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DBR & Check List

TIMES SQUARE GRAND

1) Design Basis Report:

a) Description of Project-

This project consists of 4 Basements + Ground Floor + 17 upper floors in form of commercial and hotel building. The building is classified in commercial building with importance factor of 1.2 during earthquake. The building is located near Sindhu Bhavan Road at Ahmedabad which falls under Earthquake Zone-III. No Future floor provision is made for this building.

No of Basement	- 4
Commercial floors	- G + 7
Service floor	- 8^{th} floor
Hotel floors	- 9^{th}, 11^{th} – 17^{th} floor
Skip floor	- 10^{th} floor
Mezzanine floor	- between 9^{th} and 10^{th} floor
Projection above terrace level	- NA
No of additional floors considered in design	- NO

b) List of Codes

IS 456:2000

IS 1893-2016

IS 13920-2016

SP 16

SP 34

IS 875 (Part-1)-1987

IS 875 (Part-2)-1987

IS 875 (Part-3)-1987 and All other relevant IS code

c) Loading parameters

1. Dead Load - Self weight as per calculation.
2. Floor Finish - Typical Floors: 1.25 kN/m^2
   Basement & Banquet: 1.5 kN/m^2
   Extended Basement: 2 kN/m^2
3. Live Load - 6 kN/m^2 for Basement & Hollow Plinth
   10 kN/m^2 for Extended Basement
   4 kN/m^2 for Office & Retail
   4 kN/m^2 for Lobby, Balcony, & Stairs
   4 kN/m^2 for Banquet & Terrace Garden
   4 kN/m^2 for General Amenities
   12 kN/m^2 for Swimming Pool
   2 kN/m^2 for Hotel Rooms
   2 kN/m^2 for Terrace
4. Earthquake Zone III, I=1.2, R=5
   Response Spectrum method has been used for the dynamic analysis in accordance with IS 1893 (Part 1): 2016. Load cases have been defined as SPECx and SPECy.

d) Clear cover

Column	-	40 mm
Beam	-	30 mm
Slab	-	25 mm
Shear wall	-	40 mm

e) Grade of concrete

Column	-	M50, M45, M40
Beam	-	M30, M25
Slab	-	M25
Shear Walls	-	M50, M45, M40

f) Exposure Condition - Mild

g) Wind Tunnel Testing - NA

h) Construction Sequence and loading parameters - NA

i) Proposed Approach to Structural Analysis -

Special Moment Resisting Frame with earthquake resistant design forces
Software used for analysis and design - ETABS, SAFE

j) Load Combinations

1.5(DL+LL)	DL+LL
1.2(DL+LL+EQx)	DL+LL+EQx
1.2(DL+LL-EQx)	DL+LL-EQx
1.2(DL+LL+EQy)	DL+LL+EQy
1.2(DL+LL-EQy)	DL+LL-EQy
0.9DL+1.5EQx	DL+EQx
0.9DL-1.5EQx	DL-EQx
0.9DL+1.5EQy	DL+EQy
0.9DL-1.5EQy	DL-EQy
1.5(DL+EQx)	DL+LL+SPECx
1.5(DL-EQx)	DL+LL+SPECy
1.5(DL+EQy)	DL+SPECx
1.5(DL-EQy)	DL+SPECy
1.2(DL+LL+SPECx)	
1.2(DL+LL+SPECy)	
0.9DL+1.5SPECx	
0.9DL+1.5SPECy	
1.5(DL+SPECx)	
1.5(DL+SPECy)	

k) Soil Profile

Safe Bearing Capacity - 400 kN/m^2 for Raft
Type of foundation - Raft, Combined, Isolated

