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A REVIEW STUDY ON DIFFERENT TRUSS TYPE RAILWAY STEELBRIDGE

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1. ABSTRACT:

This paper presents the investigation and focuses on alerting structural engineers to the possible distortions, associated to the steel bridge's in service life when subjected to a vehicle's dynamic actions. In this paper effort has been made to design Steel truss bridge structure. The basic emphasis has been given to minimize the total deformation of the structural member by optimizing the cross sections, material properties. The crust of our review focuses on the analysis of truss bridge structure by IRS loading, complex or simple because truss is the most widely used in steel bridges used in railways and pedestrian crossings. The analysis and design of steel truss Railway Bridge. The bridge with same railway loadings of BG has been assigned in different types of truss sections to determine the best stable section

KEYWORDS: Railway Bridge, Truss Bridge, Structural Analysis, Steel section ,Economy.

2. INTRODUCTION

A bridge is a super structure that crosses over a gorge, road, river, railway, or other obstructions, permitting smooth and safe passage of vehicles,trains and pedestrians. A pedestrian bridge is a bridge designed for pedestrians and in some cases cyclists, animal traffic and horse riders, rather than vehicular traffic. A Railways bridge is design for railway traffic only using railway loading (IRS).The bridges complement the landscape and can be useddecoratively to visually link two distinct areas or to signal a transaction. For communities in the developing world, a footbridge may be a community's only access to medical clinics, schoolsand markets, which would otherwise be unreachablewhen rivers are too high to cross. Simple truss bridge designs have been developed to be sustainable and easily constructible in such rural areas using only local materials and labour. Truss structures are composed of members that are connected to form a rigid frame of steel. This broad application can be used in many areas, such as Pedestrian Crossing Bridge, rail Bridge, Road Bridge and other transportation bridges. The individual members of a truss bridge are the load carrying components of the structure, they are arranged in a triangular manner resulting in the loads carried to become either in tension or compression. Today truss bridge are used for many purposes, since they are simple to assemble and economical.

Bridge is an important structure required for the transportation network. With the fast innovation in technology the conventional bridges have been replaced by the cost effective structured system. For analysis and design of these bridges the efficient methods are available. In this paper comparative study on different type of truss bridge has been presented. Presently in India, a general type of truss steel bridge is designed, although at a moderatepattern of Steel Bridge is required to rise by the timedue to the higher demands for railways traffic and short distance routes. The main objectives of the present study are to analyse and design truss bridge with railway loadings and to make comparative study of these bridges.

3. STEEL TRUSS BRIDGE:

Steel is widely used around the world for the construction of bridges of different size. It is a versatile and effective material that provides efficient and sustainable solutions. Steel has longbeen recognized as the economic option for a range of bridges. It dominates the markets for long span bridges, railway bridges, footbridges, and medium span highway bridges. It is now increasingly the choice for shorter span highway

structures as well. Society gains in many ways from the benefits delivered by steel bridge solutions. Landmark steel bridges embody good design, they are fast to build, and have stimulated the regeneration of many former industrial, dock and canal side areas.

The connected elements (typically straight) may be stressed from tension, compression, or sometimes both in response to dynamic loads. These trusses can be made of timber, steel or canbe composite structure. In this study, steeltrusses used for building bridges are considered. Steel has higher strength, ductility and toughnessthan many other structural materials such as concrete or wood. However steel must be painted to prevent rusting

Like other bridge types, there are both simpleand continuous truss bridges. The members of a truss can be arranged in an almost unlimited number of ways, but the vast majority of trusses encountered in bridge belong to one of the common types listed below. The integralmembers of a steel truss bridge are shown in figure

Fig. 1: Skeleton of a Typical Steel Truss Bridge

4. TYPES OF TRUSS BRIDGE

According to the configuration of members a truss can be classified in to different types and in this paper the truss configuration type was selected. Classifications of truss type according to their member configuration are listed below

- *Bailey truss*
- *Boll man truss*
- *Bowstring arch truss*
- *Brown truss*
- *Howe truss*
- *Long truss*
- *Warren truss*
- *Pratt truss*
- *K type truss etc.*

5. ADVANTAGES OF STEEL BRIDGE

The following are some of the advantages ofsteel bridges that have contributed to their popularity in India and in many other developed countries.

