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Design Of Deck Slab Of Flyover

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***Abstract*—** The project deals with deck slab of fly over bridge in Ahmednagar city. As the bridge keeps more importance for public transport and traffic management so the modern technique should be adopted for construction. In accordance with that we are designing deck slab with prestressed post tensioned technique. This first introduced in 1928 by Eugene Freyssinet , a french engineer. Post tensioned bridge deck are generally adopted for longer span exceeding 20 m. Long span continuous prestressed concrete bridges are invariably built of multicelled box girder segments of variable depth. This project checks the stability of deck by manually and with help of software and also facilitate us to go for better accuracy .

Keywords—prestressed post tensioned, deck slab , box girder bridge, incremental bridge construction, flyover bridge

I. INTRODUCTION

Deck is the uppermost element of bridge. The term deck slab mainly related to bridge engineering where the slab act as a deck or carriage way for the vehicles to commute. The deck of bridge can be of T type or box type, I beam, bulb tee or multi stemmed girder with an integral deck. single or multicelled box girder are preferred for larger span of the order of 30 to 70 m. as per requirement of Ahmednagar flyover the span is more than 30 m so presressed post tensioned trapezoidal box girder is preferred.
Prestressed concrete member possess improve resistance to shearing forces due to the effect of compressive prestress which reduce the principal tensile stress. The use of curve cables helps to reduce the shear forces developed at the support section.

The design is considered for class 1 type structure in which there are no tensile stresses under the service load. The loads are considered as per IRC class AA trecked vehicle. This code is treated as heavy loading and to be used for bridge construction in certain industrial area and other spacified areas and highways. Depth of Web, dead load bending moment & live load bending moment at mid span section, dead load bending moment and live load bending moment at mid support section, Prestressing Force, Eccentricity, Quantity of Steel are find out.

By the comparison between manual and software design we can check the accuracy.

II. LITERATURE SURVEY

H.R.Nikhade, A.L.Dandge, A.R.Nikhade (**2014**)[1]- The paper gives us idea about various classes of bridges also according to the spacified class describes loading calculations. According to the Standard specification and code of practice for road bridges (section:II) Load and stresses(IRC:6-2000) the design is given. This papers gives case study that how the height of web behave in The prestressed box girder with the span and grade of concrete. Generally load moment decreases with increase in the grade of concrete in rcc bridges.

Jian zhao, zhaibin lin, habib tabatabai (2017)[2] – The paper describes about overweight vehicle which can damage permanently to the superstructure of bridge.generally the concrete of bridge deck comes under the environmental and mechanical attacks. The cylindrical sections are made subjected to various loads and behavior is studied but impact of repeated loading is not taken under consideration.

Randall w. poston, john e. breen, raman l. carasquillo(1989)[3] – the paper deals with transverse prestressing also design durable prestressed concrete structure. In this paper focused on the application of prestressing for the prevention of concrete cracking. The chlorides and water

initiates the corrosion. This prestressed force counteract tensile stresses that occur due to live loads.

M Siva (2018)[4] – the paper facilitate us to solve the various difficulties arriving the bending moment coefficient calculation. Paper gives solution for this problem by pigeaud chart.after analysis of slab panels bending moment for various IRCloading are found that IRC class AA tracked vehicle cause maximum value as the load intensity is maximum as compared to all IRC loading. Hence for the design of national highway and express way class AA tracked vehicle as the base.

Amer S.,Van Der Veen ,C., Wallarven , J. C.[5]– paper gives information about study of bridges constructed more that 50 years ago in Netherland. Designer are found out the bridge is safe for modern traffic. Various type of loads are used and the effect of prestressed level was studied. Resulting whenloaded directly above the prestressing bridge deck slab show the higher punching stress.

