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Utilization of Advance Technology and Techniques in Analysis of A Tall Structure : A Review

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ABSTRACT

Now-a-days, the architects often prohibit the widths of the columns so that more free space is available and for the good aesthetic look of the building without columns protruding out of the walls and corners. Advances in structural members and techniques to resist lateral forces are generally used now days to pretend more stable and safe structure.
In this paper we are presenting comparative study of three differently shaped columns using analysis tool ETABS

Keywords : Structural stability, analysis, advance techniques, software's, forces, lateral forces. ETABS

I. INTRODUCTION

Structural design is a science and art of understanding the behavior of structural members subjected to loads and designing them with economy along with safety, serviceability and as a durable structure. For more cost effective and stable structure some innovative techniques are generally utilized these days which provide designer a complete mode for designing an affordable, safe and lateral load resisting structure.

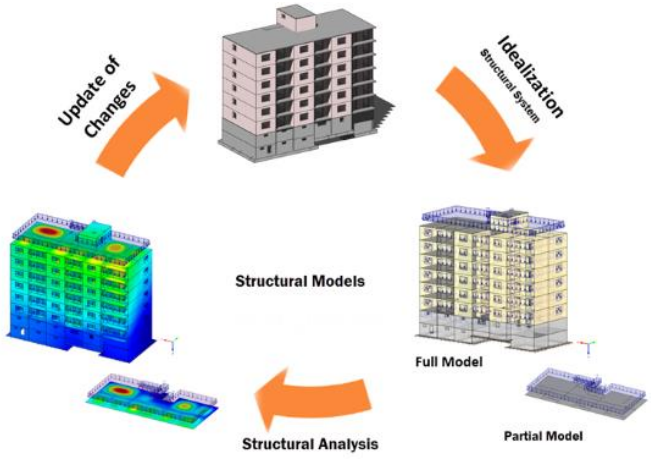

Figure 1 : Phases of structural designing

In this study we are presenting review of past publications related to stability of structures, tools utilization and techniques used to make structure lateral load resistant.

II. LITERATURE REVIEW

Following literature publications has been reviewed to determine the advances in the field of structural designing and stability of the structure. Here some of the latest publications has been considered for proper review of the technology adopted and their conclusions to have general limitations of the development in structural analysis.

Yuzhuo WANG et al (2019) The research paper presented testing of three T-formed steel-strengthened solid columns examined under high temperature and vertical loads, to mimic fire impact. The results concluded that failure characteristics, distribution of temperature field, vertical deformation attributes and imperviousness to fire were similarly investigated under various hub pressure proportions and diverse unpredictability. The test additionally demonstrated that the cracks expanded with the expansion of hub pressure proportion and flightiness. The damages of the web were severer than the rib. The breaks were for the eccentric side on the flighty side and generally slanted splits in the example. The vertical extension turned out to be increasingly evident as the unpredictability diminished. The imperviousness to fire diminished as the axial pressure proportion expanded. Contrasted and, the imperviousness to fire of enormous axial pressure examples (the pivotal pressure proportion was 0.6) was diminished by 57% than less axial pressure examples (the hub pressure proportion was 0.2). The imperviousness to fire diminished by about 30min as erraticism expanded by 20mm.

Mary Paul V and Nisha Vargheese (2019) The research paper dissected Crisscrossed moulded columns associated by the lacing bar, Single vertical steel plate with stiffeners, Double vertical steel plate, Effect of tallness, Effect of width and axial compressive conduct. The characteristics of the finite element investigation were utilized on the applied limit conditions and material properties utilizing ANSYS 16.2.

The outcomes inferred that Mono segments associated with double vertical steel plate had more load conveying limit though Mono columns associated by a lacing bar had a less load-carrying limit. Mono segments associated by single vertical steel plate with stiffeners have more burden conveying limit than binding bars. Load conveying limit contrarily propositional to the stature of the segments. Load conveying limit relies on the width of the steel plate. The measure of confinement concrete increased load-carrying capacity.