l) Soil Retention System - Diaphragm Wall

m) Key Plan - Drawing Attached

n) Added Features - NA

2) DESCRIPTION OF SUB-STRUCTURE AND SUPER STRUCTURE

Description of Sub-Structure

1.	**No. Of Basement**		4
2.	**Minimum Clearance between outermost basement retaining wall and compound wall**		6 m
3.	**Shoring system installed** **(Submit Sectional Detail of the shoring system)**		Not used
4.	**Details Of Methodology used to resist uplift pressure due to ground water for tower portion as well as the portion outside the tower**	**Bottom Level Of Raft w.r.t. ground level**	20 m
		Total downward load of self weight of raft + Counterweight over raft + Rock Anchors (if any)(for raft spanning between columns)	There is no uplift requirement.
		Whether Pressure release pipes have been used?	NA
		Water Level assumed for uplift calculation	NA
5.	**Description of the foundation for the Tower Block**		RAFT

6.	**Nature Of Foundation**	**Piles, Spread Footings , Combined Raft , Piled Raft , etc.**	Raft, Isolated, Slab-Beam type Combined
7.	**SBC t/m^2) Soil Report**		40 t/m2
8.	**Sub – grade Elastic Modulus**		818 t/m3
9.	**Flooring System of the Basements**		Tre-mix RCC floor.
10.	**Retaining Wall Types and Sequence of Backfilling**	**Whether Propped Cantilever, Cantilever Supported between Buttresses/Counter Forts,etc.**	Diaphragm Wall
11.	**Intended use of Basements**		Parking
12.	**If rock anchors are used, are they grouted after installation and stressing ?**		NA
13.	**Is Structural Steel used in the construction of Sub-Structure?**		NA
13(a).	**If Yes, what are the measures taken for its fire proofing and corrosion resistance?**		NA
14.	**Whether Expansion/Separation joints provided?**		Yes
14(a).	**Whether expansion joint/Separation joint continues through basement?**		Yes
14(b).	**If yes ,detail at Basement level and retaining wall junction**		NA

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Description of Superstructure

1.	**(a)No. Of Floors** **(b)Height Of the building**	a) 4 Basement + Ground + 17 Floors b) 70 m from ground
2.	**Shape of the Building** **(a)Plan** **(b)Elevation** **(c)Whether Symmetric in Elevation**	Drawings attached
3.	**Maximum Plan Dimension in either direction (in m.)**	Left Part - 65.9 m Right Part - 45.43 m
4.	**Ratio of Plan Dimension (Max. / Min.)** **(a) Ground to 12th floor** **(b) 13th floor to terrace**	(a) Left Part - 1.451 Right Part - 1.206 (b) Left Part - 2.68 Right Part - 1.78
5.	**(a)Typical Floor to floor height (in mt.)** **(b) Maximum floor to floor height in entire height of building (in mt.)**	(a) Commercial - 4 m Hotel - 3.4 m (b) 4.5 m
6.	**Aspect ratio (Height of Building till Terrace/ Minimum Dimension of Building)**	Left Part- 2.908 Right Part- 3.33
7.	**Type of floor slab**	RCC
8.	**Avg. Thickness of floor slab (in mm.)**	150 mm
9.	**Whether column are RCC, Composite or in Structural Steel**	RCC
10.	**Lateral System**	Special Moment resisting RCC frame with ductile shear wall structure
11.	**Whether the geometry of the building is symmetric**	No
12.	**Whether the lateral load resisting system is symmetrically placed in geometry**	No
13.	**Use of Floor at different levels(Residential/Commercial/Industrial)**	Commercial & Hotel

14.	**Use of floor at different levels(Residential/Commercial/Industrial)**	Commercial & Hotel
15.	**Is there any Transfer level? If yes, depth of Transfer Girder**	No
16.	**Whether expansion joint is provided? If yes, what is the maximum plan dimension in mt.**	65.9 m
17.	**Whether separation gap at joint is sufficiently provided?**	Yes
18.	**Maximum Cantilever projection in mt.**	3.64 m

3) DESCRIPTION OF STRUCTURAL SYSTEM

It is Special Moment Resisting Frame with Ductile shear wall for earthquake resistant design forces. Structural system attached in drawing. PT beams are provided at required locations.

