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SEISMIC EARTHQUAKE ANALYSIS OF HIGH RISE BUILDING WITH SHEAR WALL WITH SHEAR WALL AT THE CORE APPROACH

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Abstract - *There has been a considerable increase in the construction of tall buildings both commercial and residential and the modern trend is towards more taller, larger and mass structures. Thus the effects of lateral loads like wind loads, earthquake loads and blast forces are attaining increasing importance and almost every designer is faced with the problems of providing adequate strength and stability against lateral loads. Shear wall system is one of the most commonly used lateral load resisting system in high rise buildings. When shear walls are situated in advantageous positions in the building, they can form an efficient lateral force resisting system by reducing lateral displacements under earthquake loads. Therefore it is very necessary to determine effective, efficient and ideal location of shear wall. Modern trends towards high rise buildings increase recently due to the high increase in the number of tall buildings, both residential and commercial.*

***Key Words*: Analysis, Etabs, High rise structures, Shear wall at different approaches, Lateral Deflections, Results of lateral deflection analysis.**

1. INTRODUCTION

Due to the seismic destruction and importance of life and structures, detailed analysis and design of shear walls is necessity. Shear walls have been in use for medium to high rise structures but generally the design is too conservative. The earthquake resisting structure became need of an modern era, as the cities getting crowded, the requirement of the houses is rising, as an result it became necessary for the structure to be strong. In the older days the structures are constrcted without considering the earthquakes and even the structures are small so it was easy to design it manually in less time. Now, the structure are larger in mass are required so it became necessity to construct a structure considering all the forces applied on it.

2. LITERACTURE REVIEW

1) SEISMIC PERFORMANCE OF RC HIGH-RISE BUILDINGS – A CASE STUDY OF 44 STOREY STRUCTURE IN SKOPJE (MACEDONIA), Roberta Apostolska et.al.

According to the author, this paper present a review of the existing structural systems, design recommendations and guidelines for high-rises worldwide, as well as selected results from seismic performance of 44 stories RC high-rise building which is a unique experience coming from design and construction of the four high-rise buildings

2) Effect of shear wall location in buildings subjected to seismic loads by Lakshmi K.O.1 et.al.

Shear wall system is one of the mostly used lateral load resisting system in high rise buildings. Shear wall has high in plane stiffness and strength which can be used to simultaneously resist large horizontal loads and support gravity loads, which significantly reduces lateral sway of the building and thereby reduces damage to structure and its contents

3) PERFORMANCE-BASED SEISMIC DESIGN OFTALL BUILDINGS IN THE U.S.J.P. Moehle

In these paper, an understanding of the relation between performance and nonlinear response analysis is described; selection and manipulation of ground motions appropriate to the seismic hazard; selection of appropriate nonlinear models and analysis procedures; interpretation of results to determine design quantities based on nonlinear dynamic analysisprocedures; appropriate structural details; and peer review by independent qualified experts to help assure the building official that the proposed materials and system are acceptable.

4) THE OPTIMUM LOCATION OF SHEAR WALL IN HIGH RISE R.C BULIDINGS UNDER LATERAL LOADING by M R Suresh1et.al.

According to the author, Shear walls are the structural system used to increase the strength of R.C.C Structure to resist the lateral forces and increase the strength of the structure too. In high rise buildings the shear wall are used to resist lateral loads that may be caused by wind and seismic motion acting on the diaphragm of the structure. R.C. Shear wall provide large strength and stiffness to the building in the direction of their orientation which considerably reduces lateral sway of the building and there by reduces damage to the structure leading to increase the life of the structure.

5) RESPONSE OF LATERAL SYSTEM IN HIGH RISE BUILDINGUNDER SEISMIC LOADSAhsan Mohammed Khan et.al.

Practically earthquake ground motion can occur anywhere as it is a sudden natural calamity in the world and the risk associated with taller buildings, especially under severe earthquakes, should be given high attention, since tall buildings often accommodate thousands of occupants. In these paper, the behavior of the structure with response spectrum analysis method is followed.

