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A Review Study on Analysis of Concrete T-Beam Girder Bridge

Abhinav Kumar[1], Nitesh Kushwaha[2]

[1]M Tech Scholar, [2]Professor,
[1,2]Department of Civil Engineering, Millennium Institute of Technology & Science,
Bhopal, Madhya Pradesh, India

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INTRODUCTION

Bridges are the life line of road network, both in urban and country zones. With fast innovation development, the commonplace bridge has been supplanted by creative practical structural system. One of these courses of action presents basic RCC framework that is T-Beam and ordinary Beam.

Bridge design is a goal and what's more personalities boggling approach for an structural design. Just as there should rise an occasion of Bridge design, span length and live loads are consistently fundamental variables. These parts affect the conceptualization time of plan. The impacts of live load for different extents are moving. Choice of structural system for a cross is continually a range in which investigate should be possible. Structural system got is influenced by fragments like economy and fancy being created. Code strategy engages us to pick structural system i.e. T- Beam Girder. The decision of sparing and constructible basic framework relies on upon the outcome.

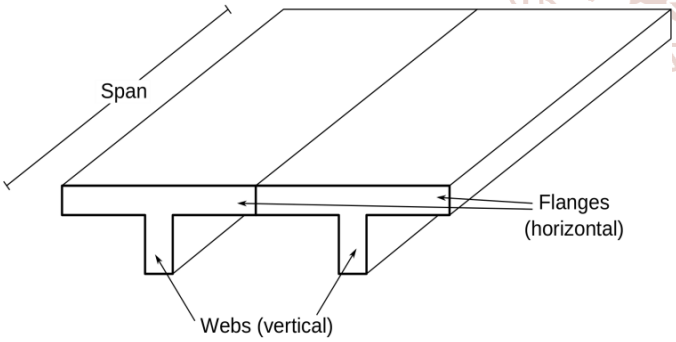

Figure 1 T-Beam

T-BEAM

T-beam utilized as a part of construction, is a load bearing structure of reinforced concrete, wood or metal, with a t-formed cross area. The highest point of the t-molded cross segment fills in as a flange or pressure part in opposing compressive stress. The web (vertical area) of the beam beneath the compression flange serves to oppose shear stress and to give more noteworthy detachment to the coupled strengths of bending.

Figure 2. T-Beam Crossection View

Literature Survey

General

- **Rajamoori Arun Kumar, (2014)** Bending moment and shear force for PSC T-Beam Girder are lesser then RCC T-Beam girder bridge. Which allow designer to have lesser heavier section for PSC T-Beam Girder then RCC T-Beam Girder for 24m span. Moment of resistance of PSC T-Beam Girder is more as compare to RCC T-Beam Girder for 24 m span. Cost of concrete for PSC T-Beam Girder is less then RCC T-Beam Girder.

- **Manjeetkumar M Nagarmunnoli, (2014)** Concentrate about on the effects of deck thickness in RCC T-Beam Bridge. For every decrement in deck segment thickness reduces the bending stiffness by around 40% to half. Stresses acting in the deck under truck wheel load are around 55 times more unmistakable than the allowable weights. For every decrement in the deck piece thickness from 280 mm to 150 mm would profoundly assemble the part slant by around 31% under the wheel stack. The uncracked depiction of inaction decays by around 45% for every decrement in the deck area thickness from 280 mm to 150 mm subjected to IRC Class A truck stacking. The Curve force made in the deck piece reduces by around 0.43% for every decrement in the deck segment thickness.

- **Praful NK, (2015)** The near review was directed in

view of the diagnostic displaying of basically bolstered RC T-pillar connect by rational method and Finite element method utilizing Staad pro. In view of this review Courbon's method gives the normal outcome with deference BM values in the longitudinal girder when contrasted with Guyon Massonet technique. While Guyon Massonet's strategy belittles the BM values when contrasted and Courbon's method.The Staad professional outcome nearly coordinates with the qualities gotten by Courbon's technique for class AA followed vehicle. For class AA Followed vehicle the Staad professional outcome is decreased by (0.01%) when contrasted with Courbon's technique and increment in result contrasted with Guyon- massonet strategy by (34.22%) for Bowing Moment.For class AA Followed vehicle the Staad star result is lessened by (33.73%) when contrasted with Courbon's strategy and increment in result contrasted with Guyon-massonet technique by (26.93%) for Shear Constrain.

- **Soumya S (2015)** The main purpose of this study is to design superstructure of a RC T-beam bridge of different spans. T-beam bridge decks are cast-in-situ concrete deck. It comprises of a concrete slab attached with girders. The finite element method is a common technique for the analysis of complicated structure. A T beam bridge was analysed by I.R.C. loadings as a one dimensional model. It is then analysed as a three-dimensional structure using software SAP 2000, v14.2.2 Models are subjected to I.RC Loadings. The result obtained by Courbons method is more than that obtained from finite element model, which indicates that the result obtained is conservative.

- **Praful N K (2015)** Analysis by rational methods of a T beam bridge is done in this paper, where we use one dimensional structure. Use of various IRC loadings is studied. The three dimensional model is been analysed by Finite element method using the software Staad Pro. The models are been created for three spans of varying lengths that are 16m, 20m, 24m. The results obtained from software are thus compared with manual results. It shows that the results of software are lesser than that of the manual results. So we can come to a conclusion that the manual results are more conservative.

- **Pavan D (2015)** In this paper a Finite element method (FEM) simulation were conducted to evaluate effect of the variation of cushion depth, coefficient of earth pressure, width or angle of dispersion on the structural behavior of the three dimensional box culvert and to examine the accuracy of FEM by comparing the FEM results with IS Code methods. It guides us in evaluating box culvert behavior under different cushion depths, the bx culvert need not be reconstructed during widening of roads.

