JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

Review on Box Girder Bridge Structure

Student Name-GAURAV*, Guide Name-MR. VISHAL CHANDRAKAR**
*** Research scholar, Department of Civil Engineering, College name-Shri Shankaracharya College Of Engineering & Technology,Junwani (Bhilai)**
****Assistant Professor, Department of Civil Engineering,Shri Shankaracharya College Of Engineering & Technology,Junwani (Bhilai) .**

Abstract: A box girder bridge is a type of bridge structure that features a rectangular box-like cross-section. A box girder bridge is a type of bridge structure that consists of a rectangular box-shaped girder made of steel or concrete. The box girder is typically composed of two webs connected by a top and bottom flange to create a closed, rectangular cross-section. The current research reviews all the existing work conducted in box girder bridge. The existing researches are conducted using experimental and numerical techniques. The possible reasons for failure of box girder bridges are evaluated by various researchers.

Key Words: *Box girder bridge, review*

1. INTRODUCTION:

A box girder bridge is a type of bridge structure that features a rectangular box-like cross-section. It is made up of two horizontal girders or beams that are connected by vertical walls, creating a hollow box-shaped structure. Box girder bridges are often used for medium to long spans (typically between 30 and 150 meters) and are commonly used for highway and railway bridges. They are popular because of their high stiffness, which makes them able to resist bending and torsion forces, as well as their aesthetic appeal. Box girder bridges can be constructed using a variety of materials, including concrete, steel, and composite materials. They can be built using precast or cast-in-place methods, and may be supported by piers, abutments, or other structures. They are often used in situations where a high degree of structural integrity is required, such as in earthquake-prone regions or where heavy loads must be carried [1].

2. LITERATURE REVIEW

Priyanka Dilip P, Fahad P. P. [2], A box girder bridge is an evident bridge section in which main longitudinal girders are provided in the hollow box shape. The box girder are constructed using steel or the concrete after prestressing or they are also constructed in the form of composite or reinforced concrete section. The typical cross section of box girder is rectangular, square and trapezoidal. In this study, 240m span of two Lane Bridge is analysed and designed. A trapezoidal cross-section of post tensioned box girder bridge with two cells is analysed using different design loads using the IRC code for loads and load combinations i.e. IRC:6-2014 which includes different loads such as Super imposed dead load, Dead loads, moving loads,

D.Aditya Sai Ram [3] Bridge are used for connecting highway, roadways and railway in the whole world has high level of importance in construction sector. Prestress girder bridges are extremely popular in bridge engineering field as they are more stable, serviceable, economical and structurally efficient and gives aesthetic appearance. In this thesis, prestressed concrete T Girder and Box Girder bridges analysis and design are carried out. IRC:112-2011 is used for analyzing the bridges. IRC:112 is a new generation code. The design provisions given in new code differs from previous codes.

Sanket Patel, Umang Parekh [4] The bridges are used for different purposes from the very beginning of human civilization. Innumerable bridges of various kinds and of various materials have been built from times immemorial. Design of medium span highway bridge system requires careful selection of structural element in preliminary stage. The motive behind present study is to prepare some useful interface for preliminary design of bridge system. The most economical design can only be found by comparing few different designs. Particular set of conditions can be used to find the most economic design.

Pragya Soni, Dr. P.S. Bokare [5] The bridging activity is as old as human civilization. Innumerable bridges of various kinds and of various materials have been built from times immemorial. Design of medium span highway bridge system requires careful selection of structural element in preliminary stage. The motive behind present study is to prepare some useful interface for preliminary design of bridge system.

Ravikant, Jagdish Chand [6] Rivers or valleys can sometimes be in the way and block the way. So, without changing the alignment, a way around or through the barrier or obstacles is made possible. In this study on the design of bridge girders, both longitudinal and cross girders were taken into account. For each span of the bridge, which is thought to be 25m, girders are built. For longitudinal girders, the size is taken to be 2000 x 500 mm, and for cross girders, the size is taken to be 1500 x 250 mm.

R.Shreedhar, Spurti Mamadapur [7] IRC loadings were used to look at a simple one-span T-beam bridge as a one-dimensional structure. The same T-beam bridge is analysed with finite element plate for the beam girder elements of the main beam and deck slab in STAAD ProV8i. The one span of bridge is looked at as a structure with three dimensions. Different IRC loadings are looked at in models. I.R.C. loads are put on both models to get reactions, shear force, and the maximum bending moment.

Wardhana and Hadipriono [8] looked into 503 bridge failures in the United States to find out the most important things about them. They looked at the type of structure, the type of material, the age of the bridge, the type of failure, and the time of the failure.

Xu et al. [9] looked at the statistics of 302 collapsed bridges in China, including when they happened, how many people were hurt, where they were, how long they had been there, and what kind of bridge it was. This study gave a lot of information about how bridges are failing in China right now.

Based on 916 bridge failures in China and other countries, Zhou and Zhen [10] analysed and compared the characteristics of bridge failures in China and other countries. They found that the safety of bridges in China was very bad.

Xu et al. [11] only looked at bridges that had completely fallen down and put them into four categories: beam bridge, arch bridge, cable-stayed bridge, and suspension bridge. Between these studies, it is clear that there are differences in how bridge failures are categorised and how they are judged. So, it's important to define the different kinds of failure characteristics and the standards for classifying them.

