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Analysis and Design of Concrete T-Beam Girder Bridge and Box Girder Bridge: A Comparative Study

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Abstract - *The reason for present review is the plan of Bridge structure for a few of span. The most clear decision of this span is T-Beam and Box Girder Support. They have their own particular attributes and impediments as T-Beam has simple development mythology, whereas girder and box Girder has complex and exorbitant formwork. In present review a two/four path essentially bolstered RCC T-Beam Girder Extension and Box Girder Bridge was investigations for dead load and IRC moving load. The dead load computation has been done physically and for live load straight examination is done on CSI Bridge 2016. The objective of study is to decide most positive alternative from above extension. The choices in view of clear component of designing that are security, serviceability and economy. Taking after these viewpoints a plan for T-Beam Bridge and Box Girder has been performed. After estimation two basic material utilization steel and cement the most practical has been chosen. This review is on the premise of snapshot of resistance of area, shear limit of segment and practical arrangement from both T-Beam and Box Girder Bridge Connect.*

Key Words: T-beam, Box Girder, Prestressed Concrete, CSI Bridge, Courbon's theory.

1. 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.

1.1 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.

1.2 GIRDER

Girder is a term used in construction to refer to a supporting, horizontal beam that can be made from a variety of construction materials such as stainless steel, concrete, or a combination of these materials. A girder bridge is a basic, common type of bridge where the bridge deck is built on top of such supporting beams, that have in turn been placed on piers and abutments that support the span of the bridge.

1.3 BOX GIRDER

A Box Girder Bridge is a Bridge in which the primary Beam involve girder in the shape of an hollow box. The box girder typically involves either prestressed concrete, structural steel, or a composite of steel and reinforced cement. The box is ordinarily rectangular or trapezoidal in cross-area. Box Girder Bridge is generally utilized for highway flyovers and for present day elevated structures of light rail transport. Although regularly the crate box girder bridge is a type of beam bridge, box girder may likewise be utilized on cable stayed bridges and different structures.

3. OBJECTIVE AND RESEARCH METHODOLOGY

3.1 OBJECTIVES

- To concentrate the conduct of basic simple RCC T-beam beam and Box Girder bridge under standard IRC loading, and the comparing analysis depends on the analytical modeling by FEM for various spans in CSI Bridge software
- To study the deck slab interaction with the loading considered as IRC Codes.
- To evaluate the suitability of the bridges for short as well as long spans
- To evaluate code expressions for live-load distribution factors for concrete girder bridges.

3.2 METHODOL

3.2.1 DEAD LOAD ANALYSIS

Dead load response can be straight forwardly taken from the CSI-Bridge 2016 model or can be physically figured by considering the dead load because of superstructure (Brace, Stomach and Deck piece). Longitudinal moments are figured similarly by duplicating responses with the longitudinal unconventionality which is the separation between the centerline of wharf and bearing. The response on each bearing because of brace, stomach and deck piece and because of Superimposed Dead Load, SIDL (wearing coat and crash hindrance) is discovered independently.

3.2.2 LIVE LOAD ANALYSIS

The live load for each heap mix can be computed physically and in addition with the assistance of a CSI-Connect display. For the CSI-Connect display vehicle definitions must be given according to IRC 6-2010, for the heap counts and position of load must be inputted according to IRC 6-2010. A point important is that CSI-Connect requires the separation to the centerline of the furthest wheel far from the inception along the transverse course, while amid manual figuring of transverse minutes the unconventionality of the focal point of gravity from the centerline of the carriage-way is utilized. According to IRC6-2014 for 2lane and carriage way width 5.3m (1.2x2+2.9=5.3) basic load blends are conceivable.

- One Class70R + One Class A
- Three Class A

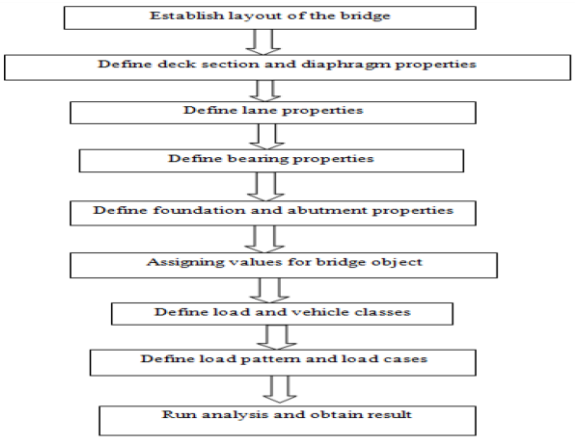


Fig -1: Steps to model the bridge in CSI-BRDIGE 2016

4. ANALYSIS USING CSI BRIDGE

CSI Bridge is analysis software used for bridges. It is adopted as it makes user convenient for layout of the deck sections and properties application.

