

# A Review Paper on “Comparative Analysis & Design of RCC & PSC Girder & Feasibility”

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**Abstract** – As Infrastructure of India is growing day by day It is essential to concentrate on ‘Bridge engineering’ & so that This paper is oriented about bridge component ‘Girder’. The main aim of this paper is to deliver proper knowledge regarding Design methodology of Girder. RCC & PSC Girder comparison is discussed with various research paper references.

**Key Words:** RCC Vs PSC, RCC Girder, PSC Girder

## I. INTRODUCTION

The Infrastructure in India is booming day by day as Development of Nation is largely Depend upon its Infrastructure, The Bridge is Main Component in Infrastructure which contain large amount of cost. It is well known that time required for construction hugely effects on cost of project. In Bridge Construction the type of Girder plays important role in time required for construction such as if Girder is PSC type then it will required more time for stressing work then after Deck slab can be cast. In case of RCC Girder only after Curing time Deck slab can be caste. Also Type of Girder largely depends upon Its Span. This paper will help to choose type of Design methodology on primary stage so that Economical aspect will be also considered with respect to Time.

## II. LITERATURE REVIEW

**1 Ayush Tiwari (2017)** This work includes cost comparison between two Bridge forms RCC girder and PSC girder. A range in which these bridge forms are usually used. The bridge forms are designed in prepared Excel sheet and thereafter analysed in Staad pro and this process is repeated for all the span length considered in the comparison. The detailed cost estimation of all these structures have been prepared and presented and thus suitability of the better bridge type have been scrutinized on the ground of economy. In this paper concluded that the PSC girder type bridge is economical as compared to RCC girder type bridge over a span length more than 25 meter for which the present study has been performed.

The paper is mainly concentrates on economical aspect of RCC & PSC

**2. Varun.T.Naik (2016)** In this paper it is concluded that, The design of Precast RCC I-girder with cast in-situ deck slab arrangement having 1.8m girder depth is economical only for span for 20m with four girder arrangement and this system gives more economical design for construction. The design has been checked for Ultimate shear resistance check as per IRC guidelines for different span lengths with different girder arrangements such as 3 girders and 4 girders system the four girders system for a span of 20m, 25m and 30m with a girder depth of 1.8m is safe against ultimate shear resistance.

It is found that the deflection obtained for various loading conditions and at service condition is well within permissible limits as per IRC. The maximum deflection in girder is found in between mid-span of the section in any type of girder.

It is found that steel requirement is crossing the permissible limit in some of the girders of different spans and girder arrangements but for 20m span with four girder system, it satisfies all the cases and conditions.

**3. Umang Parekh (2016)** This Paper study provides useful interface for preliminary design of bridge system. The Box girder also considered in this paper. There is no unique form of design which would be always most economical. It is only by comparing a few designs that the economic design can be found in a particular set of conditions. The paper states that Economy can be achieved by considering following factors such as: span of girder, cross section of girder, cost of PSC cables, steel and concrete consumption. The author analyses Box Girder and Tee Girder with CSI Bridge 2014 he conclude that as the span increases the box girder shows better results for selecting between both girders. Study of paper shows In case of Prestressing cables to withstand complete load the box girder requires less no of cables. Loads are taken similar in both the girders, In which 40m span box girder is governing section. Box girder is governing but is has its own demerits too. It is having a complex shuttering and it's required more skilled labors to carry out that task but

overall Box girder is preferable. Also box girder requires more Shuttering plates.

**4. Shubham Landge** In this paper it is concluded that Prestressed design is more feasible. pre-stressed concrete girder configuration gives us most of the design parameters within permissible limits of serviceability, deflection and shear. To obtain even better working results the precast pre-stressed concrete girder configuration deck slab can be subjected to pre/post tensioning. The pre-stressing force can be applied more easily and calculation of required jacking force is also simple. Regular configuration of deck slab tends to long term maintenance and serviceability problems as it has largely exposed components in the structure. This problem can be resolved in case of precast pre-stressed concrete girder deck slab configuration. The three types of sections are considered for study Precast I girder, Box Girder, Precast T Girder. 28 m Span is considered for analysis, The loads are applied as per IRC 6.

**5. Mugalkishor Sahu** In this paper study has been done to gain knowledge about the optimized method designing of beam by conventional RCC methods and Prestressing method, also its comparison by using Staad.pro software tool and design in excel. Depending on the feature of the design construction, methods of applying prestress and purpose of structure, prestressed concrete construction may be classified into a number of groups and one of the is pre-tensioning and post-tensioning. This paper Concluded that Conventional RCC member requires more steel reinforcement than Pre-stress members. This paper deals with Design of RCC & PSC Beam design which helps to understand structural behaviour of member in RCC & PSC Design.

**6. M. P. Choudhary (2019)** This paper states Basic knowledge of Bridge components. Typical I Section is considered for design calculation, Loading on bridge is taken as per clause by IRC 6-2017 only class A & class 70 Wheeled or track vehicle loads taken into account. The Grillage of girder is designed in staad pro and structural analysis of girder is calculated in software staad pro also. The B.M & Shear force is calculated The main conclusive study from this paper is as per design bending moment data the parabolic cable profile is provided also in staad pro software Analysis of girder in case of box section the line model is to be analysed & in case of typical I section Grillage model should be analysed. No cost calculations are included in this paper.

**7. Prasad Bhamare (2017)** This article is related to Building RCC & PSC design methodology. For general Design study of RCC & PSC This paper is found helpful. The G +12 Building is considered for Design. Both methods for design is follow & costing is compared & it is found out that the Precast Design method is economical by 1.83 Cr. Also duration of construction is much less. But for Precast design other factors also should be considered such as skilled workers & qualified contractors.

### III. FUTURE SCOPE OF WORK

Presently there is a need to have primary Design aspect with respect to RCC & PSC Girder Design. So that Designer can adopt Design methodology for girder directly which will impart economy and speed in project.

Present study can be extended in following directions –

- RCC & PSC Girder Design Excel sheet can be develop which will give direct quantities of Concrete & Steel
- An Economical analysis with respect to span of girder can be useful to select Design methodology basis on span length.
- There is need to Study of RCC & PSC I Shape Section girder without considering Box girder so that similar section economy can be relatable.

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