4) Modelling & software used

ETABS, SAFE

5) Height of building - 70 m from ground

LEFT PART:-

5A) Plan Dimensions - 65.9 m x 45.43 m (Ground to 12th floor)

- 65.9 m x 20.62 m (13th floor to Terrace)

6) EQ loading details:

a) Zone Factor = III

b) Importance Factor = 1.2

c) Response Reduction Factor = 5

d) Soil Type = Hard

e) % L.L consideration for seismic design = 25%

f) Time Period in the horizontal X-Direction = 1.81 sec

g) Time Period in the horizontal Y-Direction = 1.81 sec

h) Total Seismic weight = 656160 kN

i) Static Base shear in X-direction = 1.06 %

j) Static Base shear in Y-direction = 1.06%

k) Table of distribution for static base shear

For Base shear – X Direction

Story	Load Case	Location	P	VX	VY	T	MX	MY
			tonf	tonf	tonf	tonf-m	tonf-m	tonf-m
STAIR CABIN	EQX	Top	0	0	0	-7.92E-07	1.10E-06	0
17F SLAB	EQX	Top	0	-50.2412	0	1714.739	-0.8744	-3.4458
16F SLAB	EQX	Top	0	-96.3777	0	3287.865	-2.5032	-186.404
15F SLAB	EQX	Top	0	-137.883	0	4703.366	-5.3158	-537.919
14F SLAB	EQX	Top	0	-175.003	0	5969.51	-9.5867	-1044.79

13F SLAB	EQX	Top	0	-207.947	0	7093.482	-15.2916	-1694.54
12F SLAB	EQX	Top	0	-237	0	8084.706	-21.9666	-2473.9
11F SLAB	EQX	Top	0	-277.871	0	9284.998	-28.0292	-3368.08
10F SLAB	EQX	Top	0	-339.84	0	10656.47	-29.9943	-4760.28
9F SLAB/	EQX	Top	0	-390.801	0	11762.11	-26.3414	-5968.37
MAZZANINE F	EQX	Top	0	-414.739	0	12475.69	-24.4533	-7247.24
8F SLAB	EQX	Top	0	-449.003	0	13241.27	-27.7144	-9202.81
7F SLAB	EQX	Top	0	-477.808	0	13894.94	-32.0968	-10456.3
6F SLAB	EQX	Top	0	-501.396	0	14434.11	-38.6972	-12597.9
5F SLAB	EQX	Top	0	-519.036	0	14838.4	-45.0214	-14878.4
4F SLAB	EQX	Top	0	-531.749	0	15131.01	-50.5383	-17274.6
3F SLAB	EQX	Top	0	-540.267	0	15327.73	-54.7504	-19895.2
2F SLAB	EQX	Top	0	-545.153	0	15441.51	-56.8022	-22593.5
FF SLAB	EQX	Top	0	-547.412	0	15495.26	-56.3529	-25342.3
GF SLAB	EQX	Top	0	-548.057	0	15512.08	-53.4389	-28115.1
B-1 SLAB	EQX	Top	0	-548.057	0	15513.39	-48.1683	-31227.6
B-2 SLAB	EQX	Top	0	-548.057	0	15514.84	-40.4106	-34633.9
B-3 SLAB	EQX	Top	0	-548.057	0	15515.56	-32.0413	-37613.1
B-4 SLAB	EQX	Top	0	-548.057	0	15515.92	-25.0777	-40029.2
TIE LVL.	EQX	Top	0	-548.057	0	15516	-20.1613	-42315

For Base shear – Y Direction

Story	Load Case	Location	P	VX	VY	T	MX	MY
			tonf	tonf	tonf	tonf-m	tonf-m	tonf-m
STAIR CABIN	EQY	Top	0	0	0	0	-8.27E-07	0
17F SLAB	EQY	Top	0	0	-50.2412	-1547.68	5.0084	0.1238
16F SLAB	EQY 1	Top	0	0	-96.3777	-2980.64	191.888	0.796
15F SLAB	EQY 1	Top	0	0	-137.883	-4269.9	547.473	2.0262

