL+1.2Spy			Live>3	1.2	
16) 1.2DL+1.2LL+1.2Spy			Roof Live	1.2	
16) 1.2DL+1.2LL+1.2Spy			Sdl	1.2	
16) 1.2DL+1.2LL+1.2Spy			Wall	1.2	
16) 1.2DL+1.2LL+1.2Spy			Temp	1	
16) 1.2DL+1.2LL+1.2Spy			Spy	1.2	
17) 1.5DL+1.5Spx	Linear Add	No	Dead	1.5	
17) 1.5DL+1.5Spx			Sdl	1.5	
17) 1.5DL+1.5Spx			Wall	1.5	
17) 1.5DL+1.5Spx			Temp	1	
17) 1.5DL+1.5Spx			Spx	1.5	
18) 1.5DL+1.5Spy	Linear Add	No	Dead	1.5	
18) 1.5DL+1.5Spy			Sdl	1.5	
18) 1.5DL+1.5Spy			Wall	1.5	
18) 1.5DL+1.5Spy			Temp	1	
18) 1.5DL+1.5Spy			Spy	1.5	
19) 0.9DL+1.5Spx	Linear Add	No	Dead	0.9	
19) 0.9DL+1.5Spx			Sdl	0.9	
19) 0.9DL+1.5Spx			Wall	0.9	
19) 0.9DL+1.5Spx			Temp	1	
19) 0.9DL+1.5Spx			Spx	1.5	

Table 3.4 - Load Combination Definitions (continued)

Name	Type	Is Auto	Load Name	SF	Notes
20) 0.9DL+1.5Spy	Linear Add	No	Dead	0.9	
20) 0.9DL+1.5Spy			Sdl	0.9	
20) 0.9DL+1.5Spy			Wall	0.9	
20) 0.9DL+1.5Spy			Temp	1	
20) 0.9DL+1.5Spy			Spy	1.5	
21) 1.2DL+1.2LL+1.2Spx+0.36Spy+0.36Spz	Linear Add	No	Dead	1.2	
21) 1.2DL+1.2LL+1.2Spx+0.36Spy+0.36Spz			Live<3	1.2	
21) 1.2DL+1.2LL+1.2Spx+0.36Spy+0.36Spz			Live>3	1.2	
21) 1.2DL+1.2LL+1.2Spx+0.36Spy+0.36Spz			Roof Live	1.2	
21) 1.2DL+1.2LL+1.2Spx+0.36Spy+0.36Spz			Sdl	1.2	
21) 1.2DL+1.2LL+1.2Spx+0.36Spy+0.36Spz			Wall	1.2	
21) 1.2DL+1.2LL+1.2Spx+0.36Spy+0.36Spz			Temp	1	
21) 1.2DL+1.2LL+1.2Spx+0.36Spy+0.36Spz			Spx	1.2	
21) 1.2DL+1.2LL+1.2Spx+0.36Spy+0.36Spz			Spy	0.36	
21) 1.2DL+1.2LL+1.2Spx+0.36Spy+0.36Spz			Spz	0.36	
22) 1.2DL+1.2LL+1.2Spy+0.36Spx+0.36Spz	Linear Add	No	Dead	1.2	
