Review of Analysis of Irregular Building

Jerin Mathew Jose[1], Kesiya Josy V[2],
Likhith Koruthe Varghese[3], Nayana P P[4]
[1,2,3,4]UG Students, Department of Civil Engineering
Mangalam College of Engineering,
Kottayam,India

Adithya Viswambaran[5]
[5]Assistant Professor, Department of Civil Engineering
Mangalam College of Engineering,
Kottayam,India

***Abstract*—This paper deals with the review of structural behavior of irregular building for different plans like rectangular,C,L and I shape. Modeling of 15- stories RCCframed building to be a done on the ETABS software for analyze. maximum shear forces, bending moments, and maximum story displacement are computed and then compared for all the analyzed structure.**

Keywords: - Irregular building, ETABS software, shear force, story displacement,story drift.

I. INTRODUCTION

ETABS provides both static and dynamic analysis for a wide range of gravity, thermal and lateral loads. Dynamic analysis may include seismic response spectrum or accelerogram time history. This analysis mainly deals with the study of a rectangular, L, C and I shaped plan using ETABS.

The behaviour of any building depends on the arrangement of structures present in it.Irregularity in structures is alack of symmetry or eccentricity between geometry,mass,stiffness etc.Irregularities are introduced in real design for both aesthetic and utility.Irregularities in the distribution of mass, stiffness, and geometry along the height of the building grouped as vertical irregularities.The system having physical discontinuityis termed as irregular building.

A 32m x 24m 15- stories structure having 4m x 4m bays are modeled using ETABS. The height of each story is taken as 3m, making the total height of the structure 45m. Loads considered are accepted by the IS-875(Part1, Part2), IS-1893(2002) code,and combinations are acc. to IS-875(Part5). Analysis of the structure, maximum shear forces, bending moments, story drift, and maximum story displacement, are computed and then compared for all the analyzed system.

II. LITERATURE REVIEW

Abhay guleria studied the structural analysis of multi-storey irregular building with different plans. It emphasizes on the structural behavior of multi-storey buildings for different plan configurationslikerectangular, C, L, and I shape. Help to give an idea about the story overturning moment varies inversely with storey height. Dynamic analysis, mode shapes are generated, and it can be asymmetrical plans undergo more deformation thansymmetricalplans. Modeling is to be done by using this journal.

SIVA NAVEEN E (2018) also studied the dynamic analysis of irregular buildings under earthquake loads.The structural behavior of multi -story frames with single and combination of irregularities.Help incorporating abnormalities in structures without compromising their performance the regular and irregular models. The Idea about the response spectrum analysis was conducted to clarify these models by taking the results of maximum displacement, inter-story drift, and story shear to compared. Response spectrum method allows a clear understanding of the contribution of different modes of plans.It is also useful for approximate evaluation of seismic reliability of structures.

From the above papers the problem, was learnt, analyzed and solved. Thispaper, focused on the dynamic analysis of an irregular buildings using grid slabs for different plan configurations. The topic which we are doing has very few articlespublished

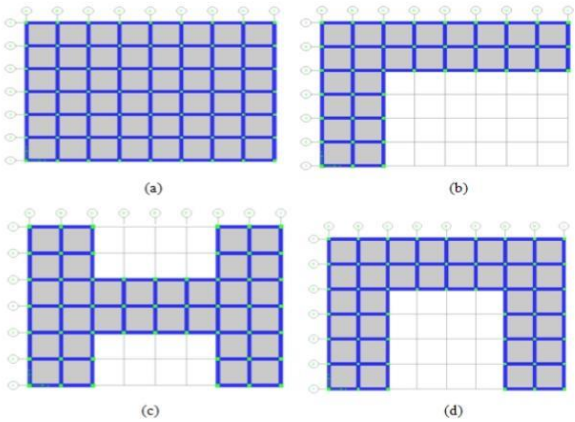
III. METHODOLOGY

A. Modelling of RCC frames

An RCC framed structure is an assembly of slabs, beams, columns, and foundations inter-connected to each other, as a unit. The load transfer mechanism in these structures is from slabs to rays, from beams to columns, and then,ultimately, from columns to the foundation, which in turnpasses the load to the soil. In this study, we have adopted four cases:

a) Rectangular Plan
b) L-shape Plan
c)I-shape Plan
d) C-shape Plan

Fig. 1: Plans of buildings



The building is 32m x 24m in plan with columns spaced at 4mfrom center to center. A floor-to-floor height of 3m is assumed.

