SESSION 2011-12

PROJECT REPORT
on

"COMPARATIVE STUDY& DESIGN OF BUILDING BY USING SEISMIC COEFFICIENT METHOD & RESPONSE SPECTRUM METHOD"

Submitted By

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In partial fulfillment of requirement for the award of degree of the Master of Technology in Structural Engineering

Guide
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(2012-2013)

ABSTRACT

In India, IS 1893(Part 1): 2002, is used to calculate earthquake loads on the structures. In this Indian Standard, three methods of analysis are given. In the first method, which is used for most of the buildings, static earthquake loads are obtained at each floor of building using empirical time period. This method is termed as Equivalent Static Analysis (ESA) or Seismic Coefficient Method (SCM). Next method given in IS 1893 is Response Spectrum Analysis (RSA), wherein, from the structural model of building, natural frequencies and natural modes are obtained. The third method given in IS 1893 is Time History Analysis (THA). In the time history analysis (THA), dynamic response is obtained by using either modal superposition method or numerical integration method. Here time history of ground acceleration is used and dynamic response in the form of time history of response is obtained.

This project work presents a comparative study of seismic coefficient method and response spectrum method using STAAD software with IS1893 (Part1:2002). For these purpose three different storey buildings having plan areas 100, 200 and 300$m^2$are analyzed using STAAD software and the results obtained are compared using seismic coefficient method & response spectrum method mentioned in IS 1893:2002. It is important to note that the study is conducted for variation in geometrical properties of building but the seismic properties for all these buildings is same. The buildings are located in zone IV region. The results obtained for base shear and other design parameters obtained from STAAD software match with IS1893:2002. The value of base shear obtained by seismic coefficient method and response spectrum method was also compared. In addition to this lateral force distribution obtained from SCM and RSM are also compared. After analysis these buildings are also designed for the results obtained from seismic coefficient method and response spectrum method. The percentage variation in concrete and steel consumption by the two methods is also studied.

CHAPTER 6

CONCLUSION

6.1 Summary

In the present study, an attempt is made to compare the results obtained from SCM and RSM using STAAD and IS 1893:2002. Different models of G+3, G+5 and G+7 are prepared in STAAD. The seismic analysis is carried out taking into consideration that all the buildings are located in zone IV. In addition, design of all these models is also done. Schedule for beams columns slabs and footings were also prepared for these buildings. At the end quantity of concrete and steel requirement by SCM and RSM was also evaluated for these models. In the next section all the conclusions obtained from the present study is discussed.

6.2 Conclusions

The major conclusions drawn from the present study are as follows:

1. Due to increase in plan area the variation in base shear by SCM and RSM increases.

   1.1 For G+3 building having area 100, 200 and 300m^2 the percentage variation in base shear varies from 69.0% to 75.0%.

   1.2 For G+5 building having area 100, 200 and 300m^2 the percentage variation in base shear varies from 63.0% to 69.0%.

   1.3 For G+7 building having area 100, 200 and 300m^2 the percentage variation in base shear varies from 55.0% to 68.0%.

2. Due to increase in height of building but same plan area the percentage variation in base shear by SCM and RSM reduces.

   2.1 For 100m^2 plan area and height of building G+3, G+5 and G+7 the percentage variation in base shear varies from 69.0% to 55.0%.

   2.2 For 200m^2 plan area and height of building G+3, G+5 and G+7 the percentage variation in base shear varies from 69.0% to 65.0%.

   2.3 For 300m^2 plan area and height of building G+3, G+5 and G+7 the percentage variation in base shear varies from 74.0%. to 67%.

3. The quantity of concrete required by SCM for G+3:100m^2 , G+3:200m^2 and G+3:300m^2 is 205, 380 and 568 m^3 respectively whereas the quantity of concrete required by RSM for G+3:100m^2 , G+3:200m^2 and G+3:300m^2 is obtained as 165, 305 and 457 m^3 respectively.

on

SEISMIC ANALYSIS AND DESIGN OF ASYMMETRICALLY PLANNED MULTISTORIED BUILDING

Submitted By

SANJAY KALE

For partial fulfillment of the requirement for the degree of Master of Technology in Structural Engineering (Full-Time)

Under the Guidance of

Prof. S. R. SATONE

Co-Guide

Prof. R. V. R. K. PRASAD

Guide

DEPARTMENT OF CIVIL ENGINEERING

K. D. K. COLLEGE OF ENGINEERING, NAGPUR.

2011-2012

ABSTARCT

Working on this project has been a worth to know the actual working of the seismic behavior of multistoried building with different configuration.