Shital A. Navghare and Amey Khedikar (2019) The research paper presented the examination of G+10 RCC Framed Structure with fluctuating states of a column by utilizing the Response Spectrum Method. To improve the exhibition of the RCC Framed Structures affected by Dynamic Forces (forces produced by a given ground movement), normally formed segments were contrasted and the different RCC segment cross-segments (L-molded, Tee-molded) in the model. Three models with each molded the RCC sections were executed in ETAB programming.

The results presented that the L-molded segment had the most extreme base shear alongside both X and Y-course and rectangular segments had least base shear along X and Y-bearing. Rectangular sections have increasingly joint displacement when contrasted with L-molded segments has the least joint displacement along X, Y and Z-bearing.

Shivaranjitha T H and Naveen Kumar S (2019) The research paper presented the comparative investigation of Y-shaped columns against customary (rectangular or square) sections, 8 storey business structures were considered for investigation and comparative r investigation among standard and Y-shaped column where the plan and examination were led utilizing application ETABS 2015 rendition. Results indicated that by embracing Y-shaped

columns about 20.53% of floor territory was expanded. Consequently, the Y-shaped column can be effectively received to expand the utility of the floor zone of private/business structure. The essential target of the examination depended on the decrease of a few columns without any decrease in strength of the structure and generate free space for the parking space.

Results expressed that the number of segments was diminished by practically 40% prompting the end more sections free zone can be acquired by lessening the number of columns. It serves to the free development of vehicles in the parking garage. Results displayed that about 20.53% of the floor region was expanded utilizing Y-molded. The slanted help individuals from the Y-formed section was exposed to higher moment while moving the pivotal loads to the focal point of the vertical part of segments. The pillars encountered the resultant forces as hub loads at the intersection. The Y-molded sections can be utilized for the architectural purpose by giving a satisfying appearance to inclined support members, which expands the stylish appearance of the structure. As the quantity of column decreases, the economy in the development of footing for sections can be accomplished.

III. METHODOLOGY

ETABS'17 is a multipurpose program for investigation of structure. The accompanying three exercises must be performed to accomplish that objective.

- Modelling of the diverse cases in ETABS
- Calculation and Provisions according to Indian gauges can be connected.
- Analysis of structure to analyze forces, dislodging and moment producing in a casing.

For this research work following steps should be followed:

Step-1 Firstly literature survey should be done to determine the past research and

Need of study.

Step-2 To prepare Sample of light weight concrete to determine its properties to be

Assign in ETABS.

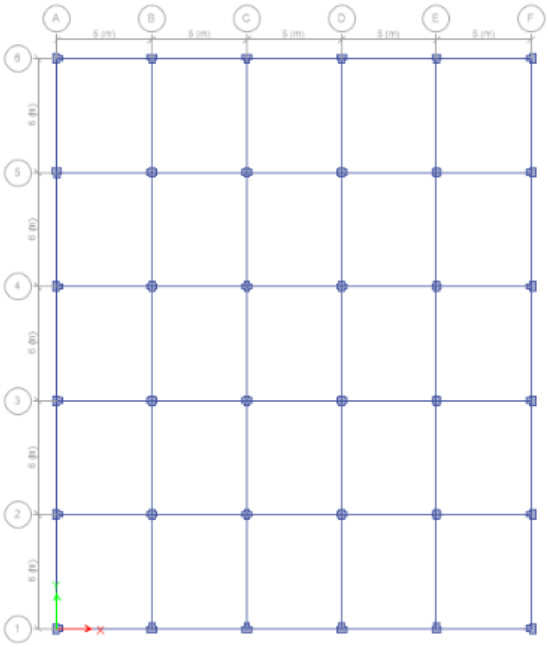

Fig 2. plan of structure

Step-3 To prepare modelling of a symmetrical building frame (G+12) using ETABS"17.

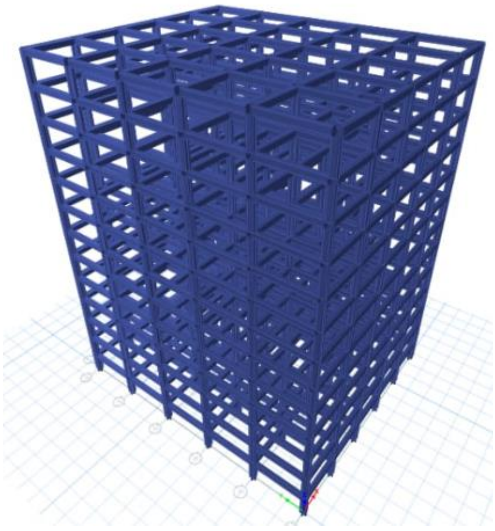

Fig 3. Model of the structure

Step-4 To assign properties and support conditions.

