

EFFECT OF SOIL-STRUCTURE INTERACTION ON RECTANGULAR RC BUILDING SUBJECTED TO EARTHQUAKE LOAD

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Abstract- At least one structural element of a civil engineering structure is in direct contact with the ground. Each other's displacements are affected when external forces like wind and earthquakes act on these systems. As a result of soil-structure interaction, both the response of the soil and the motion of the structure are affected by each other (SSI). The SSI effect is not considered in conventional structural design methods. Since there is less work done in this field of SSI, the knowledge of SSI and the fixed base foundation buildings can be gained more quickly. Construction of structures with SSI effects should be compared to structures with fixed bases in order to determine their relationship. On two types of soils as per IS 1893:2016 (Part I), a G+10 reinforced concrete (RC) rectangular structure at different locations and orientations will be analysed using the fixed and flexible foundation methods, incorporating soil-structure interaction effects as per FEMA 356 and FEMA 440. As a result, seismic zones I and II are not taken into account.

Keywords: Soil-Structure Interaction, Earthquake load.

1.INTRODUCTION

- With the increase of massive constructions on soft soils like atomic power plants, concrete and earth dams the Soil-Structure Interaction problem has become a crucial feature of Structural Engineering.
- The 500MW turbine foundation for Singrauli (Chowdhary, 2009) was the primary main structure where the dynamic effect of soil was considered within the analysis in industry in India.
- The scales of socio-economic damages caused by a seismic activity depends on the features of the strong ground motion.

The process, during which the response of the soil influences the motion of the structure and the other way around, is mentioned as Soil-Structure Interaction (SSI).

- The effect of soil on the response of structures depends on the structure of soil, properties of soil and therefore the nature of the excitation.
- Implementing Soil-structure interaction (SSI) effects allows the structural designer to observe real displacements and therefore the inertial forces of the soil foundation structure system precisely under the influence of free field motion.

2.LITERATURE REVIEW

◦ The studies is completed via way of means of Mr. Dhiraj Raj, Ms. Bharathi M in 2013. A bolstered concrete (RC) constructing(G+3) (with bracing and with out bracing), at extraordinary places and orientation as in line with IS code 1893: 2002 (Part I). They have completed the evaluation thinking about the bottom as bendy and stuck which includes Soil-Structure Interaction (SSI) effects. For a relatively stiff ----- shape (i.e. with bracing), the boom inside the essential term for the constructing thinking about SSI impact is round instances as that of the simple term with constant aid for Type-III soil and 1. five instances for Type-II soil. For each instances i.e. constant and thinking about SSI impact, amongst

all function and orientation of bracings, the homes with inverted center bracing has the minimal storey flow in Zones IV and V.

◦ In the studies completed via way of

means of P. M. Yesane, Y. M. Ghugal, R. L. Wankade (2016), the idea of soil–shape interplay (SSI) became defined and the techniques of studies had been additionally discussed. ◦ Research paintings is completed via way of means of Mr. Rahul Sawant, Dr. M. N. Bajad in 2016, the interplay among the below–floor shape and above floor is decided with the assist of models. A Non-linear body version of residential constructing of G+ forty two storeys at Mumbai area is used to have a look at the effect of the shape in ETABS software. Structural reaction of constructing may also reduce, harm can appear while bendy base is utilized in evaluation.

3.METHODOLOGY

Analyses are performed on a G+10 storey RC building with rectangular plan geometry.

There are two types of foundation soil in this building: Type-III (heavy soil) and Type-II (medium soil) (Soft soil).

In SAP 2000 v21.2.0, this model will be analysed in earthquake zones III, IV, and V.

Seismic zones, soil types and foundation orientation will be considered in different combinations.

As a result, there is a uniformity in terms of dimensions of the beams, columns, and slabs

Table -1: Properties Of Soil

Material Properties	Soft Soil	Medium Soil
SBC of Soil (kN/m ²)	200	300
Poisson's ratio	0.3	0.3
Density (kN/m ³)	18	20
Thermal Coefficient (1/oc)	1x10 ⁻⁵	1x10 ⁻⁵

4.CONCLUSION

Soil structure interaction is also an important factor to consider when studying structures subjected to earthquake loads. As the bearing capacity decreases, the top-storey displacement continues to increase as the bearing capacity decreases.

Based on changes in base rigidity, the base value changes in Base Shear. A study of the effect of SSI on buildings under the influence of earthquake loads is therefore required

• As the height of a floor increases, so does its displacement and its lateral movement.

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