Wardhana and Hadipriono [12] broke down the main reasons why bridges fall apart into two groups: internal causes (like mistakes in design, construction, or lack of maintenance) and external causes (hydraulic, overload, and collision). The research also showed that bridge failures in the United States are most often caused by water, too much weight, and crashes. B

Deng et al. [13] looked into the relationship between what caused a bridge to fail and what kind of structure it was. They found that floods, earthquakes, and overloads were the most common reasons why beam bridges and masonry arch bridges broke. The failures of beam bridges, flexible long-span bridges, and steel truss bridges were also caused by collisions, wind, and wear and tear.

Diaz et al. [14] looked at what went wrong with 63 bridges in Colombia and found that terrorist attacks were to blame for about 32% of the failures. Floods and mistakes in the design of the bridges were also to blame. This research also found that the type of material was closely linked to the reasons why bridges fail.

Biezma and Schanack (15) looked at all the steel bridges that have fallen down around the world and found that 65% of them fell because of "force majeure" events like floods, earthquakes, avalanches, and terrorist attacks.

Peng et al. (16) put the reasons bridges fail into 5 groups: construction, natural disasters, design, accidental loads, and durability. More than 70% of bridge failures were caused by construction and natural disasters.

Ji and Fu [17] put the reasons bridges fail into 6 groups: bad design and construction, bridge collisions and overload, natural disasters, too much reinforcement and demolition, bridge diseases, and human activities. In addition to earthquakes, they found that bad design and construction were the main reasons bridges fell down.

3. CONCLUSION

The box girder bridge structures are prone to failure due to various factors. These factors include design flaws, corrosion, overloading, poor maintenance and natural disasters. The box girder bridge structures are analyzed using IRC:112 codes which is different from earlier codes.

REFERENCES

1. K. Hemalatha a , Chippymol James, "Analysis of RCC T-beam and prestressed concrete box girder bridges super structure under different span conditions"https://doi.org/10.1016/j.matpr.2020.07.119
2. Fahad P. P. , Priyanka Dilip P, " Analysis and Design of Post Tensioned Box Girder Bridge Using SAP 2000," IJSRSET , Volume 3 , Issue 2 , Print ISSN: 2395-1990, Online ISSN : 2394- 4099,2017.
3. Phani Kumar, S.V.V.K.Babu, D.Aditya Sai Ram, "Analysis and Design of Prestressed Box Girder Bridge by IRC: 112-2011," International Journal of Constructive Research in Civil Engineering (IJCRCE) Volume 2, Issue 2, PP 1-10 ISSN 2454- 8693, 2016.
4. Sanket Patel, Umang Parekh, "Comparative Study of PSC. Tee Girder and PSC.Box Girder," IJSTE - International Journal of Science Technology & Engineering , Volume 2 , Issue 11 , May 2016.
5. Pragya Soni, Dr. P.S. Bokare, "Review of Design Procedure for Box Girder Bridges," International Journal for Research in Applied Science & Engineering Technology (IJRASET) ISSN: 2321-9653; Volume 5 Issue IX, September 2017.

6. Jagdish Chand, Ravikant, "Design and Analysis of Bridge Girders using Different Codes", International Journal of Engineering and Innovative Technology (IJEIT), ISSN: 2278-0181, Vol 8 Issue 07, July-2019.
7. R.Shreedhar, Spurti Mamadapur, "Analysis of Tbeam Bridge Using Finite Element Method",International Journal of Engineering and Innovative Technology (IJEIT), Issue 3, Volume 2, September 2012.
8. Wardhana, K., Hadipriono, F.C., 2003. Analysis of recent bridge failures in the United States. Journal of Performance of Constructed Facilities 17 (3), 144e150
9. Xu, F., Zhang, M., Wang, L., et al., 2016. Recent highway bridge collapses in China: review and discussion. Journal of Performance of Constructed Facilities 30 (5), 04016030
10. Zhou, J., Zhen, D., 2017. Safety of highway bridges in China. Strategic Study of CAE 19 (6), 27e37.
11. Xu, F., Zhang, M., Wang, L., et al., 2016. Recent highway bridge collapses in China: review and discussion. Journal of Performance of Constructed Facilities 30 (5), 04016030.
12. Wardhana, K., Hadipriono, F.C., 2003. Analysis of recent bridge failures in the United States. Journal of Performance of Constructed Facilities 17 (3), 144e150.
13. Deng, L., Wang, W., Yu, Y., 2016. State-of-the-art review on the causes and mechanisms of bridge collapse. Journal of Performance of Constructed Facilities 30 (2), 04015005.
14. Diaz, E.E.M., Moreno, F.N., Mohammadi, J., 2009. Investigation of common causes of bridge collapse in Colombia. Practice Periodical on Structural Design and Construction 14 (4), 194e200
15. Biezma, M.V., Schanack, F., 2007. Collapse of steel bridges. Journal of Performance of Constructed Facilities 21 (5), 398e405.
16. Peng, W., Shen, J., Tang, X., et al., 2019. Review, analysis, and insights on recent typical bridge failures. China Journal of Highway and Transport 32 (12), 132e144
17. Ji, B., Fu, Z., 2010. Analysis of Chinese bridge collapse accident causes in recent years. China Civil Engineering Journal 43 (S1), 495e498.