IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

COMPARATIVE STUDY OVER THE STATIC LOADS & DYNAMIC LOADS IN THE DESIGN OF MULTISTORY BUILDING USING STAAD PRO

P.Prasanth

MTech
Structural Engineering (CIVIL)
Aditya Institute of management.

Abstract: Advancement in applying loads is more crucial for modeling building in any software Due to considering loads in different ways which means using Static loads and Dynamic loads on the same model in STAAD Pro, there will be minor difference arrived as a result. The difference that arrived depends upon various factors and those are Using different load combinations like serviceability and collapsibility and the Application of Dynamic loads in load case details. The minor difference arrives in deflections of member and node displacements and sometimes in the failure of participation factors and also sometimes there will be no difference observed. The main objective of this project is to use the knowledge that we have learned during our post-graduation and learn to deal with practical cases.

Index Terms **- Static loads, Dynamic loads STADD PRO V8i.**

I. INTRODUCTION

1.1 Loadings

We know there are different type of forces, moments, pressures strains, and stresses that act on structure. In a Structural engineering point of view, there are called loads.

Loads can be broadly classified into

- Static loads
- Dynamic loads

1.2 Static Loads:

A static load by definition is one whose magnitude and direction does not vary with time.
In Staad Pro, there are two methods to apply on a structure.

Method -1

- A distributed load on beam
- A Concentrated force on a joint
- A pressure load on a plate element

Method -2

- A vehicle travelling on a bridge.
- Wind pressure on different buildings.

1.3 Dynamic Loads:

A dynamic load by definition by whose Magnitude and direction changes with the time.

The dynamic loads that are applied on structure are:

- The forces induced in a building due to seismic activity
- The force induced in a structure due to vibrating machinery such as turbine and likewise
- Loads that varies over time such as blast load Structure Details:

2. Methodology

2.1 Architectural Planning:

The architectural planning of building has to be created at first in Auto Cad software. Output of the drawing gives an idea to create a model in STAAD Pro software. The drawings include Plan, Elevation and section.

2.2 Modelling

Create a model in Staad according to plan given in arch. Drags and apply all loads accordingly which are dead load, live load and after lateral loads like wind and seismic by the reference of load calculations manually with the help of code books.

Different load combinations based on IS 1893 (part I): 2002 and IS 875(part v): 1987 has been added accordingly.

2.3 Structural planning

After finalizing the STAAD model concrete design has to be given in structural drawing for an execution work with extra safe percentage of Steel.

2.4 Comparison of results.

Comparison over the STAAD model by giving static and dynamic loadings in moments (Mx,My,Mz), maximum load (Fee), shear, and deflection.

3. Introduction for proposed model in STAAD

An s+7 is proposed to be built at Vishakhapatnam. The report contains the structural analysis of the building satisfying the functional requirements and ensuring the structural integrity as envisaged in the applicable codes of practice. The project brief requires that the structure be built as RC framed structure. The latest Indian Codes of practice have been used to design the structure. A computer model of the structure is generated using STAAD (finite element software) for the purpose of analysis and design.

The design of the following is done in the following way:

The design of columns and beams is carried out using the STAAD software.

3.1 Static Analysis For S+7

A static structural analysis calculates the effect of study (or static) loading conditions on a structure while ignoring inertia and damping effects, such as those caused by time-varying loads.

A static analysis can include steady inertia loads (such as gravity and the rotational velocity and accelerations), and time-varying loads that can be approximated as static equivalent loads.