6) EARTHQUAKE BEHAVIOUR OF BUILDINGS WITH AND WITHOUT SHEAR WALLS ShyamBhat M1 et.al.

In this paper the result for analysis of the structure is obtained from well known and widely used software named STAAD Pro and the results with the shear wall shows the adequate results compare to the structure without shear wall.

3. METHODOLOGY

In this paper, reinforced concrete shear wall buildings were analyzed with the procedures laid out in IS codes. The intent of the paper was to investigate the seismic behaviour of Building with shear walls provided at the centre core and center of each side of the external perimeter with openings.

4. MODELING AND ANALYSIS

For modeling purpose, in this paper the software used is an ETABS software, ETABS is the reliable software for the high rise structures. The multi story structures, is created along with all loading application on different structural elements along with structural shear wall, which is located at core approach.

5. RESULTS

The results for the shear wall is shown below, as we can see the storey deflection in the x direction and the y direction is being noted and from the results below we, can proceed to the designing.

Storey	Elevation m	Location	X-Dir mm	Y-Dir mm
Storey40	120	Top	102.8	104.9
Storey39	117	Top	101	102.8
Storey38	114	Top	99.1	100.5
Storey37	111	Top	97.2	98.2
Storey36	108	Top	95.2	95.9
Storey35	105	Top	93.1	93.5
Storey34	102	Top	90.9	91
Storey33	99	Top	88.7	88.5
Storey32	96	Top	86.4	85.9
Storey31	93	Top	84	83.3
Storey30	90	Top	81.6	80.6
Storey29	87	Top	79.1	77.9
Storey28	84	Top	76.5	75.1
Storey27	81	Top	73.8	72.2
Storey26	78	Top	71.1	69.3
Storey25	75	Top	68.3	66.4
Storey24	72	Top	65.4	63.4
Storey23	69	Top	62.5	60.3
Storey22	66	Top	59.5	57.3
Storey21	63	Top	56.5	54.2
Storey20	60	Top	53.5	51.1
Storey19	57	Top	50.4	47.9
Storey18	54	Top	47.3	44.8
Storey17	51	Top	44.2	41.7
Storey16	48	Top	41	38.5
Storey15	45	Top	37.9	35.4
Storey14	42	Top	34.7	32.3
Storey13	39	Top	31.6	29.2
Storey12	36	Top	28.4	26.2
Storey11	33	Top	25.3	23.2
Storey10	30	Top	22.3	20.3
Storey9	27	Top	19.3	17.5
Storey8	24	Top	16.4	14.7
Storey7	21	Top	13.5	12.1
Storey6	18	Top	10.8	9.6
Storey5	15	Top	8.3	7.3
Storey4	12	Top	5.9	5.2
Storey3	9	Top	3.8	3.3
Storey2	6	Top	2	1.8
Storey1	3	Top	0.7	0.6
Base	0	Top	0	0

6. CONCLUSIONS

The location of the shear wall plays a vital role in resisting the forces. The forces acting on the structural diaphragm are either resisted by the Horizontal braces or Vertical braces, and transfer it to the ground safely. But, here as an alternative if we place shear walls at the core approaches, then the forces are directly applied on it and the transferred to the ground.

REFERENCES

[1] Indian Standard code, IS 456: 2000, Plain and Reinforced Concrete-Code of practice.
[2] Indian Standards: IS 13920 : 1993, —Ductile detailing of reinforced concrete structures subjected to seismic forces— Code of Practice,
[3] Indian Standards: IS 875(part 1) : 1987, —Dead loads on buildings and Structures.
[4] IS 875(part 2) : 1987, —Live loads on buildings and Structures.
[5] Indian Standards: IS 1893 (part 1) : 2002, —Criteria for earthquake resistant design of structures: Part 1 General provisions and buildings.
[6] Chopra, A.K., —Dynamics of Structures: Theory and Application to Earthquake Engineering||, Pearson Education, 4th edition, 2012
[7] Duggal, S.K., —Earthquake Resistant Design of Structures|| Oxford University Press, New Delhi 2010