Development of a Residential Building by Using STAAD Pro

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Abstract

After Gujarat Earthquake and different quakes in India, there is an across the nation thoughtfulness regarding the seismic defencelessness appraisal of existing structures. The essential design idea of seismic tremor obstruction design of structures is to make solid section powerless bar development to guarantee wellbeing of client implies amid quake pillars yield before segments breakdown. Numerous structures that fallen amid the past quake showed precisely the inverse solid pillar frail segment conduct implies segments flopped before the shafts yielded for the most part because of delicate story impact. The structures with delicate story are entirely helpless under quake load which make calamities. Because of employments of vehicles and their developments at ground levels infill dividers are by and large stayed away from in leaving plot, which makes delicate story impact. It ought to be noticed that 70 to 80 % of structures of urban zones in India fall under the grouping of delicate story structure as per IS 1893 (2002) Part-I. The open ground story or delicate story is both a delicate and a powerless story. For appropriate appraisal of the story firmness of structures with delicate story, distinctive models G+5 and G+11 will break down utilizing programming. Assessment of the story firmness because of delicate story of multi storied structure considering different models will be introduced in conclusive period of venture.

Watchword Soft Story, Static Analysis, Time History Analysis, Seismic Analysis, Story Drift

I. INTRODUCTION

A huge research has been committed for the investigation of different fortifying procedures to upgrade the seismic execution of strengthen solid edge part and structure and a portion of the examination can perform successfully improve the sidelong solidness and opposition of the current structure. Seismic analysis with time history is vital for structure to with stand minor tremors flexibly with no auxiliary harm, and serious quake with adequate dimension of harm depending of significance of the structure. The present investigation is tries to assess unmistakable size seismic tremor and consequently increment fortify structure of structure.

The system received for this report is having following distinctive advance as examined underneath:

- Using distinctive strategies, for example, time history, Response range analysis, considering diverse seismic tremor forces to examinations the RC surrounded structure (G+5 and G+11 stories).
- To ponder the conduct of structure amid Earthquake.
- Considering delicate story impact and taking care of the issues because of the equivalent.
- By utilizing time history analysis, examination of seismic conduct of multi-storeyed RC building should be possible for various tremor powers as far as different reactions like base shear and story relocations.
- To ponder the connection between various strategy for seismic analysis and seismic reactions by time history.
- To think about the impact of seismic zone on execution of Multi-storeyed RC working as far as seismic reaction.

II. OBJECTIVES

The delicate story abnormality is the most unsafe inconsistencies. The principle destinations of the investigation are given beneath:

- To consider the conduct of structure amid Earthquake.
- Considering delicate story impact and taking care of the issues because of the equivalent.
- To think about seismic conduct of multi-storeyed RC working for various tremor forces as far as different reactions like base shear by utilizing time history analysis.

III. METHODOLOGY

Here, the study is directly based on the analysis of building structure on Software STAAD PRO. All the analysis work is taken as the result given from the software. It should be checked that its results of analysis is matching with our manual work or not.

A.Problem in Hand

Given Data for multistoried G+5 building which shown in given table:

CITY	*AHMEDABAD (ZONE = III)*
SOIL TYPE	*MEDIUM SOIL*
NOS OF BAYS	*4 x 4*
SIZE OF BAY	*5 x 5 m*
HEIGHT OF FLOOR	*3 m*
UNIT WEIGHT OF CONCRETE	*25 KN/m^3*
UNIT WEIGHT OF WALL	*20 KN/m^3*
BEAM SIZE	*0.23*0.30 m^2*
COLUMN SIZE	*0.45*0.45 m^2*
SLAB THICKNESS	*0.18 m*
FLOOR FINISH	*1 KN/m^2*
LIVE LOAD	*2 KN/m^2*
WALL THICKNESS	*0.23*

B. Model Development

The various steps involved in modelling are as follows.

- Selection of suitable Units.
- Define the properties of various material used in the models
- Define the section properties of various structural element of the model
- Model making
- Define and Assign the different loads acting on system
- Assign section properties to the model
- Assign the various loads on the structure
- Static analysis
- Comparison of Base shear result with manual calculation

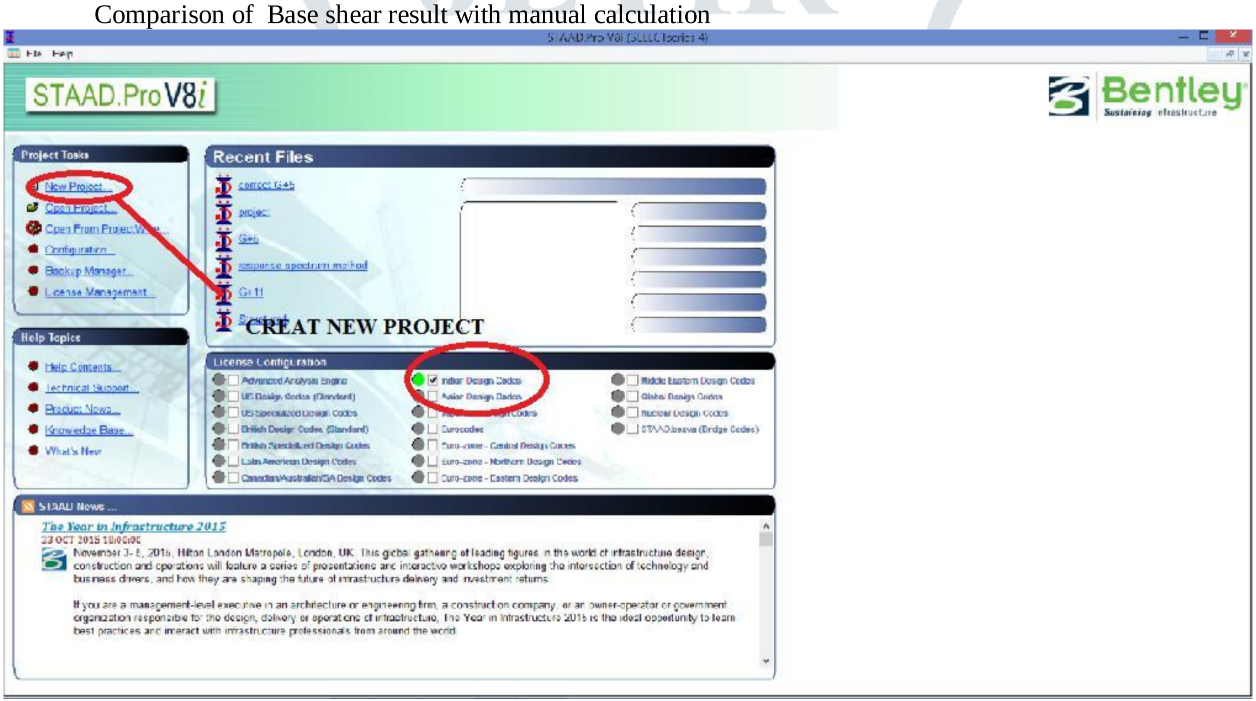


Fig. 1: home page of software

The main window of STAAD PRO software is as shown in figure 1. Select FILE > NEW PROJECT for new project and selection of necessary data's as shown in figure.