14F SLAB	EQY 1	Top	0	0	-175.003	-5422.76	1058.43	4.3255
13F SLAB	EQY 1	Top	0	0	-207.947	-6445.48	1710.905	7.8478
12F SLAB	EQY 1	Top	0	0	-237	-7347.3	2490.495	12.5114
11F SLAB	EQY 1	Top	0	0	-277.871	-8607.8	3381.27	17.4271
10F SLAB	EQY 1	Top	0	0	-339.84	-10593.1	4767.012	23.279
9F SLAB	EQY 1	Top	0	0	-390.801	-12223.1	5977.588	27.1999
MAZZANINE F	EQY 1	Top	0	0	-414.739	-12918.3	7250.228	31.0465
8F SLAB	EQY 1	Top	0	0	-449.003	-13972.2	9171.166	36.718
7F SLAB	EQY 1	Top	0	0	-477.808	-14861	10393.8	39.6549
6F SLAB	EQY 1	Top	0	0	-501.396	-15591.9	12475.94	44.5039
5F SLAB	EQY 1	Top	0	0	-519.036	-16138.1	14684.18	49.3305
4F SLAB	EQY 1	Top	0	0	-531.749	-16531.2	16993.05	54.2683
3F SLAB	EQY 1	Top	0	0	-540.267	-16794.2	19505.66	59.4254
2F SLAB	EQY 1	Top	0	0	-545.153	-16944.3	22079.69	64.3893
FF SLAB	EQY 1	Top	0	0	-547.412	-17012.8	24691.72	68.9071
GF SLAB	EQY 1	Top	0	0	-548.057	-17031.3	27319.88	72.7156
B-1 SLAB	EQY 1	Top	0	0	-548.057	-17029.4	30269.31	76.2566
B-2 SLAB	EQY 1	Top	0	0	-548.057	-17027.2	33505.63	78.2128
B-3 SLAB	EQY 1	Top	0	0	-548.057	-17026.1	36352.2	78.6908
B-4 SLAB	EQY 1	Top	0	0	-548.057	-17025.5	38682.16	78.429
TIE LVL.	EQY 1	Top	0	0	-548.057	-17025.4	40915.65	78.0259

l) Max. Deflection at roof level (mm) =

DL+LL+SPECx = 53 mm (X Direction)
DL+LL+SPECy = 58 mm (Y Direction)

m) Maximum Inter storey Drift/ Height =

X DIRECTION
DL+LL+SPECx = 0.000666

Y DIRECTION
DL+LL+SPECy = 0.001243

8) Data from Dynamic Analysis:

Case	Mode	Period (sec)	Frequency cyc/sec	Sum UX	Sum UY
Modal	1	6.204	0.161	0.5759	0.0039
Modal	2	5.585	0.179	0.6367	0.4362
Modal	3	5.056	0.198	0.6972	0.6586
Modal	4	2.04	0.49	0.7687	0.659
Modal	5	1.956	0.511	0.7692	0.7153
Modal	6	1.358	0.736	0.7712	0.7717
Modal	7	1.145	0.873	0.8182	0.8069
Modal	8	1.06	0.943	0.8572	0.8304
Modal	9	0.661	1.512	0.8653	0.8326
Modal	10	0.627	1.595	0.8896	0.8383
Modal	11	0.584	1.713	0.8919	0.8879
Modal	12	0.477	2.098	0.8994	0.8901

9) Lateral Deflections (in mm) at Terrace Level:

Height = 70 m

Load Case	Dx-max (mm)	H/Dx	Drift-x	Dy-max (mm)	H/Dy	Drift-y
DL	19.955	5000	0.000307	53.51	3203.7	0.001172
DL+LL	28.834	2500	0.000374	78.05	2431.4	0.001693
DL+LL+SPECx	53	1320.75	0.000666	61	1147.5	0.001433
DL+LL+SPECy	33	2121.12	0.000514	58	1206.89	0.001243