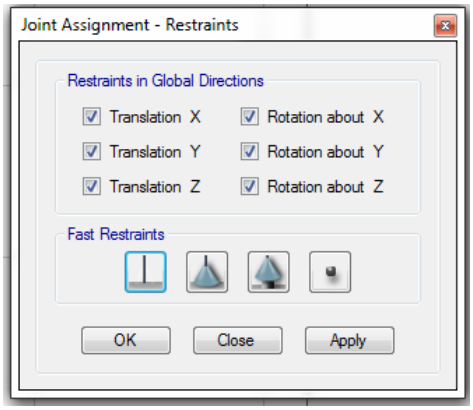

Fig 4. Assigning support conditions

Step 5 Defining and Assigning section Properties

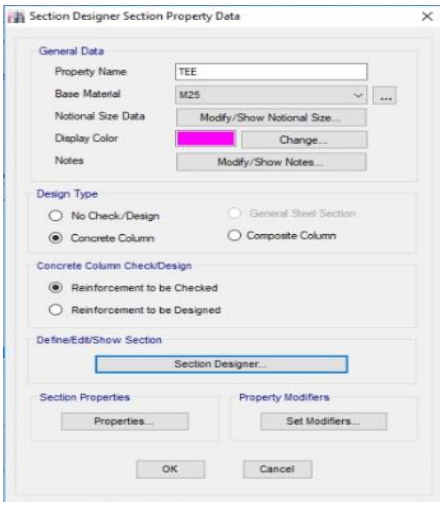

Fig 5 (a). Defining Section Properties

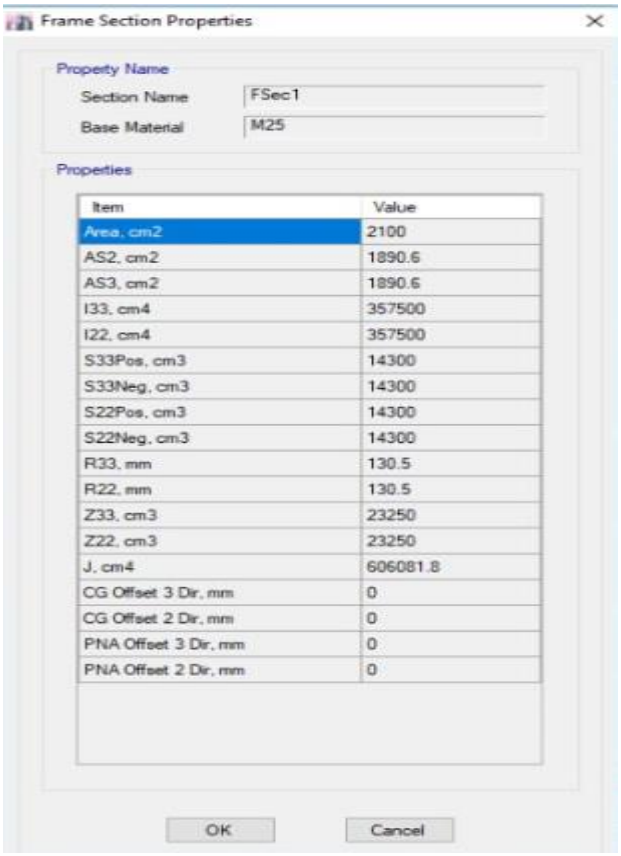

Fig 5 (b). Defining Frame Section Properties

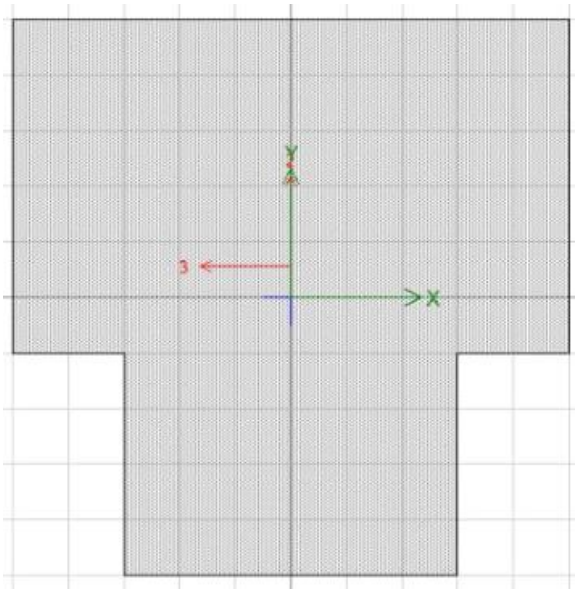

Fig 5 (c). Section Design T Shaped