Extracting out concise and effective words to exactly what has been written in this thesis is put in the following lines.

After that the buildings were analysed for Dynamic loads according to provisions of IS 1983(2002). Then the parametric variation was studied using STRUD software.

A situation in which buildings are analysed according to standards is different from those on which the seismic code is based. This is a cause of understanding configurations, and it emphasizes the analyser to relay exclusively on the code provisions and also developing a conceptual understanding of the nature of the dynamic environment and the way in which the building responds.

Conclusions were drawn based on the results obtained from the different studies carried out.

CHAPTER 8

CONCLUSION

Analysis of Multistoried buildings has been performed on six different shaped structure having same plan area i.e. 256 sq. mt. with G + 4 storey structure, they are Square, Rectangle, L, T, C & H shapes.

Following are the observations of result obtained from Analysis and Design

The Axial Force taken by column in square shape building is more proportionate than that of other shapes.

The axial forces are maximum in Ground Stories columns in all the models.

Maximum bending moment is found at intermediate stories of building.

Column's located at middle place of the model possesses more axial load and less moment, compaired with outside or corner column.

Moment's in the column increases as its unsymmetries.

Quality of concrete goes on increasing with models with more unsymmetrical nature, present rectangular shape is known to have greater moment and thereby require higher quantity of concrete and steel.

Soft story may be significant discontinuity of framing stiffness at second floor, so eliminate discontinuity.

Never stop shear wall above ground floor keep other discontinuities to mimimum.

In comparing construction it was concluded that square shape model are more stable and economical w.r.t. H-shape model, H-shape w.r.t. C-shape, C-shape w.r.t. L-shape, L-shape w.r.t. T-shape and T-shape w.r.t. rectangular shape.

It is observed that Base Shear for Square Shape Planed Building is less than C & H – Shaped Planned Structure.

Time period of Base Shear for C-Shaped Planned Building is higher than Square & H-Shaped Planned Building.

Conclusion - Building configuration i.e. Ansymmetricaly planned has very significant effect on seismic performance of building. So, this aspect has to be considered while planning and designing of structure.

Dissertation Report

On

DEVELOPING OF SCAFFOLDING STRUCTURE FOR HIGH RISE BUILDING

The report is submitted in partial fulfillment of the award of the degree of

"Master of Technology in Structural Engineering"

At Rashtrasant Tukdoji Maharaj Nagpur University

Submitted by

Omkar Arun Mogarkar

Guided By

Dr. Valsson Varghese

(Prof. KDKCE, Nagpur)

DEPARTMENT OF CIVIL ENGINEERING

KARMAVEER DADASAHEB KANNAMWAR COLLEGE OF ENGINEERING

NAGPUR-440009

2011-2012

ABSTRACT

The following project is based on study of different parameters involve in building a Scaffolding system for High Rise Structures for supporting formworks, working platform and passageway for material logistics etc. The study also includes analysis of design guidelines for safe erection of scaffolding system.

Scaffolding is the structure used or intended to use for supporting framework, swinging stage, suspended stage or protection of workers engaged in or in connection with construction work, for the purpose of carrying out that work or for the support of material transportation from one level to other or connection with any such work. Scaffolding system is defined as the planning for the design, erection and the inspection of the use and the dismantling of any scaffolding. By law, worker must have safe working environment. And most construction work involves working at heights which cannot be safely or easily reached from the ground or part of the building. The scaffolding design criteria consider the strength; stability; rigidity of the supporting structure and the safety of persons engaged in the erection, alteration and dismantling of the scaffold. When any material is transferred on or to a scaffold it shall be moved or deposited without imposing any violent shock. Scaffold system shall be properly maintained and every part shall be kept so fixed, secured or placed in a position as to prevent, as far as is practicable, accidental displacement. Thus, it must be designed for the most adverse combination of dead loads, live loads, impact loads and environmental loads that can reasonably be expected during the service life of scaffolding. The detail report considers design criteria given by Indian designing standards.

