ANALYSIS OF EARTHQUAKE RESISTANCE TALL STRUCTURE WITH RESPONSE SPECTRUM ANALYSIS (STADD. PRO)

[1]Dubey Sushil Kumar Phuldeo , [2]Prof. Dharmendra Singh
[1]Scholar M.Tech (Structure), [2]Guide
Department of Civil Engineering, RNTU, Bhopal (M.P).

Abstract: - The basic formation of the building framework presented for this project is based on IS 1893-2002 and IS 800. Such as IS 800: 2007 .The building contains six stories and has three biscuits on the straight side and five bays on the back side. The selection of the choosing categories was made after the normal process. The two methods used for the analysis are the equivalent static measurement and the Response Spectrum .A comparative analysis of the results Found from both methods was performed based on migration, story distribution and clipping.
The software used for analyze and design is STAAD Pro. Both at the time of design and analysis the calculations performed were performed and compared.
Earthquake is the most disastrous and unpredictable natural phenomenon which causes huge destruction to human lives as well as infrastructure. Seismic forces generated during earthquake leads to severe damage to structural elements and sometimes structural failure. Therefore, analysis and design of the buildings considering the effect of lateral forces is very important aspect. An RCC framed structure is basically an assembly of slabs, beams, columns and foundation inter- connected to each other as a unit. The load transfer, in such a structure takes place from the slabs to the beams, from the beams to the columns and then to the lower columns and finally to the foundation which in turn transfers it to the soil.

Keywords:- Seismic Loading, Manual Calculation, STAAD Pro., analysis-design, wind effect, seismic effect, Steel, concrete composite structure, Programming tools.

1. PROBLEM STATEMENT

A six-story structure with three biscuits on the straight side and 6 bays on the latest side was taken and analyzed by both the same methods for measuring and viewing the views and designed.
The height with the storey is 3 meters so the open space between the bays is 8 meters and the consecutive spaces of ditches are 6 meters
The following earthquake vibration parameters follows Seismic zone:3

- Zone factor 'Z':0.16
- Structure frame : steel moment performing frame designed as per IS 456:2000
- Calculation reduction factor:5
- Importancefactor:1.5
- Damping ratio:3%

2. METHODOLOGY

The first step is to design the design of the building framework. The process involved is the selection of parts for independent members. Since the consequences of aggressive actions are a function of the strength of the members, the unsafe approach involves a lot of tolerance.
An example discussed here includes a structure in which seismic resistance is provided by the resistance friction (MRF) in both x and y indicators. Temporary resistance frames (MRF) are known as flexible structures. Their structure is therefore often governed by the need to satisfy judgmental approaches under magnitude earthquakes, or the limitations of P outcomes - under earthquake load. For this reason it is very popular for strong communication. The first design has the following steps:

- Definition of beam sections, testing deviations and resistance under load gravity.
- Following the screening process, review the next steps until all the criteria have been met.

The scanning process can enable it to use a team-based team approach or a visual response approach.
1. Beam category selection.
2. The classification of columns assesses „weakness of solid column formation‟.
3. Check the compression / binding at low levels under download.
4. Calculation of seismic weight.
5. Strict analysis of structure 1 plane under lateral loads.
6. Strict analysis under load gravity.
7. Strength test using the results of P-Δ (parameter Ɵ) within the context of an earthquake load.
8. Deflection check underground loading.
9. With the visual response of scene 5 it is replaced by the visual appearance of the plane of 1 plane to reciprocate the effects of earthquake actions.

3. RESULTS OF LATERAL FORCE METHOD

Max.bending moment, shear Force etc. Available in load combination1.7 (EQ+DL)

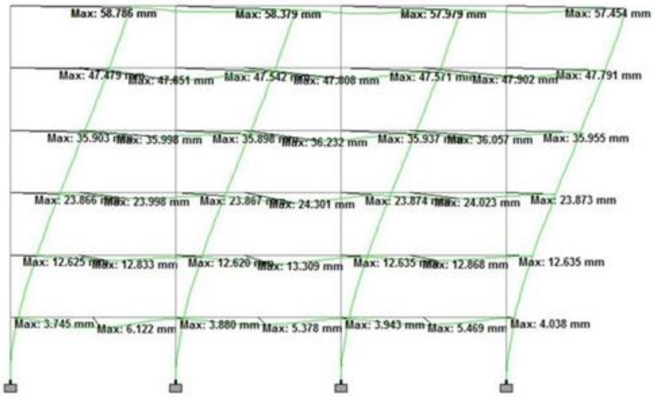


FIG (6.1) Shows the Displacement Figure for load combination 1.7(EQ+DL)

e inner center of the storey visible from the diagram above is within the limits of the collapse of the code i.e. is within .004 of storey height = 0.004X3000 = 12mm.

