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DESIGN BASIS REPORT

PROPOSED RESIDENTIAL APARTMENT-VARAM AT VILANKURICHI, COIMBATORE.

[ONE BASEMENT +STILT+ 9 UPPER FLOORS ABOVE]

CLIENT : **M/s. Renaatus Projects Pvt.Ltd**

DATE : **20/03/2025**

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Structural Design Basis Report for the Proposed Residential Apartment-Varam at Vilankurichi, Coimbatore.

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1.0 DESIGN BRIEF:

This document furnishes the structural design basis for the Proposed Residential Apartment-Varam at Vilankurichi, Coimbatore. The building was designed as a Reinforced Cement Concrete Framed Structure with Raft foundation. The design was done in accordance with IS 456:2000 (Limit State Method) IS 1893:2016 and NBC (SP 7-1983).

2.0 GENERAL DESIGN CRITERIA

2.1 Description of the structure

The building consists of One Basement + Stilt + 9 Upper floors + Terrace floor [Foundation has been designed for One basement + stilt + 9 upper floors] and the structure is designed as a RCC framed structure.

1.	Size of the building	: 113.08 x 19.71 m [approximately]
2.	Height of the building	: 34.74 m from FGL
3.	Number of storeys above GL	: Stilt + 9 upper floors
4.	Floor to floor height of the building	: Each floor – 3 m
5.	Type of foundation	: Raft Foundation [As per soil investigation report]

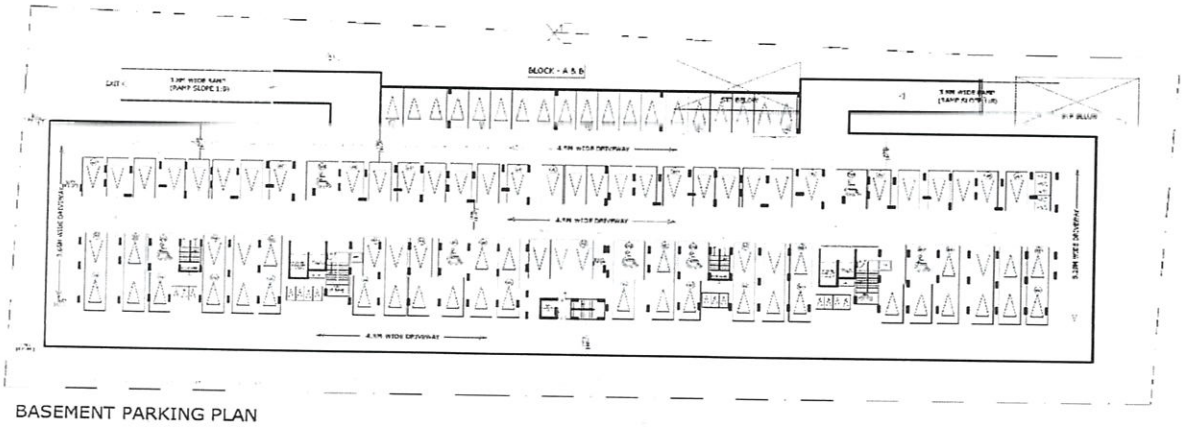
2.2 Materials Used

Following materials are generally used in the design of the various components of the structure.
For Concrete Structure

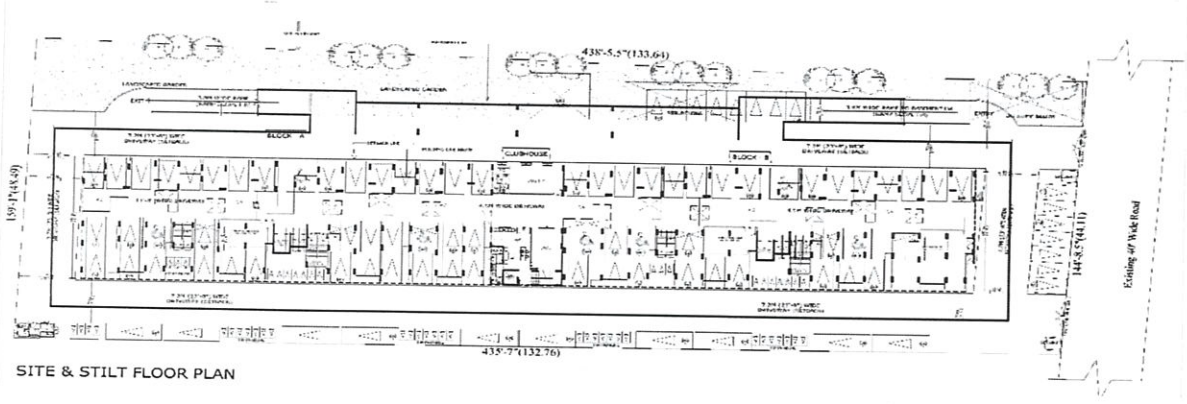
- M35 grade concrete for Column, Core wall reinforced concrete parts of the structure
- M35 grade concrete for RC Slab, Beam reinforced concrete parts of the structure
- M30 grade concrete for Raft reinforced concrete part of structure
- Fe550D grade Structural reinforcement steel
- Aerocon/Renacon Masonry for all walls

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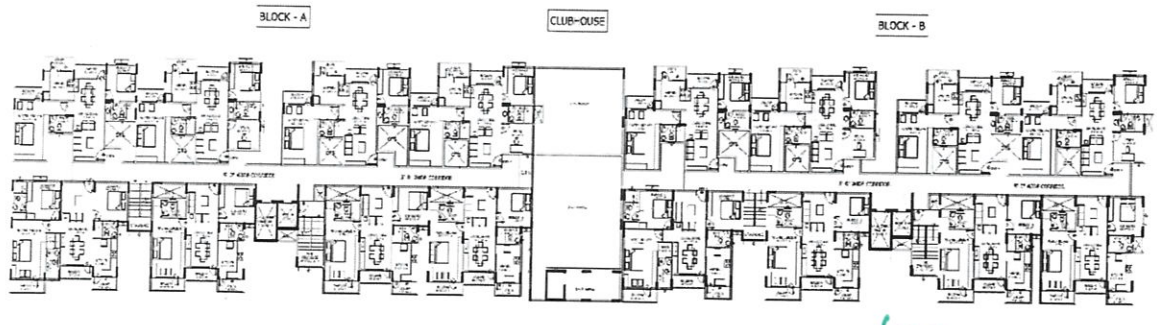
2.3 Architectural Plan



BASEMENT PARKING PLAN



SITE & STILT FLOOR PLAN



TYPICAL FLOOR PLAN (4-9 FLRS)

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2.4 Design Codes & Standards

Following codes and specifications have been generally used in the design of the member of the structure.

