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COMPARATIVE PUSHOVER ANALYSIS OF RCC, STEEL AND COMPOSITE HIGH RISE BUILDING FRAME (G+11) BY USING ETABS

[1] Pranita A. Maske [2] Prof. M. R . Nikhar [3] Prof. A .B. Dehane

[1] PG Student [2] Professor [3] Professor

Department of Civil Engineering,
Bapurao Deshmukh college of Engineering ,Sewagram.

ABSTRACT- *The majority of building structures are designed and constructed in reinforced concrete which is mainly depends upon availability of the constituent materials and the level of skill required in construction, as well as the practicality of design codes. R.C.C is no longer economical because of their increased dead load, hazardous formwork. However composite construction is a new concept for construction industry. The use of modern composite systems, allowing the erection of multi-story structural frames to proceed at pace, can make it economically prohibitive to delay the construction of each floor while concrete columns are cast. In Japan, however, the superior earthquake resistant properties of composite beam-columns have been long recognized and have become a commonly used for construction in that region. It was therefore necessary to develop seismic design criteria for typically used Indian structural systems, to advance the use of this efficient type of mixed construction. This Project shows comparison of various aspects of building.*

In this project a residential of G+11 multi-story building is studied for Pushover Analysis using ETABS, assuming that material property linear, static and dynamic analysis is performed. These non-linear analysis are carried out and different parameters like displacement, storey drift, Performance point, base shear are plotted. Now it is the demand of time that every structure must be analyzed and designed for lateral forces such as earthquake and wind forces. But generally it is found that the cross sectional area of RCC structural member comes out very heavy with large amount of constituent material such as steel & concrete, which takes large space in construction of multistory building. Under such circumstances composite structure is one of the best options, which not only takes care for earthquake forces but also gives less cross sectional area of structural member and provides large space for utilization in economical way.

KEYWORDS- *Pushover, ETABS, Performance Point, Non-linear*

I. INTRODUCTION

1.1 Introduction to project work

The majority of building frames are designed and constructed in reinforced concrete structures, depending upon the availability of constituent materials and the workmanship required in construction industry along with practicality of the existing design codes. Now a day to fulfill the demand of increasing population there is need of high rise building construction and today in India RC construction is popular to fulfill demand of construction industry. But since from last two decades construction industry experiences drastic changes due to increasing population demand, market condition, and availability of resources (men, money & material) etc. which results new techniques of construction are introduces in industry by inventors which give alternative solution to conventional construction. These are mix type or hybrid construction called as a composite construction, which are make efficient use of constituent material which can be most effective than conventional RC construction. The composite structures is the structures in which sections are made up of building different types of materials such as steel and concrete which are used for construction of beams, columns, slabs etc. Numbers of the studies are carried out on composite construction techniques by different researchers in different parts of the world and found it to be better earthquake resistant and more economical as compared to RCC construction.

In composite or hybrid construction different types of sections are utilized as a encased or in filled sections.

1.2 Alternative construction Techniques-

There are various techniques are used for the fulfillment of demand of construction industry. Some of them are popular due to availability of men, material & money, some of them are popular due to their practicality of design.

There are mainly three types of Construction techniques used for the high rise buildings construction and these are:

- RCC Construction

- Steel Structures
- Composite or hybrid Construction

1.3 Composite construction

Now a day's composite is famous one in foreign countries due to their suitability in construction, also it overcomes the disadvantages of RCC & Steel construction which make the composite or hybrid beneficial for high rise construction though the composite resist lateral forces more effectively compared to the RCC & steel.

In composite structure the advantage of bonding property of steel and concrete is taken in to consideration so that they will act as a single unit under loading. These essentially different materials are completely compatible and complementary to each other; they have almost the same thermal expansion; they have an ideal combination of strengths with the concrete efficient in compression and the steel in tension; concrete also gives corrosion protection and thermal insulation to the steel at elevated temperatures and additionally can restrain slender steel sections from local or lateral-torsional buckling. In conventional composite construction, concrete rests over steel beam and under loading conditions these two component acts independently and a relative slip occurs at the interface of concrete slab and steel beam, which can be eliminated by providing appropriate connection between them. So that steel beam and slab act as composite beam and gives behavior same as that of Tee beam.

In steel concrete composite sections both steel and concrete resists external loads together and helps to limit sway of the building frame. It should be added that the combination of concrete cores, steel frame and composite floor construction has become the standard construction method for multi-story commercial buildings in several countries. The main reason for this preference is that the sections and members are best suited to resist repeated earthquake loadings, which require a high amount of resistance and ductility.

1.3.1 Composite Frame Element

A composite member is constructed by combining concrete member and steel member so that they act as a single unit. As we know that concrete is strong in compression and weak in tension on the other side steel is strong in tension and weak in compression. The strength of concrete in compression is complemented by strength of steel tension which results in an efficient section. By the concept of this composite member the concrete and steel are utilized in well-organized manner.

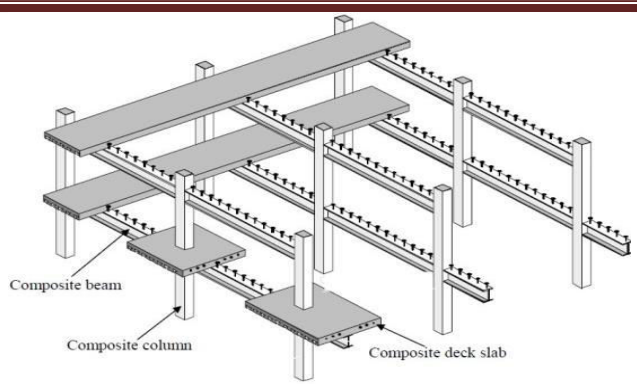

Fig no.1: Composite Frame

Composite Element-

The primary structural components used in composite construction consist of the following elements.

a. Composite Slab
b. Composite Beam
c. Composite Column
d. Shear Connector

II. AIMS AND OBJECTIVES

1. To evaluate the comparison of composite columns with concrete filled steel tubes and composite encased I section column.

2. To fing the structural behavior of multi-storey building for different plan configuration like Rectangular, C,L,and I shape with two different composite columns.

3 .To find out which building is performed good in each cases.

III. LITERATURE SURVEY

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IV. CONCLUSION

In elastic/pushover analysis of both RCC & Composite frame is carried out using ETAB. The outcome from the analysis is described with respective to various parameters in this chapters and comparative analysis is done with RCC frame. The results from above analysis shows that in case of dead load and base shear the sections of steel,EIS-SB,CIS-SB and CFT-SB gives minimum dead load as compared to RCC. The performance point of CFT-RC is maximum as compared to RCC .

Hence we can conclude that the composite section are more prefable than RCC for high rise building.

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