TABLE1
Building Description

Length x Width	32mmx24mm
No. of stories	15
Story height	3m
Beam dimensions	450mmx450mm
Column 1-5 stories dimensions	600mmx600mm
Column 6-12 stories dimensions	500mmx500mm
Slab thickness	125mm
Thickness ofthe main wall	230mm
Thickness of the parapet wall	115mm
Support conditions	Fixed

TABLE 2
Material Specifications

Grade of Concrete	M30 fck= 30N/mm2
Grade of Steel	fy= 415N/mm2

TABLE 3
Loads

PARAMETERS	**DETAILS**
Dead load	15.87kN/m2
Live load	8 kN/m2
Seismic zone	V
Soil type	I
Importance factor	1
Response reduction factor	5
Damping	5%
Codes	IS 875 (part 1) IS 875 (part 2) IS 875 (part 5)

IV. RESULTS

TABLE 4
Story displacement

Story Response Values

Story	Elevation	Location	X-Dir	Y-Dir
	m		mm	mm
Story15	45	Top	31.419	32.046
Story14	42	Top	31.004	31.582
Story13	39	Top	30.223	30.753
Story12	36	Top	29.07	29.549
Story11	33	Top	27.585	28.013
Story10	30	Top	25.797	26.173
Story9	27	Top	23.729	24.054
Story8	24	Top	21.401	21.677
Story7	21	Top	18.833	19.061
Story6	18	Top	16.041	16.222
Story5	15	Top	13.034	13.174
Story4	12	Top	10.271	10.365
Story3	9	Top	7.358	7.411
Story2	6	Top	4.356	4.375
Story1	3	Top	1.558	1.557
Base	0	Top	0	0

The above table shows that the story displacement increaseswith the increase in story.

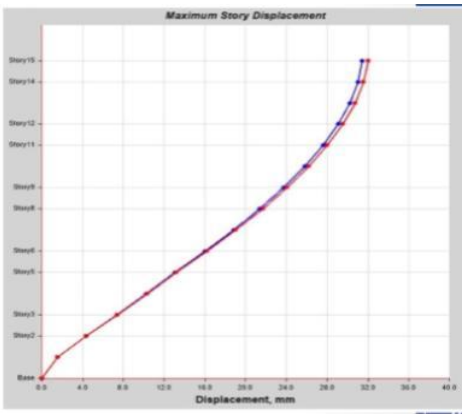


Fig.2 Displacement diagram

The above graph, it represents the graphical representation of the story displacement with different stories.

Shear force

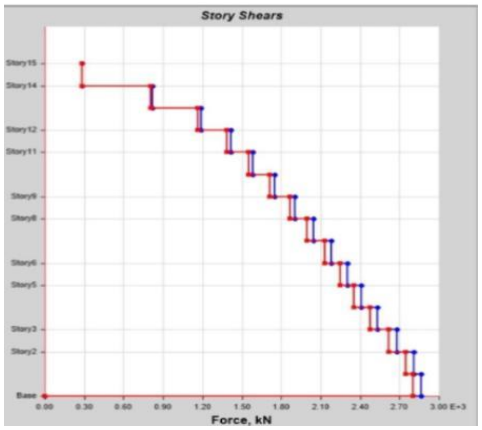


Fig. 3 shear force diagram

As per the above figure it has been concluded that the story shear decreases with the increase in story height.

Story drift

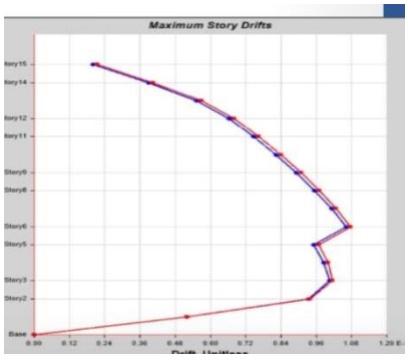


Fig.4 story drift diagram

The above graph, it represents the graphical representation of story drift with various heights. It increases initially and decreases with increasing the height.

The above results show that, the displacement of building is increased with increasing the height but the shear force is decreased with increasing height and the story drift increasing

with increasing the height and reach the maximum point and slowly decreased with increasing the height.

V. CONCLUSIONS

Dynamic analysis, mode shapes are generated and it can be concluded that asymmetrical plans.

- Validation of the software has been done by selecting suitable journal
- Comparison of modal mass participation ratios was done usingETABS software. A very less variation was found
- Comparison of story displacement values resultedin 0.35 variation
- The comparison of story drift value resulted in the difference of 1.27mm
- The story shear results we obtained were nearly 2800kN.

TABLE 5
COMPARISON OF RESULTS

Parameters	**Journal**	**ETABS**
Story displacement	32.39	32.04
Story shear	2876.87	2865.65
Story drift	9.5	10.77

The above table shows that the difference between journal structure and analytical structure.

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