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A review on Comparison report on Result analysis between STAADPRO & ETAB

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Abstract :- ETAB & STAAD PRO are leads designing software in the market in present times. Many other companies are using these design software.This development of project deals with the virtual analysis of the result for a design of concrete frame RCC structure for a G+5 building or multistory buildings using with ETAB & STAAD software. In modern days the building are made to fulfill basic aspect & better serviceability.

Keywords – Comparison, Static analysis, AUTOCAD, STAADPRO, ETAB.

Introduction:- Analysis of G+5 building structure have most widely tools for ETAB and STAADPRO software. In these days, manual computation of tall structure with various seismic zone is problematic job to do and it takes so much time., to reduce time and receiving accurate result we procedure STAAD PRO and ETABS with different earthquake zone with seismic analysis on 5 story building. For a 5 story building with sesmic consideration using ETABS and STAAD PRO software.with Using IS code 1893 and 456-2000.

Objectives of the study:- The purpose of this study analysis and designing of G+5 structures Comparison of STAAD PRO, and ETABS, and analysis of rectangular Plan irregular multi-story building using static analysis method with ETABS & STAAD PRO.

Staadpro :- It is 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.

ETAB:- It is define a engineering **software** product that caters to multi-story building analysis and design. Modeling tools and templates, code-based load prescriptions, analysis methods and solution techniques, all coordinate with the grid-like geometry unique to this class of structure.

PROBLEM FORMULATION

TYPES OF LOAD USED

1. **DEAD LOAD (DL):** Dead loads, also known as permanent or static loads, are those that remain relatively constant over time and comprise, for example, the weight of a building's structural elements, such as beams, walls, roof and structural flooring components.

2. **LIVE LOAD (LL):** Live load is a civil engineering term that refers to a load that can change over time. The weight of the load is variable or shifts locations, such as when people are walking around in a building. Anything in a building that is not fixed to the structure can result in a live load, since it can be moved around

3. **WIND LOAD (WL):** Wind load is the load, in pounds per square foot, placed on the exterior of a structure by wind. ... The angle at which the wind strikes the structure. The shape of the structure (height, width, etc.)

4. **SEISMIC LOAD Or EARTHQUAKE LOAD (EQ):.** Seismic loading is one of the basic concepts of earthquake engineering which means application of an earthquake-generated agitation to a structure. It happens at contact surfaces of a structure either with the ground, or with adjacent structures, or with gravity waves from tsunami.

CALCULATION OF LOADS

1. MAIN WALL LOAD: IT should be the area of cross sectional wall multiply by unit weight of the brick. (brick taken as 12KN/m 3).understanding concept of the plinth load to the IS-code be supposed to be partially of the main wall load. Internal plinth load should be half of the plinth load.

2. SLAB LOAD: Slab load is define as Arrangement of slab load+ floor finishes of slab. Slab load be able to be deliberate by breath and width of slab multiplied by unit weight of material (concrete is taken as 2.5 Kn/m 3).

3. FLOOR FINISH LOAD: The Floor load is a live load acting on the floor in the building, which taken as 1.5 KN/m3 .

4. LIVE LOAD: Live load is define as all over the brick masonry structure with the exception of Live load varies to the types of structure.for , building live load is taken as -2 KN/m 2 on each floor and -1.5 KN/m 2 on roof. Negatives sign indicates its acting on downward direction.

LOAD COMBINATION

For seismic analysis of a building, refer the code following load combination

1. COMBINATION OF LOAD.

1.5(DL + IL)

1.2(DL + IL ± EL)

1. 5(DL ± EL)

0.9 DL ± 1.5 EL

2. SERVICE LOAD

• 1DL+1LL

For the wind load analysis of a structure,classification refers following load combination.

• DL +LL

• DL+WL

• DL+0.8LL+0.8WL

Plan details:-A Rectangular plan with vertical Regular section A 25m in X direction and 25m in Y direction and an 05 story building is modelled using both STAAD and ETAB Software's. The height of each story is kept as 3 m in the structure with the total height of the structure as 33 m. Analysis and design of the structure is done and then the results generated by these software's are compared and a conclusion is drawn from them.

1. Materials properties: Steel:

• Modulus of elasticity of steel, E = 200 Gpa

• Poisson's ratio, μ = 0.3

• Steel density = 77 Kn/m 3 (7.850 Kg/m 3)

- Yield strength of steel, Fy =450 Mpa
- Ultimate yield strength of steel, Fu = 450 Mpa Concrete:
- Characteristic strength of concrete, Fck = 25 Mpa
- Density of concrete, □ = 25 Kn/m 3 **Building Parameters:**
- Length and width =12.19mx12.19m , No of story =05

  Story height=3m

  Main Beam=400mmx400mm

  Column 1-6=650mmx650mm

  Column 6-11=450mmx450mm
- Slab thick =150mm
- Support condition =fixed □ Beam release =axial force

Loading Conditions:

Dead Load:

- Dead Load =1Kn/m 2 □ Main wall load =12Kn/m 2

Live Load:

- live load = 2Kn/m 2
- Floor load=1.5Kn/m 2
- Floor load pressure=4.625Kn/m 2 Seismic weight:
- Dead load = 1 Kn/m 2
- Live Load = 0.25Kn/m 2 Seismic parameters:
- Code -IS 1893-2002 - Seismic analysis in X1 and X3 directions. Load combo:
- Self-weight =1.5Kn/m 2

- Wall load =1.5Kn/m 2
- Floor load =1.5Kn/m 2
- Live load =1.5Kn/m 2 Method of combining approach shapes – Whole quadratic combination with:
- Damping ratio= 0.05 (5%)

Zone = III (0.1)

Importance factor =1

Response Reduction factor = 5

Time period (Ta) = 0.54 sec (calculate as per 1893:2002)

- Wind intensity =36m for 1.617Kn/m

RESULTS AND DISCUSSION

Result of vertical reaction of a sample node for different loads have been tabulated in table 1

TABLE 1

VERTIVAL REACTION OF DIFFERENT LOADS

LOADING	STAAD Pro.	ETABS
Dead load	5	5
Live load	3	3
Earthquake load along the length	0.024	0.024
Earthquake load along the width	1.5	1.5

TABLE 2

BENDING MOMENT, AXIAL FORCE AND SHEAR FORCE OF A SAMPLE COLUMN

LOADING	FORCES	STAAD Pro.	ETABS
DEAD LOAD	Axial force Fx	19.43	15.43
	Shear force Fy	30.53	28.53
	Shear force Fz	17.02	17.02
	Bending moment Mx	0	0
	Bending moment My	27.28	27.28
	Bending moment Mz	27.28	27.28

LIVE LOAD	Axial force Fx	29.34	29.34
	Shear force Fy	3.899	4.05
	Shear force Fz	3.899	4.05
	Bending moment Mx	0	0
	Bending moment My	5.98	6.01
	Bending moment Mz	5.98	6.01
Combo load 1.5DL+1.5LL at the support reaction	Axial force Fx	22.58	23.98
	Shear force Fy	989.0	969.9
	Shear force Fz	20.58	21.56
	Bending moment Mx	22.93	22.93
	Bending moment My	0	0
	Bending moment Mz	21.87	23.98

TABLE 3

BENDING MOMENT AND SHEAR FORCE OF A SAMPLE BEAM

LOADING	FORCES	STAAD Pro.	ETABS
DEAD LOAD	Axial force Fx	2192.30	2293.88
	Shear force Fy	12.65	13.32
	Shear force Fz	12.65	13.32
	Bending moment Mx	0	0
	Bending moment My	23.49	21.43
	Bending moment Mz	12.42	11.13
LIVE LOAD	Axial force Fx	158.54	160.8
	Shear force Fy	2.65	1.98
	Shear force Fz	2.65	1.98
	Bending moment Mx	0	0
	Bending moment My	4.54	1.78
	Bending moment Mz	1.89	1.78
Combo load 1.5DL+1.5LL at the support reaction	Axial force Fx	3580.76	3550.34
	Shear force Fy	20.76	19.76
	Shear force Fz	20.76	19.76
	Bending moment Mx	0	0
	Bending moment My	21.87	20.98
	Bending moment Mz	39.98	40.87

TABLE 4

BENDING MOMENT AND SHEAR FORCE OF EARTHQUAKE ALONG THE LENGTH AND WIDTH

LOADING	FORCES	STAAD Pro.	ETABS
EARTHQUAKE ALONG THE LENGTH	Axial force Fx	12.67	13.87
	Shear force Fy	8.98	9.56
	Shear force Fz	0	0
	Bending moment Mx	0	0
	Bending moment My	0	0
	Bending moment Mz	9.54	9.23
EARTHQUAKE ALONG THE WIDTH	Axial force Fx	12.67	14.43
	Shear force Fy	8.98	9.45
	Shear force Fz	0	0
	Bending moment Mx	0	0
	Bending moment My	0	0
	Bending moment Mz	9.54	9.23

TABLE 5

TOTAL REINFORCEMENT OF A SAMPLE BEAM AND COLUMN

SECTION	TOTAL REINFORCEMENT	
	STAAD Pro.	ETABS
BEAM	3000	666.01
COLUMN	1161.02	509.88

CONCLUSION

- Comparison of STAAD PRO and ETABS software is getting the result different manner difficult to understanding and lot of confusing during the assign the loading parameter and design.

- From the design result of beams, we may conclude that ETABS gave lesser area of required steel as compared to STAAD PRO. Similarly the column section required area of the steel similar both software's but in these case are considered in percentage 0.3% to 0.5%.
- From the design results of column; since the required steel for the column forces trendy this certain problem is less than the minimum steel limit of column (i.e., 0.85%), then amount of steel calculated by both the software's is equal. Therefore, comparison of results for this is not possible.

REFERENCES

1. Government of Bureau of Indian Standards: IS 1893, Part-1 (2002), Criteria for Earthquake Resistant Design of concrete frame Structures: Part-1 General requirement of buildings New Delhi, India.
2. Government of Bureau of Indian Standards: IS 875, Part-1 (1987), Dead loads on Building and Structures, New Delhi, India.
3. Government of Bureau of Indian Standards: IS 875, Part-2 (1987), Live loads on Building and Structures, New Delhi, India.