



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 13, Issue 11, November 2024

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.524

9940 572 462

6381 907 438

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Effect of Wind Load on Tall Building in Different Terrain Categories by using STAAD.PRO

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ABSTRACT: Designing a structure in such a way that reducing damage during an earthquake makes the structure quite uneconomical, as the earthquake might or might not occur in its life time and is a rare phenomenon. In this project a multi existing RCC framed structure & Wind plays a critical position in design of tall structures because of its dynamic nature. The effect of wind is predominant on tall structures depending on location of the structure, height of the structure. In this project equivalent static method is used for evaluation of wind loads on buildings in different wind categories has been analysed and designed using STAAD.Pro V8i. The main objectives of the project are to compare the variation of steel percentage, maximum shear force, maximum bending moment, and maximum deflection in different wind categories and seismic zone.

KEYWORDS: RCC framed structure, Staad pro, seismic zone, STAAD. Pro V8i. Maximum deflection.

I. INTRODUCTION

A. In this project, the frames have been analyzed by using STAAD PRO(V8i).

B. STAAD or (STAAD.Pro) is a structural analysis and design software application originally developed by Research Engineers International in 1997. In late 2005, Research Engineers International was bought by Bentley Systems.

C. STAAD.Pro is one of the most widely used structural analysis and design software products worldwide. It supports over 90 international steel, concrete, timber & aluminium design codes.

It can make use of various forms of analysis from the traditional static analysis to more recent analysis methods like p-delta analysis, geometric non-linear analysis, Pushover analysis (Static- Non Linear Analysis) or a buckling analysis. It can also make use of various forms of dynamic analysis methods from time history analysis to response spectrum analysis. The response spectrum analysis feature is supported for both user defined spectra as well as a number of international code specified spectra

II. LITERATURE SURVEY

Inchara, K.P., Ashwini, G., (2016):The main objectives of this study were to study the performance and variation in steel percentage and quantities concrete in R.C framed irregular building in gravity load and different seismic zones. And to know the comparison of steel reinforcement percentage and quantities of concrete when the building is designed as per IS 456:2000 for gravity loads and when the building is designed as per IS 1893(Part 1):2002 for earthquake forces in different seismic zones. In this study five (G+4) models were considered. All the four models were modelled and analysed for gravity loads and earthquake forces in different seismic zones. ETABS software was used for the analysis of the models. According to their research, it can be inferred that support reactions tended to increase as the zone varied from II to V, which in turn increased volume of concrete and weight of steel reinforcement in footings and in case of beams, percentage of steel reinforcement increased through zones II to V.**Perla karunakar (2014):**

The author put his efforts to find out the performance and variation in steel percentage and concrete quantities in various seismic zones and impact on overall cost of construction. According **Perla Karunakar** to his research, the concrete quantities are increased in exterior and edge columns due to increase in support reactions however; variation is very small in interior column footings. Reinforcement variation for whole structure between gravity and seismic loads are 12.96, 18.35, 41.39, 89.05%.the cost variation for ductile vs. non-ductile detailing are 4.06%.