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10) Corner Displacements (in mm) for Torsional Irregularity (along x- Direction)

Load Case	Corner-1	Corner-2	Corner-3	Corner-4	Avg-x	% Max./ Avg.
DL+LL+SPECx	52.03	46.013	21.54	21.54	35.28	1.474

11) Corner Displacements (in mm) for Torsional Irregularity (along y- Direction)

Load Case	Corner-1	Corner-2	Corner-3	Corner-4	Avg-y	% Max./ Avg.
DL+LL+SPECy	27.094	98.90	28.97	98.90	63.466	1.558

13) Data regarding Vertical Elements

a) Size of Maximum Loaded Column = 1350 mm X 1350 mm
b) Gravity Load on Max. Loaded Column = 3258 tonne [Un-factored]
c) Axial Stress in max. Loaded Column (Gravity Loads)
= 16.42 N/mm^2 (For concrete only)
d) Grade of max. Loaded Column = M45
e) % Base Shear resisted by all columns along X (static) = 43.10 %
f) % Base Shear resisted by all columns along Y (static) = 29.09 %

14) Data Regarding Floating Columns - NA

a) Total Gravity Load on Floating Column =
b) Size and span of girders supporting floating columns =
c) Number of floors supported by floating columns =
d) Deflection of girder under column (from model) =
e) Deflection of girder under column (from S/S action) =
f) Specific Details about floating columns on cantilever girders

Column	Supporting Girder		Deflection Values		Floors Above	Total Load in Column
	Size	Span	Model	S/S Action		

Note: S/S denotes simply supported

15) Data Regarding Soft Storey Effect

a) Stiffness- X dir. of lower Floor Slab over Ground (in deflection/kN) = 540377 kN/m

Stiffness- Y dir. of lower Floor Slab over Ground (in deflection/kN) = 353644.62 kN/m

b) Stiffness-X dir. of Upper Floor Slab over 1st (in deflection/kN) = 542686.9 KN/m

Stiffness-Y dir. of Upper Floor Slab over 1st (in deflection/kN) = 329649.2 KN/m

c) Relative Stiffness Ratio X-dir. = 1.00

Relative Stiffness Ratio Y-dir. = 0.932

d) Level of Soft Storey = There is no soft storey in this building.

e) Number of floors above soft storey = There is no soft storey in this building.

16) Data for each Cantilever -

a) Cantilever Span = 3.64 m
b) Structural System = Frame structure
c) Nature of Usage = Commercial
d) Maximum elastic deformation under gravity loads = 39 mm

17) Stability Calculations for uplift and overturning

There is no water pressure above basement floors and hence No uplift would be there.

18) Typical Design Calculations for footings:

Design calculations based on SAFE and RCDC model for Raft foundation and isolated footing

19) Typical Design Calculations for RCC Columns (Or Composite Columns)

As per E-tabs. There are no composite columns

20) Typical Design Calculations for RCC Walls

As per E-tabs

21) Typical Design Calculations for RC Beams (Or Steel Beams) -

RCC beams are designed as per E-tabs and there are no steel beams.

22) Typical Design Calculations for RCC Girders (Or Steel Girders/Trusses)-NA

23) Typical Design Calculations for Steel Bracings-NA

24) Wind tunnel – NA

25) Special provision for building – NA

RIGHT PART:-

5A) Plan Dimensions - 37.405 m x 45.43 m (Ground to 12th floor)

- 37.405 m x 20.62 m (13th floor to Terrace)