1. *They could carry heavier loads over longer spanswith minimum dead weight, leading to smaller foundations*
2. *Steel has the advantage where speed of construction is vital, as many elements can be prefabricated and erected at site.*
3. *In urban environment with traffic congestion and limited working space, steel bridges can be constructed with minimum disruption to the community*
4. *Greater efficiency than concrete structures is invariably achieved in resisting seismic forces and blast loading*
5. *The life of steel bridges is longer than that of concrete bridges*
6. *Due to shallow construction depth, steel bridgesoffer slender appearance, which make them aesthetically attractive. The reduced depth also contributes to the reduced cost of embankments*
7. *All these frequently leads to low life cycle costs in steel bridges In India there are many engineers who feel that corrosion is a problem insteel bridges, but in reality it is not so. Corrosion in steel bridges can be effectively minimized by employing newly developed paints and special types of steel.*
8. *The steel truss bridge as less cost (economical) compare to other bridge.*
9. *Steel truss bridge is Simple to assemble andspeedup the construction time.*
10. *This bridge is Flexibility in design.*
11. *Steel bridge have also advantage over Resistance to dynamic loads.*
12. *The steel truss bridge has Easy maintenance*

6. LITERTURE REVIEW

A bridge is a construction that crosses over a road, river, railway, or other impediments, allowing easy and safe passage of vehicles, trains and pedestrians. Numerous studies examined the dynamic performance of bridges structure investigation. A simplified method was followed so that you can execute an immediate analysis of the effects of the parameters involved within the hassle. The deformation of the bridge structure to the applying load is incredibly extensive; hence it's far clear that the dynamic reaction of the bridge underneath the shifting load (moving load) should be

taken into consideration within the technique of structural design.

Gupta. (2017). *Present the investigation and outline of steel support railroad extension of range 50 m. The extension with same railroad loadings of 32.5 ton has been allotted in various sorts of bracket segments to decide the best steady and temperate area. Investigation and configuration is finished utilizing device STAAD star to enhance the area and decide best stable areas for examination. The plan of basic individuals from the support is done as per arrangement of Indian railroad standard code and Indian streets congress code.*

R.Shreedhar, Spurti Mamadapur (September 2012) *Analyzed a simple span T-beam bridge by using I.R.C. specifications and Loading (dead load and live load) as a 1-D (one dimensional) structure. Finite Element Method analysis of a three-dimensional structure was carried out using STAAD. Pro software both models were subjected to I.R.C. Loadings to produce maximum bending moment. The results were analyzed and it was found that the results obtained from the finite element model are lesser than the results carried from 1-D (one dimensional) analysis, which states that the results obtained from I.R.C. loadings are conservative and FEM gives economicaldesign.*

Shrivastava et. al. (2017). *This examination exhibits the auxiliary investigation and plan of RCC box compose minor extension utilizing manual approach (i.e. MDM technique) and by computational approach (Staad-star) utilizing IRS - CBC codes. The basic components (top section, base chunk, side divider) were intended to withstand Ultimate Load criteria (greatest bowing minute and shear drive)Due to different burdens (Dead Load, Live Load, SIDL, LL extra charge, DL additional charge) and workableness criteria (Crack width) and a similar investigation of the outcomes got from the over two approach has been completed to approve the accuracy of the outcomes. Further, it was likewise watched that the investigation utilizing manual count turns out to be extremely repetitive and bulky and for a mind boggling kind of structure, consequently it is a significant complex undertaking to play out the examination physically, so the utilization of computational technique (Staad – expert and exceed expectations sheet) turns into the undeniable decision for plan. The outcomes acquired utilizing MDM technique demonstrates a decent concurrence with the outcomes got from computational strategies.*

K. Senthil et. al. (2017) *3d numerical examinations completed on railway bridges structure the use of Abaqus/ Explicit finite detail application. The duration of bridge 30 m and single truck become considered inside the present study. The constitutive and fracture conduct of substances had been anticipated the use of JC version to be had in ABAQUS. The material parameters of JC model for the bridge contributors to be had within the look at. The responses of bridge were predicted in light of and von-misses stress. The investigations done by using considering the bridge towards elegance AA loading. The impact of intensity of primary girder turned into studied by using varying the intensity as 1600, 1400, 1200 and a thousand mm.*

