Seismic Analysis of Foot Over Bridge

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Abstract-*Now a days construction and use of foot over bridge is increasing day by day. Thus it is necessary to provide seismic analysis for different span of bridges to maintain the economy. Seismic analysis of foot over bridge for different soil conditions and for different earthquake zones i,e. II, III, IV, V should be done. Structural models should be analysed by using STAAD pro software for span of 20m and 30m. During heavy earthquake motions many structures collapses due to poor earthquake analysis and from weak points and joints.*

Keywords-Seismic Analysis, Different Zones, Different Soil Conditions, STAAD Pro

I. INTRODUCTION

A Footbridge is a bridge specially designed for pedestrians, animals, horse riders and not for vehicular traffic. Foot over bridge facilitates safety travel way at railway station provided for easy transportation. Footbridges are mostly constructed to allow pedestrians to cross water or railways. They are situated across the roads for pedestrians to cross safely without slowing down the traffic. As per the Indian code IS 1893:2002 Part1, about 60% Indian land comes under seismic zone III, IV, V. However, only about 3% of build environment is well designed. India has ability for strong shaking during earthquake with a large stock of unsafe buildings. Thus, it is an urgent need to introduce good seismic design and features in the field of construction. Structural analysis is a process of analysis of structural members to predict its responses and behaviours by using mathematical equations. The main purpose of structural analysis is to calculate internal forces, stresses and deformations of structures under different load conditions.

Through Type Bridge- This is the plate girder type bridge in which carriage way is supported to main load carrying sections and at lowest part roadway is at bottom chord level in plate girder type through bridge whereas in truss girder through type bridge roadway is at bottom chord portion

Fig.:- Foot Over Bridge

Objectives: -

- Analysis of foot over bridge using STAAD Pro software.
- To understand the effects of earthquake on foot over bridge in different earthquake zones (II, III, IV, V).
- To examine the effects of different soil conditions in different earthquake zones for foot over bridge.
- To give most structurally efficient and economic foot over bridge superstructure according to earthquake zone and suitable soil condition.

II. LITERATURE REVIEW

Andre R. Barbosa et.al(1994) deals with the effects of duration on the seismic response of soil-foundation-bridge structure. By keeping amplitude and frequency same, the earthquake motions were determined. By analysing the results, it was concluded that when shallow earthquake zones were selected the shear force, bending moment verses depth profiles were same. This work presents the effect of duration on seismic response of soil-foundation-bridge system.

Dimitris C. Rizos et.al (1996) studied that the soil foundation models were designed by considering soil structure interaction effect for seismic analysis. Soil structure

interaction effect depends on rigidity of the superstructure and the soil.

Ama.Ijeet et.al (1997) states that Probabilistic seismic design is a relatively new term for seismic design of bridges subjected to earthquake. By this method, doubtfulness in seismic response and seismic demand are taken into consideration. This concept can be extended to control damages by designing for a certain target apparent damage with an associated probability of high quality.

George C.Lee, et.al (2002) focussed on collecting currently available information on observed performance of foot over bridge and to check where further research may be necessary to improve the state of bridges. Results from the observation, calculation and shake table experiments have shown the advantages of seismically isolated bridge over non-isolated bridge.

Jaw-Nan et.al (2006) selected the two long span bridges from US and designed for soil-structure-interaction effect. . The first bridge was a cable stayed bridge and the second one was existing suspension bridge. These bridges were modelled for strong ground motions for different pier location and also at various elevations in the vertical axis. Due to different soil conditions, it was suggested to construct bridge superstructure and foundation as a whole.

James DeCelle et.al (March 2013) designed four basic bridge types, each consisting of steel or concrete was initially considered. Two models were designed in details, a steel truss bridge and a steel arch bridge. A structural information model was generated to visualize the two alternatives.

Sachin Dass et.al (2015) gather information about the way by which the people think for the pedestrian's facility they are using day to day. It will provide awareness into the people's mind what they think about the facilities and what are the ideas for them to discard those facilities leading to accidents. This will provide input for the enhancement in design of these facilities for the pedestrian movement to be faster, efficient and convenient.

Praveen kumar (2015) gives some methods of bridge maintenance, inspection and construction of foot over bridge were explained. By regular maintenance of the bridge structure, life of the structure should be increased and there was a proper functioning of superstructure occurs. This will also provide safety to the passengers.

III. METHODOLOGY

If the structure is not properly designed and built with required quality, they may cause large destruction of structures due to earthquakes. Response spectrum analysis is an efficient technique for seismic analysis of structure when the structure shows linear response.

- A large literature survey by referring books, technical papers to understand basic concept of the topic selected.
- Selection of an appropriate model of foot over bridge by survey and observation.
- Computation of loads and selection of preliminary properties for the model of foot over bridge.
- Geometrical modelling and structural analysis of foot over bridge.
- Design for the structural members of foot over bridge.
- Interpretation of results.

IV. CONCLUSION

Many studies have shown seismic analysis of foot over bridge for different soil condition. But for the different earthquake zones and the economy of the construction, seismic analysis of foot over bridge for different span and different earthquake zones is necessary.

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