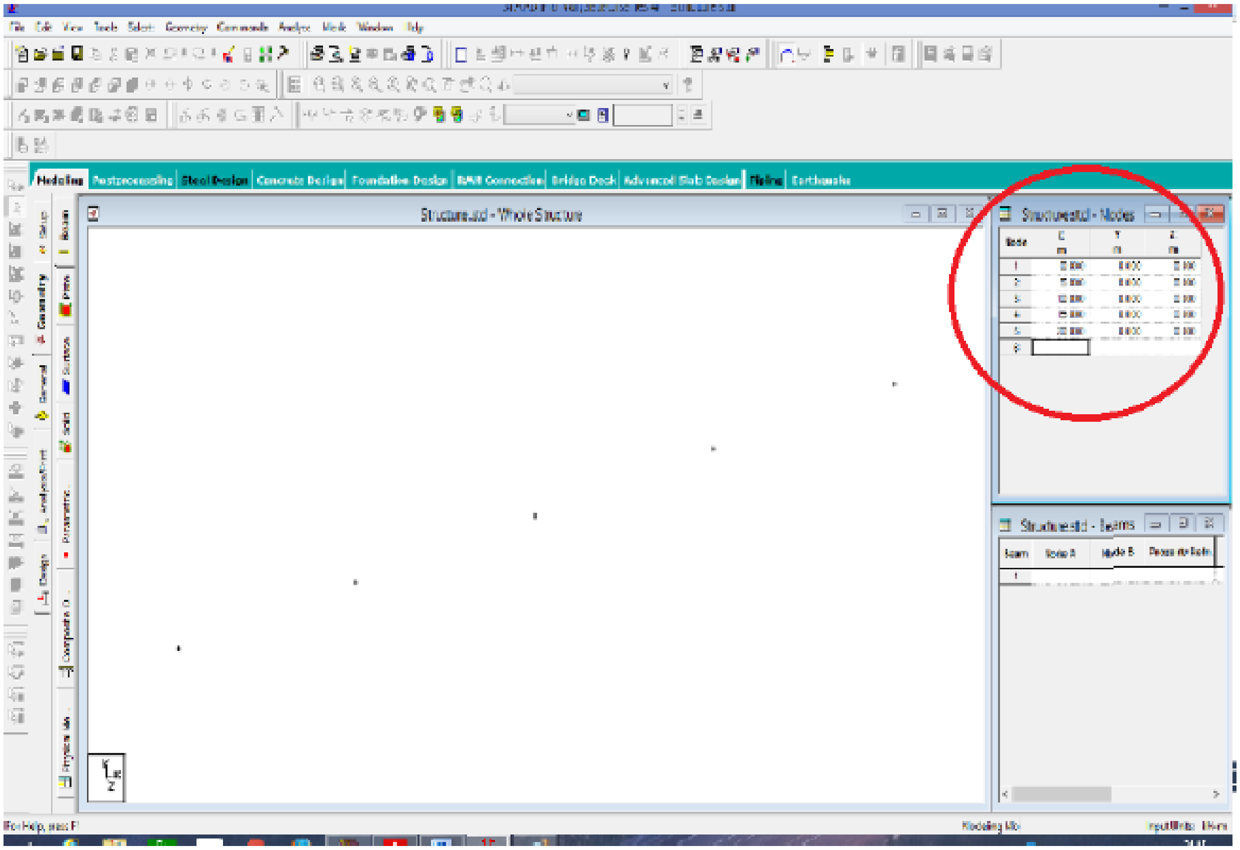
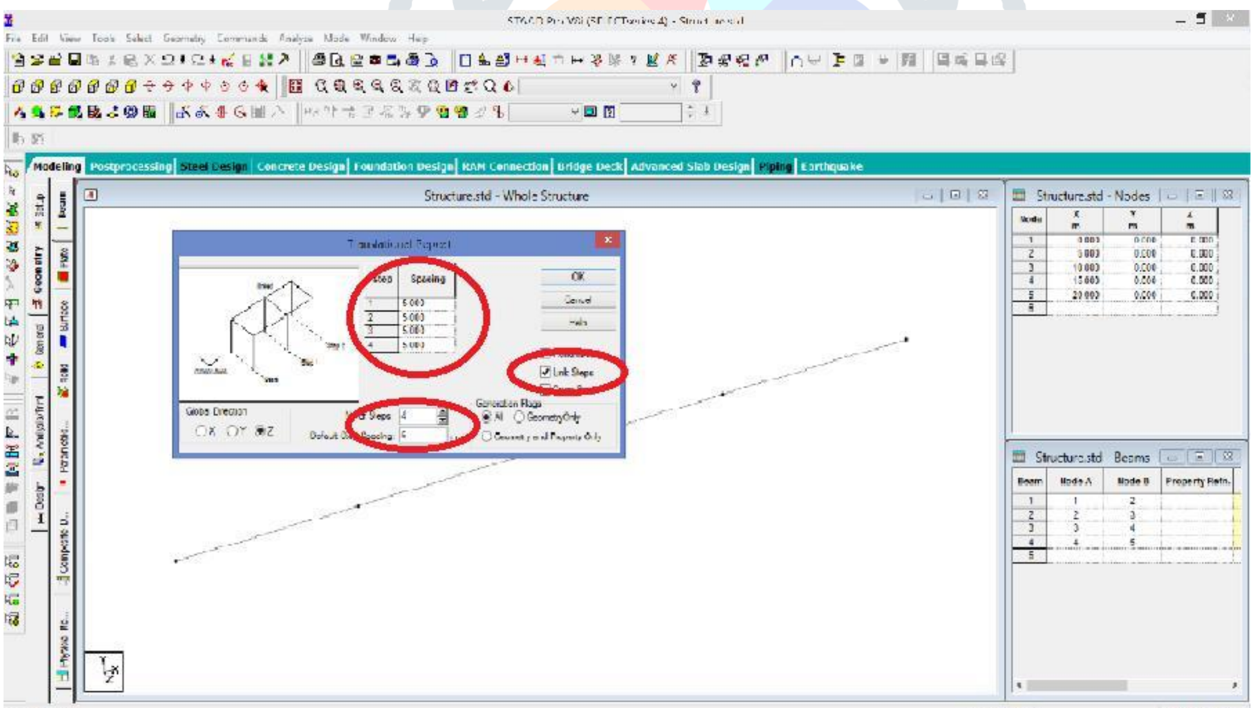


Fig. 2: node identification

Entre the node value in the table which is shown in figure.

