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A REVIEW ON SEISMIC BEHAVIOUR OF HIGH RISE BUILDING WITH TRANSFER FLOOR

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Abstract : As the world's population expands, so does the need for land. To address this issue, the transfer floor concept is suitable for meeting the needs of a large number of families in a single area by offering all facilities and land requirements. A floor system that supports a load-bearing system, i.e. lateral and vertical load, and the load is transferred to a different below system. The weight is spread from the column's short span to the column's long span. To get a fundamental grasp of the transfer structure and the tests conducted on it, a number of author's articles are read. The fundamental purpose of this article review is to highlight the behaviour of transfer structures in different seismic zones, as well as the elements that influence the structure.

IndexTerms **- Transfer Structure, Transfer Floor, Plate, Seismic Analysis, Response Spectrum Analysis.**

I. INTRODUCTION

A floor system that supports a load-bearing system, i.e. lateral and vertical load, and the load is transferred to a different below system. Column and wall arrangement changes show the need for helpful, inventive, or planning. New structures are being constructed all over the world with a variety of applications and public expectations in mind. Structures in different seismic zones are utilised for a variety of functions, such as function halls, parking, gardens, children's playgrounds, and so on, whereas buildings in higher seismic zones are used for offices and residences. The most significant disadvantage of the transfer floor is the abrupt fall in lateral stiffness in the area of the building.

TRANSFER FLOOR

Transfer floor is a floor system that supports elements that prevent vertical and lateral load and transfer their loading functions to another construction system. The transfer system may also be transfer girders or transfer slabs. The transfer mechanism is divided into deep waist or thicker slabs with structural irregular mass, hardness and geometric manipulations. Practice codes explain the limitations for these types of disorders in order to avoid the phenomenon of soft story mechanism. The deformity of the transfer system is still neglected and is assumed in the design of the diaphragm. The transfer slab can be re-distributed from the superstructure on the transfer plate to the wide gap columns and the core walls below the transfer slab. They make it easy to combine architectural design to provide open space on the lower floors.

Figure 1:- Transfer slab With Shear wall

Figure 2:- Transfer slab With Column

II. LITERATURE REVIEW

I. **Mohammed Abdul Sameer, et al (2019),** The seismic behaviour of buildings with varied heights and transfer floors was assessed using the software SAP 2000, and push over analysis of the model structures was performed. The depth of the plates obtained ranges from 1-3 metres at various heights, taking into account the architectural requirements for the transfer plate in the structure, and on that basis, base shear, displacement, drift, natural frequency, time period, and other characteristics were examined. The author discovered that the SWF model behaviour is much better than the moment resisting frame in load capacity and stiffness, and the findings were also good for drift, displacement, and base shear.

II. **Kong Wei-yi, et al (2018),** To explore the internal forces of the model that is in contact with fire and the vertical loads on coupling, an RCC structure with a four-story model with a huge transfer girder on the first level was used for ABAQUS software analysis under various fire scenarios. The internal force of the supporting beam of the transfer structure column model increased as the heating time advanced, and the forces were reorganised, but the reorganisation was too obvious and severe ahead of 90 minutes of heating. There is a little variance in B.M.s when heating evenly and over from the fire floor to the first level utilising transfer girder and deliver the stresses. The internal force superposition created by the whole heating process may exceed the room temperature design.

III. **Neelkanth D. Joshi, et al (2018)**, Due to a lack of space, high-rise structures were built with columns spaced at considerable distances to provide parking, a function hall, a garden, and other amenities necessary in modern life buildings, using transfer girders. Analytically, the author investigates the effect of variation in transfer girder stiffness under lateral load on the lateral stiffness of the frame. The frame structure with transfer girder was analysed using STAAD-PRO. As a result, the transfer girder's stiffness altered, but the soft storey floating frame's condition stayed intact. The column with a separate base has less lateral stiffness than the floating column on the transfer girder. The variation in the stiffness of the frame was directly proportional to the stiffness variation of the transfer girder when the frame was centred, and it was directly proportional to the support deflection and stiffness variation of the transfer girder when the frame was eccentrically centred.

IV. **Mehair Yacoubian, et al (2017)**, Buildings with many features in one site, including a transfer structure, have become common in large metro areas with low seismic zones. During an earthquake, the authors assessed the behaviour of a structure using a transfer slab. The transfer plate bias and both rotational and translational motion of the building's substructure were used to determine the building's behaviour.