22) 1.2DL+1.2LL+1.2Spy+0.36Spx+0.36Spz			Live<3	1.2	
22) 1.2DL+1.2LL+1.2Spy+0.36Spx+0.36Spz			Live>3	1.2	
22) 1.2DL+1.2LL+1.2Spy+0.36Spx+0.36Spz			Roof Live	1.2	
22) 1.2DL+1.2LL+1.2Spy+0.36Spx+0.36Spz			Sdl	1.2	
22) 1.2DL+1.2LL+1.2Spy+0.36Spx+0.36Spz			Wall	1.2	
22) 1.2DL+1.2LL+1.2Spy+0.36Spx+0.36Spz			Temp	1	
22) 1.2DL+1.2LL+1.2Spy+0.36Spx+0.36Spz			Spy	1.2	
22) 1.2DL+1.2LL+1.2Spy+0.36Spx+0.36Spz			Spx	0.36	
22) 1.2DL+1.2LL+1.2Spy+0.36Spx+0.36Spz			Spz	0.36	
23) 1.2DL+1.2LL+1.2Spz+0.36Spx+0.36Spy	Linear Add	No	Dead	1.2	
23) 1.2DL+1.2LL+1.2Spz+0.36Spx+0.36Spy			Live<3	1.2	
23) 1.2DL+1.2LL+1.2Spz+0.36Spx+0.36Spy			Live>3	1.2	
23) 1.2DL+1.2LL+1.2Spz+0.36Spx+0.36Spy			Roof Live	1.2	
23) 1.2DL+1.2LL+1.2Spz+0.36Spx+0.36Spy			Sdl	1.2	
23) 1.2DL+1.2LL+1.2Spz+0.36Spx+0.36Spy			Wall	1.2	
23) 1.2DL+1.2LL+1.2Spz+0.36Spx+0.36Spy			Temp	1	
23) 1.2DL+1.2LL+1.2Spz+0.36Spx+0.36Spy			Spz	1.2	
23) 1.2DL+1.2LL+1.2Spz+0.36Spx+0.36Spy			Spx	0.36	
23) 1.2DL+1.2LL+1.2Spz+0.36Spx+0.36Spy			Spy	0.36	
24) 1.5DL+1.5Spx+0.45Spy+0.45Spz	Linear Add	No	Dead	1.5	
24) 1.5DL+1.5Spx+0.45Spy+0.45Spz			Sdl	1.5	
24) 1.5DL+1.5Spx+0.45Spy+0.45Spz			Wall	1.5	
24) 1.5DL+1.5Spx+0.45Spy+0.45Spz			Temp	1	
24) 1.5DL+1.5Spx+0.45Spy+0.45Spz			Spx	1.5	
24) 1.5DL+1.5Spx+0.45Spy+0.45Spz			Spy	0.45	
24) 1.5DL+1.5Spx+0.45Spy+0.45Spz			Spz	0.45	
25) 1.5DL+1.5Spy+0.45Spx+0.45Spz	Linear Add	No	Dead	1.5	
25) 1.5DL+1.5Spy+0.45Spx+0.45Spz			Sdl	1.5	
25) 1.5DL+1.5Spy+0.45Spx+0.45Spz			Wall	1.5	

