International Journal of Recent Development in Engineering and Technology
Website: www.ijrdet.com (ISSN 2347-6435(Online) Volume 10, Issue 6, June 2021)

Load Analysis of Tall Structure by using STAAD Pro Software with Retrofit Techniques

Somit Mohan Pathak[1], Prof. Kamlesh Kumar Choudhary[2]
[1]M Tech Student, [2]Assistant Prof, Department of Civil Engineering, SIET, Jabalpur, India

***Abstract*-- The resolution is being worn out zone three. Earthquake resolution is completed by considering (DL +25%LL). From the physical and experimental investigations it had been all over that the building either ought to be razed or a minimum of ought to be retrofitted with appropriate technique to extend its service life. It was then determined to implement RCC column jacketing technique because of its practicability and ease for execution. All the columns on all the floors are currently befittingly jacketed, the loose pockets of concrete that were investigated throughout the check are concrete, within the past few decades, vital endeavor, work over, are dedicated to over hauling of existing building and range of resolution within the style of over hauling approach, the engineer should Seismic Strengthening (over hauling).**

Actions taken to upgrade the ground braking resistance of an existing building in order that it becomes safer underneath future earthquakes extensions being administrated while not correct regard for effects on structure throughout an earthquake Poor materials, construction and acquisition used, notably in industrial buildings Improper particularization of masonry and strengthened structures Buildings erected while not house owners seeking correct engineering recommendation unknowingness Lack of data, understanding or coaching within the use of those codes by native engineers New Buildings not being designed.

***Keywords* – Earthquake, Load Analysis, Retrofit, RCC building, slab, beams and columns, stad Pro.**

I. INTRODUCTION

The aim of the study is to recommend varied methodologies and techniques to access the siesta vulnerability of recent structure and to propose appropriate over haul measures for deficient structures with price thought[1]. Over hauling Out of the many natural and environmental disasters, ground braking action like earthquake, structures most[4].

It's been seen extensions being administrated while not correct regard for effects on structure throughout an earthquake Poor materials, construction and acquisition used, notably in industrial buildings Improper particularization of masonry and strengthened structures Buildings erected while not house owners seeking correct engineering[2]. recommendation unknowingness Lack of data, understanding or coaching within the use of those codes by native engineers New Buildings not being designed to Indian earthquake codes Hence, engineers are required to arrange and style the over hauling approaches[5]. That structures with the passing of your time they lose their strength thanks to several reasons like ground braking activity, soil failure because of optimizing the strength, plasticity and earthquake hundreds[6].

Strength ground braking resistant, etc extensions being administrated while not correct regard for effects on structure throughout an earthquake Poor materials, construction and acquisition used, notably in industrial buildings Improper particularization of masonry and strengthened structures Buildings erected while not house owners seeking correct engineering recommendation unknowingness Lack of data, understanding or coaching within the use of those codes by native engineers New Buildings not being designed to Indian earthquake codes Hence, engineers are required to arrange and style the over hauling approaches[3].

II. OBJECTIVE OF THE STUDY

The fundamental goal of the examination is to research the adjustment of qualities strength properties and functionality of cement blended in with various level of silica vapor with strands. Following are destinations of the examination.

International Journal of Recent Development in Engineering and Technology
Website: www.ijrdet.com (ISSN 2347-6435(Online) Volume 10, Issue 6, June 2021)

- To discover the impact of strands and silica fume on strength when blended in with substantial example.
- To study the usefulness of cement on variety in various fiber with various level of silica fume when blended in with concrete.
- To discuss the adjustment of variation of strength.
- To find out the strength examination and specific gravity of total utilized.