Fig. 3: Generation of frame



Now Fill up the spacing which is given in the table and select Nos of steps 4 and select the link steps which are shown in figure.

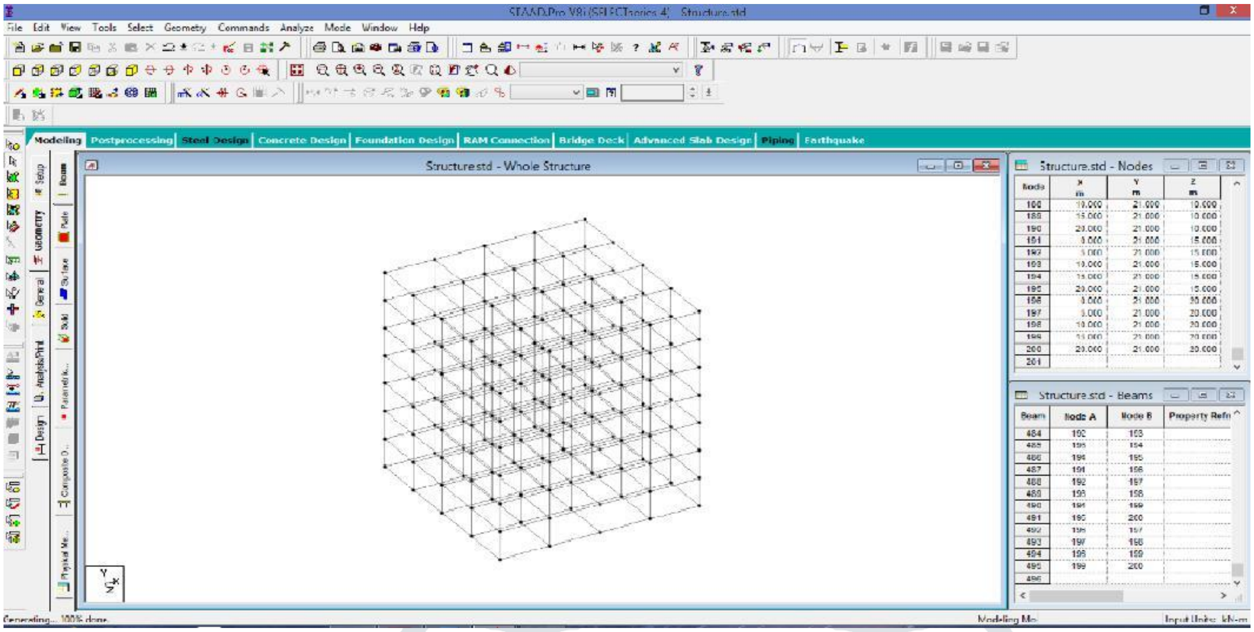


Fig. 4: Generate building frame

Using Translation repeat tool generate building frame which is shown in figure.

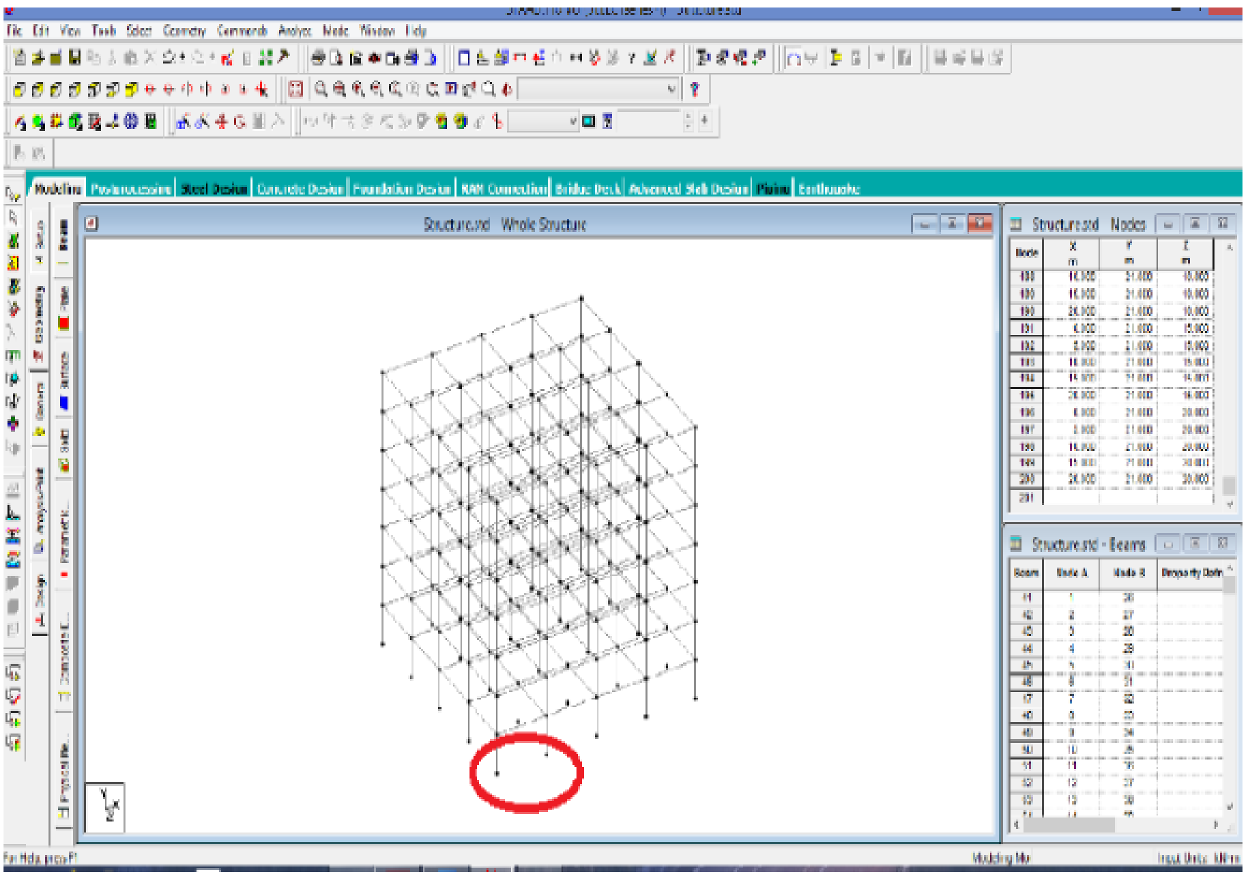


Fig. 5: Removal of bottom beam

Now select the bottom beams and remove it because at foundation level cannot provide beams which are shown in figure.