Table 3.4 - Load Combination Definitions (continued)

Name	Type	Is Auto	Load Name	SF	Notes
25) 1.5DL+1.5Spy+0.45Spx+0.45Spz			Temp	1	
25) 1.5DL+1.5Spy+0.45Spx+0.45Spz			Spy	1.5	
25) 1.5DL+1.5Spy+0.45Spx+0.45Spz			Spx	0.45	
25) 1.5DL+1.5Spy+0.45Spx+0.45Spz			Spz	0.45	
26) 1.5DL+1.5Spz+0.45Spx+0.45Spy	Linear Add	No	Dead	1.5	
26) 1.5DL+1.5Spz+0.45Spx+0.45Spy			Sdl	1.5	
26) 1.5DL+1.5Spz+0.45Spx+0.45Spy			Wall	1.5	
26) 1.5DL+1.5Spz+0.45Spx+0.45Spy			Temp	1	
26) 1.5DL+1.5Spz+0.45Spx+0.45Spy			Spz	1.5	
26) 1.5DL+1.5Spz+0.45Spx+0.45Spy			Spx	0.45	
26) 1.5DL+1.5Spz+0.45Spx+0.45Spy			Spy	0.45	
27) 0.9DL+1.5Spx+0.45Spy+0.45Spz	Linear Add	No	Dead	0.9	
27) 0.9DL+1.5Spx+0.45Spy+0.45Spz			Sdl	0.9	
27) 0.9DL+1.5Spx+0.45Spy+0.45Spz			Wall	0.9	
27) 0.9DL+1.5Spx+0.45Spy+0.45Spz			Temp	1	
27) 0.9DL+1.5Spx+0.45Spy+0.45Spz			Spx	1.5	
27) 0.9DL+1.5Spx+0.45Spy+0.45Spz			Spy	0.45	
27) 0.9DL+1.5Spx+0.45Spy+0.45Spz			Spz	0.45	
28) 0.9DL+1.5Spy+0.45Spx+0.45Spz	Linear Add	No	Dead	0.9	
28) 0.9DL+1.5Spy+0.45Spx+0.45Spz			Sdl	0.9	
28) 0.9DL+1.5Spy+0.45Spx+0.45Spz			Wall	0.9	
28) 0.9DL+1.5Spy+0.45Spx+0.45Spz			Temp	1	
28) 0.9DL+1.5Spy+0.45Spx+0.45Spz			Spy	1.5	
28) 0.9DL+1.5Spy+0.45Spx+0.45Spz			Spx	0.45	
28) 0.9DL+1.5Spy+0.45Spx+0.45Spz			Spz	0.45	
29) 0.9DL+1.5Spz+0.45Spx+0.45Spy	Linear Add	No	Dead	0.9	
29) 0.9DL+1.5Spz+0.45Spx+0.45Spy			Sdl	0.9	
29) 0.9DL+1.5Spz+0.45Spx+0.45Spy			Wall	0.9	
29) 0.9DL+1.5Spz+0.45Spx+0.45Spy			Temp	1	
29) 0.9DL+1.5Spz+0.45Spx+0.45Spy			Spz	1.5	
29) 0.9DL+1.5Spz+0.45Spx+0.45Spy			Spx	0.45	
29) 0.9DL+1.5Spz+0.45Spx+0.45Spy			Spy	0.45	
LC 1	Linear Add	No	Dead	1	
LC 1			Sdl	1	
LC 1			Wall	1	
LC 1			Temp	1	
LC 1			Live<3	1	
LC 1			Live>3	1	
LC 1			Roof Live	1	
LC 2	Linear Add	No	Dead	1	
LC 2			Sdl	1	
LC 2			Wall	1	
LC 2			Temp	1	
LC 2			Spx	1	
LC 3	Linear Add	No	Dead	1	

Table 3.4 - Load Combination Definitions (continued)

Name	Type	Is Auto	Load Name	SF	Notes
LC 3			Sdl	1	
LC 3			Wall	1	
LC 3			Temp	1	
LC 3			Spy	1	
LC 4	Linear Add	No	Dead	1	
LC 4			Sdl	1	
LC 4			Wall	1	
LC 4			Temp	1	
LC 4			Wx	1	
LC 5	Linear Add	No	Dead	1	
LC 5			Sdl	1	
LC 5			Wall	1	
LC 5			Temp	1	
LC 5			Wx	-1	
LC 6	Linear Add	No	Dead	1	
LC 6			Sdl	1	
LC 6			Wall	1	
LC 6			Temp	1	
LC 6			Wy	1	
LC 7	Linear Add	No	Dead	1	
LC 7			Sdl	1	
LC 7			Wall	1	
LC 7			Temp	1	
LC 7			Wy	-1	
LC 8	Linear Add	No	Dead	1	
LC 8			Sdl	1	
LC 8			Wall	1	
LC 8			Temp	1	
LC 8			Spx	0.8	
LC 8			Live<3	0.8	
LC 8			Live>3	0.8	
LC 8			Roof Live	0.8	
LC 9	Linear Add	No	Dead	1	
LC 9			Sdl	1	
LC 9			Wall	1	
LC 9			Temp	1	
LC 9			Spy	0.8	
LC 9			Live<3	0.8	
LC 9			Live>3	0.8	
LC 9			Roof Live	0.8	
LC 10	Linear Add	No	Dead	1	
LC 10			Sdl	1	
LC 10			Wall	1	
LC 10			Temp	1	
LC 10			Wx	0.8	

Table 3.4 - Load Combination Definitions (continued)