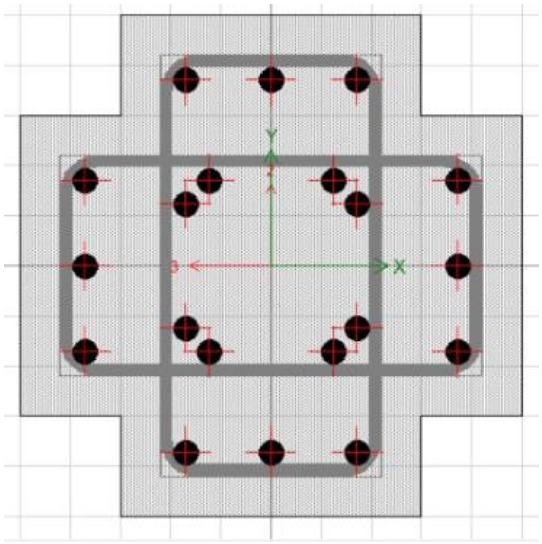

Fig 5 (d). Section design Plus Shaped

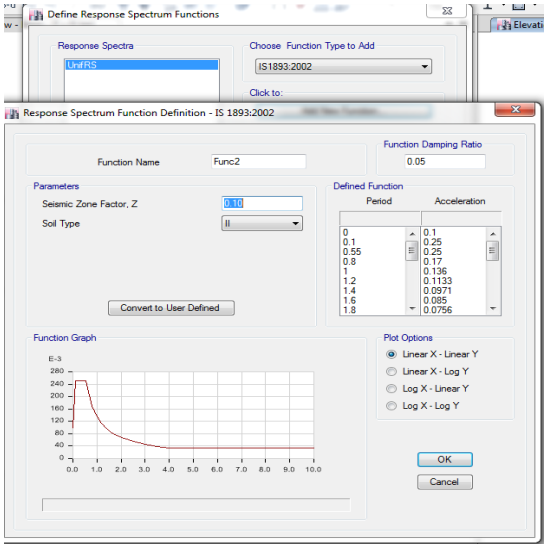

Fig 7. Dynamic analysis

Step-6 To Assign lateral force (response spectrum) dynamic analysis as per I.S. 1893-Part-I: 2016.

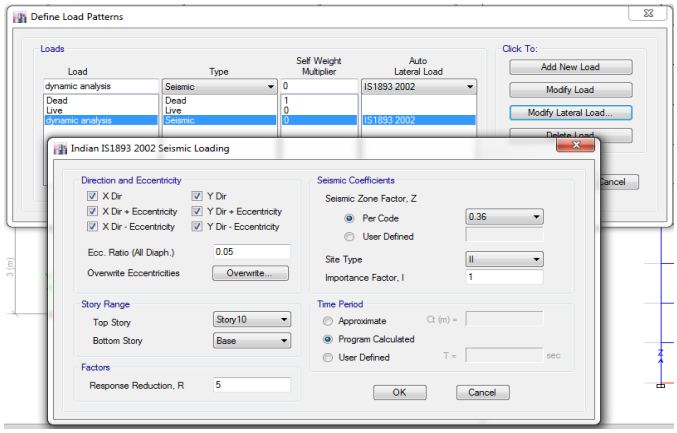

Fig 6. Defining loading conditions

Step-7 To analyze the structure for dynamic loading.