III. METHOLODOGY

In the present study an attempt has been made to evaluate an existing building located in seismic zone III using equivalent static analysis. Indian Standard IS-1893:2016 (Part-1) is followed for the equivalent static analysis procedure. Building is modeled in commercial software STAAD Pro. Seismic force demand for each individual member is calculated for the design base shear as required by IS-1893:2002. Corresponding member capacity is calculated as per Indian Standard IS456:2000. Deficient members are identified through demand-to-capacity ratio. A number of beams and column elements in the first floor of the present building are found to be deficient that needs retrofitting. A local retrofitting strategy is adopted to upgrade the capacity of the deficient members.

The standards and needs for temporary strengthening is also not up to those for permanent strengthening temporary strengthening versus permanent strengthening. Special concerns in the present study an attempt has been made to evaluate an existing building located in seismic zone III using equivalent static analysis. Indian Standard IS-1893:2016 (Part-1) is followed for the equivalent static analysis procedure. Building is modeled in commercial software STAAD Pro. Seismic force demand for each individual member is calculated for the design base shear as required by IS-1893:2002. Corresponding member capacity is calculated as per Indian Standard IS456:2000. Deficient members are identified through demand-to-capacity ratio.

One kN/m2for floor finish). (Floor finishing:- one kN/m2 (Each floor height:-3.5m (Beam size:- 230 x 300mm, 230 x 400mm (Depending on span of beam). Allowable bearing pressure:- twenty ton/m2 Outer Column sizes:- 230 x five hundred metric linear unit

Type of Soil:- Medium Soil Interior Column sizes:- 230 x four hundred metric linear unit Thickness of slab:-135mm.

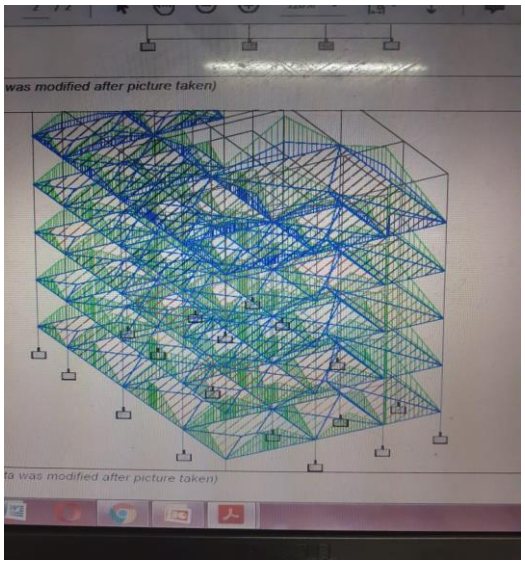


Fig. no.1 Loading on Staad -pro

IV. OBSERVATION AND CALCULATION

Dimensions of the beams and columns are determined on the basis of trial and error process in analysis of Staad software by considering nominal sizes for beams and columns and safe sizes are as show in the table below.

Beams : 230mmx400mm

Columns : 400mmx400mm

Material properties of the building are like M20 grade of concrete, FE415 steel and 13800N/mm2 of modulus of elasticity of brick masonry in the buildings.

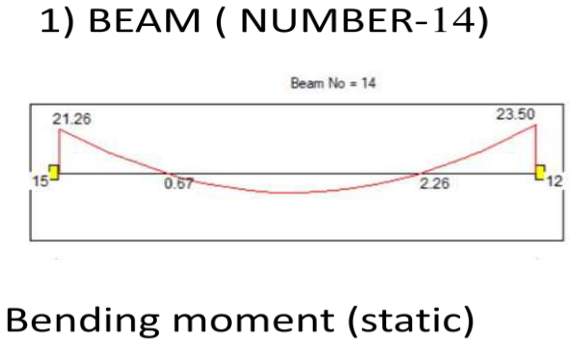
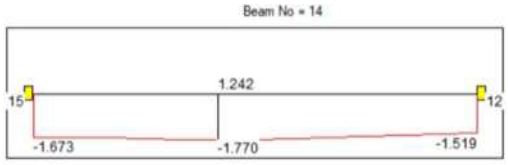