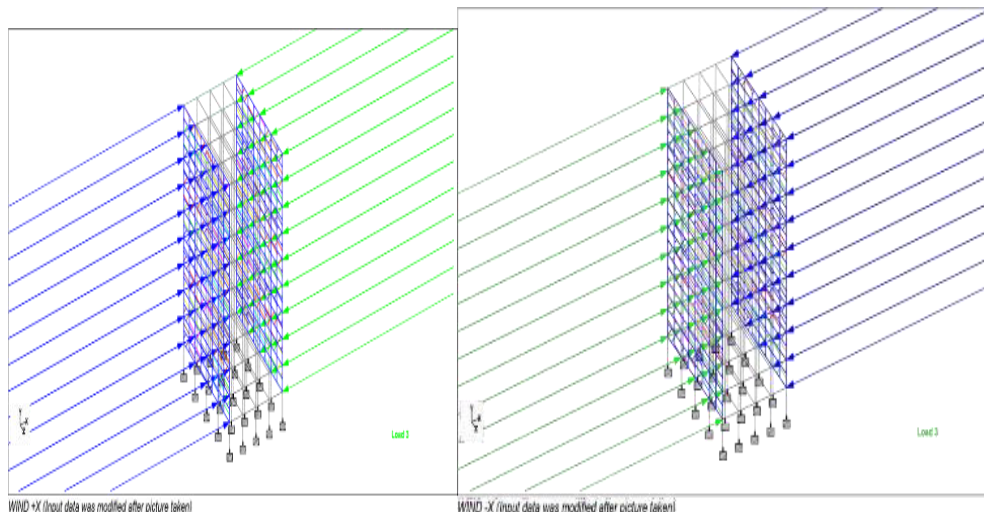
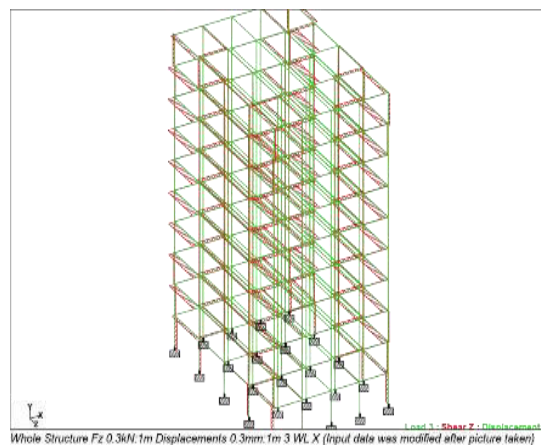
III. METHODOLOGY

With 0 at ground surface to a maximal at a height referred to as the gradient height, wind velocity as in atmosphere outermost layer generally rises with height. The Code does not take into account Ekman effect, which is a little shift in direction. The change in height is mostly dependent on the topography. As a result, it was considered advantageous to divide the wind speed in mean or average value and a variable element near this estimated value.

As per average period used in analysis of meteorological data, this average value might range as few seconds to few minutes. The greater average duration, the greater the fluctuation element of wind velocity, that indicates gustiness of wind. The higher wind speed, smaller average interval.

IV. EXPERIMENTAL RESULTS

The structure analysis of frame model that includes different wind categories has been done by using software STAAD.Pro and the results are shown below. The parameters which are to be studied are maximum bending moment, maximum shear force, maximum beam and node displacement and maximum support reactions.



(a)

(b)

(c)