Step-8 To compare the results of the structure.

Analysis Results:

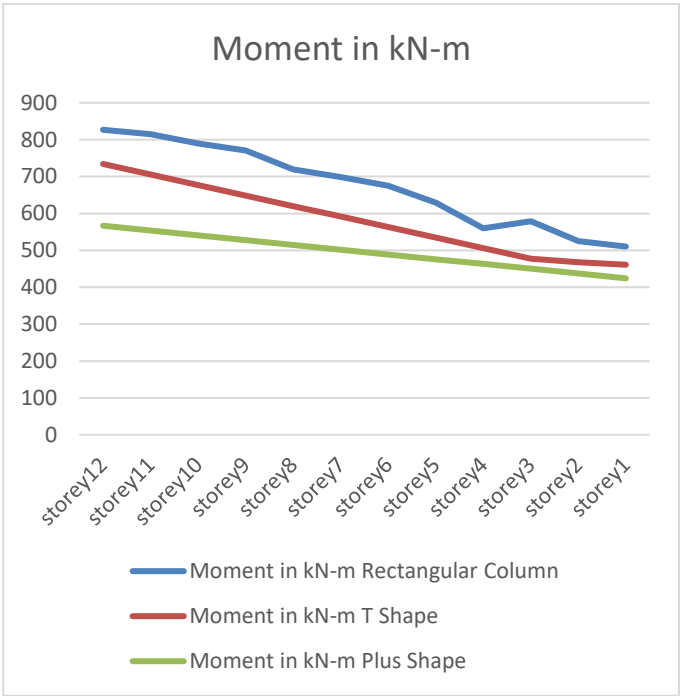

Fig 8. Bending Moment

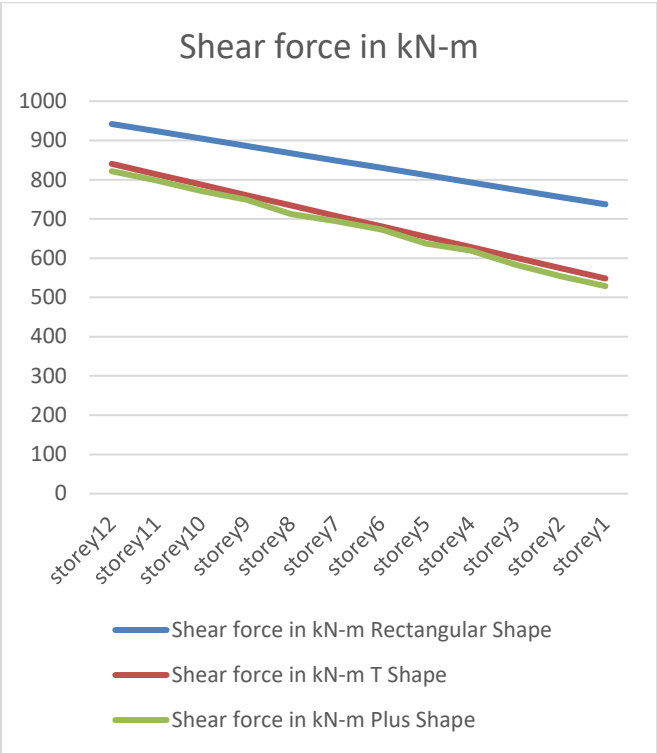

Fig 9. Shear Force

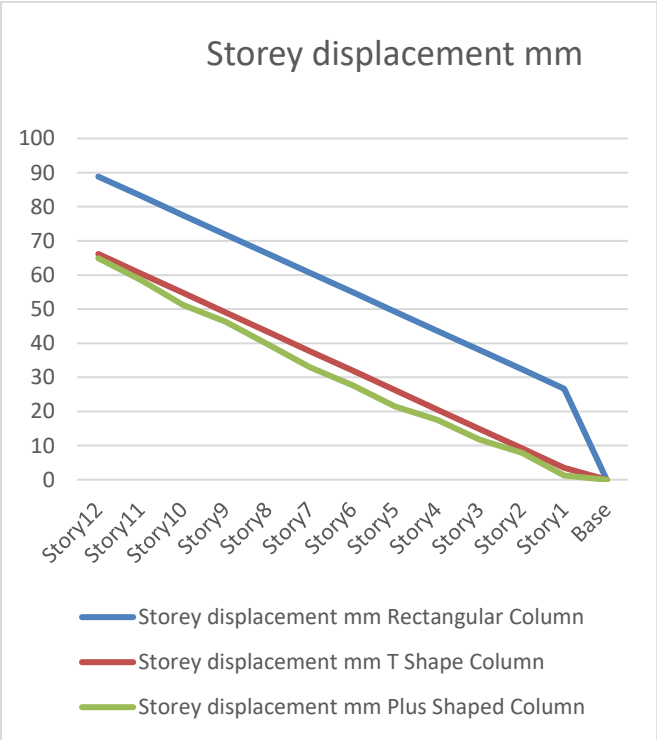

Fig 10. Displacement

IV.Conclusion

Bending Moment:

In the section above, it is unmistakably seen that bowing second in structure utilizing Rectangular segment was 826.76 kN-m though structure utilizing T shapes and Plus Shaped segment indicated less bowing second as 734.17 and 566.81 kN-m, in this way Plus formed case requires less support.

Axial Force

In above part it is seen that unbalance powers are greatest in rectangular case 941.85 kN though in Plus molded case these are diminished to 840.43 kN which shows strength of the structure.

Storey Displacement:

It is seen that sidelong steadiness is relatively expanded in structure with in addition to molded section case contrasting with structure utilizing conventional rectangular segment. In the event of light weight structure relocation is limited to 66.16 mm rather than 88.84 mm in uncovered casing.

Shear Force:

In the above section it is seen that there is exact moment variety in hub power as it is considered for same stacking condition in both the cases.

V. REFERENCES

[1]. Yuzhuo WANG ,Ying HUANG and Chuanguo FU, [Performance of T-Shaped Steel Reinforced Concrete Column under High Temperature], 6th International Workshop on Performance, Protection & Strengthening of Structures under Extreme Loading, PROTECT2017, 11-12 December 2017, Guangzhou (Canton), China.

[2]. Mary Paul V and Nisha Vargheese, [AXIAL COMPRESSIVE BEHAVIOUR OF CRISS