- Is 456: 2000 Code of practice for Plain and Reinforced concrete
- SP: 16 Design Aids for Reinforced concrete
- IS 875-1: 1987 Design Loads for building and structures
- IS 875-2 :1987 Design loads for Buildings and structures, Code of Practice Imposed Loads
- IS 875-3:2015 Design loads for Buildings and structures, Cod of Practice Wind Loads
- IS 1893: 2016 Criteria for Earthquake Resistant design of structures
- SP: 34 Handbook on Concrete Reinforcement & Detailing
- IS 1904: 1986 Code of practice for design and construction of foundations in soil general Requirements.
- IS 1786: 2008 Specification for high strength deformed bars and wires for concrete reinforcement

3.0 LOADING

Primary Load:

- Dead Load (DL)
- Live Load (LL)
- Earthquake Load (EL)
- Wind Load (WL)

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3.1 Dead Load (DL)

The unit weights of the materials considered are in accordance with IS 875:1987 Part 1. The unit weights are as follows

- Density of Reinforced Concrete = 25kN/m^3
- Plain Cement Concrete = 24 kN/m^3
- D.L. due to partitions
  (Light Partition as per IS 875) = 1.00 kN/m^2
- D.L due to floor finish 50 mm think = 0.05 x 20 = 1.0 kN/m^2
- Brick Masonry = 20 kN/m^3

3.2 Live Load (LL)

The Live loads considered are in accordance with IS 875:1987 Part 2. The Live loads are as follows

Occupancy or use	Live Load (kN/m^2)
• All rooms	2.0
• Hall	3.0
• Corridors, passages and staircase	4.0
• Terrace Floor	1.5

3.3 Seismic Load (EL) :

The structure is located at Chennai, in Zone – III. This is a seismic Moderate damage risk Intensity zone. Thus the seismic loads are considered for design as per IS 1893:2016.

Zone Factor	=	0.16
Importance factor	=	1.2
Response reduction factor	=	4
Depth of Foundation	=	4m

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Type of Soil	=	Type – I
		Depth of foundation - 4m
		SBC of soil - 360T/m^2
		[As per Soil investigation report]
Type of Structure	=	RCC Framed Structure
Time Period in X and Y Dir.	=	0.09 x h / $\sqrt{d}$
Design base shear (Vb)	=	$\frac{Z}{2} \times \frac{I}{R} \times \frac{S_a}{g} \times W$

3.4 Wind Load (WL) :

The Wind Pressure on the Structure was calculated using IS:875-Part 3-2015.

The basic wind speed for Coimbatore, V_b	=	39 m/s	
probability factor, k_1	=	1	
Terrain Category 2, k_2	=	1.	
Topography factor, k_3	=	1 (Flat terrain)	
Importance factor for Cyclonic region k_4	=	1.0	
The Design wind Speed, V_z	=	V_bx k_1x k_2x k_3 xk_4	= 39 m/s
Wind pressure, p_z	=	$0.6V_Z^2$	=0.91N/m^2
Design wind pressure , p_d	=	K_d x K_a x K_c x p_z	
Wind directionality factor , K_d	=	0.9	
Area averaging factor , K_a	=	1	
Combination factor, K_c	=	0.9	
Design Wind pressure, p_d	=	0.74 kN/m^2 >	0.637 (0.7 x p_z)

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3.5 Loading Combinations

The various load combinations for the design are in accordance with IS 456:2000. The various combinations used for design are

1) 1.5 (DL+LL)

2) 1.5 ($DL+EL_{-x}$)

3) 1.5 ($DL+EL_{+x}$)

4) 1.5 ($DL+EL_{-z}$)

5) 1.5 ($DL+EL_{+z}$)

6) 1.5 ($DL+WL_{-x}$)

7) 1.5 ($DL+WL_{+x}$)

8) 1.5 ($DL+WL_{-z}$)

9) 1.5 ($DL+WL_{+z}$)

10) 0.9 $DL+1.5\ EL_{-x}$

11) 0.9 $DL+1.5\ EL_{+x}$

12) 0.9 $DL+1.5\ EL_{-z}$

13) 0.9 $DL+1.5\ EL_{+z}$

14) 0.9 $DL+1.5\ WL_{-x}$

15) 0.9 $DL+1.5\ WL_{+x}$

16) 0.9 $DL+1.5\ WL_{-z}$

17) 0.9 $DL+1.5\ WL_{+z}$

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18) 1.2 (DL+LL+EL_{-x})

19) 1.2 (DL+LL+EL_{+x})

20) 1.2 (DL+LL+EL_{-z})

21) 1.2 (DL+LL+EL_{+z})

22) 1.2 (DL+LL+WL_{-x})

23) 1.2 (DL+LL+WL_{+x})

24) 1.2 (DL+LL+WL_{-z})

25) 1.2 (DL+LL+WL_{+z})

4.0 STRUCTURAL MATERIAL

4.1 Concrete Material Specifications:

Concrete compressive cube strength	- 30 N/mm^2
Minimum cement content	- Refer standard drawings for general & Legends
Cement type	- OPC
Free water cement ratio	- 0.5 (Maximum)
Nominal maximum size of aggregate	- 20 mm UNO

4.2 Reinforcement:

Steel reinforcement shall be deformed bars, the characteristic of reinforcement bars shall conform to the following specification:

Grade of Steel	- Grade Fe550D
Actual Yield Strength (MPa)	- Minimum 550 MPa
Elongation percentage for Fe500	- 12% as per code Is 1786-2008

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4.4 Concrete cover:

The exposure condition considered is Moderate.

Cover for Reinforcement is considered as per Table 16A of IS 456, for a Fire resistance of 2 hrs.

- Raft = 50 mm
- Columns = 30 mm
- Wall = 30 mm
- Beams = 25 mm
- Slabs = 25 mm

5.0 Structural Description

5.1 Method of analysis

The structure is analysed and designed as a frame structure with ETABS. Columns, Footings, Slabs, Beams and Staircases are designed as reinforced concrete members. Expansion joint has been provided since the building length is above 45m.

5.2 Framing System, Analysis and design

Limit State concept of design will be used as per IS: 456 - 2000 & SP – 16.

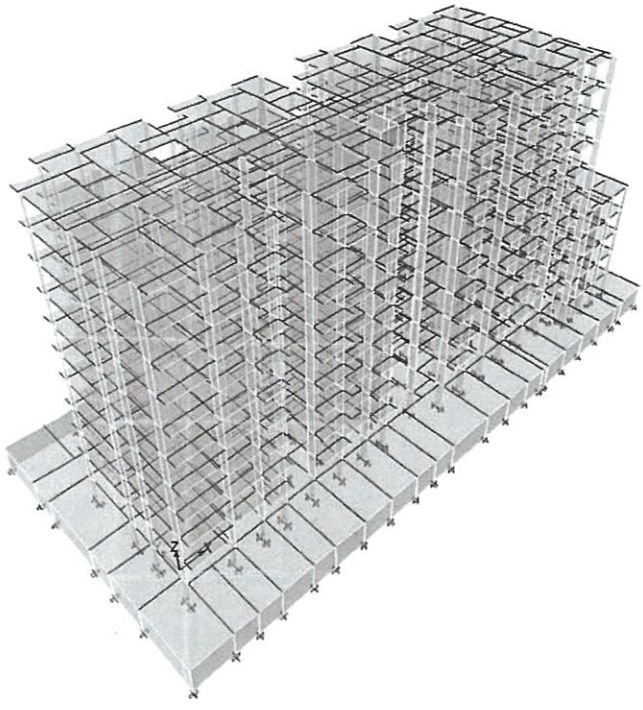
The detailing of reinforcement shall be done satisfying the requirements of IS: 456 – 2000,

SP – 16, IS: 4326-1993 and SP – 34.

