

Analysis of Different Railway Bridge Sections Considering Seismic A load As Per Raiway Provisions

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Abstract- India being the largest rail network in Asia and the worlds second largest network operated under a single management with a track length of 1,15,000kms with no major upgradation till date and the same goes with the connecting railway bridges. With time and evolution railway bridges took various shapes with their own advantages and limitations.

Railway bridges play a crucial role in ensuring fast and smooth communication and transportation between cities across the country. Consequently, they hold a major role in the economy and infrastructure development of a country.

This paper attempts to synthesize the existing research in the field of railway bridges so as to provide a better understanding among the practising engineers and researchers. Excerpts from the research may be utilized for assessing the dynamic performance of railway bridges in the near future with further refinement.

Keywords- Railway, Bridges, Vehicle-Bridge Interaction, Fatigue, Dynamic.

I. INTRODUCTION

A bridge is a structure, by which a road, railway or other service is carried over an obstacle such as a river, valley, and other road or railway line. The superstructure of a bridge is the part directly responsible for carrying the road or other service. Its layout is determined largely by the disposition of the service to be carried. Supports at convenient locations. A typical configuration of a truss bridge is a 'through truss' configuration. There is a pair of truss girders connected at bottom chord level by a deck that also carries the traffic, spanning between the two trusses.

Vehicle load capacity analysis of a bridge superstructure is required as per Railway specification provision and manuals for standard and specification for Indian rail conditions. Its main purpose is to assure, that bridge is safe for the user or public. By the load capacity analysis, a bridge might be found to be incapable of securely conveying some legal loads. Furthermore when the loads are beyond the range of permit loads need to be utilizing a

particular structure, load limit analysis can give answer about which loads are securely satisfactory. STAAD.Pro is efficient and accurate software used for concrete and steel bridge analysis and design.

While considering any project, firstly there is need to study its background and its past research provides a track towards the work done and the future scope.

The analytical application STADD.Pro is been used in order to study the bridge sections superstructure. Various advantages of Bridges from construction point of view are been explained in Chapter 1. Bridge sections are the easiest and the most convenient form leading to fast construction of the structure and are generally used worldwide for the span length of 25 meters to 75 meters. The literature review is subjected to describe the project report, evaluate the selected project and clarify the future scope going beyond the search for information which includes identification and articulation acting as bridge between relationship of field of search and the literature. The sources of literature reviews are included from journals, websites and dissertation of various authors.

T.Pramod Kumar, G.Phani Ram (July 2015) Here the primary objective of author behind the study was to evaluate the estimate of railways cum Road Bridge so as to determine its economic importance. Separate bridge for roadways and railways in the same place shall consume more funds so author defined a practical solution in order to reduce the cost of construction by proposing a single bridge for both railway's and roadways. The analytical application STADD.Pro Version 8i was used for analyzing and design of the project. This project resulted in reduction of the land acquisition problem and a drastic stabilization in cost of construction due to two separate entities in the same bridge roadways and railways.

R.Shreedhar, SpurtiMamadapur (September 2012) The author here investigated a basic range T-pillar Bridge by utilizing I.R.C. details and Loading (dead loads and live loads) as a 1-D (one dimensional) structure. The author prepared two different models and subjected them to IRC loadings in order to put together maximum bending moment, besides carried out Finite element Analysis using the STADD.Pro of the three-

dimensional structure. The outcomes were examined and it was discovered that the outcomes acquired from the Finite element Analysis are lesser than the outcomes conveyed from 1-D (one dimensional) investigation, which expresses that the outcomes received from I.R.C. loadings are preservationist and FEM gives the conservative plan.

Rajesh F. Kale, N.G.Gore, P.J.Salunke (January 2014)

Here the author studied the cost effectiveness of reinforced concrete used in T-beam girders. With the main objective of cost minimization while designing the bridge keeping in head the cost of materials namely concrete, foaming, construction materials, cost of reinforcement and manpower. For every single extension its brace length, the width of the bridge, deck section profundity, width of the web support structure and depth of girder being considered for the cost minimization of the extension framework, the structure is displayed and investigated utilizing the immediate plan techniques. Cost effective issue is figured in NLPP (Non-Linear Programming Problem) by Sequential Unconstrained Minimization Technique. The model is examined and intended for an improvement reason by utilizing Mathematical lab (MATLAB) Software with SUMT, and it's the most appropriate for demonstrating accurately with a minimum design variable. Improvement for reinforced bond solid T-bar support framework is represented and the aftereffects of the ideal and traditional plan methods are analyzed. Seen that significant reserve funds in expense over the ordinary plan can be accomplished by the advancement. Be that as it may, the careful sparing acquired from the ideal plan of fortified bond solid T-bar support relies on the range of piece and grade of material. The expense of Othe support is straightforwardly relative to the evaluation of cement.

Georgios Michas (2012) The author here focused on technological advancement on high speed rails tracks considering various concepts on non-ballasted tracks in order to increase its life cycle. Ballasted tracks being the future of the railways are more practical in today's era being economically efficient for a long term perspective as its was been observed that the cost of constructing slab tracks is significantly higher around 50% but the maintenance cost in comparison to ballasted tracks is just one-fourth.