CROSSED SHAPED CONCRETE COLUMNS FENCED WITH STEEL], International Journal of Scientific & Engineering Research Volume 10, Issue 5, May-2019, ISSN 2229-5518.

[3]. Dr.MD.Subhan, [An investigational behaviour of RCC Core Steel Composite Column], SSRG International Journal of Civil Engineering (SSRG - IJCE) – Volume 4 Issue 5 – May 2017.

[4]. Shital A. Navghare and Amey Khedikar, [Analysis of RCC Framed Structure for Column with Modelling Irregularities], International Journal of Innovative Research in Science, Engineering and Technology, Vol. 6, Special Issue 11, May 2017.

[5]. Shivaranjitha T H and Naveen Kumar S, [Comparative Study of Y-Shaped Columns with Conventional Rectangular Shaped Columns], International Research Journal of Engineering and Technology (IRJET), Volume: 04 Issue: 06 | June -2017.

[6]. Pu Yang, Hongxing Liu and Zongming Huang, [A COMPARISON OF SEISMIC BEHAVIOR BETWEEN SPECIALLY SHAPED COLUMN FRAME STRUCTURE AND RECTANGULAR COLUMN FRAME STRUCTURES], The 14 th World Conference on Earthquake Engineering October 12-17, 2008, Beijing, China.

[7]. Suraj Shet, Sabyath Shetty and Shanmukha Shetty, [Analysis of Pu-Mu Interaction Diagram of C-Shaped Equal Legged RC Column Developed using ETABS and Analytical Method], International Journal of Engineering & Technology, 7 (3.34) (2018) 835-839.

[8]. Tinu Mathew T. and Krishnachandran V.N., [Parametric Study on Tubed Steel Reinforced Concrete Columns under Axial Loading], International Journal for Research in Applied Science & Engineering Technology (IJRASET), Volume 4 Issue VIII, August 2016, ISSN: 2321-9653.

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