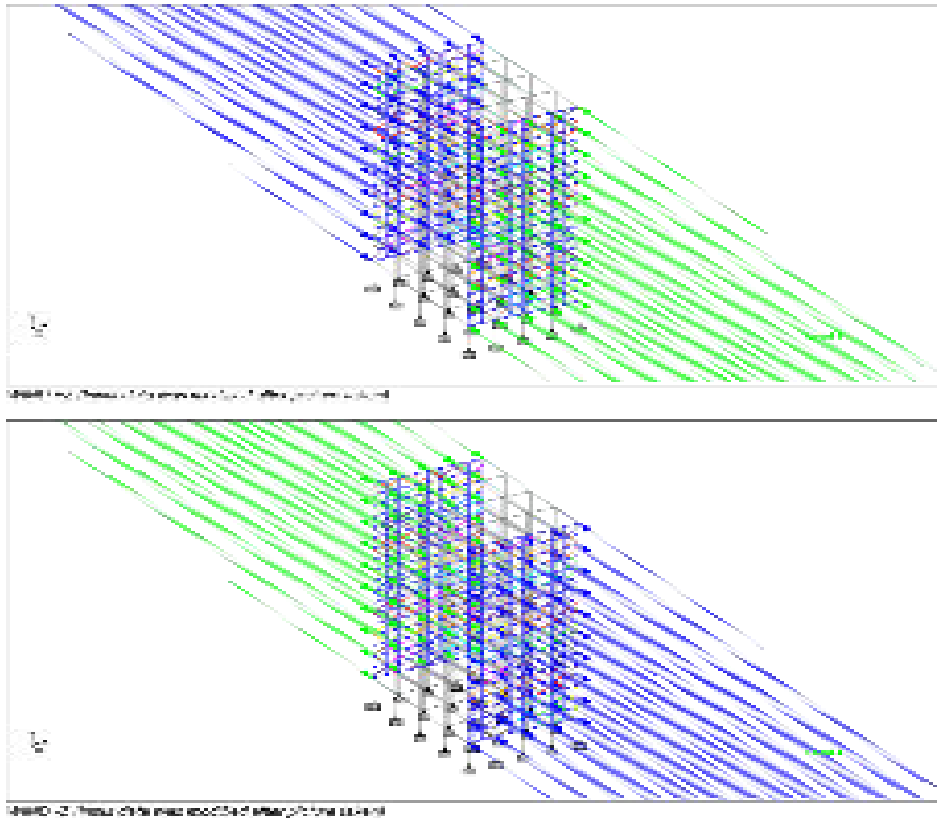
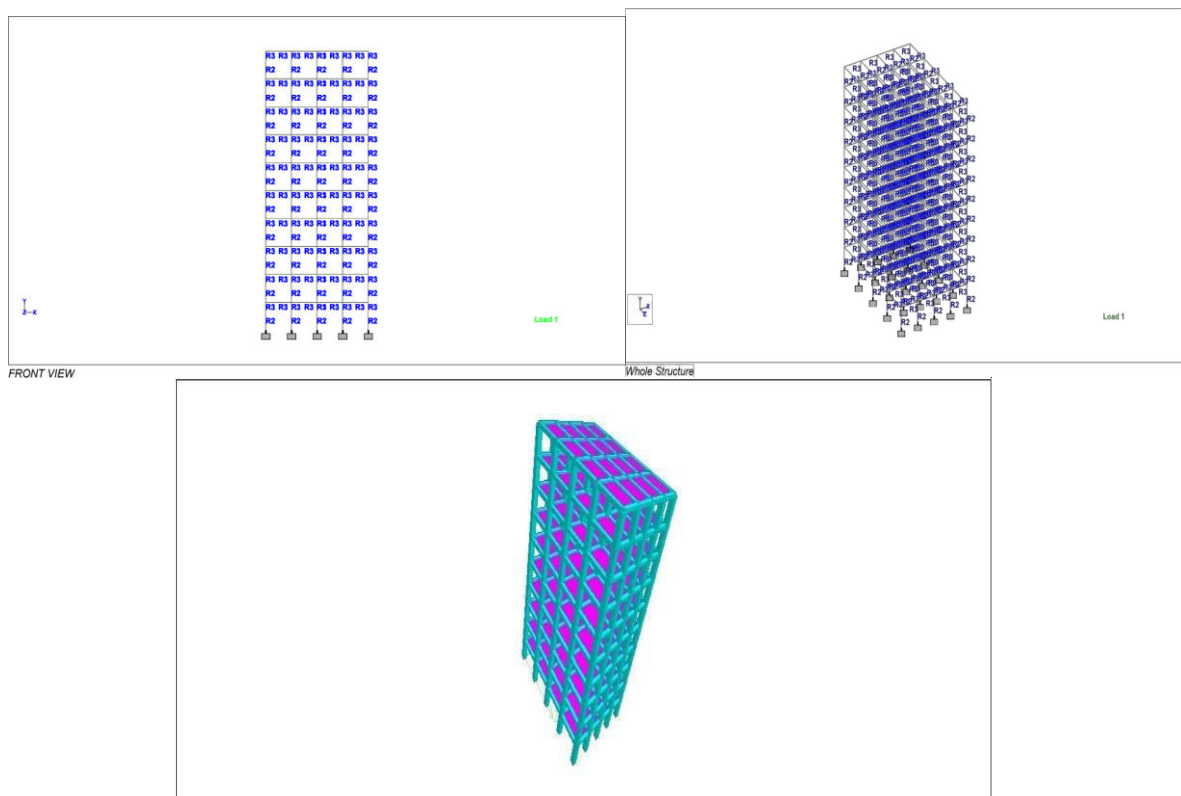