R.G.Oesterte, A.F.Elremaily (2009)[6]- This paper are facilitate us to study of deck, precast prestressed bridge deck and also perform to develop the guideline design, construction and geometry. Second goals of that research to improve the longitudinal joint system. Its resulting the future deck replacement are adequate for thr horizontal shear transfer across the casting and shear key are required.

III. NEED AND SCOPE OF STUDY

The need of study is to meet the requirements of the design and comparison between manual and software design. To study the tracked wheel load on deck slab and to get positive and negative bending moment at that region. Compare the both results value of design as per the limit state method. That structure can be design class 1 type structure and also make crack free structure. To select safer and economical design from both results. To select method which gives maximum resistance to various stresses due to various loading. To study the action of direct load and bending moment resulting from an eccentrically applied load.

Scope of this project is to make design as per requirement and also increased design life of deck. The maximum bending caused by a wheel load, to reduced the cross section of bridge and make bridge aesthetically good and strengthen.

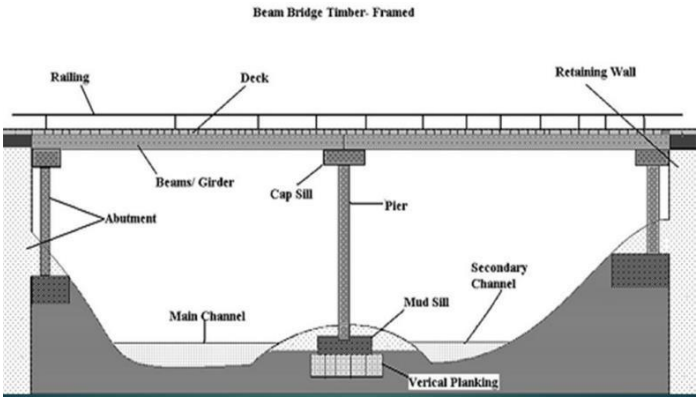

Fig-1 Componant of Bridge

Requirements of design of bridge deck

- Safer design.
- To know maximum S. F. and Max. B. M.
- Difference between manual and software work.
- Design should be safely resist to various stresses.
- Use of modern technology.
- Design life.
- Cost effective.
- Material saving possible.
- Reduced failure chances.
- Asthetically good.
- Enovirment friendly structure.
- Durability of structure.
- Application of prestressing.