Name	Type	Is Auto	Load Name	SF	Notes
LC 10			Live<3	0.8	
LC 10			Live>3	0.8	
LC 10			Roof Live	0.8	
LC 11	Linear Add	No	Dead	1	
LC 11			Sdl	1	
LC 11			Wall	1	
LC 11			Temp	1	
LC 11			Wx	-0.8	
LC 11			Live<3	0.8	
LC 11			Live>3	0.8	
LC 11			Roof Live	0.8	
LC 12	Linear Add	No	Dead	1	
LC 12			Sdl	1	
LC 12			Wall	1	
LC 12			Temp	1	
LC 12			Wy	0.8	
LC 12			Live<3	0.8	
LC 12			Live>3	0.8	
LC 12			Roof Live	0.8	
LC 13	Linear Add	No	Dead	1	
LC 13			Sdl	1	
LC 13			Wall	1	
LC 13			Temp	1	
LC 13			Wy	-0.8	
LC 13			Live<3	0.8	
LC 13			Live>3	0.8	
LC 13			Roof Live	0.8	

4 Analysis Results

This chapter provides analysis results.

4.1 Modal Results

Table 4.1 - Modal Periods And Frequencies

Case	Mode	Period sec	Frequency cyc/sec	CircFreq rad/sec	Eigenvalue rad2/sec2
Modal	1	3.62	0.276	1.7356	3.0123
Modal	2	3.558	0.281	1.766	3.1187
Modal	3	3.178	0.315	1.9771	3.9088
Modal	4	1.03	0.971	6.1029	37.2451
Modal	5	1	1	6.2817	39.4599
Modal	6	0.875	1.142	7.1774	51.515
Modal	7	0.511	1.959	12.306	151.4369
Modal	8	0.473	2.114	13.283	176.4374
Modal	9	0.412	2.43	15.2655	233.0365
Modal	10	0.387	2.586	16.2486	264.0179
Modal	11	0.37	2.703	16.9833	288.4313
Modal	12	0.359	2.783	17.4879	305.8267
Modal	13	0.321	3.117	19.5827	383.482
Modal	14	0.301	3.317	20.8408	434.3397
Modal	15	0.287	3.49	21.9282	480.848
Modal	16	0.283	3.536	22.219	493.6821
Modal	17	0.261	3.834	24.0912	580.3877
Modal	18	0.257	3.894	24.4681	598.6899
Modal	19	0.254	3.935	24.7274	611.4452
Modal	20	0.223	4.487	28.1931	794.8534
Modal	21	0.214	4.664	29.3078	858.9482
Modal	22	0.202	4.944	31.0665	965.1257
Modal	23	0.177	5.648	35.4877	1259.3781
Modal	24	0.16	6.253	39.2902	1543.72
Modal	25	0.126	7.952	49.9647	2496.4678
Modal	26	0.114	8.797	55.2709	3054.8712
Modal	27	0.107	9.351	58.7554	3452.1927
Modal	28	0.067	14.897	93.6036	8761.627
Modal	29	0.057	17.645	110.8665	12291.3821
Modal	30	0.049	20.239	127.1644	16170.7802

Table 4.2 - Modal Participating Mass Ratios (Part 1 of 2)

Case	Mode	Period sec	UX	UY	UZ	SumUX	SumUY	SumUZ	RX	RY	RZ
Modal	1	3.62	0.2634	0.0835	1.088E-05	0.2634	0.0835	1.088E-05	0.0345	0.2285	0.1676
Modal	2	3.558	0.123	0.4511	1.708E-06	0.3864	0.5347	1.259E-05	0.1778	0.1031	0.0051
Modal	3	3.178	0.2721	0.0272	1.512E-06	0.6585	0.5619	1.41E-05	0.0106	0.2253	0.2061
Modal	4	1.03	0.0013	0.1081	0	0.6598	0.6699	1.442E-05	0.0579	0.0012	0.003
Modal	5	1	0.0792	0.0036	2.076E-05	0.739	0.6736	3.518E-05	0.0022	0.0652	0.0391
Modal	6	0.875	0.0827	0.0002	1.343E-06	0.8217	0.6738	3.653E-05	0.0003	0.0694	0.0415
Modal	7	0.511	0.0001	0.0513	9.921E-06	0.8218	0.7251	4.645E-05	0.0153	3.99E-05	2.295E-05