Fig. 2. Text Detection and Inpainting (a) whole structure(b)wind-x(c)+x wind(d)wind -z,+z



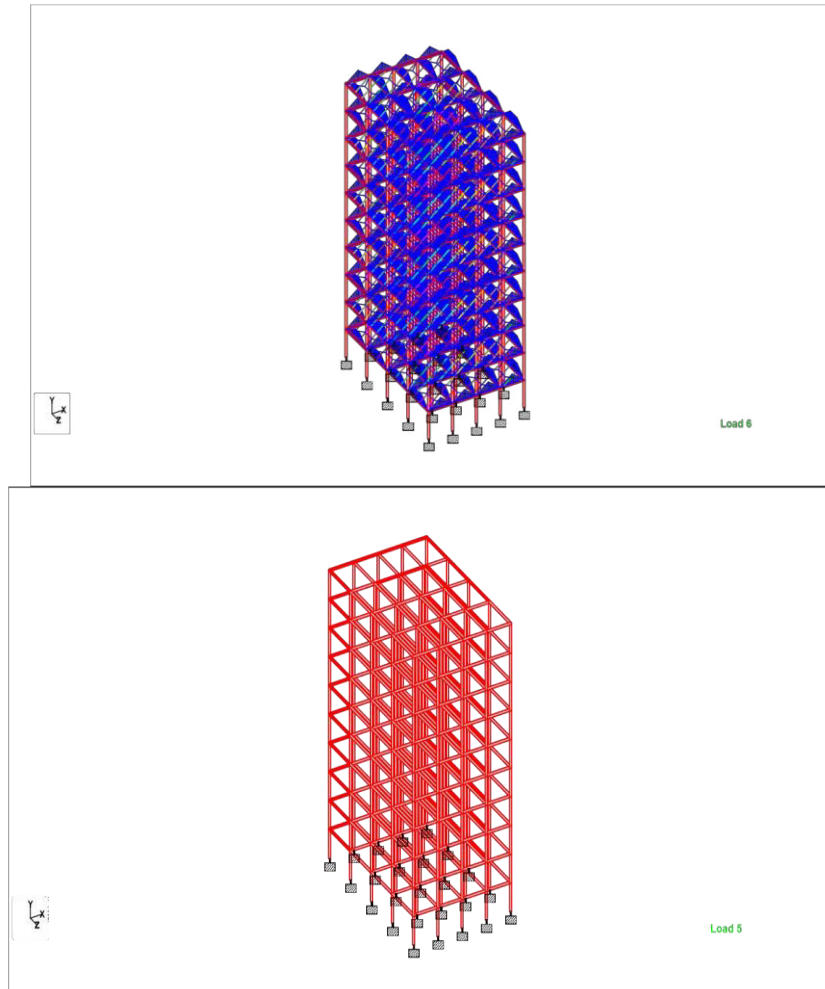


Fig. 3 Text Detection and Inpainting (a) floor plan(b)front view(c)rendering view(d)live load on framed structure(e)dead load on framed structure

V. CONCLUSION

Wind analysis was accomplished out on the G+9 story RCC structural building with different wind categories and with the help of analysis it can be concluded that, When wind load is applied along length of the building the displacement value was increased from category-I to category-IV. The value of maximum bending moment in wind category-4 is more as compared to wind category-1 when wind load was applied. Maximum beam displacement and Maximum node displacement of structure is approximately equal in all wind categories individually. In this project wind response of a residential G+9 RC frame building is analyzed by the Wind Analysis using Staad Pro software are compared on the basis of maximum bending moment, maximum shear force, support reactions, beam displacement, base shear, nodal displacement.

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