Sharmaet.al. (2017). *Examined that the outline, development and upkeep of physical and normally manufactured condition, including works like extensions, streets, waterways, dams and structures. It is the most established and broadest designing calling. All the designing claims to fame have been gotten from structural building. It is isolated into different sub disciplines including ecological designing, geotechnical building, auxiliary building, transportation building, material building, reviewing and development designing. The standards of all the above building perspectives are connected to the private, business, mechanical and open works activities everything being equal and levels of development.*

Hani (2016). *Contemplated that the basic outline includes thought of load cases (box unfilled, full, additional charge loads and so on.) and factors like live load, powerful width, braking power, dispersal ofload through fill, affect factor, co-proficient of earth weight and so forth. Applicable IRCs are required to be alluded. The basic components are required to be intended to withstand most extreme twisting minute and shear constrain. This paper gives exchanges on the arrangements in the Codes, contemplations and avocation of all the above viewpoints on plan. The container scaffold can be broke down either by Software or Computational strategies. So it is important to examine the adequacy of results got from both the techniques.*

Kumar. (July 2015). *This current research's goal was to evaluate the monetary significance of the railroad cum street connect. This paper was done to discover the decrease in cost of development by giving single*

scaffold to both street and also railroads. The investigation and configuration period of the undertaking was finished using STAAD PRO V8i. It was watched that the development of a solitary scaffold diminished the cost of two separate extensions for street and railroads, likewise arrive securing issue is decreased to some degree.

TT. Pramod Kumar, & G.Phani Ram (2015). *This present research's goal was to appraise the monetary significance of the railroad cum Road Bridge. This paper was done to discover the decrease in cost of development by giving single scaffold to both street and additionally railroads. Theexamination and configuration period of the undertaking was finished using STAAD PRO V8i.*

Pathak (January-2014). *Examined different practices like twisting, shear, pivotal and torsion for on a level plane bended fortify bond solid box spans considering three measurements FEM utilizing SAP programming. This approach improves examinationand the fundamental outline of bended extension segment. The expansion in the torsion for any arrangement of chart is relatively increments than that of bowing minutes, shear powers and pivotal powers which demonstrate that crate segment is having high torsional firmness and is nonlinearly shift with level of ebb and flow. From the investigation it is watched that different range, the duplication factor for variable level of ebb and flow isshifting directly for pivotal power and twisting minute, which is around 1.20 to 1.30 for 90° ebb andflow. Increase factor for torsion minute is differing nonlinearly having 1.80 to 1.90 for 90° ebb and flow, while there isn't important to apply augmentation factor for shear compel.*

E.Yamaguchi. (2011) *The post-member-failure conduct of a truss bridge turned into investigated via the static analysis and the dynamic evaluation. Large discrepancy among the consequences because of the 2 analyses turned into determined, which turned into discovered resulting from the fact that the 2 analyses led to special deformed configurations. Then an analysis approach of the publish-member- failure conduct became proposed in an effort to encompass the dynamic effect inside the static evaluation. The effectiveness of the proposed method has been proven via comparing the result with that because of the dynamic evaluation.*

7. CONCLUSION

From this we can conclude that the above study analysis for truss is very insightful. The study has addressed the possibility of analysis and design of truss steel bridges with locally available steel profiles. Based on the analysis and design made so far, the study has proved that, The construction of steel bridge with locally available steel profiles is an option worth .Even though the cost of local production is closer to importing it is still a good option since it helps in the capacity building of local design, fabrication and construction firms, creates job opportunities for many people and is a saving in foreign currency. For many short span bridges in railway construction projects, these local assembled steel truss bridges can be used as different type of truss bridges. In addition to the fact that these assembled truss steel bridges are preferable in inaccessible areas they also take very short time to erect.

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[14] IRC: 21 Section –III Cement Concrete (plain and reinforced) standard specifications and code of practice for road bridges.