Fig. No. 2 Bending Moment of Beam Analysed by Staad Pro

International Journal of Recent Development in Engineering and Technology
Website: www.ijrdet.com (ISSN 2347-6435(Online) Volume 10, Issue 6, June 2021)

Bending moment (seismic)

Fig. No. 3 Bending Moment of Beam Analysed by Staad Pro



Deflection (static)

Fig. No. 4 Bending Moment of Beam Analysed by Staad Pro

Deflection (seismic)

Fig. No. 5 Bending Moment of Beam Analysed by Staad Pro

V. CONCLUSION

For Beam:

- The analysis enables to analyze the G+4 structure in Zone III under seismic as well as static loads wherein the displacements observed are nearly same.
- The moment obtained in z-direction is very high in case of seismic analysis as compared to that in static analysis.
- From our following results, we can conclude that with the effect of seismic forces the moment on the load carrying member gets increased**.**

For Column:

- The analysis enables to analyze the G+4 structure in Zone III under seismic as well as static loads wherein the displacements observed are nearly same.
- The change in moment in Z direction is nearly same but the change in moment in y-direction is very high in case of seismic analysis. Because of the higher moment, we have to provide higher amount of reinforcement.

Critical section in any structure is major area for the concern of seismic analysis and retrofitting assessment.

- The retrofitting techniques should be applied according to the existing strength of the component of buildings and required standard strength needed as per the building codes.
- The economy and cost of the structure possess an important aspect to suggest suitable retrofitting techniques.
- Seismic Retrofitting is a suitable technology for protection of a variety of structures.
- Proper Design Codes are needed to be published as code of practice for professionals related to this field.
- The retrofitting buildings vulnerable to earthquakes and briefly discuss about the different methods of seismic retrofitting.

This experimental study is carried out to analyze the behavior of RCC columns with different of slenderness ratio and ferro cement confinement on the strength of the columns. Based on test results, the following conclusions are obtained

1. Ferro cement confinement increased the ultimate load carrying capacity of columns.
2. It is essential to find out the specific areas where Ferro cement confinement can be used.
3. Economically Ferro cement technique is long lasting than other techniques.

REFERENCES

[1] Sanjivan Mahadik and S. R. Bhagat (2020) “Earthquake Resisting Elements and Techniques in High Rise Buildings” International Journal of Innovative Technology and Exploring Engineering (IJITEE) ISSN: 2278-3075, Volume-9 Issue-3, January 2020

[2] Jay Prakash Pandit and Lelisa Nemo Nura, (2019) “Comparative Study of Structural Software Sap2000 and Staad Pro”, International Journal of Engineering Science Volume 8 Issue 03 Series. IV March 2019 PP 37-43

[3] M.A. Qureshi, Nidhi Bhavsar and Pratiksha Chaudhari (2018) “ Comparison between Manual calculation and Software calculation of G+5 Building Using Staad pro” Volume: 05 Issue: 05 | May-2018 www.irjet.net p-ISSN: 2395-0072.

[4] V.ramanjaneyulu, dharmesh.m and v.chiranjeevi (2018)" Comparative study on design results of a multi-storied building using staad pro and etabs for regular and irregular plan configuration" volume: 05 issue: 01 | jan-2018 www.irjet.net p-issn: 2395-0072.

[5] S .Vijaya Bhaskar Reddy* and V.Madhu (2018) "Comparative Study on Design Results of a Multi-storied Building using STAAD PRO and ETABS for Regular and Irregular Plan Configuration " International Journal of Applied Engineering Research ISSN 0973-4562 Volume 13, Number 15 (2018) pp. 12194-12201 © Research India Publications. http://www.ripublication.com.

[6] S.A. Raji, A.A. Bello, O.I. Adeyanju, O.L. Tazou (2017) " Analysis of a Six Storey Steel Frame Structure using AutodeskRevit, Staadpro and SAP2000" Journal of Multidisciplinary Engineering Science and Technology (JMEST) ISSN: 2458-9403 Vol. 4 Issue 4, April – 2017.