Parametric Study of I-Girder System of Bridge as Per IRC:112;2011

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Abstract-*This Paper Presents the Analysis of Bridge Super Structure as per IRC:112;2011 newly published code for the significant change from the Previous Code IRC:18; The analysis has been carried out by the excel work book for continuous support and simply support for various span and various depth of section live load analysis carried out in STAAD,Pro software for Class 70R &Class A Wheeled Vehicle is used final results are based on the required prestressing force and required no. of strands.*

Keywords-simply support, continuous support, I-Girder, Box Girder, Prestressing Force, High Tensile Strands, Prestressed concrete, pre-tension, post tension.

I. INTRODUCTION

Bridge is a structure which provides a passage to people, vehicles, railways or pipelines to cross various obstacles to travel. Engineers build bridges over obstacles such as lakes, rivers, canyons, and dangerous roads and railway tracks. Without bridges, people would need boats to cross waterways and would have to travel around canyons and ravines. Bridges range in length from a few meters to several kilometers. They are among the largest structures built by man. Bridges range in length from a few meters to several kilometers. precast bridges IRC 18 are used previously before IRC 112 is published. Indian Roads Congress introduces new code of practice for designing of road bridges in India i.e. IRC 112:2011. IRC 21 is based on the working stress method and IRC 112 is based on the limit state method. IRC 112 contains both prestressed and Reinforced Concrete Bridge design. They also mention about working stress method in annexure. The object of issuing new code of practice for the concrete road bridge is to establish a common procedure for design and construction of road bridges in India based on the limit state method. Pre-stressed concrete is basically concrete in which internal stresses of a suitable magnitude and distribution are introduced so that the stresses resulting from external loads are counteracted to a desired degree by using prestressed concrete the maximum span length is achievable.

II. PROBLEM DATA

A 13-m width with continuous and simply support span of bridge is selected the concrete grade is, M 45 thickness of slab 200 mm, wearing coat thickness is 70 mm.

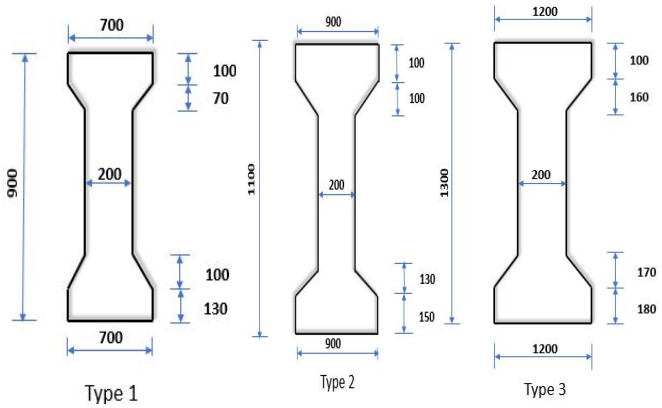


Fig 2.1 All Types of Girder Section for Continuous Span

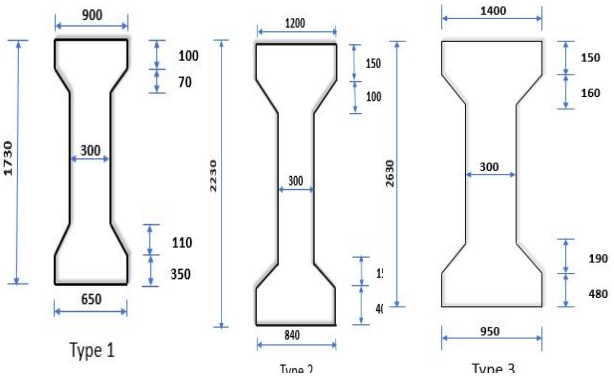


Fig.2.2 All Types of Girder Section for Simply supported Span

III. RESULTS AND DISCUSSION

3.1 Simply Supported Span

From the analysis, the results are shown below for simply supported span the graphs are developed for the no. of strands Vs. span and similarly for the required prestressing force Vs. span.