The Slabs and beams are checked for deflection as per IS 456 - 2000, Cover for Reinforcements is considered as per Table 16A of IS 456 - 2000, for a Fire resistance of 2 hrs.

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ETABS®



Residential apartment _ Varam

Model File: MODEL 1, Revision 0
20-03-2025

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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	Splice Height m	Color
T1	OHT	2.5	Yes	None	No		Yellow
T1	Roof	3	Yes	None	No		Blue
T1	9th	3	Yes	None	No		Cyan
T1	8th	3	Yes	None	No		Magenta
T1	7th	3	Yes	None	No		Gray8Dark
T1	6th	3	Yes	None	No		Green
T1	5th	3	Yes	None	No		Red
T1	4th	3	Yes	None	No		Yellow
T1	3rd	3	Yes	None	No		Blue
T1	2nd	3	No	3rd	No		Cyan
T1	1st	3	No	3rd	No		Magenta
T1	Plinth	3	No	3rd	No		Gray8Dark

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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
A416Gr270	Tendon	Uniaxial	Grade 270	Red	
HYSD500	Rebar	Uniaxial	HYSD Grade 500	Blue	
M35	Concrete	Isotropic	M35	Yellow	

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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
Dead	No	Dead	1	
EX	No	Seismic	0	IS 1893:2016
EY	No	Seismic	0	IS 1893:2016
Live<3	No	Reducible Live	0	
Live>3	No	Reducible Live	0	
ROOF	No	Roof Live	0	
SDL	No	Super Dead	0	
WALL	No	Super Dead	0	
WX	No	Wind	0	Indian IS 875:2015
WY	No	Wind	0	Indian IS 875:2015

3.2 Load Sets

Table 3.2 - Shell Uniform Load Sets

Name	Load Pattern	Load Value kN/m2
Balcony /utility	Live>3	3
Balcony /utility	SDL	2.5
corridor	Live>3	3
corridor	SDL	1.5
HALL	Live>3	5
HALL	SDL	1.8
Parking	Live<3	2.5
Parking	SDL	2.4
ROOF	ROOF	3
ROOF	SDL	3
ROOMS	Live<3	2
ROOMS	SDL	1.5
STAIRCASE	Live>3	4
STAIRCASE	SDL	2.8
TOILET	Live<3	2
TOILET	SDL	2.5

3.3 Auto Wind Loading

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Table 3.3 - Load Pattern Definitions - Auto Wind - Indian IS 875 2015 (Part 1 of 3)

Name	Exposure Set	Is Auto Load	Exposure Source	Top Story	Bottom Story	Include Parapet	Parapet Height m	Cp Windward	Cp Leeward	Wind Speed meter/sec
WX	1	No	Diaphragms	Roof	Plinth	Yes	1.2	0.8	0.5	50
WX	1	No								
WX	1	No								
WX	1	No								
WX	1	No								
WX	1	No								
WX	1	No								
WX	1	No								
WX	1	No								
WX	1	No								
WX	1	No								
WY	1	No	Diaphragms	Roof	Plinth	Yes	1.2	0.8	0.5	50
WY	1	No								
WY	1	No								
WY	1	No								
WY	1	No								
WY	1	No								
WY	1	No								
WY	1	No								
WY	1	No								
WY	1	No								
WY	1	No								

Table 3.3 - Load Pattern Definitions - Auto Wind - Indian IS 875 2015 (Part 2 of 3)

Name	Exposure Set	Terrain Category	Importance Factor	Risk Coefficient	Topography	Width Type	Direction Angle deg	Story	Diaphragm
WX	1	2	1.00	1	1	Auto	0	Roof	D1
WX	1							9th	D1
WX	1							8th	D1
WX	1							7th	D1
WX	1							6th	D1
WX	1							5th	D1
WX	1							4th	D1
WX	1							3rd	D1
WX	1							2nd	D1
WX	1							1st	D1
WX	1							Plinth	D1
WY	1	2	1.00	1	1	Auto	90	Roof	D1
WY	1							9th	D1
WY	1							8th	D1
WY	1							7th	D1
WY	1							6th	D1
WY	1							5th	D1
WY	1							4th	D1

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Table 3.3 - Load Pattern Definitions - Auto Wind - Indian IS 875 2015 (Part 2 of 3, continued)

Name	Exposure Set	Terrain Category	Importance Factor	Risk Coefficient	Topography	Width Type	Direction Angle deg	Story	Diaphragm
WY	1							3rd	D1
WY	1							2nd	D1
WY	1							1st	D1
WY	1							Plinth	D1

Table 3.3 - Load Pattern Definitions - Auto Wind - Indian IS 875 2015 (Part 3 of 3)

Name	Exposure Set	Depth m	X m	Y m
WX	1	51.847	24.7235	5.627
WX	1	51.847	24.7235	5.627
WX	1	51.847	24.7235	5.627
WX	1	51.847	24.7235	5.627
WX	1	51.847	24.7235	5.627
WX	1	51.847	24.7235	5.627
WX	1	60.915	29.2575	5.449
WX	1	60.915	29.2575	5.449
WX	1	60.915	29.2575	5.449
WX	1	60.915	29.2575	5.449
WX	1	64.92	27.255	8.162
WY	1	20.382	24.7235	5.627
WY	1	20.382	24.7235	5.627
WY	1	20.382	24.7235	5.627
WY	1	20.382	24.7235	5.627
WY	1	20.382	24.7235	5.627
WY	1	20.382	24.7235	5.627
WY	1	20.738	29.2575	5.449
WY	1	20.738	29.2575	5.449
WY	1	20.738	29.2575	5.449
WY	1	20.738	29.2575	5.449
WY	1	34.634	27.255	8.162

3.4 Auto Seismic Loading

Table 3.4 - Load Pattern Definitions - Auto Seismic - IS 1893 2016 (Part 1 of 3)

Name	Period Used sec	Coeff Used	Weight Used kN	Base Shear kN	Is Auto Load	X Dir?	X Dir Plus Ecc?	X Dir Minus Ecc?	Y Dir?	Y Dir Plus Ecc?	Y Dir Minus Ecc?	Ecc Ratio
EX					No	Yes	Yes	Yes	No	No	No	0.05
EY					No	No	No	No	Yes	Yes	Yes	0.05

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Table 3.4 - Load Pattern Definitions - Auto Seismic - IS 1893 2016 (Part 2 of 3)

Name	Period Used sec	Coeff Used	Weight Used kN	Base Shear kN	Top Story	Bottom Story	Ecc Overwrite Story	Ecc Overwrite Diaphragm	Ecc Overwrite Length m	Period Type
EX					Roof	Plinth				User Defined
EY					Roof	Plinth				User Defined

Table 3.4 - Load Pattern Definitions - Auto Seismic - IS 1893 2016 (Part 3 of 3)

Name	Period Used sec	Coeff Used	Weight Used kN	Base Shear kN	User T sec	Z	Site Type	I	R
EX					0.345	0.16	I	1.2	4
EY					0.632	0.16	I	1.2	4

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IS 1893:2016 Auto Seismic Load Calculation

This calculation presents the automatically generated lateral seismic loads for load pattern EX according to IS 1893:2016, as calculated by ETABS.