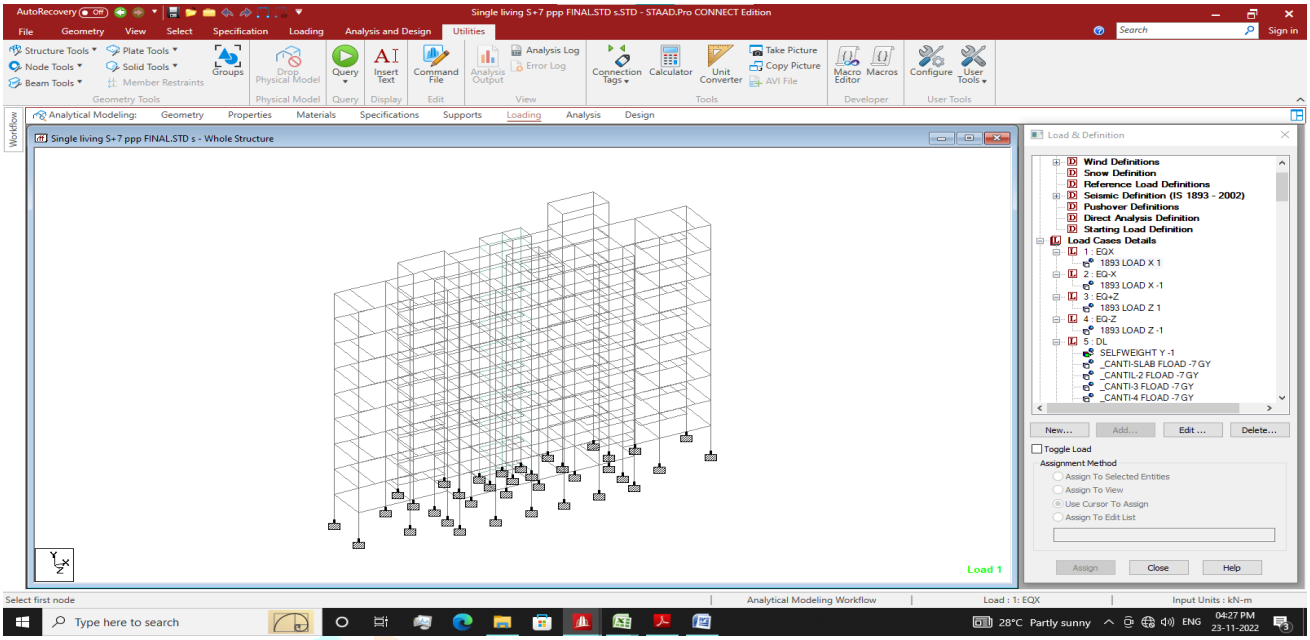

Fig 1:- Application of loads in Static

3.2. Dynamic Analysis

Dynamic analysis is one of the effective procedures for evaluating the seismic performance of the building. Damage control is one of the important design considerations which is increasing its influence and can be achieved only by introducing dynamic analysis in the design. This is also called the response spectrum method.