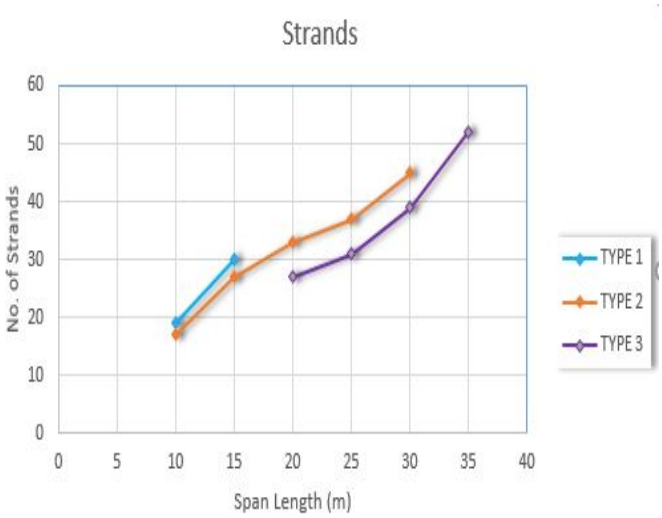


Fig 3.1 Required strands for Post-tensioned girder.

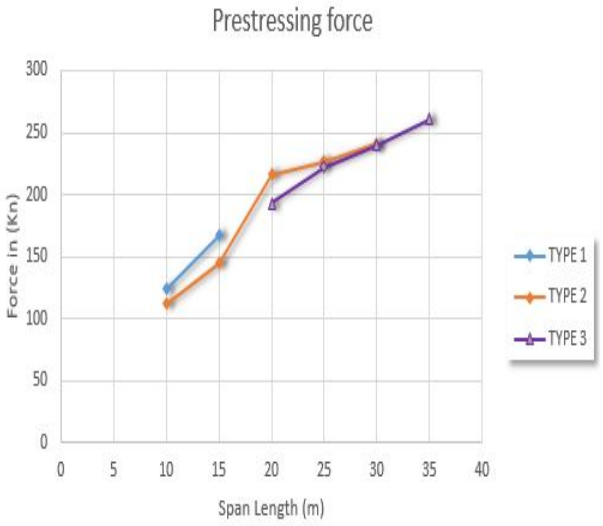
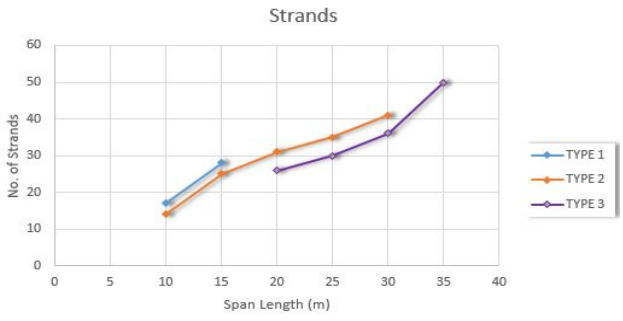


Fig 3.2 Required prestressing force Post- Tension girder



.Fig 3.3 Required strands for Pre-tensioned girder

Fig.3.4 Required Prestressing force pre-Tensioned girder

3.2 continuous span

Similarly, this type of study has been carried out for the continuous span the required prestressing force and no of strands are represented in graphical representation.