V. **Y.M. Abdlebasset, et al (2016),** The vertical parts of the structure between the different storeys of the building are unevenly constructed as a consequence of design constraints in many multistory constructions. The loads of upper and lower floors, i.e. lateral and vertical loads, are transmitted to board such disordered vertical parts by a transfer floor. When the findings of linear and non-linear time history analysis are compared, linear time history analysis shows a 20 to 35 percent increase in lateral and drift displacement, as well as a 20 to 35 percent increase in storey moment, shear force, and consequences. By a ten-to-thirty-percentage-point. The linear time history analysis is regarded to be more stable than the elastic response spectrum analysis. High-rise structures with transfer floors can be designed with a cracking inertia of 1.2 Icr.

VI. **Yasser M. Abdlebasset, et al (2016)**, The numerical analysis was conducted using a building model with a transfer floor, and the performance, movement, forces, design process, and influence of time-dependent material characteristics were investigated by conducting the study on construction phases. The investigation indicated that the effect of time dependent accounts for 45 percent of the whole total burden, which is why it requires attention. The shrinkage displacement is less than the creep value. Analysis during the construction stage changes internal force values, which influences the distribution of forces, and analysis reveals a rise in the dead load within the factor of safety. Whether or not the displacement distribution is incorporated in the building stage analysis makes no difference.

VII. **Yong L., et al (2016),** If anomalies in the building are not taken into account when it is being built, the irregularities may cause the structure to suffer a series of damages when it is struck by an earthquake, according to the authors. During a rare earthquake, damage will occur at the floor between two independent load resisting systems in the structure as a result of vertical irregularity.

VIII. **Tamrazyan A., et al (2012),** In heavily populated nations or metropolitan regions, multistory building development has become crucial. The authors looked at the hazard assessment in analysing a multi-story building with transfer floors and sought to find the outcome of important structural parts when an unexpected event occurs, and then decided how to manage the structure's stability in such a condition. There were variations in the internal forces when the drift angle investigation was done between the floor below and the higher the changeover, and the changeover was crucial. The drift angle between floors and the change in internal forces are larger when the transfer level is high in height.

IX. **Y. Zhua, et al (2008),** Transfer floor constructions are becoming more common in modern building construction, especially in multistory complexes that are positioned between the low and high seismic zones. The behaviour of the structure was investigated utilising previous numerical analysis and practical test data. Shake table testing of building models with transfer floors revealed that the structure stays elastic, no cracks emerge during earthquake attack, and the inherent frequency of the models remains constant. When the models were tested under restricted earthquakes, huge fissures formed in the structure's surrounds, inflicting damage to the models. In addition, the natural frequency was lowered by 46%, and the damping ratio of the structure was increased by 4.5-7.5 percent. The outside wall above the transfer floor was revealed to be the source of shear concentration for the local flexural deformation of the transfer floor structure.

X. **R.K.L. Su (2008)**, To carry out the shaking table tests, The data from the Taft and El-Centro earthquakes was widely used for building seismic analysis, and it was thought that it may lead to previous reactionary estimate behaviour of buildings in HONGKONG under various seismic situations. The moderate earthquake model of the structure in question revealed no fractures and the natural frequency did not change.

III. CONCLUSION

To avoid serious structural damage, imperfections in the structure should be considered when constructing a building with a transfer floor, and columns with separate footings have better lateral stiffness than floating columns on a transfer floor. Minor earthquakes do not cause cracks to form, and the structure stays pliable.

- To observe the transfer slab vertical position in the structure a study was supervised, with the different locations of the transfer slab in the structure with respective to the height of structure. Following are the some conclusion obtained by study.
- There is increase in storey shear as the transfer floor system location is in the lowest position in the building as compared to the total height of building.
- Story shear goes on decreasing above transfer slab position in every case because of unusual mass devaluation.
- Decrease in the displacement as the location of transfer slab at lowest level and increase when it is at upper level in X & Y directions.
- Drift value goes on increasing up to the transfer slab level and then sudden goes on decreasing.
- Maximum base shear value goes on increasing when the position of the transfer slab is at higher level & lesser when the location of transfer slab is at the lower level.

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