- **Y Yadu Priya (2016)** In his study, analysis of Pre stressed concrete bridge is done. The spans are varied by 25m, 30m, 35m, 40m where the width of the bridge is constant. The bridge deck system which comprises t-beam is been subjected to IRC loadings i.e., IRC class AA, IRC Class 70-R tracked vehicle. After the analysis we get the values of Shear Force and Bending Moment. They are then compared manually by Courbons method with that of Finite element method. The comparison shows that there is no much difference in comparison.

- **Sandesh Upadhyaya K (2016)** This paper gives a comparative examination of a deck slab system of 20m, 24m, 28m span lengths. Conventional design was made using excel sheets. Shear force and bending moment values are studied. The live load assigned is of Class AA wheeled vehicle. Validation is done by checking between finite element method analysis and manual Courbons method. It shows T beam slab is more efficient than ordinary slab on girder.

- **Tangudupalli (2017)** In this project comparison of all loadings and all methods and same bridge is analyzed using software STAAD Pro V8i. Analysis of the girder is done using the three rational methods (Hendry Jaegar, Guyon-Massonet, Courbons theory). The loadings assigned are IRC loadings Class A, Class AA, Class 70-R, Class-B). The different country loadings given are Saudi Arabia loading, AASHTO loading, and British Standard loading.'

- **Pallvi rai,(2017)** To shield connect from blast loading, there is need to consider blast loading at the period of design of structure. For viably existing structures, retrofitting system can be gotten or an effect limit can be made all through the structure. It was found from the result that a typical T-Beam bridge will bomb due to effect stack associated by an impact of 226.8 kg of explosive above and underneath the augmentation deck. Some bit of the augmentation is depended upon not to bomb after utilization of effect load if region of effect is near the portion. In case affect happens close support, a segment of the props on various extents are typical not, It can be settled from this audit a common T-Beam connect with solid segments besides, wharfs is not prepared for restricting specific impact stacking.

- **Abrar Ahmed (2017**) The aim of the work is to find out the most suitable section for bridges of different spans. The purpose of the work is for designing and analyzing sections for different I.R.C vehicles. Analysis of structure is done by Csibridge software, the validation is done by using working stress method and Courbons theory. We can observe that I.R.C 70-R vehicle gives maximum impact. Till 30m span of bridge, T beam girder is suitable, and if span is higher makes it uneconomical. Box girder is suitable for higher spans.

- **nand Soni et. al. (May 2017)** The Innovative deck profile of cable-stay bridge proposed here for an investigation of various sorts of deck profiles by utilizing cable stay bridge framework. The prime target of the present work is to demonstrate an upgraded Cable Stay Bridge with managed support with different highlights, i.e. length to profundity proportion as steady parameter an Endeavour is made here to check the cost economy, auxiliary quality of proposed by bridge by checking a proportion of load conveying ability to material necessity separately. The total work comprises an investigation utilizing business programming (MIDAS CIVIL 2016). Static investigation of bridge with variety in deck profiles, i.e., PSC-I Deck, PSC-T bar, PSC-Box supports. Parametric examination will be work out

utilizing different unthinkable and graphical shape which features a goal dependent on cost economy perspective as far as quality, usefulness and economy individually are the prime foundation. Here a geometry was taken of "Pandit Dindayal Upadhyay Cable Stay Bridge" which is directly developing on Tapi waterway across Athwa to Adajan.

- **R. Shreedhar, Spurti 2017** A simple span T-beam bridge was analyzed by using I.R.C. specifications and Loading (dead load and live load) as a 1-D structure. Finite Element Method analysis of a 3D structure was carried out using STAAD. Pro software. it was found that the results carried 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 economical design

- **Weiwei Lin 2017** A bridge deck is the roadway, or the pedestrian walkway, surface of a bridge. The deck may be of either cast-in-situ or precast concrete, wood, which in turn may be covered with asphalt concrete or other pavement. The deck systems varies with different bridge types and bridge superstructure construction methods, particular attention of this chapter will be given to the bridge accessories with special emphasis on pavement, drainage system and waterproofing system, expansion joint, sidewalk, lamps post, handrail, guardrail, etc.

- **Manohar R (2018)** According to the study a T-beam bridge of varying slab size 3×2, 3.5×2.5, 4×3, 4.5×3.5, 5×4 and depths of deck (200,225,250,275,300) mm is analyzed using SAP 2000 software. The main bridge components are deck slab, cross girders, longitudinal girder. Here the different dimensions of cross girders and deck slab are selected. Many manual methods are used for the analysis. It is noted that Shear force, Bending moment and deflection in the girder increases with the increase in the span length.

- **Phani Kumar.Ch, (2019)** The present communication aims at development, implementation and evaluation of finite element method (FEM) in the MATLAB environment for the determining stress and displacement in a truss. For this purpose, a simple 3-D truss with 48 members was designed in MATLAB. A MATLAB script based on finite element method (FEM) was developed in the form of m-file to generate the numerical results on stress and displacement of the truss members under the application of lateral forces. The results were obtained in the form of graphical form for visual analysis and tabular in form for statistical analysis. Subsequently, the results were validated for the results obtained by analyzing the same truss in STAAD Pro for stress and displacement. The visual analysis showed that out of the 48 structural members 24 were deformed and the remaining 24 were undeformed. The deformation in the truss members facing the lateral force took place because of tension stress while the truss members opposite to applied lateral force underwent deformation due to compression stress.

OBJECTIVES

- To study on simple girder deck and T Beam girder.

CONCLUSION

T beam deck show better results in comparison to ordinary beam deck, thus T beam deck slab can be considered for further research & design work.

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