Table 4.2 - Modal Participating Mass Ratios (Part 1 of 2, continued)

Case	Mode	Period sec	UX	UY	UZ	SumUX	SumUY	SumUZ	RX	RY	RZ
Modal	8	0.473	0.0296	0.0001	4.725E-06	0.8514	0.7252	0.0001	0.0001	0.0232	0.0168
Modal	9	0.412	0.0382	0.0001	0	0.8895	0.7252	0.0001	1.68E-05	0.0323	0.0165
Modal	10	0.387	0	0	0.0025	0.8895	0.7252	0.0025	0.0031	0.0008	8.951E-07
Modal	11	0.37	0	0	0.0016	0.8895	0.7252	0.0041	0.002	0.0001	3.95E-06
Modal	12	0.359	0	0	0.0011	0.8895	0.7252	0.0051	0.0057	0.0004	2.749E-06
Modal	13	0.321	0.0001	0.0316	0.0001	0.8897	0.7568	0.0052	0.0179	0.0002	1.989E-05
Modal	14	0.301	0.0001	1.025E-05	0.0279	0.8897	0.7568	0.0331	0.0103	2.708E-06	0.0003
Modal	15	0.287	0.0149	6.474E-06	0.0234	0.9046	0.7568	0.0565	0.0011	0.0225	0.007
Modal	16	0.283	0.0009	0.0001	0.2345	0.9055	0.7569	0.2911	0.0072	0.003	0.0013
Modal	17	0.261	0.0035	0.0011	0.1401	0.909	0.758	0.4312	0.0033	0.0062	0.0021
Modal	18	0.257	0.0123	0.0026	0.0021	0.9213	0.7606	0.4333	0.0022	0.0203	0.0079
Modal	19	0.254	0.0028	0.0023	0.1079	0.9241	0.7629	0.5412	0.0054	0.0041	0.001
Modal	20	0.223	0.0008	0.003	0.0754	0.9249	0.7658	0.6166	0.0134	0.0006	0.0002
Modal	21	0.214	0.0002	0.0171	0.0112	0.9251	0.7829	0.6278	0.012	0.0003	1.29E-05
Modal	22	0.202	0.0043	0.0001	0.0163	0.9294	0.783	0.6441	0.0001	0.0102	0.0006
Modal	23	0.177	0.0003	0.0008	0.0694	0.9296	0.7838	0.7135	0	0.0003	4.914E-05
Modal	24	0.16	3.146E-06	0.0201	0.0019	0.9296	0.8039	0.7154	0.0061	2.633E-06	0.0009
Modal	25	0.126	0.0021	1.158E-05	0.0255	0.9317	0.8039	0.741	0.0003	0.0023	0.0126
Modal	26	0.114	0.001	0.0042	0.051	0.9328	0.8081	0.792	0.0078	0.0012	0.0139
Modal	27	0.107	1.121E-06	0.0443	0.0048	0.9328	0.8524	0.7968	0.0441	4.078E-06	0.0014
Modal	28	0.067	0.0001	0.1411	0.0002	0.9329	0.9935	0.7971	0.0922	0.0002	3.326E-05
Modal	29	0.057	0.0017	0.0001	0.1091	0.9346	0.9936	0.9061	0.0007	0.0027	0.0144
Modal	30	0.049	0.0419	0.0008	0.0045	0.9765	0.9944	0.9106	0.0008	0.0624	0.2503

Table 4.2 - Modal Participating Mass Ratios (Part 2 of 2)

Case	Mode	SumRX	SumRY	SumRZ
Modal	1	0.0345	0.2285	0.1676
Modal	2	0.2123	0.3317	0.1727
Modal	3	0.2228	0.5569	0.3788
Modal	4	0.2807	0.5581	0.3818
Modal	5	0.2829	0.6233	0.4209
Modal	6	0.2833	0.6926	0.4624
Modal	7	0.2986	0.6927	0.4625
Modal	8	0.2987	0.7159	0.4793
Modal	9	0.2987	0.7481	0.4958
Modal	10	0.3018	0.7489	0.4958
Modal	11	0.3038	0.749	0.4958
Modal	12	0.3095	0.7494	0.4958
Modal	13	0.3274	0.7497	0.4959
Modal	14	0.3376	0.7497	0.4961
Modal	15	0.3387	0.7722	0.5031
Modal	16	0.3459	0.7752	0.5044
Modal	17	0.3493	0.7814	0.5065
Modal	18	0.3515	0.8016	0.5143
Modal	19	0.3569	0.8058	0.5153