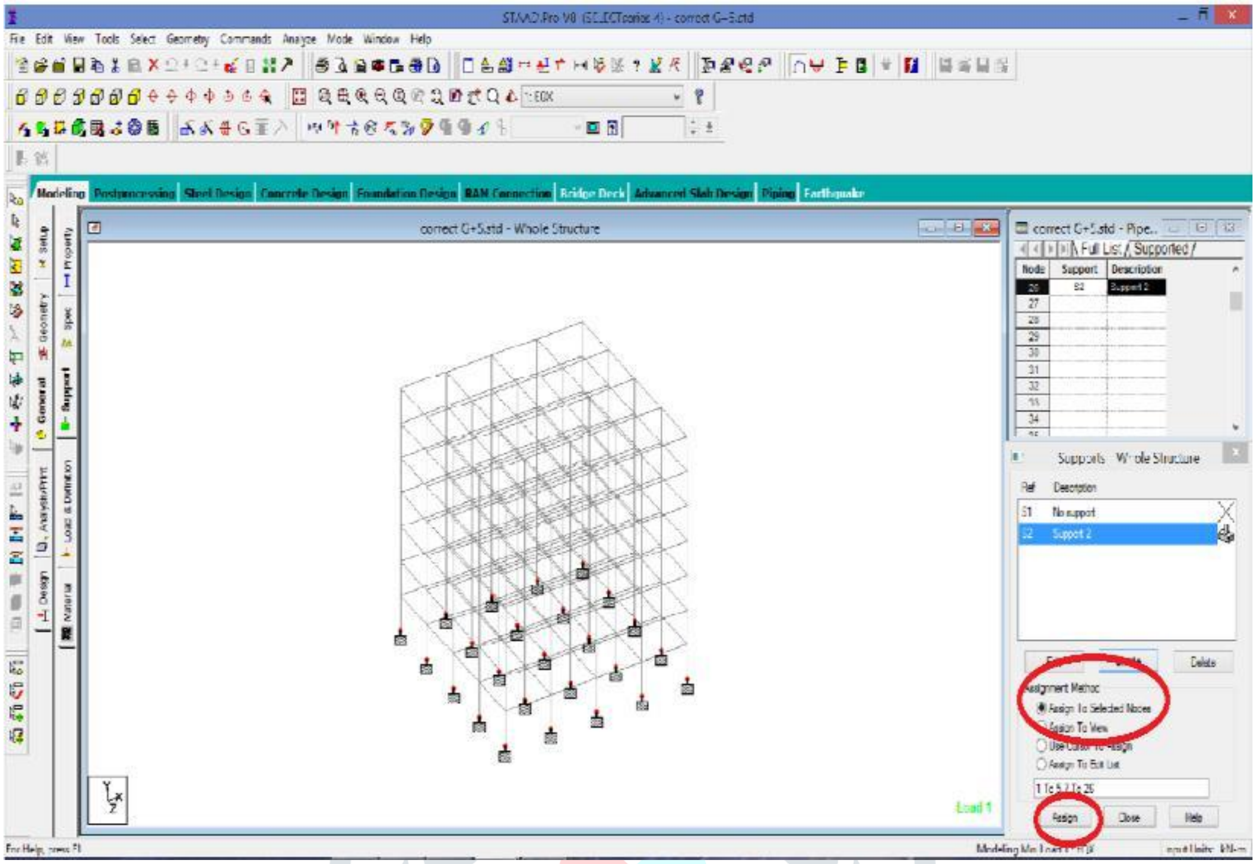


Fig. 6: assign supports

Now give supports condition and assign the supports which are shown in figure.

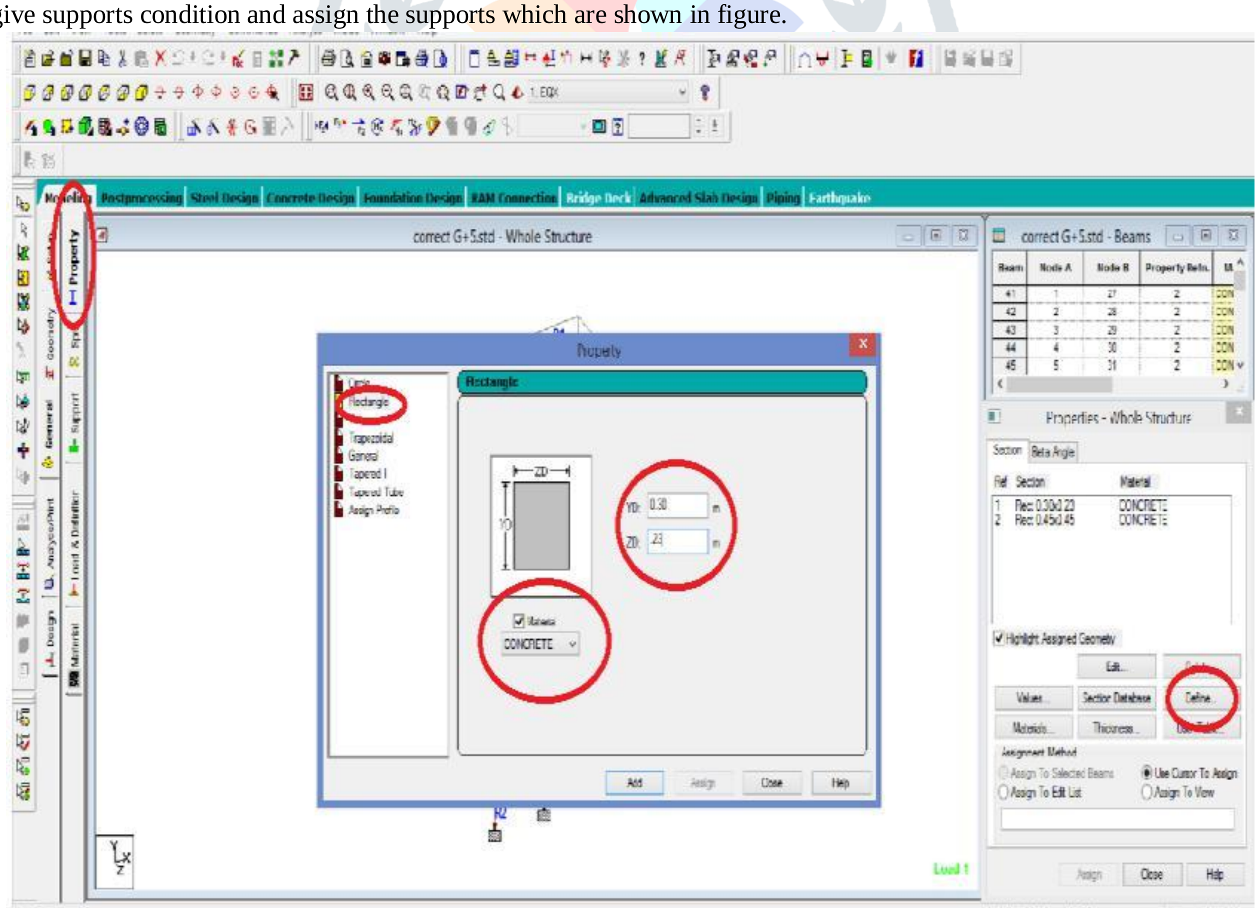


Fig. 7: Selection of material for beam

Now give size, width of beam and depth of beam which are shown in figure.