The interface of Staad in Dynamic

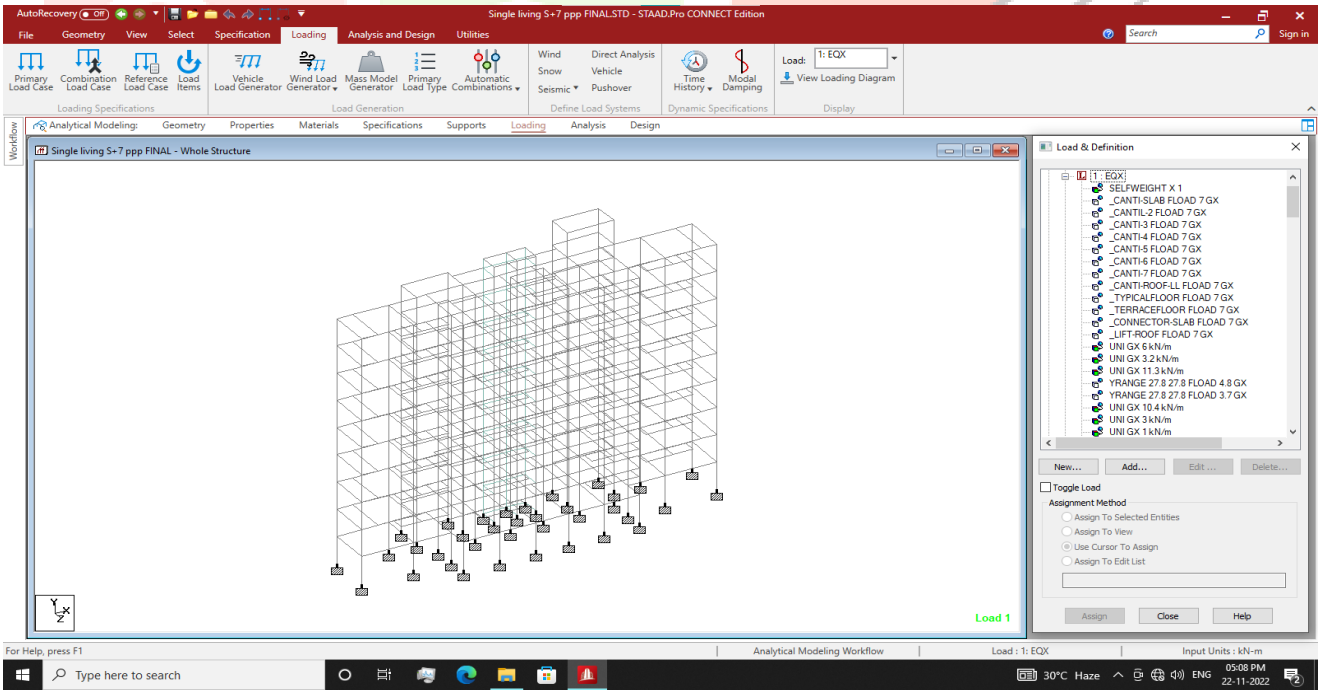

Fig 2:- Application of loads in Dynamic

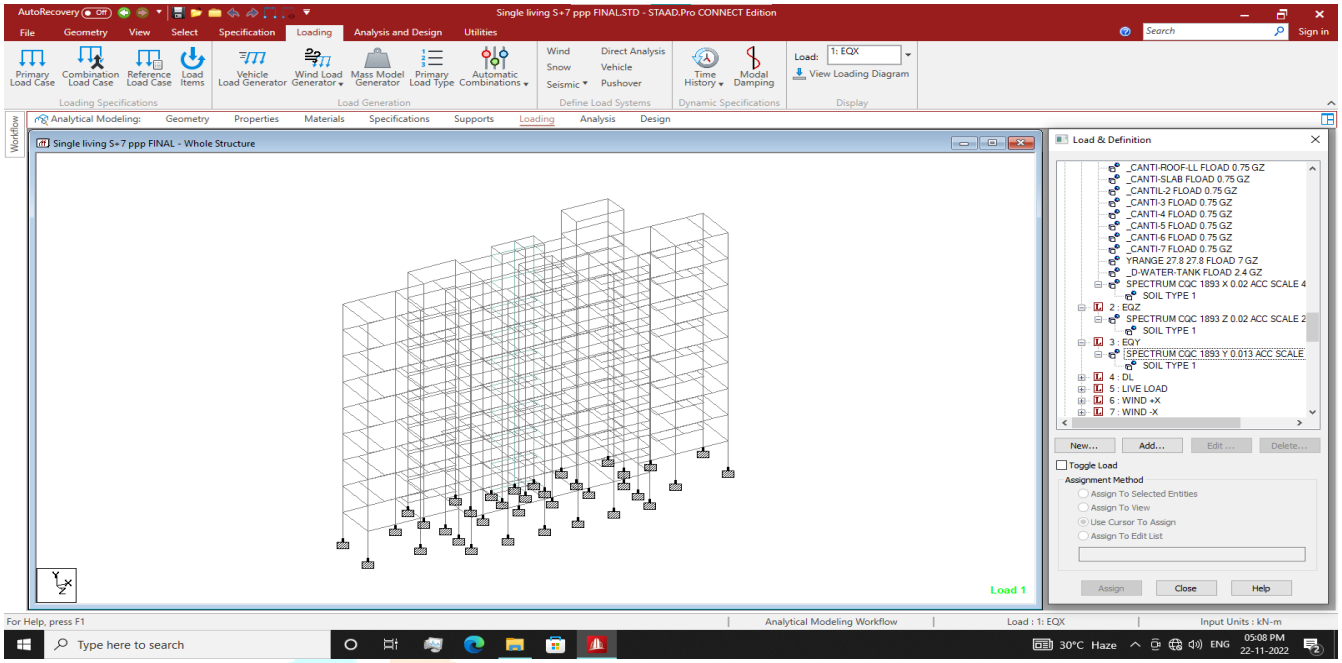

Fig 3:- Application of loads in Static

3.3. 3D MODEL

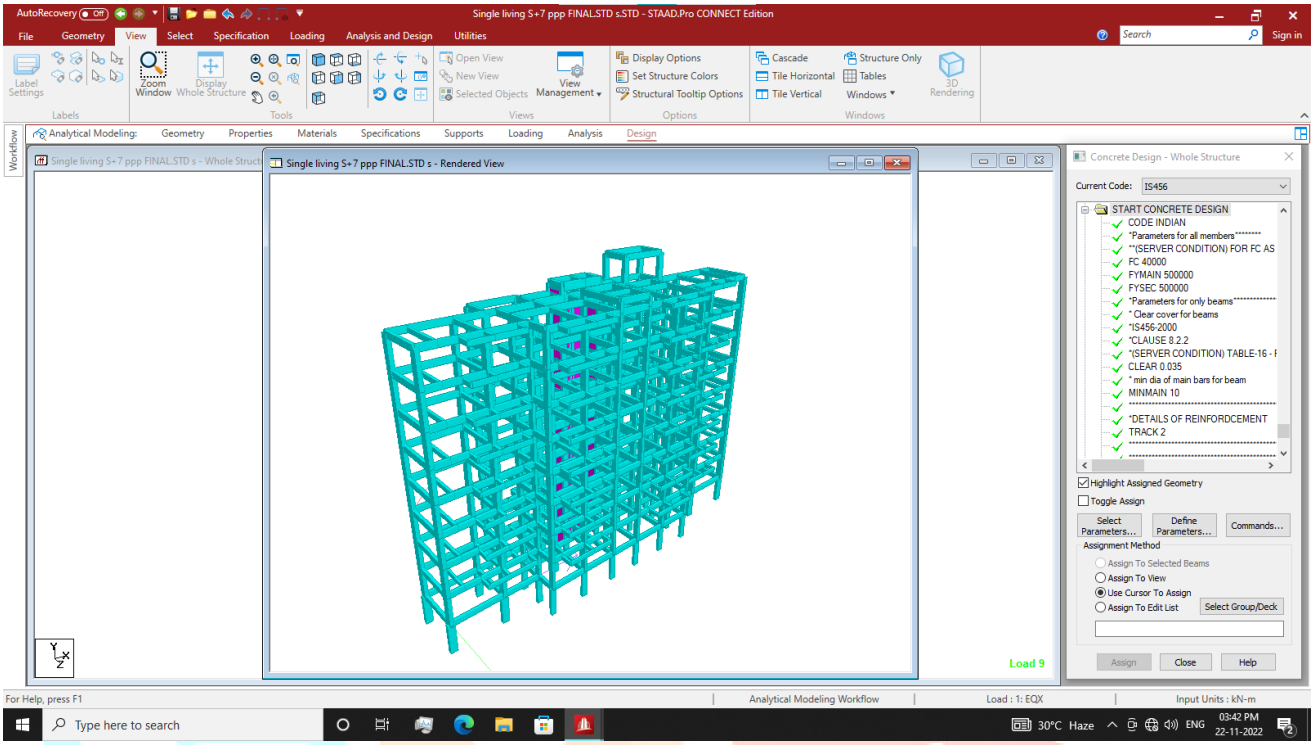

Fig 4:-3D Model for front side view

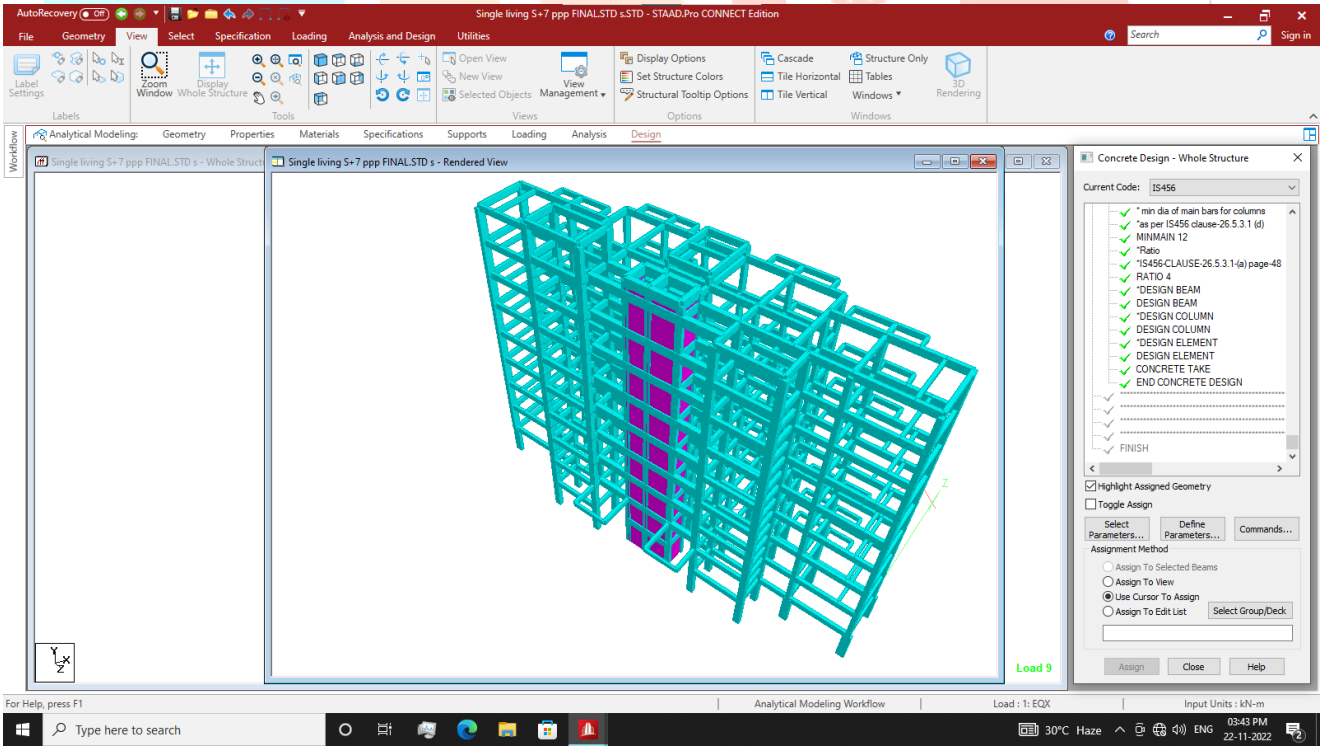

Fig 5:- 3D Model for back side view

4. RESULTS AND DISCUSSION

4.1 Results of Descriptive Statics of Study Variables

IN THIS STUDY, IT IS OBSERVED THAT THE DISPLACEMENTS OBTAINED BY THE STATIC ANALYSIS ARE HIGHER THAN BY DYNAMIC ANALYSIS, STATIC ANALYSIS IS NOT SUFFICIENT FOR HIGH-RISE STRUCTURES AND IT IS NECESSARY TO PROVIDE DYNAMIC ANALYSIS DISTRIBUTION OF LOADS.

	MAXIMUM RELATIVE DISPLACEMENT (DEFLECTION)
STATIC LOADING	0.007 INCHES
DYNAMIC LOADING	0.001 INCHES
DIFFERENCE	0.006 INCHES

TABLE : - DEFLECTION COMPARISON OF BOTH MODELS