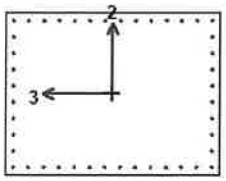
Table 4.2 - Modal Participating Mass Ratios (Part 2 of 2, continued)

Case	Mode	SumRX	SumRY	SumRZ
Modal	20	0.3703	0.8064	0.5155
Modal	21	0.3822	0.8067	0.5155
Modal	22	0.3823	0.8169	0.5162
Modal	23	0.3823	0.8172	0.5162
Modal	24	0.3885	0.8172	0.5171
Modal	25	0.3888	0.8195	0.5297
Modal	26	0.3965	0.8206	0.5436
Modal	27	0.4406	0.8206	0.545
Modal	28	0.5328	0.8208	0.5451
Modal	29	0.5335	0.8235	0.5594
Modal	30	0.5344	0.8859	0.8097

RC COLUMN DESIGN

ETABS Concrete Frame Design

IS 456:2000 + IS 13920:2016 Column Section Design (Summary)



Column Element Details (Part 1 of 2)

Level	Element	Unique Name	Section ID	Combo ID	Station Loc	Length (mm)
1	C6	4342	C 1200X1600	27) 0.9DL+1.5Spx+0.45Spy+0.45Spz	4050	5250

Column Element Details (Part 2 of 2)

LLRF	Type
1	Ductile Frame

Section Properties

b (mm)	h (mm)	dc (mm)	Cover (Torsion) (mm)
1600	1200	58	30

Material Properties

E_c (MPa)	f_{ck} (MPa)	Lt.Wt Factor (Unitless)	f_y (MPa)	f_{ys} (MPa)
35355.34	50	1	550	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 % %
7196.9165	-2390.4575	-15425.4642	442.1306	346.1717	59383	3.09

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	4050	-2286.5704	0	346.1717
Minor Bend(M2)	1	4050	-1449.7513	0	442.1306

Axial Compression Check for Seismic Design per IS 13920:2016 Section 7.1

Limit Compression Factor Unitless	Limit Compression Strength kN	Compression D/C Ratio Unitless	Status
0.4	38400	0.301599	OK

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}	5876.3673	1824.0705	4052.2968	5876.3673	9833
Minor, V_{u3}	1885.119	1837.996	740.1584	1885.119	1330.12

Joint Shear Check/Design

	Joint Shear Force kN	Shear V_{Top} kN	Shear $V_{u,Tol}$ kN	Shear V_c kN	Joint Area cm²	Shear Ratio Unitless
Major Shear, V_{u2}	0	0	10362.9368	16291.7402	19200	0.636
Minor Shear, V_{u3}	0	0	3182.014	21722.3203	25600	0.146

(1.4) Beam/Column Capacity Ratio

Major Ratio	Minor Ratio
0.942	0.244

Additional Moment Reduction Factor k (IS 39.7.1.1)

A_g cm²	A_{sc} cm²	P_{uz} kN	P_b kN	P_u kN	k Unitless
19200	593.8	67695.4435	22468.421	7196.9165	1

Additional Moment (IS 39.7.1)

	Consider M_a	Length Factor	Section Depth (mm)	KL/Depth Ratio	KL/Depth Limit	KL/Depth Exceeded	M_a Moment (kN-m)
Major Bending (M_3)	Yes	0.771	1200	3.375	12	No	0
Minor Bending (M_2)	Yes	0.771	1600	2.531	12	No	0

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)	Pier Ductility	LLRF
2	SW8a	29899	105264	3180	200	Special Wall	0.5

