REVIEW ON DYNAMIC ANALYSIS OF PSC T BEAM & BOX GIRDER BRIDGESUPERSTRUCTURE FOR DIFFERENT SPAN LENGTHS

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Abstract

The pre-stressed concrete bridges have excellent riding characteristics that minimize traffic vibrations, torsional rigidity, less likely to crack prematurely continuous span, strength and the most noteworthy characteristic is natural frequency of vibration hardly matches with vehicle frequency therefore attained spacious acceptance in free way, highway flyovers, and in modern metro rail systems. As bridges are the important structures should be capable to withstand static as well as dynamic loads specially, earthquake-induced load to achieve a structure that behave at the level of life safety under enormous earthquakes. The present article shows the linear dynamic behavior of T-beam girder and Trapezoidal box girder bridge deck and compares static as well as dynamic behavior.

Keywords: - T-beam girder, Box girder, Dynamic analysis, ANSYS

I. 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 Box Girder.

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 and Box Girder. The decision of sparing and constructible basic framework relies on upon the outcome.

For e.g 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

II. STATE OF DEVELOPMENT

B.Paval "Analysis of Multi-Cell Pre-stressed Concrete Box-Girder Bridge" International Journal of Engineering Technology ISSN 2394 – 3386 Volume 3, Issue 4[1].The aim of this thesis is to study a basic design of a pre-stressed concrete box girder bridge and to describe the linear, non-linear and time history analysis of this concrete spread box girder superstructure when subjected to different loads simulating the effect of traffics. The pre-stressed concrete box girder bridge superstructure analyzed in the base case consists of two concrete box girders with simple

span. The superstructure is loaded by IRC loads and the loads are incremented until the bridge superstructure system fails. A sensitivity analysis is performed to study how variations in the bridge geometry, damage scenarios, member properties and bridge continuity affect the redundancy of the superstructure. Specifically, Time History Analysis is used to investigate the sensitivity of the structure to variations in various parameters including: a) boundary conditions; b) damage of pre-stressed members and damage scenarios; c) member capacity; d) non-linear effect.

Pragya Soni, Dr. P.S. Bokare "Review of Design Procedure for Box Girder Bridges" International Journal for Research Volume 5 Issue IX, September 2017.[2]Due to population growth and rapid urbanization, there has been an enormous growth in traffic volume on highways over the last few decades. In order to ensure smooth flow of traffic, numerous new highways and flyovers are being constructed. The use of box-girders has proven to be a very efficient structural solution for highway bridges and flyovers due to its high tensional rigidity, serviceability, economy, aesthetics and the ability to efficiently distribute the eccentric vehicular live load among the webs of the box-girder. For the multi-lane bridges, multi-spine/cell box-girders are most commonly adopted in order to limit the local deformations in the top slab of box. Many studies are available on suitability of box girder bridges for various spans and effect of stresses for skewed box Girder Bridge.

Mr. Praveen Naik, Dr. R. Shreedhar "Study on Behavior of Skew PSC Box Girder Bridge" (IJRASET) Volume 6 Issue V, May 2018[3].Skew bridges are built where geometry cannot accommodate straight bridge. The most common and basic type of bridge, that is widely used for roadways is Girder Bridge. The two most common types of girders that are used in practice are beam and Box Girders. Though box girder design is more complicated, it has wide acceptance due to their structural efficiency, aesthetic appearance, better stability and serviceability. Over years simple RCC box girders used for short spans resulted in long span pre-stressed concrete bridges. The use of pre-stressing enables concrete bridge beams to span long distances. Box girders are constructed in single cell, double cell or multi cell. Generally bridge with a skew angle less than 20° is designed as normal bridge.