5. ACKNOWLEDGMENT

I would like to express my deep sense of gratitude to Sri G Gowri Sankara Rao sir, for his wholehearted co-operation, unfailing inspiration, and valuable guidance for the completion of this thesis work and share his knowledge about "COMPARITIVE STUDY OVER THE STATIC LOADS AND DYNAMIC LOADS IN THE DESIGN OF MULTISTORY BUILDING USING STAAD PRO " has helped me a lot during the span of this thesis work.

REFERENCES

1 IS:875 (Part 1) -1987 Code of Practice for Design Loads (other than earthquake) for buildings and structures Unit weights of buildings materials and stored material
2 Imposed loads IS:875 (Part 2) -1987 Code of Practice for Design Loads (other than earthquake) for buildings and structures
3 Wind loads IS:875 (Part3) -2015 Code of Practice for Design Loads (other than earthquake) for buildings and structures
4 IS:875 (Part 5) -1987 Code of Practice for Design Loads (other than earthquake) for buildings and structures Special loads and load combinations
5 IS:456 – 2000 Code of Practice for Plain and Reinforced Concrete
6 IS:1786 – 200 Specification for High Strength Deformed Bars and Wires for Concrete Reinforcement
7 IS:13920 – 2016 Ductile design and detailing of reinforced concrete structures subjected to seismic forces – Code of practice
8 IS:2911 – 2010 Code of Practice for Design & Construction of Pile Foundations
9 IS:2950 (Part 1) -1981 Code of Practice for Design & Construction of Raft Foundations
10 IS:1904 – 1986 Code of Practice for Design and Construction of Foundation in Soil: General Requirements
11 IS:1893 (Part 1) -2016 Criteria for Earthquake resistant design of structures
12 Technical papers, Journals, Reference books
EtcFrom noted authors, universities publications, institutions, technical forum publications etc