6) EQ loading details:

a) Zone Factor = III

b) Importance Factor = 1.2

c) Response Reduction Factor = 5

d) Soil Type = Hard

e) % L.L consideration for seismic design = 25%

f) Time Period in the horizontal X-Direction = 1.81 sec

g) Time Period in the horizontal Y-Direction = 1.81 sec

h) Total Seismic weight = 303450.4 kN

i) Static Base shear in X-direction = 1.06 %

j) Static Base shear in Y-direction = 1.06%

k) Table of distribution for static base shear

For Base shear – X Direction

Story	Load Case	Location	P	VX	VY	T	MX	MY
			tonf	tonf	tonf	tonf-m	tonf-m	tonf-m
Stair Cabin	EQ X	Top	0.00	0.00	0.00	0.00	0.00	0.00
SO 17th	EQ X	Top	0.00	-35.22	0.00	1201.74	0.00	-1.52
SO 16th	EQ X	Top	0.00	-63.93	0.00	2181.91	1.27	-136.48
SO 15th	EQ X	Top	0.00	-89.76	0.00	3064.58	3.82	-383.28
SO 14th	EQ X	Top	0.00	-112.86	0.00	3854.73	7.64	-735.07
SO 13th	EQ X	Top	0.00	-133.38	0.00	4557.57	12.88	-1185.00
SO 12th	EQ X	Top	0.00	-151.47	0.00	5178.22	19.55	-1724.94
SO 11th	EQ X	Top	0.00	-169.10	0.00	5765.40	27.46	-2344.22

SO 10th	EQ X	Top	0.00	-210.83	0.00	6621.45	38.61	-3256.60
SO Mezanine	EQ X	Top	0.00	-236.80	0.00	7208.92	49.28	-4061.75
SO 9th	EQ X	Top	0.00	-251.34	0.00	7679.19	61.78	-4903.66
SO 8th	EQ X	Top	0.00	-271.72	0.00	8147.24	81.88	-6196.82
SO 7th	EQ X	Top	0.00	-287.36	0.00	8512.59	95.96	-7030.85
SO 6th	EQ X	Top	0.00	-301.10	0.00	8828.89	122.02	-8452.83
SO 5th	EQ X	Top	0.00	-311.40	0.00	9067.53	152.43	-9965.76
SO 4th	EQ X	Top	0.00	-318.81	0.00	9240.96	185.38	-11555.11
SO 3rd	EQ X	Top	0.00	-323.76	0.00	9358.01	221.71	-13291.26
SO 2nd	EQ X	Top	0.00	-326.59	0.00	9426.56	258.44	-15073.73
SO 1st	EQ X	Top	0.00	-327.91	0.00	9459.31	294.14	-16880.43
SO G.F	EQ X	Top	0.00	-328.24	0.00	9468.35	327.35	-18688.46
SO B1	EQ X	Top	0.00	-328.24	0.00	9470.09	360.77	-20686.63
SO B2	EQ X	Top	0.00	-328.24	0.00	9470.38	395.51	-22886.07
SO B3	EQ X	Top	0.00	-328.24	0.00	9470.53	420.49	-24800.81
SO B4	EQ X	Top	0.00	-328.24	0.00	9470.54	435.54	-26332.65
Tie Beam	EQ X	Top	0.00	-328.24	0.00	9470.54	443.05	-27740.87

For Base shear – Y Direction

Story	Load Case	Location	P	VX	VY	T	MX	MY
			tonf	tonf	tonf	tonf-m	tonf-m	tonf-m
Stair Cabin	EQ Y	Top	0.00	0.00	0.00	0.00	0.00	0.00
SO 17th	EQ Y	Top	0.00	0.00	-35.22	-1025.92	0.94	-0.24
SO 16th	EQ Y	Top	0.00	0.00	-63.93	-1854.88	130.39	-0.99
SO 15th	EQ Y	Top	0.00	0.00	-89.76	-2600.26	365.86	-2.38
SO 14th	EQ Y	Top	0.00	0.00	-112.86	-3266.63	698.30	-4.50
SO 13th	EQ Y	Top	0.00	0.00	-133.38	-3858.42	1118.90	-7.65