Mulesh K. Pathak (January-2014) Here the author studied different practices like bowing, shear, axial and torsion for on a level plane reinforce cement concrete box bridges considering three measurement FEM utilizing SAP programming. This methodology rearranges the investigation and preliminary design of a curved bridge section. The expansion in the torsion for any arrangement of a diagram is nearly expanding than that of bending moments, shear powers

and axial forces which demonstrate that crate area is having high torsional firmness and nonlinearly differ with the degree of curvature. From the examination, it is seen that different range, the increase factor for the variable level of degree of curvature is shifting straightly for axial force & bending moment, which is about 1.20 to 1.30 for 90° curvature. Augmentation factor for torsion moment is changing nonlinearly having 1.80 to 1.90 for 90° curvature, while there isn't important to apply multiplication factor for shear force.

Amit Saxena, Dr. Savita Maru (April-May, 2013)

Here the author explored the variety and cost contrast in T shaft girder and two cells enclose girder in terms of solid amount and infer that cost of cement for T-Beam Girder isn't as quite a bit of two cell Box Girder as amount required by T-pillar Girder, Quantity of steel for T-bar Girder is less so spending plan of steel in T-Beam is less when contrasted with two cells Box Girder Bridge T-Beam Girder is affordable for range length isn't more than 25m however on the off chance that range is in excess of 25 m, so Box Girder is constantly reasonable. This sort of scaffold structure lies in the high torsional unbending nature on account of the shut box area.

Stanislovaskalantal, Juozas, et al,

Here the author considered the ideal structure issues of the flexible and versatile plastic bars. The numerical models of the issues, including the auxiliary prerequisites of the quality, firmness and steadiness, are figured in the terms of finite element method. The expressed nonlinear advancement issues are settled by the iterative technique, structures. These issues are figured as nonlinear discrete enhancement issues.

Yasuyuki Nagano and T. Okamoto, et al,

here the author exhibited this paper behind the motivation to demonstrate practical applications of a new optimum design method by the creators to a real elevated structure with hysteretic dampers. They reasoned that it was conceivable to spare the basic expense and reduce computational expense than the ordinary seismic safe structure strategies, including iterative dynamic response analysis.

E. Kalkan and S.K. Kunnath (2004)

here the author uncovered in their examination that the appropriateness of utilizing one of a kind model mixes to decide horizontal burden designs that best rough the between story depends in multi-story development opposing casing structures exposed to seismic burdens.

Krishnan et. al. (2006)

here the author examined the reactions of tall steel development outline structures in situation size 7.9 seismic tremors on the southern San Andreas fault zone. This work utilized three-dimensional, nonlinear

limited component models of current eighteen-story moments outline building and overhauled to fulfil the 1997 uniform construction law. The creators found that the mimicked reactions of the first structures demonstrate the potential for critical harm all through the San Fernando and Los Angeles bowls. The overhauled building fared better yet at the same time demonstrated critical disfigurement in a few regions. The elation on the southern San Andreas that spread north-to-south instigated a lot bigger building reactions that the crack that proliferated south-to-north.

Thomas Heaton, et al. (2007) reenacts the reaction of 6 and 20-story steel development opposing edge structures (US 1994. UBC) For ground movements recorded in the 2003 Tokachi-oki seismic tremor. Considered working with both impeccable welds and furthermore with fragile welds like those observed in the 1994 Northridge seismic tremor. Their reproductions demonstrate that the extensive stretch ground movements recorded in the close source districts of the 2003 Tokachi-oki tremor would have caused expansive between story floats in adaptable steel minute – opposing edge structures planned by the US 1994, UBC.

Takanori OYA, takashi Fukazawa, et al (2009), here the author presented the use of another sort BRB to different structures. The prop has two clasping limiting parts (steel mortar boards), cutting a centre plate being under pivotal forces. These parts are welded together and control the centre plate of plastic conduct, dodging the out-of-plane twisting and the clasping.

Vaibhav B. Chavan et. al. (1990) here the author's goal was to assess the financial significance of the Hollow Sections conversely with traditional areas. This paper was done to discover the percentage economy achieved utilizing Hollow Sections in order to comprehend the significance of cost productivity. The method utilized so as to achieve the goal includes the examination of different profiles for various mixes of stature and material cross - segment for a given range and stacking conditions. The investigation and configuration period of the venture was finished using STAAD PRO V8i. The aftereffects of STAAD examination were approved with the consequences of Manual investigation.

Davison and Birkemoe (1982) here the author established that there are two residual pressure slopes the longitudinal way, one over the cylinder face and around the cross-segment signified as the layer, and the other opposite to the cylinder face through the material thickness meant as bending. "The perimeter (membrane) lingering pressure angle speaks to the variety in the mean estimation of the longitudinal leftover pressure and the through thickness (bending) remaining

pressure slope is the deviation from this mean esteem ordinary to the edge through the material thickness".

A Joghataie and M. Takaloozadeh (2009), Here the author proposed a new penalty function which has better combination properties when contrasted with the usually utilized outside and inside penance work. They connected the old and new outside and inside penance work related to the steepest drop strategy to three-bar support and ten-bar bracket and looked at the outcomes. It was demonstrated that the combination speed and exactness of the outcome were improved.

A Csebfalvi and G. Csebfalvi proposed a hereditary calculation for discrete weight structure of steel plane edges with semi-inflexible shaft to-section associations. It was uncovered that the aftereffects of discrete negligible weight configuration are profoundly influenced by the connected association demonstrating strategy.

II. CONCLUSION

Observations from the above literature review suggest the use of finite element modelling of superstructure using STADD.pro in order to study the bridge structure considering the various forces which act on the structure so as to obtain the practical results.

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