Material Properties

E_c (MPa)	f_{ck} (MPa)	Lt.Wt Factor (Unitless)	f_y (MPa)	f_{ys} (MPa)
35355.34	50	1	550	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	0.8	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	29899	103674	29899	106854	3180	200
Bottom	Leg 1	29899	103674	29899	106854	3180	200

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

Station Location	Required Rebar Area (mm²)	Required Reinf Ratio	Current Reinf Ratio	Flexural Combo	P_u kN	M_{u2} kN-m	M_{u3} kN-m	Pier A_g mm²
Top	23122	0.0364	0.0022	07) 1.5DL+1.5Wx	16348.4927	361.0188	1837.5706	636000
Bottom	23386	0.0368	0.0022	07) 1.5DL+1.5Wx	16424.7902	-362.9721	1846.1464	636000

Shear Design

Station Location	ID	Rebar mm²/m	Shear Combo	P_u kN	M_u kN-m	V_u kN	V_c kN	$V_c + V_s$ kN
Top	Leg 1	500	25) 1.5DL+1.5Spy+0.45Spx+0.45Spz	11127.9689	845.0026	-84.1069	649.3675	1108.3936
Bottom	Leg 1	500	25) 1.5DL+1.5Spy+0.45Spx+0.45Spz	11203.6946	760.8135	-84.1069	651.9015	1110.9276

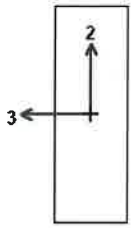
Boundary Element Check

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	1200	25) 1.5DL+1.5Spy+0.45Spx+0.45Spz	14745.6703	-862.9578	25.75	10
Top–Right	Leg 1	1200	25) 1.5DL+1.5Spy+0.45Spx+0.45Spz	14745.6703	845.0026	25.69	10
Bottom–Left	Leg 1	1200	25) 1.5DL+1.5Spy+0.45Spx+0.45Spz	14822.5394	-1122.5918	26.64	10
Botttom–Right	Leg 1	1200	25) 1.5DL+1.5Spy+0.45Spx+0.45Spz	14822.5394	760.8135	25.56	10

RC BEAM DESIGN

ETABS Concrete Frame Design

IS 456:2000 + IS 13920:2016 Beam Section Design (Summary)



Beam Element Details

Level	Element	Unique Name	Section ID	Combo ID	Station Loc	Length (mm)	LLRF	Type
2	B134	79	B 200X600	08) 1.5DL-1.5Wx	29	5565	1	Ductile Frame

Section Properties

b (mm)	h (mm)	b_f (mm)	d_s (mm)	d_{ct} (mm)	d_{cb} (mm)
200	600	200	0	45	45

Material Properties

E_c (MPa)	f_{ck} (MPa)	Lt.Wt Factor (Unitless)	f_y (MPa)	f_{ys} (MPa)
29580.4	35	1	550	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
-313.2333	0.0208	227.058	0

Design Moments, M_{u3} & M_t

Factored Moment kN-m	Factored M_t kN-m	Positive Moment kN-m	Negative Moment kN-m
-313.2333	0.049	0	-313.2823

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)	-313.2823		1433	0	1433	358
Bottom (-2 Axis)		0	358	0	140	358

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
227.058	81.9378	145.2869	46.9718	725.41

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
0.0208	227.058	130	530	0

RC SLAB DESIGN

DESIGN OF SLAB : **TS1**

Panel Name : Two Short edge discontinuous Code : 10 18

Clear Longer span, ly = 5800 mm

Clear Shorter span, lx = 5100 mm

ly / lx = 1.14 < 2, Hence, Twoway slab.