Direction and Eccentricity

Direction = Multiple

Eccentricity Ratio = 5% for all diaphragms

Structural Period

Period Calculation Method = User Specified

User Period — $T = 0.345$ sec

Factors and Coefficients

Seismic Zone Factor, Z [IS Table 3] — $Z = 0.16$

Response Reduction Factor, R [IS Table 9] — $R = 4$

Importance Factor, I [IS Table 8] — $I = 1.2$

Site Type [IS Table 1] = I

Seismic Response

Spectral Acceleration Coefficient, S_a/g [IS 6.4.2] — $\frac{S_a}{g} = 2.5$ — $\frac{S_a}{g} = 2.5$

Equivalent Lateral Forces

Seismic Coefficient, A_h [IS 6.4.2] — $A_h = \frac{Z I \frac{S_a}{g}}{2R}$

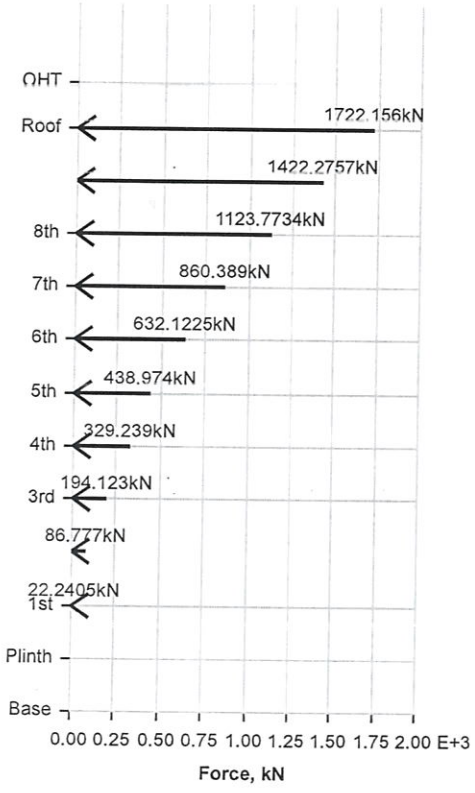
Calculated Base Shear

Direction	Period Used (sec)	W (kN)	V_b (kN)
X	0.345	113867.8316	6832.0699
X + Ecc. Y	0.345	113867.8316	6832.0699
X - Ecc. Y	0.345	113867.8316	6832.0699

Applied Story Forces

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Lateral Load to Stories - X



Story	Elevation	X-Dir	Y-Dir
	m	kN	kN
OHT	35.5	0	0
Roof	33	1722.156	0
9th	30	1422.2757	0
8th	27	1123.7734	0
7th	24	860.389	0
6th	21	632.1225	0
5th	18	438.974	0
4th	15	329.239	0
3rd	12	194.123	0
2nd	9	86.777	0
1st	6	22.2405	0
Plinth	3	0	0
Base	0	0	0

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IS 1893:2016 Auto Seismic Load Calculation

This calculation presents the automatically generated lateral seismic loads for load pattern EY according to IS 1893:2016, as calculated by ETABS.

Direction and Eccentricity

Direction = Multiple

Eccentricity Ratio = 5% for all diaphragms

Structural Period

Period Calculation Method = User Specified

User Period $T = 0.632\ sec$

Factors and Coefficients

Seismic Zone Factor, Z [IS Table 3] $Z = 0.16$

Response Reduction Factor, R [IS Table 9] $R = 4$

Importance Factor, I [IS Table 8] $I = 1.2$

Site Type [IS Table 1] = I

Seismic Response

Spectral Acceleration Coefficient, S_a/g [IS 6.4.2] $\frac{S_a}{g} = \frac{1}{T}$ $\frac{S_a}{g} = 1.582278$

Equivalent Lateral Forces

Seismic Coefficient, A_h [IS 6.4.2] $A_h = \frac{Z\,I\,\frac{S_a}{g}}{2\,R}$

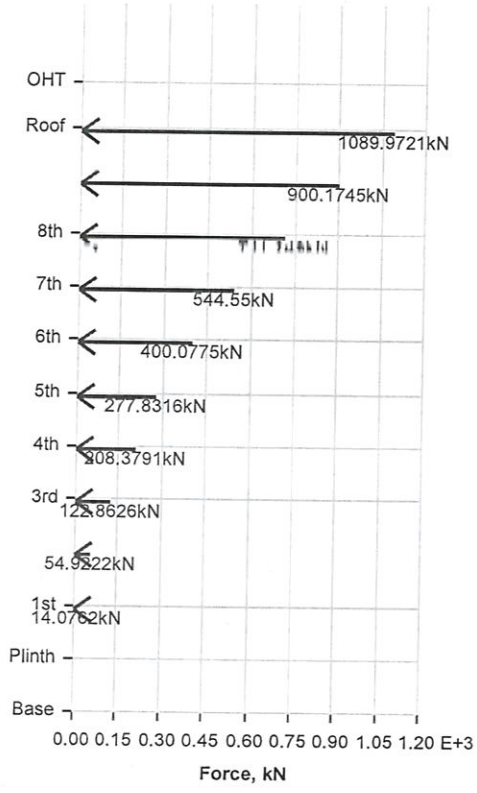
Calculated Base Shear

Direction	Period Used (sec)	W (kN)	V_b (kN)
Y	0.632	113867.8316	4324.0949
Y + Ecc. X	0.632	113867.8316	4324.0949
Y - Ecc. X	0.632	113867.8316	4324.0949

Applied Story Forces

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Lateral Load to Stories - Y



Story	Elevation	X-Dir	Y-Dir
	m	kN	kN
OHT	35.5	0	0
Roof	33	0	1089.9721
9th	30	0	900.1745
8th	27	0	711.249
7th	24	0	544.55
6th	21	0	400.0775
5th	18	0	277.8316
4th	15	0	208.3791
3rd	12	0	122.8626
2nd	9	0	54.9222
1st	6	0	14.0762
Plinth	3	0	0
Base	0	0	0

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3.5 Functions

3.5.1 Response Spectrum Functions

Table 3.7 - Functions - Response Spectrum - IS1893 2016

Name	Period sec	Value	Seismic Zone	I	Soil Type	R	Damping Ratio
Func1	0	0.024	III	1.2	I	4	0.05
Func1	0.1	0.06					
Func1	0.4	0.06					
Func1	0.6	0.04					
Func1	0.8	0.03					
Func1	1	0.024					
Func1	1.2	0.02					
Func1	1.4	0.017143					
Func1	1.6	0.015					
Func1	1.8	0.013333					
Func1	2	0.012					
Func1	2.5	0.0096					
Func1	3	0.008					
Func1	3.5	0.006857					
Func1	4	0.006					
Func1	4.5	0.006					
Func1	5	0.006					
Func1	5.5	0.006					
Func1	6	0.006					
Func1	6.5	0.006					
Func1	7	0.006					
Func1	7.5	0.006					
Func1	8	0.006					
Func1	8.5	0.006					
Func1	9	0.006					
Func1	9.5	0.006					
Func1	10	0.006					

3.6 Load Cases

Table 3.8 - Load Case Definitions - Summary

Name	Type	Notes
Modal	Modal - Eigen	
Dead	Linear Static	
Live	Linear Static	
SDL	Linear Static	
WALL	Linear Static	
EX	Linear Static	
EY	Linear Static	
WX	Linear Static	
WY	Linear Static	
Live<3	Linear Static	
ROOF	Linear Static	

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Table 3.8 - Load Case Definitions - Summary (continued)

Name	Type	Notes
spx	Response Spectrum	
spy	Response Spectrum	

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4 Analysis Results

This chapter provides analysis results.