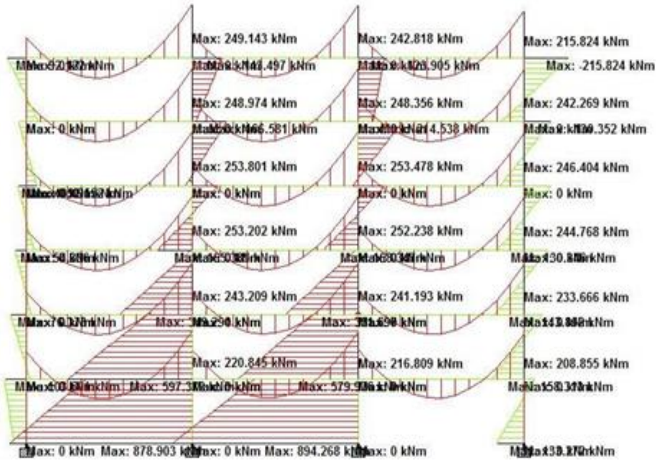
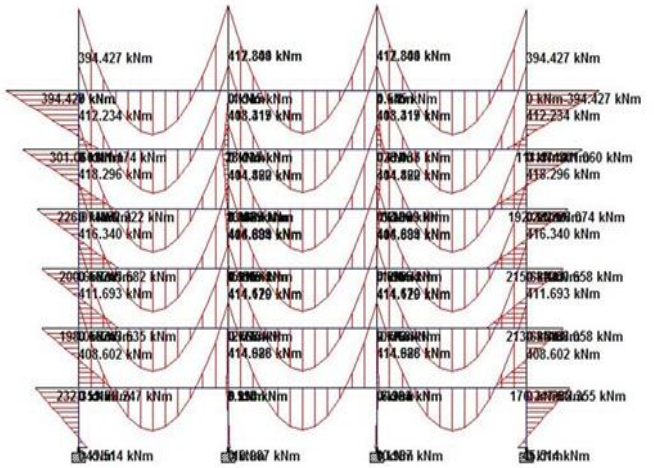


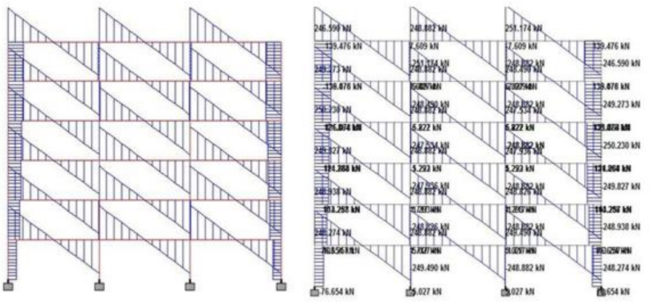
FIG (6.2) Shows the Bending moment Figure for load combination 1.7(EQ+DL)

4. RESULTS OF RESPONSE SPECTRUMANALYSIS

Max bending moment, shear Force etc. Available in load combination1.3(DL+LL+EQ)



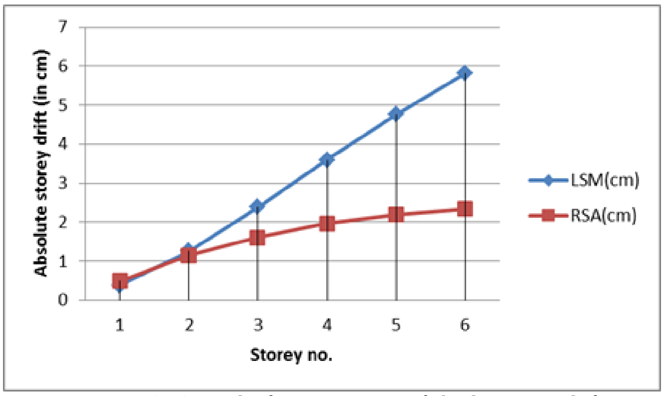
Fig(6.3) Shows the Bending moment figure for load combination1.3(DL+LL+EQ)