SO 12th	EQ Y	Top	0.00	0.00	-151.47	-4380.08	1618.65	-12.18
SO 11th	EQ Y	Top	0.00	0.00	-169.10	-4868.09	2188.04	-18.60
SO 10th	EQ Y	Top	0.00	0.00	-210.83	-6089.31	3028.29	-30.74
SO Mezanine	EQ Y	Top	0.00	0.00	-236.80	-6835.50	3778.82	-42.19
SO 9th	EQ Y	Top	0.00	0.00	-251.34	-7247.87	4553.32	-53.89
SO 8th	EQ Y	Top	0.00	0.00	-271.72	-7819.13	5725.18	-73.11
SO 7th	EQ Y	Top	0.00	0.00	-287.36	-8256.93	6474.64	-86.54
SO 6th	EQ Y	Top	0.00	0.00	-301.10	-8639.30	7741.87	-111.39
SO 5th	EQ Y	Top	0.00	0.00	-311.40	-8925.95	9083.38	-139.83
SO 4th	EQ Y	Top	0.00	0.00	-318.81	-9132.10	10487.16	-169.80
SO 3rd	EQ Y	Top	0.00	0.00	-323.76	-9269.32	12015.41	-201.97
SO 2nd	EQ Y	Top	0.00	0.00	-326.59	-9347.63	13580.34	-233.96
SO 1st	EQ Y	Top	0.00	0.00	-327.91	-9384.30	15166.90	-264.59
SO G.F	EQ Y	Top	0.00	0.00	-328.24	-9393.41	16758.24	-292.88
SO B1	EQ Y	Top	0.00	0.00	-328.24	-9393.18	18531.37	-320.29
SO B2	EQ Y	Top	0.00	0.00	-328.24	-9392.77	20493.20	-348.17
SO B3	EQ Y	Top	0.00	0.00	-328.24	-9392.66	22224.48	-368.66
SO B4	EQ Y	Top	0.00	0.00	-328.24	-9392.63	23640.23	-381.00
Tie Beam	EQ Y	Top	0.00	0.00	-328.24	-9392.63	24984.21	-387.29

l) Max. Deflection at roof level (mm) =

DL+LL+SPECx = 65.48 mm (X Direction)
DL+LL+SPECy = 51.57 mm (Y Direction)

m) Maximum Inter storey Drift/ Height =

X DIRECTION
DL+LL+SPECx = 0.001262

Y DIRECTION
DL+LL+SPECy = 0.000916

8) Data from Dynamic Analysis:

Case	Mode	Period	Frequency	Sum UX	Sum UY
		sec	cyc/sec		
Modal	1	6.795	0.147	0.5241	0.0107
Modal	2	4.923	0.203	0.5431	0.5548
Modal	3	4.178	0.239	0.5762	0.5722
Modal	4	2.316	0.432	0.66	0.5724
Modal	5	1.731	0.578	0.6601	0.6763
Modal	6	1.437	0.696	0.6632	0.6911
Modal	7	1.201	0.833	0.799	0.6913
Modal	8	0.976	1.024	0.8081	0.6931
Modal	9	0.879	1.137	0.8084	0.8172
Modal	10	0.719	1.392	0.8555	0.8175
Modal	11	0.65	1.538	0.8557	0.8175
Modal	12	0.547	1.829	0.856	0.82
Modal	13	0.508	1.968	0.8563	0.874
Modal	14	0.485	2.06	0.8871	0.8751
Modal	15	0.35	2.853	0.9013	0.8792
Modal	16	0.34	2.945	0.9044	0.9068
Modal	17	0.321	3.117	0.9135	0.9069
Modal	18	0.273	3.665	0.9196	0.9071
Modal	19	0.263	3.805	0.9266	0.9122
Modal	20	0.249	4.008	0.9307	0.9225
Modal	21	0.211	4.73	0.9372	0.9258
Modal	22	0.207	4.822	0.9402	0.9262
Modal	23	0.185	5.411	0.9487	0.9358
Modal	24	0.179	5.592	0.9503	0.9469