4.1 Structure Results

Table 4.1 - Base Reactions (Part 1 of 2)

Output Case	Case Type	Step Type	Step Number	Step Label	FX kN	FY kN	FZ kN	MX kN-m	MY kN-m
Dead	LinStatic				0	0	79680.1503	456740.3145	-2213131
Live	LinStatic				0	0	7124.0376	38626.8934	-253704.7863
SDL	LinStatic				0	0	52330.403	301203.6666	-1413797
WALL	LinStatic				0	0	0	0	0
EX	LinStatic	Step By Step	1		-6832.0699	0	0	6.736E-06	-179849.2349
EX	LinStatic	Step By Step	2		-6832.0699	0	0	7.143E-06	-179849.2349
EX	LinStatic	Step By Step	3		-6832.0699	0	0	6.329E-06	-179849.2349
EY	LinStatic	Step By Step	1		0	-4324.0949	0	113828.6297	6.731E-06
EY	LinStatic	Step By Step	2		0	-4324.0949	0	113828.6297	8.716E-06
EY	LinStatic	Step By Step	3		0	-4324.0949	0	113828.6297	4.746E-06
WX	LinStatic				-1416.2983	0	0	8.439E-07	-26581.3745
WY	LinStatic				0	-3728.022	0	69449.8598	2.729E-06
Live<3	LinStatic				0	0	16730.6022	101920.4926	-438109.4872
ROOF	LinStatic				0	0	2538.5792	15616.2871	-67268.9839
spx	LinRespSpec	Max			6799.4725	1084.1201	0	24550.1175	125568.8789
spy	LinRespSpec	Max			516.8819	4507.5326	0	71109.0481	12148.1577

Table 4.1 - Base Reactions (Part 2 of 2)

MZ kN-m	X m	Y m	Z m
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
38507.9218	0	0	0
45308.3936	0	0	0
31707.4499	0	0	0
-110359.1632	0	0	0
-121468.1156	0	0	0
-99250.2108	0	0	0
8138.9911	0	0	0
-99184.2059	0	0	0
0	0	0	0
0	0	0	0
72280.8525	0	0	0
129437.8865	0	0	0

4.2 Story Results

6.2

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Table 4.2 - Story Drifts

Story	Output Case	Case Type	Step Type	Step Number	Step Label	Direction	Drift	Label	X m	Y m	Z m
Roof	Dead	LinStatic				X	3.2E-05	141	25.428	0.121	33
Roof	Dead	LinStatic				Y	9.8E-05	40	-1.2	-4.452	33
Roof	Live	LinStatic				X	1.3E-05	176	23.505	15.294	33
Roof	Live	LinStatic				Y	6.9E-05	40	-1.2	-4.452	33
Roof	SDL	LinStatic				Y	0.000105	40	-1.2	-4.452	33
Roof	EX	LinStatic	Step By Step	1		X	0.004014	136	27.456	1.186	33
Roof	EX	LinStatic	Step By Step	2		X	0.004002	136	27.456	1.186	33
Roof	EX	LinStatic	Step By Step	3		X	0.004026	136	27.456	1.186	33
Roof	EY	LinStatic	Step By Step	1		Y	0.001604	40	-1.2	-4.452	33
Roof	EY	LinStatic	Step By Step	2		Y	0.00137	141	25.428	0.121	33
Roof	EY	LinStatic	Step By Step	3		Y	0.001901	40	-1.2	-4.452	33
Roof	WX	LinStatic				X	0.000476	136	27.456	1.186	33
Roof	WY	LinStatic				Y	0.000763	40	-1.2	-4.452	33
Roof	Live<3	LinStatic				X	2.1E-05	176	23.505	15.294	33
Roof	Live<3	LinStatic				Y	3.1E-05	40	-1.2	-4.452	33
Roof	ROOF	LinStatic				X	5E-06	125	23.312	0.121	33
Roof	ROOF	LinStatic				Y	1.1E-05	40	-1.2	-4.452	33
Roof	spx	LinRespSpec	Max			X	0.002964	176	23.505	15.294	33
Roof	spx	LinRespSpec	Max			Y	0.001046	40	-1.2	-4.452	33
Roof	spy	LinRespSpec	Max			X	0.000439	275	50.647	-4.92	33
Roof	spy	LinRespSpec	Max			Y	0.001284	40	-1.2	-4.452	33
9th	Dead	LinStatic				X	2.7E-05	248	27.456	-1.054	30
9th	Dead	LinStatic				Y	9.8E-05	40	-1.2	-4.452	30
9th	Live	LinStatic				X	1.5E-05	176	23.505	15.294	30
9th	Live	LinStatic				Y	7.3E-05	40	-1.2	-4.452	30
9th	SDL	LinStatic				Y	0.000105	40	-1.2	-4.452	30
9th	EX	LinStatic	Step By Step	1		X	0.004237	176	23.505	15.294	30
9th	EX	LinStatic	Step By Step	2		X	0.004326	176	23.505	15.294	30
9th	EX	LinStatic	Step By Step	3		X	0.004204	133	25.428	1.186	30
9th	EY	LinStatic	Step By Step	1		Y	0.00173	40	-1.2	-4.452	30
9th	EY	LinStatic	Step By Step	2		Y	0.0015	264	50.647	-1.558	30
9th	EY	LinStatic	Step By Step	3		Y	0.002081	40	-1.2	-4.452	30
9th	WX	LinStatic				X	0.000494	136	27.456	1.186	30
9th	WY	LinStatic				Y	0.000829	40	-1.2	-4.452	30
9th	Live<3	LinStatic				X	1.9E-05	176	23.505	15.294	30
9th	Live<3	LinStatic				Y	3.1E-05	40	-1.2	-4.452	30
9th	ROOF	LinStatic				X	4E-06	248	27.456	-1.054	30
9th	ROOF	LinStatic				Y	9E-06	40	-1.2	-4.452	30
9th	spx	LinRespSpec	Max			X	0.003494	176	23.505	15.294	30
9th	spx	LinRespSpec	Max			Y	0.001225	40	-1.2	-4.452	30
9th	spy	LinRespSpec	Max			X	0.000528	275	50.647	-4.92	30
9th	spy	LinRespSpec	Max			Y	0.001425	40	-1.2	-4.452	30
8th	Dead	LinStatic				X	2.3E-05	256	49.757	-4.564	27
8th	Dead	LinStatic				Y	9.5E-05	40	-1.2	-4.452	27
8th	Live	LinStatic				X	1.5E-05	176	23.505	15.294	27