Fig(6.4) shows the 'shear forcediag.inX-axis' 'shear force diag. in Y-axis'

The Load combination is same as both cases of Load 'case1.3(DL+LL+EQ)'Comparison analysis of the absolute storey drift in both methods: (table 6.1)

Storey no.	Storey height	LSM(cm)	RSA(cm)
1	3	0.3869	0.491
2	6	1.2595	1.15
3	9	2.3837	1.61
4	12	3.5892	1.96
5	15	4.7566	2.19
6	18	5.8123	2.34

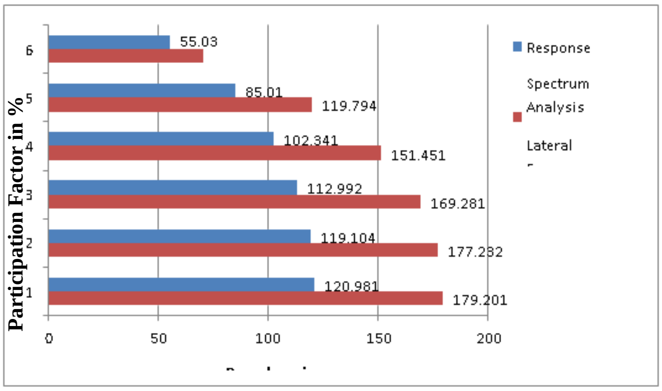


Fig(6.5) Graph of comparison no of absolute storey drift

Table(6.2) Comparison analysis of the storey shear: (using both LSM and RSA)

Storey no.	Storey height	LSM (KN)	RSA (KN)	Difference in %
1	3	179.201	120.981	28.91
2	6	177.232	119.104	32.79
3	9	169.281	112.992	33.25
4	12	151.451	102.341	32.42
5	15	119.794	85.01	28.99
6	18	70.582	55.03	22.033

It is found that the extreme shear difference of these methods is approximately 29.73% somewhere in each yard.



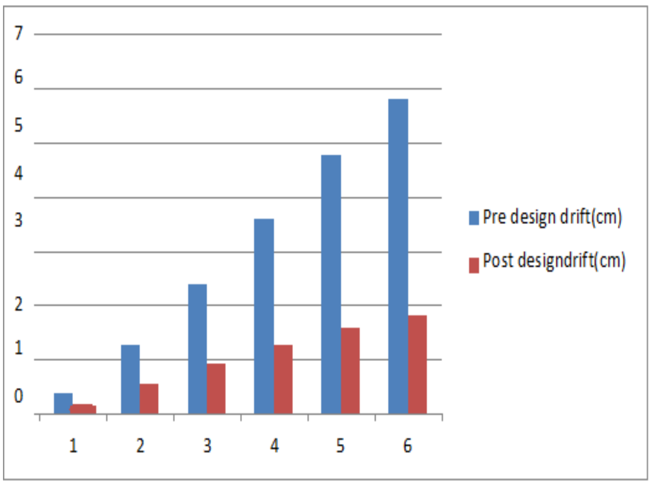
Figure(6.6) Graph of the comparison of shear storey

Final results with compared to initial design result

Table (6.3)Drift: By Lateral Force Method

Storey no.	Pre design drift (cm)	Post design drift(cm)	Difference in %
1	0.3869	0.2056	46.85
2	1.2595	0.5472	56.55
3	2.3837	0.9052	68.11
4	3.5892	1.2561	65
5	4.7566	1.5729	66.93
6	5.8123	1.8012	69.05

It is evident that the variability in design and pre-delivery variations is approximately 62.08% in the individual retail space.