4.1 Modeling of Girder Bridges

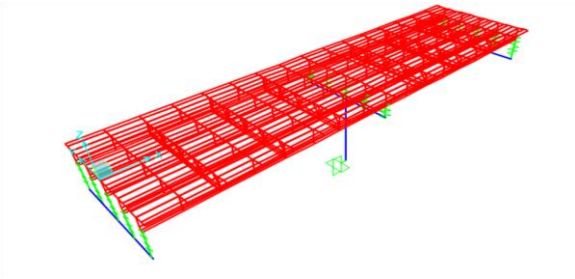


Fig -2: T-Beam Bridge

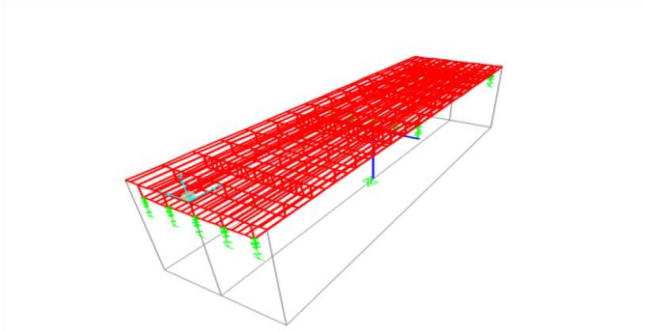


Fig -3: Box girder

5. ANALYSIS AND DESIGN OF T-BEAM BRIDGE AND BOX GIRDER BRIDGE

FOR 20 m SPAN

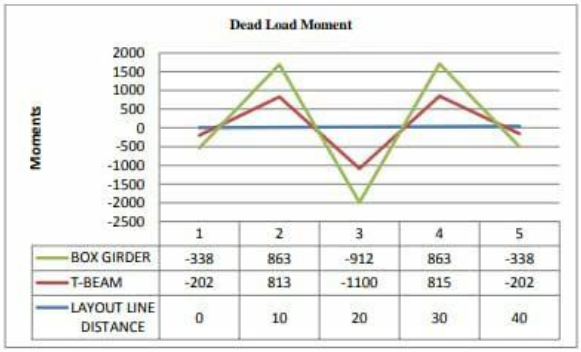
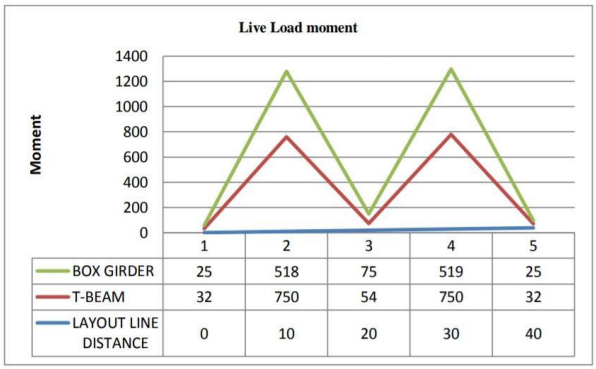
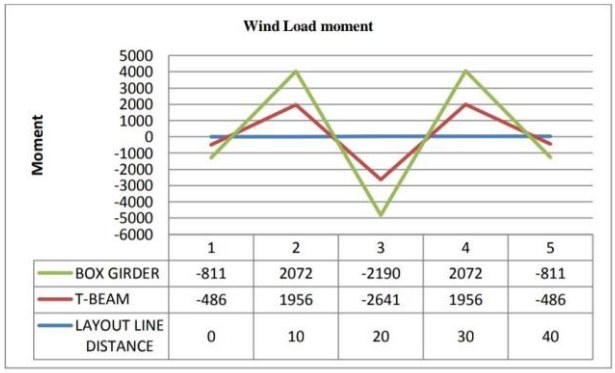


Fig-4: Variation of dead load moment in T- Beam and Box Girder Plus all Girder



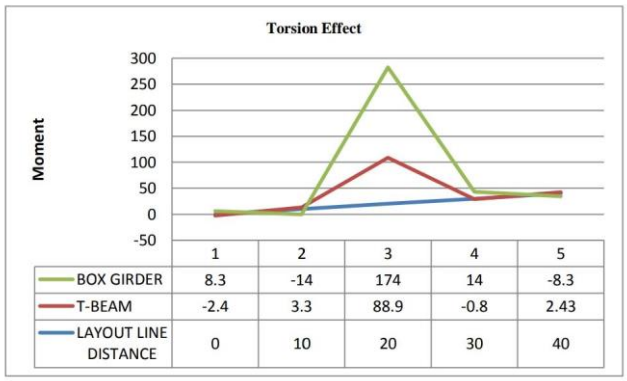
	1	2	3	4	5
BOX GIRDER	25	518	75	519	25
T-BEAM	32	750	54	750	32
LAYOUT LINE DISTANCE	0	10	20	30	40

Fig-5: Variation of Live load moment in T- Beam and Box Girder Plus all Girder



	1	2	3	4	5
BOX GIRDER	-811	2072	-2190	2072	-811
T-BEAM	-486	1956	-2641	1956	-486
LAYOUT LINE DISTANCE	0	10	20	30	40

Fig-6: Variation of Wind load moment in T- Beam and Box Girder Plus all Girder



	1	2	3	4	5
BOX GIRDER	8.3	-14	174	14	-8.3
T-BEAM	-2.4	3.3	88.9	-0.8	2.43
LAYOUT LINE DISTANCE	0	10	20	30	40

Fig-7: Variation of Torsion load moment in T- Beam and Box Girder Plus all Girder

6. CONCLUSION

For 20m spans T-Beam Girder is more economical but if span is more than other span so, Box Girder is always suitable. This type of Bridge lies in the high torsional rigidity available because of closed box section.

Moments for both has been evaluated and conclusions drawn that T-Beam Girder has more capacity for 20 m span.

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