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Table 4.2 - Story Drifts (continued)

Story	Output Case	Case Type	Step Type	Step Number	Step Label	Direction	Drift	Label	X m	Y m	Z m
8th	Live	LinStatic				Y	7.3E-05	40	-1.2	-4.452	27
8th	SDL	LinStatic				Y	0.000101	40	-1.2	-4.452	27
8th	EX	LinStatic	Step By Step	1		X	0.004838	176	23.505	15.294	27
8th	EX	LinStatic	Step By Step	2		X	0.005066	176	23.505	15.294	27
8th	EX	LinStatic	Step By Step	3		X	0.004852	176	23.505	15.294	27
8th	EY	LinStatic	Step By Step	1		Y	0.001816	40	-1.2	-4.452	27
8th	EY	LinStatic	Step By Step	2		Y	0.001618	274	50.647	-4.02	27
8th	EY	LinStatic	Step By Step	3		Y	0.002218	40	-1.2	-4.452	27
8th	WX	LinStatic				X	0.000538	176	23.505	15.294	27
8th	WY	LinStatic				Y	0.000888	40	-1.2	-4.452	27
8th	Live<3	LinStatic				X	1.9E-05	176	23.505	15.294	27
8th	Live<3	LinStatic				Y	3E-05	40	-1.2	-4.452	27
8th	ROOF	LinStatic				X	4E-06	275	50.647	-4.92	27
8th	ROOF	LinStatic				Y	7E-06	40	-1.2	-4.452	27
8th	spx	LinRespSpec	Max			X	0.003859	176	23.505	15.294	27
8th	spx	LinRespSpec	Max			Y	0.001375	40	-1.2	-4.452	27
8th	spy	LinRespSpec	Max			X	0.000607	275	50.647	-4.92	27
8th	spy	LinRespSpec	Max			Y	0.001528	40	-1.2	-4.452	27
7th	Dead	LinStatic				X	2.4E-05	264	50.647	-1.558	24
7th	Dead	LinStatic				Y	9.1E-05	40	-1.2	-4.452	24
7th	Live	LinStatic				X	1.4E-05	176	23.505	15.294	24
7th	Live	LinStatic				Y	7.1E-05	40	-1.2	-4.452	24
7th	SDL	LinStatic				Y	9.6E-05	40	-1.2	-4.452	24
7th	EX	LinStatic	Step By Step	1		X	0.005395	176	23.505	15.294	24
7th	EX	LinStatic	Step By Step	2		X	0.005514	176	23.505	15.294	24
7th	EX	LinStatic	Step By Step	3		X	0.005277	176	23.505	15.294	24
7th	EY	LinStatic	Step By Step	1		Y	0.001884	40	-1.2	-4.452	24
7th	EY	LinStatic	Step By Step	2		Y	0.00169	320	50.647	14.14	24
7th	EY	LinStatic	Step By Step	3		Y	0.002324	40	-1.2	-4.452	24
7th	WX	LinStatic				X	0.000617	176	23.505	15.294	24
7th	WY	LinStatic				Y	0.00095	40	-1.2	-4.452	24
7th	Live<3	LinStatic				X	1.9E-05	176	23.505	15.294	24
7th	Live<3	LinStatic				Y	2.9E-05	40	-1.2	-4.452	24
7th	ROOF	LinStatic				X	4E-06	264	50.647	-1.558	24
7th	ROOF	LinStatic				Y	5E-06	40	-1.2	-4.452	24
7th	spx	LinRespSpec	Max			X	0.004043	176	23.505	15.294	24
7th	spx	LinRespSpec	Max			Y	0.001467	40	-1.2	-4.452	24
7th	spy	LinRespSpec	Max			X	0.000665	275	50.647	-4.92	24
7th	spy	LinRespSpec	Max			Y	0.0016	40	-1.2	-4.452	24
6th	Dead	LinStatic				X	2.6E-05	260	50.647	-0.658	21
6th	Dead	LinStatic				Y	8.4E-05	40	-1.2	-4.452	21
6th	Live	LinStatic				Y	6.6E-05	40	-1.2	-4.452	21
6th	SDL	LinStatic				X	1.8E-05	264	50.647	-1.558	21
6th	SDL	LinStatic				Y	9E-05	40	-1.2	-4.452	21

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Table 4.2 - Story Drifts (continued)

Story	Output Case	Case Type	Step Type	Step Number	Step Label	Direction	Drift	Label	X m	Y m	Z m
6th	EX	LinStatic	Step By Step	1		X	0.005645	176	23.505	15.294	21
6th	EX	LinStatic	Step By Step	2		X	0.005767	176	23.505	15.294	21
6th	EX	LinStatic	Step By Step	3		X	0.005524	176	23.505	15.294	21
6th	EY	LinStatic	Step By Step	1		Y	0.001925	40	-1.2	-4.452	21
6th	EY	LinStatic	Step By Step	2		Y	0.001681	274	50.647	-4.02	21
6th	EY	LinStatic	Step By Step	3		Y	0.002378	40	-1.2	-4.452	21
6th	WX	LinStatic				X	0.000686	176	23.505	15.294	21
6th	WY	LinStatic				Y	0.001006	40	-1.2	-4.452	21
6th	Live<3	LinStatic				X	1.8E-05	176	23.505	15.294	21
6th	Live<3	LinStatic				Y	2.7E-05	40	-1.2	-4.452	21
6th	ROOF	LinStatic				X	3E-06	256	49.757	-4.564	21
6th	ROOF	LinStatic				Y	4E-06	40	-1.2	-4.452	21
6th	spx	LinRespSpec	Max			X	0.004165	176	23.505	15.294	21
6th	spx	LinRespSpec	Max			Y	0.001493	40	-1.2	-4.452	21
6th	spy	LinRespSpec	Max			X	0.000719	275	50.647	-4.92	21
6th	spy	LinRespSpec	Max			Y	0.001634	40	-1.2	-4.452	21
5th	Dead	LinStatic				X	3.6E-05	275	50.647	-4.92	18
5th	Dead	LinStatic				Y	7.5E-05	40	-1.2	-4.452	18
5th	Live	LinStatic				X	2.4E-05	260	50.647	-0.658	18
5th	Live	LinStatic				Y	5.7E-05	40	-1.2	-4.452	18
5th	SDL	LinStatic				X	2.6E-05	275	50.647	-4.92	18
5th	SDL	LinStatic				Y	8.2E-05	40	-1.2	-4.452	18
5th	EX	LinStatic	Step By Step	1		X	0.00512	176	23.505	15.294	18
5th	EX	LinStatic	Step By Step	2		X	0.005236	176	23.505	15.294	18
5th	EX	LinStatic	Step By Step	3		X	0.005003	176	23.505	15.294	18
5th	EY	LinStatic	Step By Step	1		Y	0.001961	40	-1.2	-4.452	18
5th	EY	LinStatic	Step By Step	2		Y	0.00154	40	-1.2	-4.452	18
5th	EY	LinStatic	Step By Step	3		Y	0.002382	40	-1.2	-4.452	18
5th	WX	LinStatic				X	0.000668	176	23.505	15.294	18
5th	WY	LinStatic				Y	0.001059	40	-1.2	-4.452	18
5th	Live<3	LinStatic				X	1.5E-05	176	23.505	15.294	18
5th	Live<3	LinStatic				Y	2.5E-05	40	-1.2	-4.452	18
5th	ROOF	LinStatic				X	3E-06	275	50.647	-4.92	18
5th	ROOF	LinStatic				Y	3E-06	40	-1.2	-4.452	18
5th	spx	LinRespSpec	Max			X	0.003787	176	23.505	15.294	18
5th	spx	LinRespSpec	Max			Y	0.001472	40	-1.2	-4.452	18
5th	spy	LinRespSpec	Max			X	0.000594	256	49.757	-4.564	18
5th	spy	LinRespSpec	Max			Y	0.001601	40	-1.2	-4.452	18
4th	Dead	LinStatic				Y	6.4E-05	40	-1.2	-4.452	15
4th	Live	LinStatic				X	1.9E-05	286	59.715	10.966	15
4th	Live	LinStatic				Y	4.7E-05	40	-1.2	-4.452	15
4th	SDL	LinStatic				Y	7.2E-05	40	-1.2	-4.452	15
4th	EX	LinStatic	Step By Step	1		X	0.003912	176	23.505	15.294	15
4th	EX	LinStatic	Step By Step	2		X	0.004019	176	23.505	15.294	15