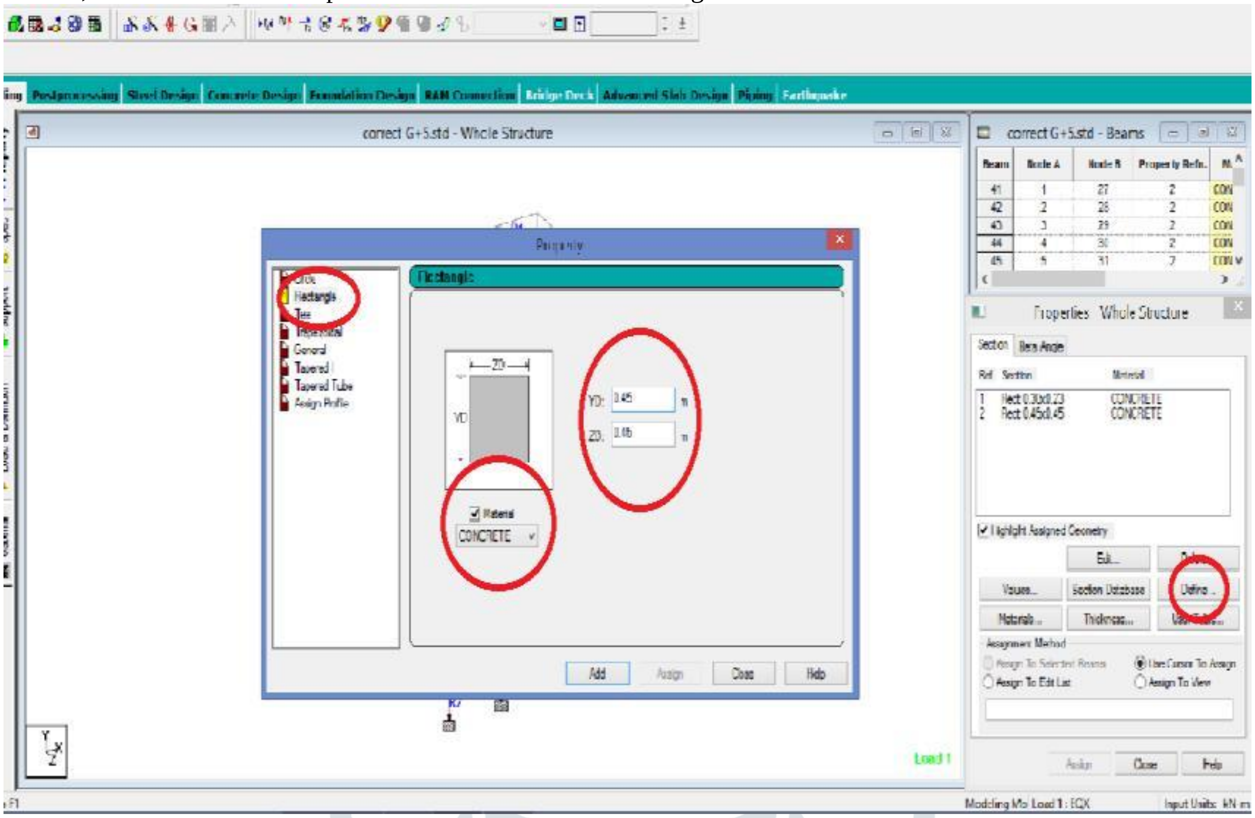


Fig. 8: Selection of material for column

Now give size, width of beam and depth of beam which is shown in figure.

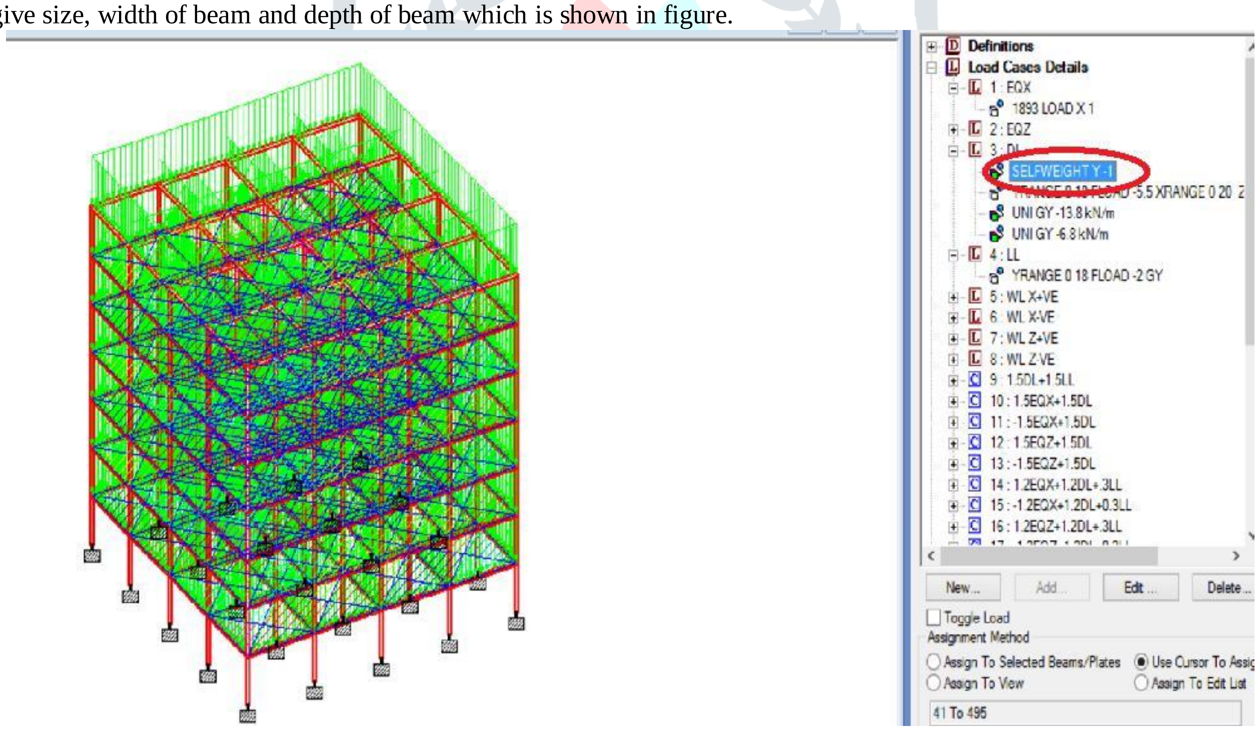


Fig. 9: Apply self-weight

Now apply self-weight of structure in vertical direction which is shown in figure.