Effective Longer span = 5921.00 mm

Effective Shorter span = 5221.00 mm

Assume thickness of slab = 150.00 mm

Effective depth available = 121.00 mm

Loads :

Dead Load and Imposed Load (fixed) :

Floor finish = 1.800 kN/m^2

Self weight = 3.750 kN/m^2

w_{DL} = 5.550 kN/m^2

Imposed Load (Not fixed) :

Occupancy classification as per IS: 875(Part 2) - 1987 :

Live load = 2.000 kN/m^2

w_{LL} = 2.000 kN/m^2

Total load, $w = w_{DL} + w_{LL}$ = 7.550 kN/m^2

Span Moments:

Along Shorter span: $BM = \alpha_x w l_x^2$ = 0.038 x 7.55 x 5.221^2 = 7.80 kNm M_{ux1} = 11.70 kNm

Along Longer span: $BM = \alpha_y w l_x^2$ = 0.035 x 7.55 x 5.221^2 = 7.20 kNm M_{uy1} = 10.80 kNm

Support Moments:

Along Shorter span: $BM = \alpha_x w l_x^2$ = 0.050 x 7.55 x 5.221^2 = 10.27 kNm M_{ux2} = 15.40 kNm

Along Longer span: $BM = \alpha_y w l_x^2$ = 0 x 7.55 x 5.221^2 = 0.00 kNm M_{uy2} = 0.00 kNm

Check for section :

Factored Max. BM, Mu = 15.40 kNm / m

For M35 grade concrete & Fe550 grade steel , $Mu, lim / bd^2$ = 4.829

Effective depth required = 56.48 mm < Effective depth available, OK

Along the Shorter span

A_{st} reqd at midspan :

$A_{st} = [\ 0.5 f_{ck} / f_y\ ] \{1 - \sqrt{(\ 1 - [4.6\ M_{ux1} / (f_{ck}\ bd^2)]\ )}\}\ b\ d =$ 207.79 mm^2 / m

Provide 8 mm dia bars @ 150 mm c/c As = 335.10 mm^2 / m OK

A_{st} reqd at support :

$A_{st} = [\ 0.5 f_{ck} / f_y\ ] \{1 - \sqrt{(\ 1 - [4.6\ M_{ux2} / (f_{ck}\ bd^2)]\ )}\}\ b\ d =$ 276.09 mm^2 / m

Provide 8 mm dia bars @ 150 mm c/c As = 335.10 mm^2 / m OK

Along the Longer span

A_{st} reqd at midspan :

$A_{st} = [\ 0.5 f_{ck} / f_y\ ] \{1 - \sqrt{(\ 1 - [4.6\ M_{uy1} / (f_{ck}\ bd^2)]\ )}\}\ b\ d =$ 191.47 mm^2 / m

Provide 8 mm dia bars @ 150 mm As = 335.10 mm^2 / m OK

A_{st} reqd at support :

$A_{st} = [\ 0.5 f_{ck} / f_y\ ] \{1 - \sqrt{(\ 1 - [4.6\ M_{uy2} / (f_{ck}\ bd^2)]\ )}\}\ b\ d =$ 0.00 mm^2 / m

Provide 8 mm dia bars @ 150 mm c/c As = 335.10 mm^2 / m OK

Min Ast = 0.12% Gross section area = 180 mm^2 / m

Distribution steel = 0.5 x (0.12/100) x 1000 x 150 = 90.00 mm^2 / m

Provide 8 mm dia bars @ 250 mm c/c As = 201.06 mm^2 / m OK

Max Spacing = 3d or 300 mm whichever is less = 363 mm or 300 mm

Check for deflection:

fs = 0.58 x fy x (Ast req/Ast pro) = 197.80 MPa

MF = 1/(0.225+0.00322 fs – 0.625 log 10 (1/pt)) ≤ 2 = 1.948

Type of Slab = Continuous

Effective Shorter span = 5221.00 mm

Basic Value = 26

Allowable l/d = 50.64

Actual l/d = 43.15 Hence OK

30/12/25

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THE LANDLENS SUITE

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

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

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

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

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

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

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

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

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

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

FREE TOOLS · NO ACCOUNT NEEDED

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

Records and verification

The registers themselves, read for you.

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

Value and duty

What it is worth and what it costs to register.

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

Zoning and land use

What the plan says can happen on this land.

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

Registers and directories

Who holds it, and which office keeps the record.

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

Every free tool
/tools

Services we run for you
/services

The LandLens suite
/landlens/one

Verified RealEstate™

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

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

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