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PARAMETRIC STUDIES OF DIFFERENT STRUCTURAL COMPONENTS OF MINOR BRIDGE

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Abstract

In this project report, the investigation, study of various structural components like top slab, bottom slab, curtain wall, toe wall, shear key as well as load calculation is done. This project majorly focuses on the constructions work of structural components which is mentioned above. The study of the structural analysis of components along with the method adopted for them is done. The site being located at Sakoli-Wadsa road NH 353 C. The new concept of shear key is adopted in the minor bridge which is used for to provide lateral transverse support to the superstructure under lateral loads, plays a significant role in resting seismic loads as well as resistance against water pressures and wind.

Keywords: Structural component, Seismic loads, Minor bridge.

1. INTRODUCTION

A bridge is a structure which helps to cross the physical obstacle such as body of water, valley or road. and it should be strong enough to safely support its own weight as well as the weight of anything that should pass over it. In this project the Box Type Minor Bridge constructed at Sakoli-Wadsa Road NH 353 C at Chainage no. km 31+320 on two lane with cement concrete road in the state of Maharashtra. The design includes 3 cells of 16.0 m total width and 33.705 m in length, maximum clear height of box is 4.908 m, side wall thickness 0.7 m, thickness of partition walls 0.4 m, thickness of deck slab 0.7 m, thickness of Raft 0.750 m, haunch thickness 0.3 m, haunch length 0.3 m. The design is based on limit state method approach. A unit meter width is taken for the analysis and design using effective width method for the live load distribution and for calculating the design bending moment and shear force unit width of carriageway is considered and modeled in STAAD-PRO.

2. AIMS AND OBJECTIVES

To study the analysis and design of various structural component of Box Type Minor Bridge and the techniques used in the constructions.

- To study structural analysis of Minor bridge
- To study the concept of Minor Bridge
- To analyze and structural design of Minor Bridge as per IRC Codes.
- To know the brief about various terms used in the construction work.

3. METHODOLOGY

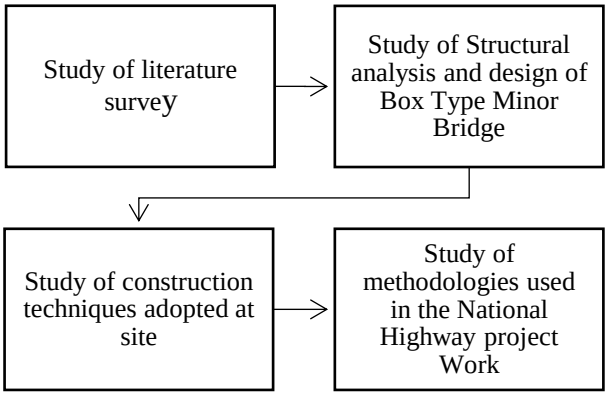

Figure 1 Work Plan

Structural Components

Bottom Slab/Raft:

- Bottom slab provided at compacted earth on 150 mm thick leveling course
- Depth provided at this section is 750 mm
- Grade of concrete M-30 and Grade of reinforcement steel Fe-500
- Minimum R/f required 515 mm^2
- Distribution steel provided at Top 12 mm @ 200 mm c/c; R/f provided 565 mm^2
- Distribution steel provided at Bottom 12 mm @ 200 mm c/c; R/f provided 565 mm^2
- Approach Slab:
- Approach Slab/deck/top slab completely rest on

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150 mm thick PCC

- Dimension of approach slab is 0.7 m thick
- Minimum R/f required 604 mm^2
- Distribution steel provided at Top 12 mm @ 150 mm c/c; R/f provided 754 mm^2
- Distribution steel provided at Bottom 12 mm @ 150 mm c/c; R/f provided 754 mm^2

Side wall:

- Side wall provided at the end of the bridge.
- It is 700 mm thick and 4908 mm in height, which is attached to the bottom and top slab of the bridge.
- Minimum R/f required 515 mm^2
- Distribution steel provided at the soil surface 12 mm @ 200 mm c/c; R/f provided 565 mm^2
- Distribution steel provided at the other surface 12 mm @ 200 mm c/c; R/f provided 565 mm^2

Interior Walls:

- The thickness of interior wall of minor bridge is 400 mm
- Minimum R/f required 157.1 mm^2
- Distribution of steel at both the faces 10 mm @ 300 mm c/c, R/f provided 261.8 mm^2

4. CONCLUSION

- All Civil Engineering structures are very risky, costly and also be a time-consuming process, so every member of any construction project is very much important for make the project safe and economical.
- Structural analysis is necessary for every civil engineer to work with proper design and build structure that can withstand its loads and pressures without leading to any failure.
- The Structural designing is very important for every Civil Engineer to work as per design aesthetics in their all phases. The testing, evaluations as well as inspection of structural member plays a significant major role in satisfying the safety while construction, performing after construction and safely with stand in their whole life.

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REFERENCES

Box Type Minor Bridge- As a Sustainable Option Over Small Rivers in Alluvial Region. Rakesh Varma, Mulk Raj Anand, Rajendra Kumar Srivastava.

Review on most efficient innovations in the field of bridge engineering technologies. Heemika Upadhyay, Pradeep Pandey

Analysis and Design of Minor Type Box Bridge" Saurabh R. Jamdhade (M.Tech Student), Sachin B. Mulay

Study of Foundations for Minor Bridge over Small River" Avinash Kumar Upadhyay, Rajendra Kumar Srivastava and Anurag Bajpai

A Parametric Study on Raft Foundation. G. S. Kame, S. K. Ukarande, K. Borgaonkar, V. A. Sawant

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Analysis of the Dynamic Response of Bridges Under Moving Loads. Y. Khadri, S. Tekili, E. M. Daya, A. Daouadji , M. Guenfoud , B. Merzoug.

https://www.nh.gov/dot/org/projectdevelopment/highwaydesign/designmanual/documents/ch07_00_chapter_2014.pdf

https://www.researchgate.net/

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