6.2

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Table 4 2 - Story Drifts (continued)

Story	Output Case	Case Type	Step Type	Step Number	Step Label	Direction	Drift	Label	X m	Y m	Z m
4th	EX	LinStatic	Step By Step	3		X	0.003806	176	23.505	15.294	15
4th	EY	LinStatic	Step By Step	1		Y	0.001938	40	-1.2	-4.452	15
4th	EY	LinStatic	Step By Step	2		Y	0.00158	40	-1.2	-4.452	15
4th	EY	LinStatic	Step By Step	3		Y	0.002296	40	-1.2	-4.452	15
4th	WX	LinStatic				X	0.000561	176	23.505	15.294	15
4th	WY	LinStatic				Y	0.001075	40	-1.2	-4.452	15
4th	Live<3	LinStatic				X	1.1E-05	176	23.505	15.294	15
4th	Live<3	LinStatic				Y	2.2E-05	40	-1.2	-4.452	15
4th	ROOF	LinStatic				X	4E-06	286	59.715	10.966	15
4th	ROOF	LinStatic				Y	3E-06	40	-1.2	-4.452	15
4th	spx	LinRespSpec	Max			X	0.003076	176	23.505	15.294	15
4th	spx	LinRespSpec	Max			Y	0.00143	40	-1.2	-4.452	15
4th	spy	LinRespSpec	Max			X	0.000436	327	59.715	-4.92	15
4th	spy	LinRespSpec	Max			Y	0.001503	40	-1.2	-4.452	15
3rd	Dead	LinStatic				X	1.6E-05	327	59.715	-4.92	12
3rd	Dead	LinStatic				Y	5.2E-05	40	-1.2	-4.452	12
3rd	Live	LinStatic				Y	3.9E-05	40	-1.2	-4.452	12
3rd	SDL	LinStatic				X	9E-06	327	59.715	-4.92	12
3rd	SDL	LinStatic				Y	5.9E-05	40	-1.2	-4.452	12
3rd	EX	LinStatic	Step By Step	1		X	0.003528	176	23.505	15.294	12
3rd	EX	LinStatic	Step By Step	2		X	0.003618	176	23.505	15.294	12
3rd	EX	LinStatic	Step By Step	3		X	0.003439	176	23.505	15.294	12
3rd	EY	LinStatic	Step By Step	1		Y	0.001726	40	-1.2	-4.452	12
3rd	EY	LinStatic	Step By Step	2		Y	0.001415	40	-1.2	-4.452	12
3rd	EY	LinStatic	Step By Step	3		Y	0.002037	40	-1.2	-4.452	12
3rd	WX	LinStatic				X	0.000539	176	23.505	15.294	12
3rd	WY	LinStatic				Y	0.001001	40	-1.2	-4.452	12
3rd	Live<3	LinStatic				X	1E-05	176	23.505	15.294	12
3rd	Live<3	LinStatic				Y	1.8E-05	40	-1.2	-4.452	12
3rd	ROOF	LinStatic				X	2E-06	327	59.715	-4.92	12
3rd	ROOF	LinStatic				Y	2E-06	40	-1.2	-4.452	12
3rd	spx	LinRespSpec	Max			X	0.002932	176	23.505	15.294	12
3rd	spx	LinRespSpec	Max			Y	0.00133	331	59.715	-2.329	12
3rd	spy	LinRespSpec	Max			X	0.000402	327	59.715	-4.92	12
3rd	spy	LinRespSpec	Max			Y	0.00137	40	-1.2	-4.452	12
2nd	Dead	LinStatic				X	1.1E-05	141	25.428	0.121	9
2nd	Dead	LinStatic				Y	4.2E-05	252	27.456	-1.954	9
2nd	Live	LinStatic				Y	2.8E-05	40	-1.2	-4.452	9
2nd	SDL	LinStatic				Y	4.3E-05	40	-1.2	-4.452	9
2nd	EX	LinStatic	Step By Step	1		X	0.002959	176	23.505	15.294	9
2nd	EX	LinStatic	Step By Step	2		X	0.003028	176	23.505	15.294	9
2nd	EX	LinStatic	Step By Step	3		X	0.00289	176	23.505	15.294	9
2nd	EY	LinStatic	Step By Step	1		Y	0.001341	40	-1.2	-4.452	9
2nd	EY	LinStatic	Step By Step	2		Y	0.001095	40	-1.2	-4.452	9

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Table 4.2 - Story Drifts (continued)