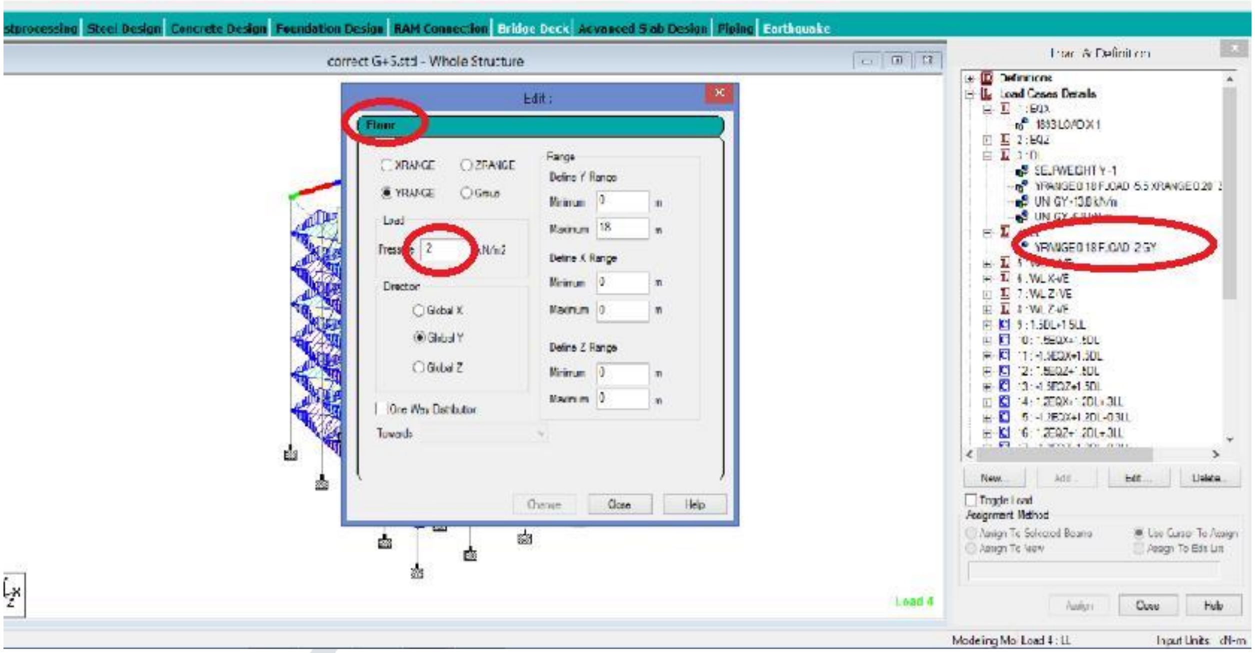


Fig. 10: Application of live load

Now apply live load on the structure which is shown in figure.

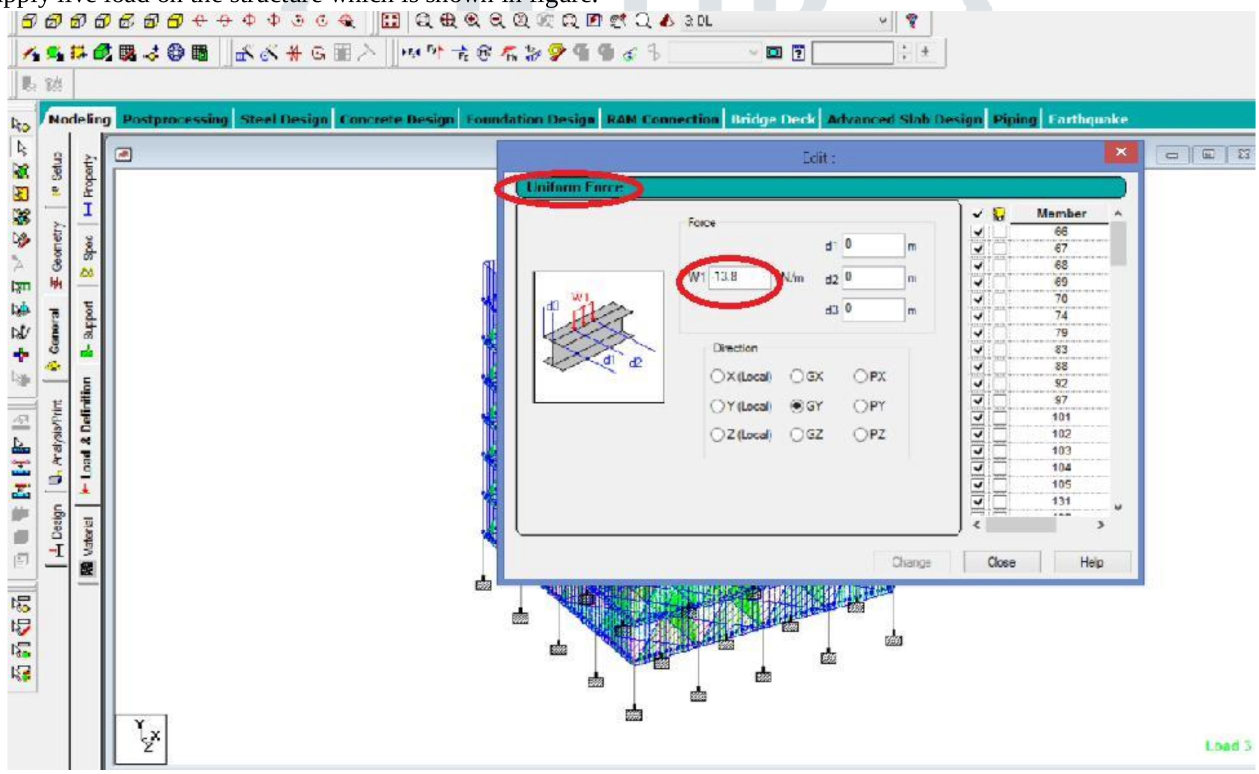


Fig. 11: Apply outer wall load

Select the Load and Definition> Definitions>Load cases Deatails>Floor load>Add, which shown in figure.