Fig(6.7) Graph of the results of storey drift for final & initial design

Response Spectrum Method:

Participation factor:

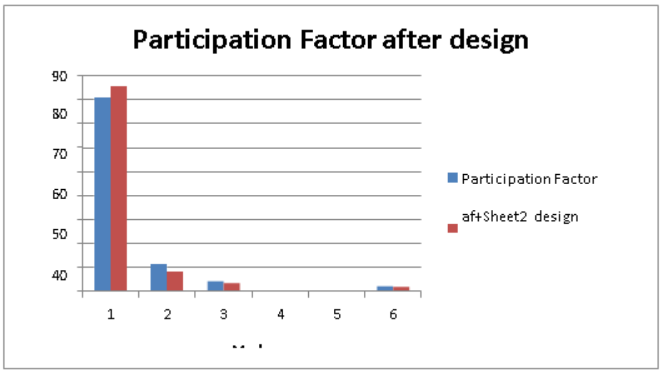


Fig. (6.8) graph of the results of mode participation for final and initial design

The total amount of metal required within the type of connection with the parts of the members is more than the analysis and support style of the support system used rather than the dynamic strength method

5. CONCLUSION

1. Inter-storey Drift was identified using the power team method and response method and it was found that the downside of the response system is not only visual but also a lateral force method.
2. The shear obtained by the physical means of the method is smaller than that obtained by the lateral force method.
3. Differences in the results of the expression of the response and the effect of the force of force are attributed to certain common assumptions within the lateral force path. Of course:
a. the initial mode mode makes a very important contribution to the lower shear.
b. the total weight of the construction is considered to be the opposite of the weight used in the process used. Both considerations are allowed in low and medium-sized buildings.
4. As seen within the above results the values obtained according to the force analysis are smaller than those of the lateral force method. this is very common because the duration of the main mode with a powerful analysis is 0.62803 is greater than the 0.33 s estimate of the lateral force method.
5. The analysis also shows that the basic modal weight is 85.33% of the seismic weight. The second modal is 8.13% of the total seismic mass m so the time frame is 0.19s.

In the base shear forces, the results of the rubber and friction pendulum alternatives are very close to each other, and they provided approximately 85% reduction in the x direction and 57% reduction in the y direction.

This reduction in the forces indicates that the performance of the base isolation under the influence of earthquake is extremely good. When the reduction in the other effects are taken into account, it can be concluded that story isolation may also be considered as a strengthening alternative, as in the case of base isolation, when the characteristics of the

structure allow this. It is seen that in all alternatives, apart from the first floor, the relative storey drifts is significantly reduced especially in the fixed-base alternative. This situation indicates that the superstructure exhibits behaviour close to rigid body behaviour in base isolation.
Tall building quite often require extra basic material keeping in mind the end goal to confine the relocation and storey tallness. The consequences of two models of investigation are looked at between two arrangements of models. Aimed the review realized that the response spectrum analysis investigation predicts the auxiliary reaction precisely.

REFERENCES

1. Subramanian N., Design of steel structures, Oxford University Press,7th edition,2011,173- 209
2. NegiLS,Design of Steel Structures, Tata Mc-Graw Hill Publishing Company Limited,,2nd edition,1997,
3. Punmia. P. C, 'Design of Concrete Structure', Lakshmi publications.
4. Dhirajlal. A 'Design of RC Elements (Limit State Method)'.
5. DUTTA, 'Estimation and cost', VSP Publications.
6. IS Code of manual calculation for plain & reinforced concrete (fourth revision) IS:456 (2000). Methods of Indian standards, July 2000, New Delhi.
7. IS code of practices sp 16-1999 Methods of Indian Standards March 1999, New Delhi.
8. Minister of health section 44, ACT 1997.
9. AgarwalPankaj and Shrikhande Manish, Seismic Design of Buildings, Prentice Hall of India Limited, July 2006,251-336.
10. J. Sankar, E. V. RaghavaRao, N. Chennakesavulu, Design of G+4 structure for earthquake resistant, IJES&RT, December 2016.
11. M. I. Adiyanto, M. I. Adiyanto, T. A. Majid, Malaysia S. S. Zaini, Analysis & Design of 3 Storey Hospital Structure Subjected to Seismic Load Using STAAD PRO ,2008.
12. 'Dr. Ashok kumar N', 'Navaneethan M', 'Naviya B', 'Gopalakrishnan D', 'Atun Roy Choudhury'; Planning-Analysis & Design of Hospital BuildingS Using Staad Prov8i., 2017