Story	Output Case	Case Type	Step Type	Step Number	Step Label	Direction	Drift	Label	X m	Y m	Z m
2nd	EY	LinStatic	Step By Step	3		Y	0.001587	40	-1.2	-4.452	9
2nd	WX	LinStatic				X	0.000484	176	23.505	15.294	9
2nd	WY	LinStatic				Y	0.000818	40	-1.2	-4.452	9
2nd	Live<3	LinStatic				X	7E-06	176	23.505	15.294	9
2nd	Live<3	LinStatic				Y	1.3E-05	40	-1.2	-4.452	9
2nd	ROOF	LinStatic				X	1E-06	141	25.428	0.121	9
2nd	ROOF	LinStatic				Y	1E-06	40	-1.2	-4.452	9
2nd	spx	LinRespSpec	Max			X	0.002596	176	23.505	15.294	9
2nd	spx	LinRespSpec	Max			Y	0.001115	327	59.715	-4.92	9
2nd	spy	LinRespSpec	Max			X	0.000343	327	59.715	-4.92	9
2nd	spy	LinRespSpec	Max			Y	0.001121	40	-1.2	-4.452	9
1st	Dead	LinStatic				X	1E-05	125	23.312	0.121	6
1st	Dead	LinStatic				Y	2.2E-05	331	59.715	-2.329	6
1st	Live	LinStatic				Y	1.4E-05	34	-1.2	-3.385	6
1st	SDL	LinStatic				X	4E-06	125	23.312	0.121	6
1st	SDL	LinStatic				Y	1.9E-05	34	-1.2	-3.385	6
1st	EX	LinStatic	Step By Step	1		X	0.001685	136	27.456	1.186	6
1st	EX	LinStatic	Step By Step	2		X	0.001683	136	27.456	1.186	6
1st	EX	LinStatic	Step By Step	3		X	0.001687	136	27.456	1.186	6
1st	EY	LinStatic	Step By Step	1		Y	0.000686	34	-1.2	-3.385	6
1st	EY	LinStatic	Step By Step	2		Y	0.000574	125	23.312	0.121	6
1st	EY	LinStatic	Step By Step	3		Y	0.000802	34	-1.2	-3.385	6
1st	WX	LinStatic				X	0.000265	136	27.456	1.186	6
1st	WY	LinStatic				Y	0.000439	34	-1.2	-3.385	6
1st	Live<3	LinStatic				X	4E-06	176	23.505	15.294	6
1st	Live<3	LinStatic				Y	6E-06	34	-1.2	-3.385	6
1st	ROOF	LinStatic				X	1E-06	125	23.312	0.121	6
1st	ROOF	LinStatic				Y	1E-06	34	-1.2	-3.385	6
1st	spx	LinRespSpec	Max			X	0.001354	176	23.505	15.294	6
1st	spx	LinRespSpec	Max			Y	0.000559	331	59.715	-2.329	6
1st	spy	LinRespSpec	Max			X	0.000177	334	58.815	-4.92	6
1st	spy	LinRespSpec	Max			Y	0.000581	34	-1.2	-3.385	6
Plinth	Dead	LinStatic				X	9E-06	133	25.428	1.186	3
Plinth	Dead	LinStatic				Y	6E-06	416	59.715	25.479	3
Plinth	Live	LinStatic				Y	4E-06	416	59.715	25.479	3
Plinth	SDL	LinStatic				X	4E-06	133	25.428	1.186	3
Plinth	SDL	LinStatic				Y	4E-06	416	59.715	25.479	3
Plinth	EX	LinStatic	Step By Step	1		X	5E-05	133	25.428	1.186	3
Plinth	EX	LinStatic	Step By Step	1		Y	1.6E-05	416	59.715	25.479	3
Plinth	EX	LinStatic	Step By Step	2		X	5.1E-05	430	47.353	25.479	3
Plinth	EX	LinStatic	Step By Step	2		Y	2.3E-05	373	59.715	-9.155	3
Plinth	EX	LinStatic	Step By Step	3		X	5.1E-05	133	25.428	1.186	3
Plinth	EY	LinStatic	Step By Step	1		Y	0.000165	416	59.715	25.479	3
Plinth	EY	LinStatic	Step By Step	2		Y	0.000175	416	59.715	25.479	3

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Table 4.2 - Story Drifts (continued)

Story	Output Case	Case Type	Step Type	Step Number	Step Label	Direction	Drift	Label	X m	Y m	Z m
Plinth	EY	LinStatic	Step By Step	3		Y	0.000154	416	59.715	25.479	3
Plinth	WX	LinStatic				X	1E-05	133	25.428	1.186	3
Plinth	WX	LinStatic				Y	0E-00	410	59.715	25.479	3
Plinth	WY	LinStatic				Y	0.000122	416	59.715	25.479	3
Plinth	Live<3	LinStatic				X	1E-06	133	25.428	1.186	3
Plinth	Live<3	LinStatic				Y	1E-06	404	27.450	20.129	3
Plinth	ROOF	LinStatic				X	2.011E-07	133	25.428	1.186	3
Plinth	ROOF	LinStatic				Y	1.228E-07	416	59.715	25.479	3
Plinth	spx	LinRespSpec	Max			X	5.6E-05	133	25.428	1.186	3
Plinth	spx	LinRespSpec	Max			Y	5.8E-05	416	59.715	25.479	3
Plinth	spy	LinRespSpec	Max			X	2.8E-05	430	47.353	25.479	3
Plinth	spy	LinRespSpec	Max			Y	0.000141	416	59.715	25.479	3

4.3 Modal Results

Table 4.3 - Modal Participating Mass Ratios (Part 1 of 2)

Case	Mode	Period sec	UX	UY	UZ	SumUX	SumUY	SumUZ	RX	RY	RZ
Modal	1	1.854	0.5406	0.0012	0	0.5406	0.0012	0	0.0017	0.4338	0.0256
Modal	2	1.437	0.0162	0.3662	0	0.5568	0.3674	0	0.2992	0.0149	0.2114
Modal	3	1.214	0.0114	0.2245	0	0.5682	0.5919	0	0.1388	0.0114	0.2644
Modal	4	0.604	0.136	0.0007	0	0.7042	0.5926	0	0.0005	0.1237	0.0049
Modal	5	0.436	0.0055	0.0077	0	0.7097	0.6002	0	0.0045	0.0035	0.1552
Modal	6	0.379	0.0415	1.309E-05	0	0.7512	0.6002	0	1.818E-05	0.0266	0.0009
Modal	7	0.36	0.0001	0.1592	0	0.7514	0.7594	0	0.1743	0.0001	2.159E-05
Modal	8	0.259	0.0222	3.312E-05	0	0.7736	0.7594	0	0.0001	0.0301	0.0015
Modal	9	0.223	0.0002	0.0007	0	0.7739	0.7602	0	0.0009	0.0003	0.0428
Modal	10	0.189	0.0274	2.519E-05	0	0.8012	0.7602	0	1.32E-05	0.0342	0.0001
Modal	11	0.162	3.714E-05	0.0644	0	0.8013	0.8246	0	0.0738	2.972E-05	0.0001
Modal	12	0.145	0	0	0	0.8013	0.8246	0	9.188E-07	7.937E-07	3.448E-05

Table 4.3 - Modal Participating Mass Ratios (Part 2 of 2)

Case	Mode	SumRX	SumRY	SumRZ
Modal	1	0.0017	0.4338	0.0256
Modal	2	0.3009	0.4487	0.237
Modal	3	0.4397	0.4602	0.5013
Modal	4	0.4401	0.5839	0.5062
Modal	5	0.4447	0.5873	0.6615
Modal	6	0.4447	0.6139	0.6624
Modal	7	0.619	0.614	0.6624
Modal	8	0.619	0.6441	0.6639
Modal	9	0.6199	0.6444	0.7067
Modal	10	0.6199	0.6785	0.7068
Modal	11	0.6937	0.6785	0.7068
Modal	12	0.6937	0.6785	0.7069

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