9) Lateral Deflections (in mm) at Terrace Level:

Height = 70 m

Load Case	Dx-max (mm)	H/Dx	Drift-x	Dy-max (mm)	H/Dy	Drift-y
DL	28.45	2460.5	0.000331	21.85	3203.7	0.000206
DL+LL	36.19	1934.2	0.000413	28.79	2431.4	0.000308
DL+LL+SPECx	65.48	1069	0.0009	41.46	1688.4	0.000495
DL+LL+SPECy	40.58	1725	0.000528	51.57	1357.4	0.000867

10) Corner Displacements (in mm) for Torsional Irregularity (along x- Direction)

Load Case	Corner-1	Corner-2	Corner-3	Corner-4	Avg-x	% Max./ Avg.
DL+LL+SPECx	62.44	65.37	50.63	50.63	57.27	1.141

11) Corner Displacements (in mm) for Torsional Irregularity (along y- Direction)

Load Case	Corner-1	Corner-2	Corner-3	Corner-4	Avg-y	% Max./ Avg.
DL+LL+SPECy	51.575	32.225	32.443	51.575	41.95	1.229

13) Data regarding Vertical Elements

a) Size of Maximum Loaded Column = 1350 mm X 1350 mm
b) Gravity Load on Max. Loaded Column = 2992.3 tonne [Un-factored]
c) Axial Stress in max. Loaded Column (Gravity Loads)
= 16.42 N/mm^2 (For concrete only)

d) Grade of max. Loaded Column = M45
e) % Base Shear resisted by all columns along X (static) = 24.03 %
f) % Base Shear resisted by all columns along Y (static) = 26.6 %

14) Data Regarding Floating Columns - NA

a) Total Gravity Load on Floating Column =
b) Size and span of girders supporting floating columns =
c) Number of floors supported by floating columns =
d) Deflection of girder under column (from model) =
e) Deflection of girder under column (from S/S action) =
f) Specific Details about floating columns on cantilever girders

Column	Supporting Girder		Deflection Values		Floors Above	Total Load in Column
	Size	Span	Model	S/S Action		

Note: S/S denotes simply supported

15) Data Regarding Soft Storey Effect

a) Stiffness- X dir. of lower Floor Slab over Ground (in deflection/kN) = 317965.6 kN/m

Stiffness- Y dir. of lower Floor Slab over Ground (in deflection/kN) = 605121.8 kN/m

b) Stiffness-X dir. of Upper Floor Slab over 1st (in deflection/kN) = 312819.8 KN/m

Stiffness-Y dir. of Upper Floor Slab over 1st (in deflection/kN) = 598166.7 KN/m

c) Relative Stiffness Ratio X-dir. = 0.984

Relative Stiffness Ratio Y-dir. = 0.988

d) Level of Soft Storey = There is no soft storey in this building.

e) Number of floors above soft storey = There is no soft storey in this building.

16) Data for each Cantilever -

a) Cantilever Span = 3.64 m
b) Structural System = Frame structure
c) Nature of Usage = Commercial
d) Maximum elastic deformation under gravity loads = 39 mm

17) Stability Calculations for uplift and overturning

There is no water pressure above basement floors and hence No uplift would be there.

18) Typical Design Calculations for footings:

Design calculations based on SAFE and RCDC model for Raft foundation and isolated footing

19) Typical Design Calculations for RCC Columns (Or Composite Columns)

As per E-tabs. There are no composite columns

20) Typical Design Calculations for RCC Walls

As per E-tabs

21) Typical Design Calculations for RC Beams (Or Steel Beams) -

RCC beams are designed as per E-tabs and there are no steel beams.

22) Typical Design Calculations for RCC Girders (Or Steel Girders/Trusses)-NA

23) Typical Design Calculations for Steel Bracings-NA

24) Wind tunnel – NA

25) Special provision for building – NA