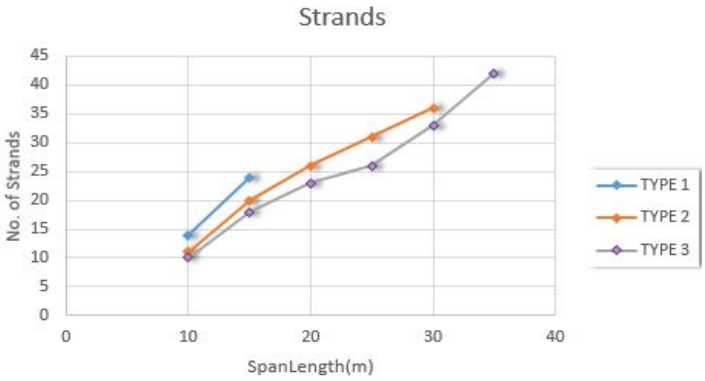


Fig 3.5 Required strands for Post-tensioned girder

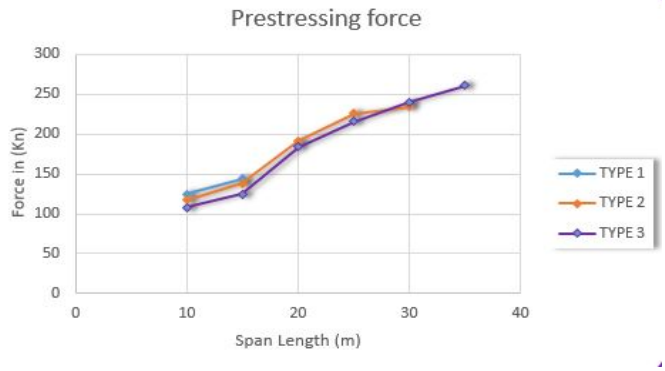


Fig 3.6 Required prestressing force for Post- Tensioned girder

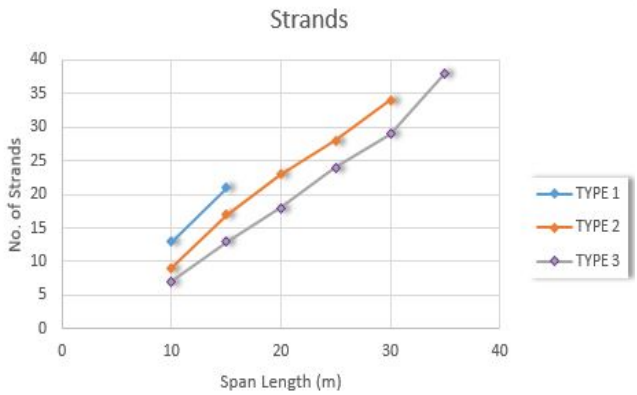


Fig 3.7 Required strands for Pre-tensioned girder

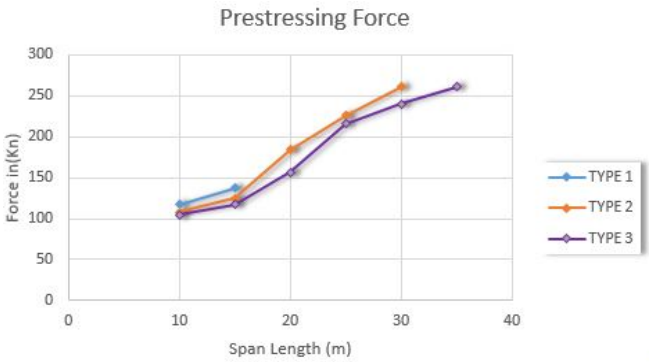


Fig.3.8 Required Prestressing force for pre-Tensioned girder.

.Comparison of pre-tension and post-tension method

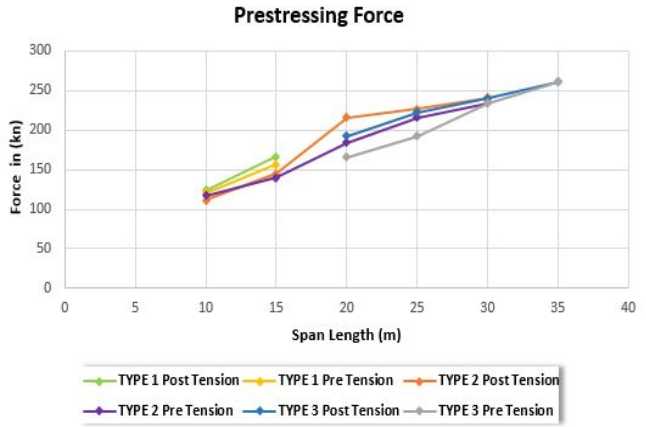


Fig3.9 Required Prestressing force for both pre-and post-tensioned girder simply supported span