IV. DATA COLLECTION OF DESIGN OF DECK SLAB OF AHMEDNAGAR FLYOVER

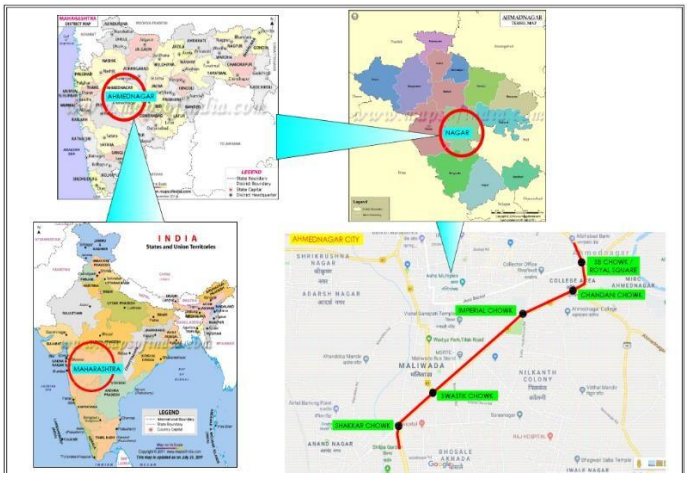

Fig. 2 Location of Ahmednagar Flyover

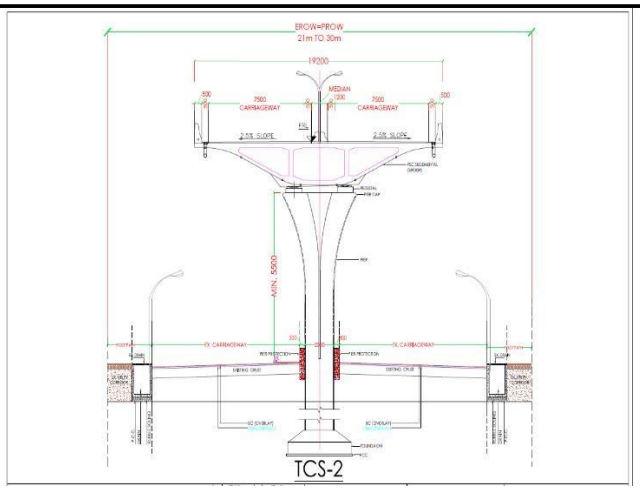

Fig. 3 C/S of proposed bridge

The location of proposed bridge (fig-2) is Ahmednagar city of maharastra state in india. Its lies in city from swastic chowk to D.S.P. chowk that distance is 1800 M. including 200 M ramp at both end of flyover. Its located on NH-222, (kalyan – nirmal highway).

C/S (fig-3 and fig-4) of deck slab total length of deck slab is 19.2 M. which including four lane (3.5 m each lane), in that 1.2 m. median in middle of deck. The kerbs are providing 0.5 m on each side. Generally as per IRC recommendation in 30m center to center distance between two pier we are used trapezoidal type box girder deck

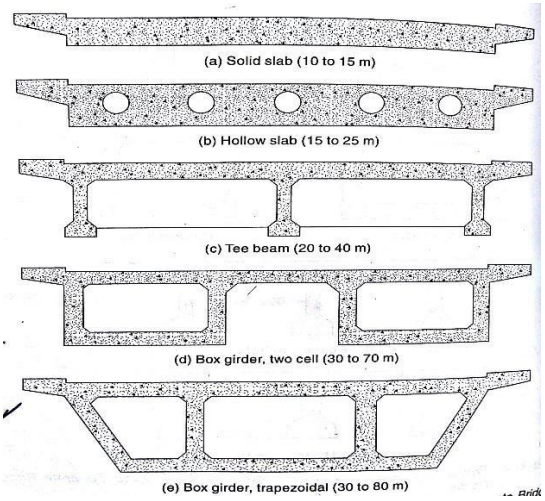

Fig-4 Types of c/s of deck

Loading as per IRC-

Loading class AA (IRC 6 : 1966)

This code is treated as heavy loading and to be used for bridge construction in certain industrial area. and other spacified areas and highways. it include two pattern

a) Tracked type
b) Wheel type

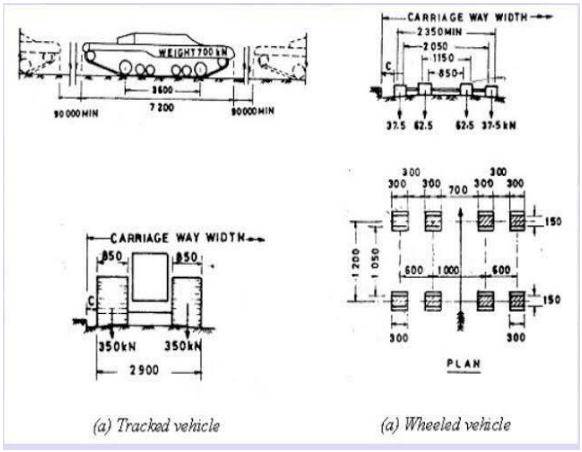

Fig-5 loading condition

Loads and stresses-

Design of superstructure many components of bridge is based on loading condition which the component must withstand. this loads may vary dependant on direction of action, type of deformation, nature of structural action, (shear, bending, torsion etc.) in order to form consistant basis for design the indian road congress have designed, set of standard load conditions which are taken into account for design of bridge.

1) Dead load 2) Live load
3) Impact load 4) Wind load
5) Transverse forces 6) Temperature stresses
7) Seismic forces 8) Deformation stresses

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