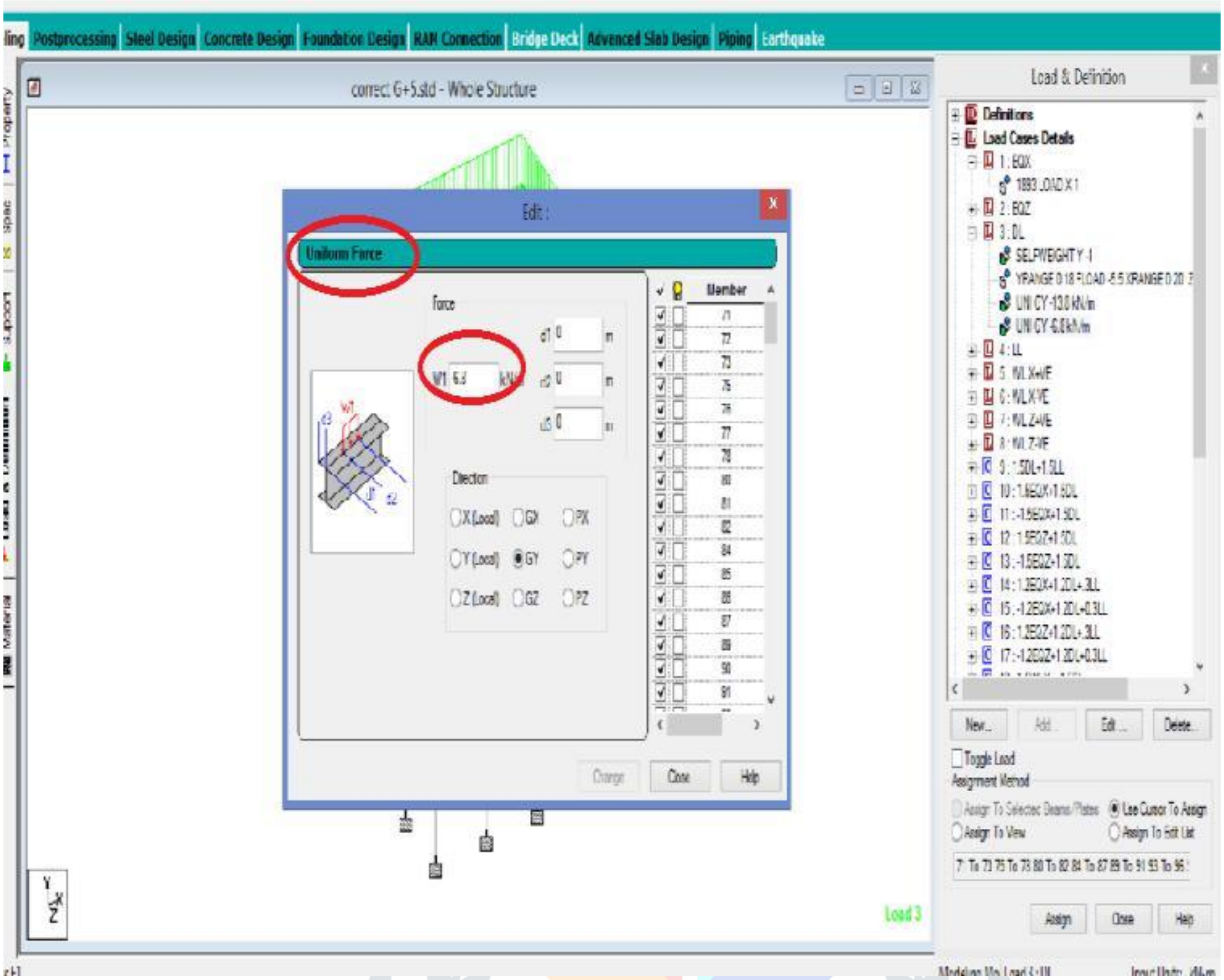


Fig. 12: Apply inner wall load

Select the Load and Definition> Definitions>Load cases Deatails>Floor load>Add, which shown in figure.

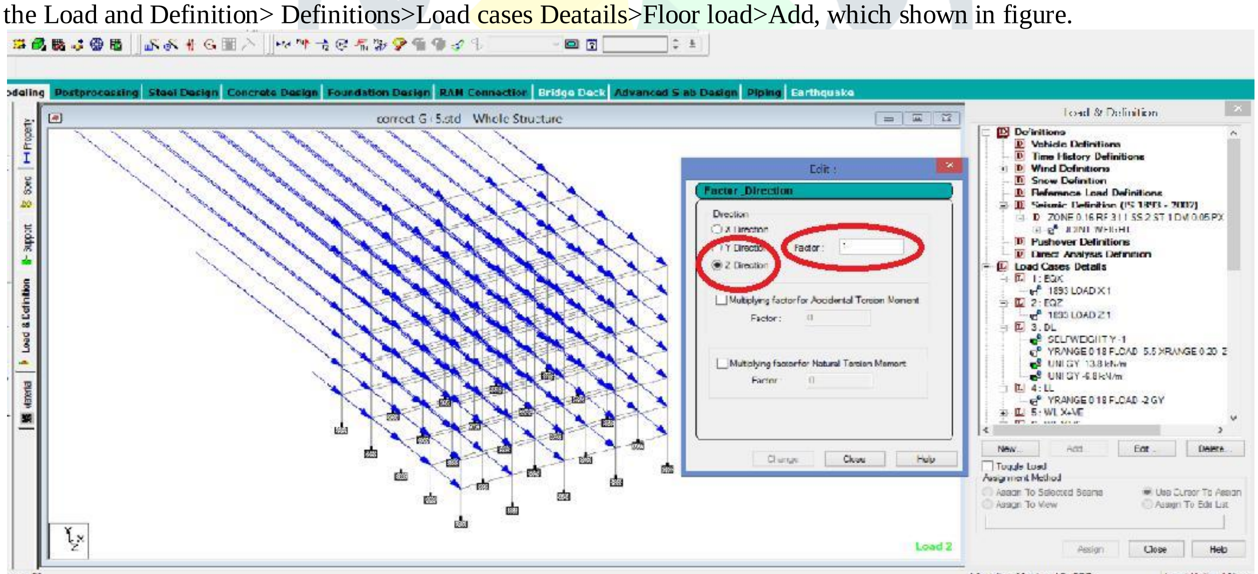


Fig. 13: Apply earthquake load in X, Y , Z-direction

EQX>X or Y or Z- direction>Factor=1> add > Assign, and the direction of earthquake load shown in the figure.