Chapter 8
CONCLUSION

The study briefly introduces findings of study of development and emphasis on the design, safety performance and economical effectiveness of scaffolding in high rise buildings. To ensure safety during construction, support scaffolds should be monitored by their axial forces and displacements of the standards especially during concrete placement, and inspected if bracings are applied correctly and adequately. In case of access scaffolds, sufficient ties to permanent structure must be provided to prevent excessive lateral movement. To consider both safety and economic factors synthetically, it is found that designer, contractors and laborers should be encouraged to use properly designed scaffolding for safer construction. The study provides guidelines for developing, modeling, analysis and design of scaffold systems. To ensure safety during construction, support scaffolds should be monitored by their axial forces and displacements of the standards especially during concrete placement, and inspected if bracings are applied correctly and adequately. For access scaffolds, sufficient ties to permanent structure must be provided to prevent excessive lateral movement.

Considering above comparative study we have found following merits in Option 1

- Design Safety
  - Vertical stability can be very well controlled by using different dimension of grid sizes according to vertical loads
  - Lateral stability can be controlled by various methods by providing various methods like, hinge support as various levels, as we have seen earlier.
  - Various bracing options can be used plan bracing, vertical bracing, knee braces, etc.
- Safe in Rigidity
  - Vertical stability is more and gives more rigiity while using the whole structure.
  - More stiffness can be achieved for the accessible structures like , stairs,

Project Report

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It is observed that Base Shear for Square Shape Planed Building is less than C & H – Shaped Planned Structure.

PROJECT REPORT

on

"PARAMETRIC STUDY OF BLOCK TYPE MACHINE FOUNDATION RESTING ON SOIL AND SPRING"

Submitted By

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For the Degree of Master of Technology in Structural Engineering

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ABSTRACT

Analysis and design of machine foundation has become an important topic of studies in last three decades. Machines are the major features of industries. Proper functioning of machine is ensured through only proper foundation. Proper analysis and design is necessary because the losses occur due to failure of foundation and depending shut down are multiple times than the cost of proper analysis and design.

This project includes design of block type machine foundation for impact and Diesel engine type machine resting on soil and the same resting on spring.
The IS: 2974 Part II and Part III which deals with the provision of block type foundation. Foundation for impact and rotary type machine is analyzed on the basis of two degree freedom system undergoing free vibration.

Analysis of following topics has been considered in the project-

1) Analysis and design of block type machine foundation for impact type resting on soil and resting spring.
2) Analysis and design of block type machine foundation for Diesel engine type machine resting on soil and resting spring.

Also, parametric studies are carried out by changing geometry for both type of machine.

CONCLUSIONS:-

In this project analysis and design of block type machine foundation for impact and Diesel Engine type machine, resting on soil and resting on spring is carried out. For impact type machine foundation results are obtained as shown in Tables 5.3 and Table 5.4.

For Diesel Engine type machine foundation results are obtained as shown in Table 6.8 and Table 6.9

A) In Case Of Impact Type Machine Foundation

Based on the comparative parametric study and results obtained from excel sheets, following conclusions are drawn.

1. Increase in depth of foundation ,weight of foundation is increasing in both cases. But the weight is more in case of block resting on spring than block resting on soil.

2.Increase in depth of foundation, natural frequency (ωn_1) of foundation is decreasing in case of block resting on soil but it increases with very negligible amount in case of block resting on spring. But the natural frequency (ωn_1) is less in case of block resting on spring than block resting on soil.

3. Increase in depth of foundation, natural frequency (ωn_2) of foundation is decreasing in both cases.. But the natural frequency (ωn_2) is less in case of block resting on spring than block resting on soil.

4.Increase in depth of foundation, amplitude of foundation is decreasing in case block resting on soil but the amplitude is remain consatant in case of block resting on spring. But the amplitude is very less in case of block resting on spring than block resting on soil.

5.Increase in depth of foundation, amplitude of anvil is decreasing in both cases. But the amplitude is more in case of block resting on spring than block resting on soil.

6. Increase in depth of foundation, dynamic force in foundation is decreasing in both cases. But the dynamic force in foundation is decreases in case of block resting on spring than block resting on soil.

7. Increase in depth of foundation, stresses in soil is decreasing in case block resting on soil but it slightly increases in case block resting on spring. But the stresses in soil is decreases in case of block resting on spring than block resting on soil.

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