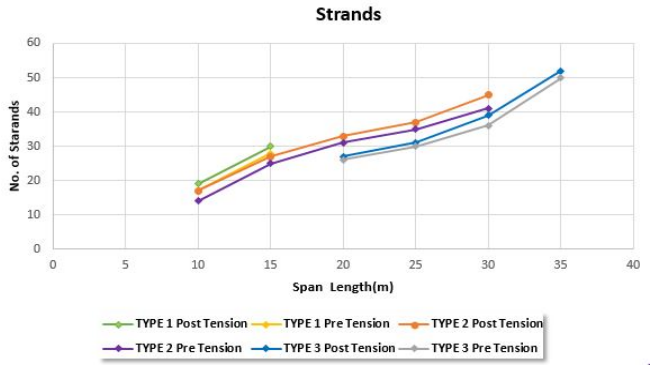


Fig3.10 Required strands for both pre-and post- tensioned girder simply supported span.

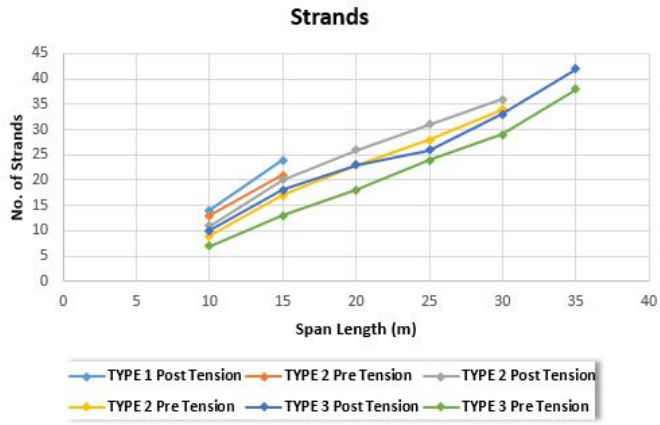


Fig3.11 Required strands for both pre-and post-tensioned girder continuous span.

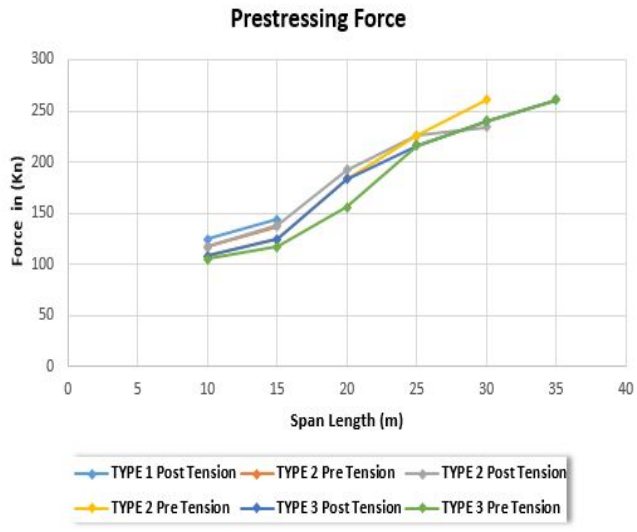


Fig3.12 Required prestressing force for both pre-and post-tensioned girder continuous span

IV. CONCLUSION

From graph, it can be concluding that that Pre-tensioned method is required less no of strands and less

prestressing force as compared to Post-tension method. But it is also depending on the availability of equipment.

1) for simply supported span and continuous span there is no change in Prestressing force but there is change in required no. strands for max achievable span.
2) For 10 to 35m varying in case of simply support the required prestressing force is varying between 0.45% to 0.70% in pre-tensioned girder and for post- tensioned girder it is 0.46% to 0.74% for all types of section
3) For 10 to 35m varying in case of continuous support the required prestressing force is varying between 0.45% to 0.65% in pre-tensioned girder and for post- tensioned girder it is 0.46% to 0.69% for all types of section

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