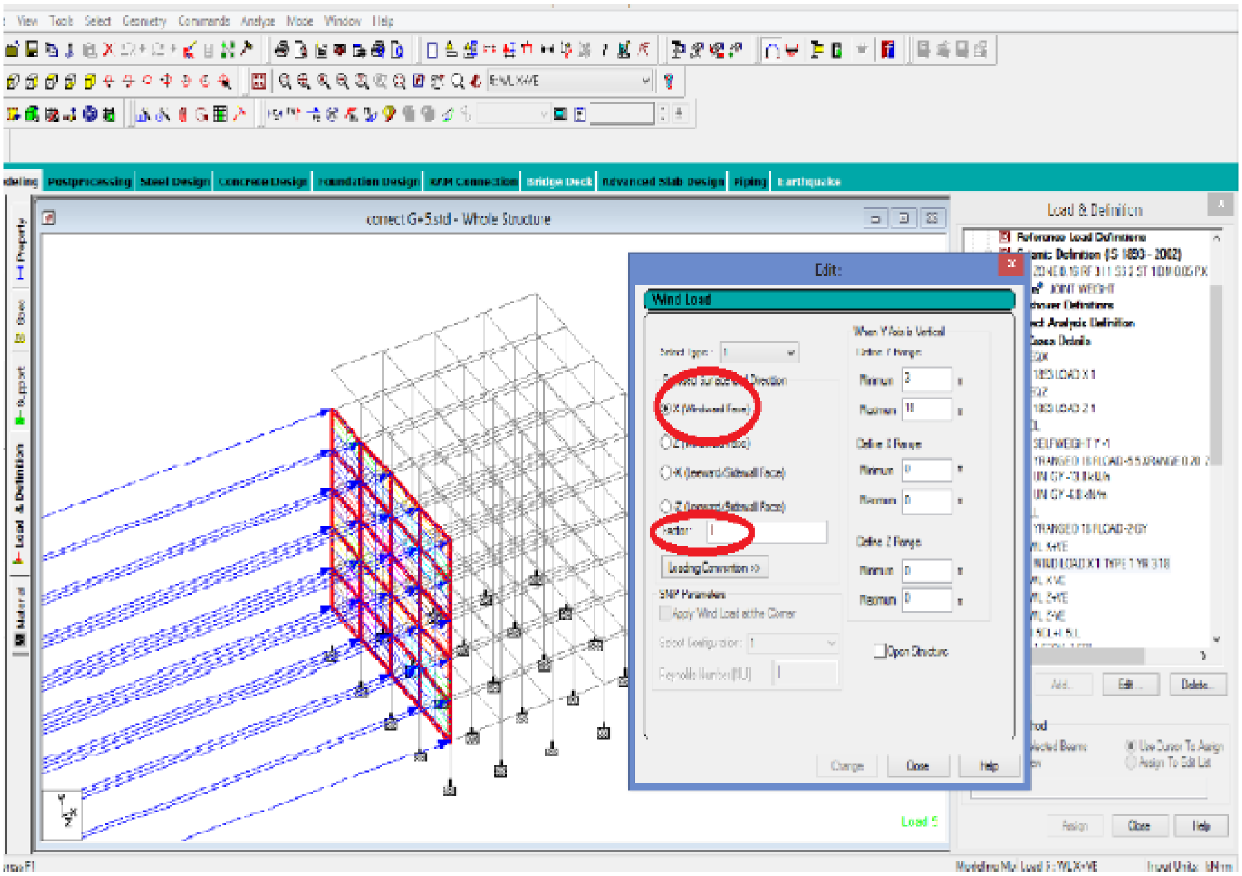


Fig. 14: Apply wind load in X and Z Direction

Apply Wind Load in X and Z direction which is shown in figure.

IV. ANALYSIS OF MODEL

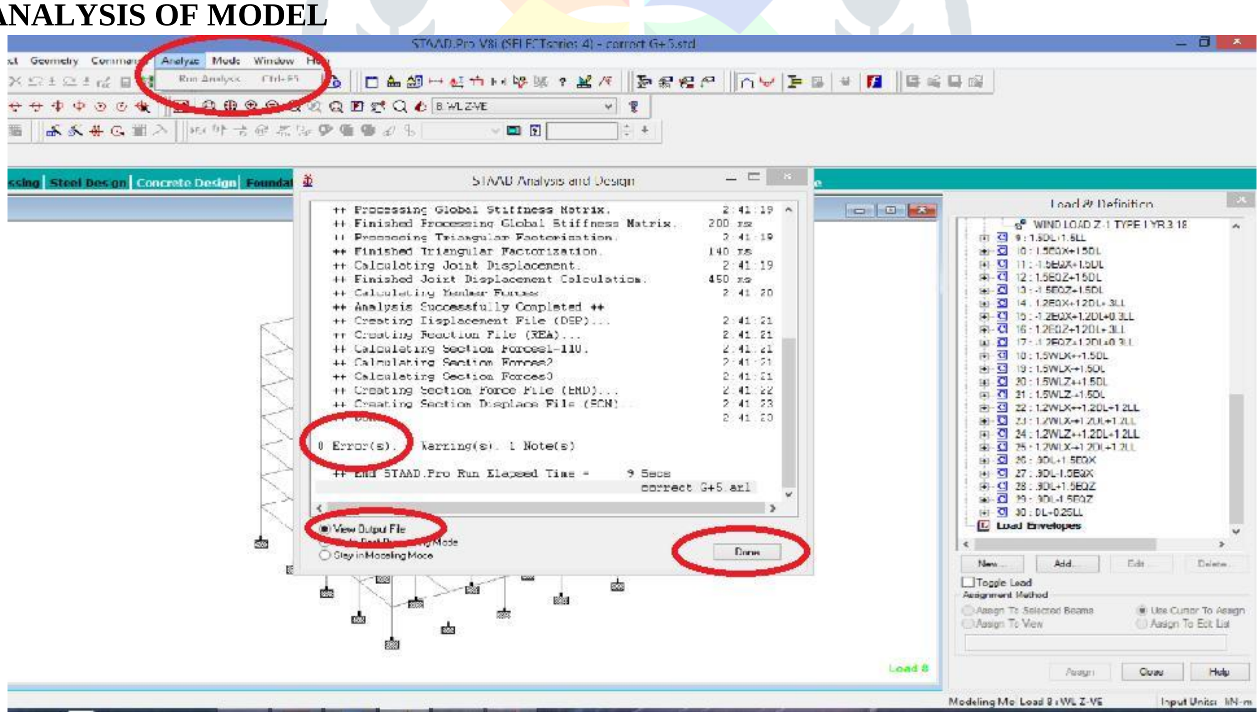


Fig. 15: Analyse model

Now select the Analyze>Run Analysis>View output File>Done, which is shown in figure.

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TIME PERIOD FOR X 1893 LOADING =     0.36200 SEC
SA/G PER 1893=     2.500, LOAD FACTOR= 1.000
     FACTOR V  PER 1893=     0.0667 X  33820.95

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TIME PERIOD FOR Z 1893 LOADING =     0.36200 SEC
SA/G PER 1893=     2.500, LOAD FACTOR= 1.000
     FACTOR V  PER 1893=     0.0667 X  33820.95
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Fig. 16: Base shear values

Compare the value of STAAD PRO Software Base Shear with Manual Calculation. The STAAD PRO Software value is shown in figure.

VI. Conclusion

From the above observation following conclusion are obtained:

- Over estimations are of relocations for the majority of the models and misshapening levels by uniform horizontal burden design.
- When increment in tallness of story nonlinear time history analysis required.
- The uprooting estimation for multi-story constructing straightly shifts from base to top.

References

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