Palden Humagai, Pavan Kumar Peddineni "Manual Analysis And Design Of Post Tensioned Pre-Stressed Concrete T-Beam Segment Bridge Using Proto-Type Model" (IJCIET) Volume 8, Issue 4, April 2017[4].The report examines in detail the application of segmental precast T-Beam girder construction in achieving long spans in bridge structures. Numerous examples from throughout the world indicate that such construction can provide an effective means of achieving long span in the range of 100 to 500 ft. Used segmental pre-cast bridge structure member is manufactured in a number of short units which during erection are joined together, end to end, and post-tensioned to form the completed superstructure. Cantilever concrete T-Beam girder bridges composed of precast reinforced and pre-stressed concrete beams with a T- cross section and a cast-in place top slab are frequently used for medium spans due to their competitiveness.

Vivek P. Joshi Ronak S. Gajjar "Literature Review in Analysis of Horizontally Curved Box-Girder Bridges" IJSRD Vol. 6, Issue 10, 2018[5].Bridge is life line of road network, both in urban and rural areas. With rapid technology growth the conventional bridge has been replaced by innovative cost effective structural system such as T-Beam Girder System and Box Girder Bridge System. In spite of difficult design procedure and complex form work requirement , box girders, have gained wide acceptance in freeway and bridge systems due to their structural efficiency, better stability, serviceability, economy of construction and aesthetic appearance. This paper present a literature review related to Curved span PSC Box girder.

Punil Kumar M P, Shilpa B S "Dynamic analysis of box girder bridges" International Research Journal of Engineering and Technology, Volume: 03 Issue: 07 | July-2016[6].Now days the dynamic performance of structure is very much essential while designing any structure. Analyzing the PSC Box girder bridge, statically and dynamically is the basic aim of this dissertation. Here with and without application of dynamic loads, the performance of bridge is studied. The study of bridge with bearing between girder and top of pier are included. By applying moving load, vehicle (or) truck load, pre-stress and axial forces, the effects of bridge model is carefully studied

A. Jayasri , V. Senthil kumar "A Study On Behavior Of Girder Bridge Under Class AA Loading And Class 70R Loading" (IRJET) Volume: 05 Issue: 04 | Apr-2018[7]**.**Bridges are the most common major structure encountered in highway engineering and the most varied in design. Bridges range from timber deck on stringers that are supported at each end to very complex designs. Span lengths can vary from 6m (20 feet) to hundreds of meters(feet). The obstacle to be crossed may be a river, a road, railway or a valley. Structural engineering work consists of designing new structures and repairing or rehabilitating existing ones. The bridge is a structure providing a passage over an obstacle may be for a road, a railway and pipeline. This study is aimed to understand the behavior of Girder Bridge with two lanes of different span. ANSYS software is used as a tool for the analysis of performance including total deformation, bending moment, shear stress under static and dynamic load.

Selvan V* and Gobinath RS "Pre-Stressed Concrete Box Girder Multi Cell (3-Cell) Bridge of Different Shapes a Comparative Study: A Review Paper" ISSN: 2574-187X December 03, 2019[8].The continued enlargement of

route network throughout the globe is basically the results of nice increasing traffic, population and intensive growth of metropolitan urban areas. This growth has cause several changes within the use and development of assorted varieties of bridges. As Span will increase, dead load is an important increasing factor. To reduce the load, unnecessary material, which is not utilized to its full capacity, is removed out of section, this ends up in the form of box beam or cellular structures, depending upon whether or not the shear deformations may be neglected or not. "When tension flanges of longitudinal girders area unit connected along, the resulting structure is called a box girder bridge". A bridge may be a structure providing passage over Associate in nursing obstacle while not closing the means below.

III. CONCLUSION

The behavior of T-beam girder and box girder proposed for bridge Superstructure of spans span 35m, 40m 45m, 50m is studied. By conducting Dynamic analysis, it was clear that box girder is an efficient and economical girder system by optimization of cross-section as compared to T-beam girder section by comparing static and dynamic responses. The study of bridge with bearing between girder and top of pier are included. By applying moving load, vehicle (or) truck load, pre-stress and axial forces, the effects of bridge model is carefully studied

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